

1. GENERAL INSTRUCTIONS

1.1. GENERAL INSTRUCTIONS

The detailed specifications given hereinafter are for the items of works described in the schedule of quantities attached herein, and shall be guidance for proper execution of work to the required standards. It may also be noted that the specifications are of generalized nature and these shall be read in conjunction with the description of item in schedule of quantities and drawings. The work also includes all minor details of construction which are obviously and fairly intended and which may not have been referred to in these documents but are essential for the entire completion in accordance with standard Engineering practice.

Unless specifically otherwise mentioned, all the applicable codes and standards published by the Indian Standard Institution and all other standards which may be published by them before the date of receipt of tenders, shall govern in all respects of design, workmanship, quality and properties of materials and methods of testing, method of measurements etc. Wherever any reference to any Indian Standard Specification occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued there to or revisions thereof, if any, up to the date of receipt of tenders. In case there is no I.S.I. specification for the particular work, such work shall be carried out in accordance with the instructions in all respects, and requirements of the Engineer-in-Charge. The work shall be carried out in a manner complying in all respects with the requirements of relevant bye-laws of the Municipal Committee/ Municipal Corporation/ Development Authority/ Improvement Trust etc. under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-Charge and, unless otherwise mentioned, nothing extra shall be paid on this account.

Samples of various materials, fittings etc. proposed to be incorporated in the work shall be submitted by the contractor for approval of the Engineer-in-charge before order for bulk supply is placed.

The contractor shall take instructions from the Engineer-in-Charge regarding collection and stacking of materials in any place. No excavated earth or building materials shall be stacked on areas where other buildings, roads, services, compound walls etc. are to be constructed.

The contractor shall maintain in perfect condition all works executed till the completion of the entire work allotted to him. Where phased delivery is contemplated, this provision shall apply to each phase.

The contractor shall give a performance test of the entire installation(s) as per standard specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.

The contractor shall clear the site thoroughly of all debris, surplus excavated materials and rubbish etc. left out of his work and dress the site around the building to the satisfaction of the Engineer-in-Charge before the work is considered as complete.

The Chief Engineer, DCSE, DAE, shall be the sole deciding authority as to the meaning; interpretations and implications for various provisions of the specifications and his decision in writing shall be final and binding on all concerned.

In case any difference or discrepancy between the specifications and the description in the schedule of quantities, the schedule of quantities shall take precedence. In case of any difference or discrepancy between specifications and drawing, the specifications shall take precedence. In case any difference or discrepancy between the specifications for civil works and specification for Public Health Engineering works, specifications for civil works shall take precedence.

1.1.1.APPROVAL

The materials for P.H. Engineering works which are to be supplied by the contractor shall conform to the relevant IS specifications and on the latest approved list of Mumbai Municipal Corporation/ Local bodies if any, and shall be approved by the Engineer-in-Charge prior to installation of fixture and the approved samples shall be maintained at site till the completion of work. The approved makes of main items are, however specified in the list of approved makes of materials here in before.

1.1.2.PRECAUTIONS

While carrying out pipe line work in case the contractor encounters any interference with other services such as cables, conduits etc, he shall take sufficient precautions in order to prevent any damage to them. If any damage occurs, it shall be rectified to its original condition at his own cost to the satisfaction of the officers concerned with such services.

The contractor shall ensure that all inserts, pipe lines embedded in structural members or sleeves are placed in position in co-ordination with civil work.

All public health engineering services shall be handed over to Engineer-in-charge complete in all respects on completion of the work. Incomplete work will not be taken over. Any loss or damage to these services due to any reasons by anybody whatsoever before handing over will be at contractor's risk and cost. Any damage to any structural/finishing work done during the testing or rectification shall be made good by the contractor at his own cost and risk.

1.1.3.COST TO BE COVERED

The rates quoted by the tendered under this contract shall cover the cost of all the following elements.

1.1.4.MISCELLANEOUS WORK

The contractor carrying out the construction work shall take effective measures to carefully open out all existing channels, culverts, bridges, pipelines, conduits, water courses, sewer, drains, electrical cables, transmission lines and their supports and all works buried or otherwise where such services have to be interfered with the purpose of the construction of the works. He shall provide and arrange all necessary temporary supports and diversions if necessary across/under/even through along sides of the trenches and all other parts of construction work for all such channels, culverts, bridges, pipe lines, conduits.

1.1.5.CLEARANCE FOR ROADS AND FOOT PATHS

The contractor shall arrange to carry out all works with least interference practicable with public footpath and vehicular traffic and with existing waste water or storm water drainage arrangements and provide all necessary road barriers, fences, notices, lights, gangways, access crossings, diversions for traffic, temporary drains, dewatering channels, chutes pumping or water lifting arrangements and all other facilities for the proper execution of the works to the approval and satisfaction in all respects of the Engineer-in-Charge. Any work carried out by the contractor in this connection shall be deemed as temporary works incidental to the construction work.

1.1.6.LOCATION

The rates quoted by the tendered under this contract shall be applicable for the work at all floor and locations.

1.1.7.DEWATERING

The rates quoted by the tendered under this contract shall include bailing or pumping out all the water which may accumulate during the progress of the work either through seepage, springs, rain or any other cause.

1.1.8. WATER SUPPLY MAIN

The cost includes for transport charges and testing charges prescribed by the municipal Corporation. Water mains thus laid shall be tested to a pressure as specified in the schedule and specifications. Contractor has to get the pipe line laid hydraulically tested by the Municipal Authorities. Contractor has to bear the Municipal hydraulic testing charges.

1.1.9.FORMALITIES WITH STATUTORY BODIES

The work shall be carried out in a manner complying in all respects with requirement of relevant bye-laws of the Municipal Committee/ Municipal Corporation/ Development Authority/ Improvement Trust under the jurisdiction of which the work is to be executed or as directed by the Engineer-in- Charge and, unless otherwise mentioned, nothing extra shall be paid on this account. The contractor has to satisfy all the requirement of fire brigade, drainage and hydraulic engineering department of Municipal Corporation.

Note: In case a separate item is included in the schedule of quantities, contractor shall engage a licensed P.H. Engineer/ licensed plumber and obtain all the above certificates from Municipal Corporation. The Department shall authorize the contractor to deal with BMC on behalf of the Department.

1.2. LIST OF INDIAN STANDARDS

The following IS codes shall be referred in execution of PH Engineering works.

IS CODE	SUBJECT
27 - 1992	Specifications for Pig Lead
269- 1989	Specifications for 33 grade Ordinary Portland Cement
407- 1981	Brass tubes for General purposes
456- 2000	Code of practice for Plain & Reinforced concrete.
458- 2003	Specifications for Concrete Pipes.
554- 1999	Dimensions for pipe thread where pressure tight joints are required.
636- 1988	Fire fighting hose ,rubber lined or fabric reinforced rubber lined woven – jacketed
638- 1979	Sheet rubber jointing & rubber insertion jointing
651- 1992	Specifications for Salt glazed stoneware pipes & fittings.
771 (Pt. I &VII)	Glazed Fire Clay Sanitary Appliances.
771- 1979 (Pt. I)	General requirements
771- 1985 (Pt. II)	Specific requirements of kitchen & laboratory sinks
771- 1979 (Pt. III/ Sec 1)	Specific requirements of urinals (section 1- Slab urinals)
771- 1985 (Pt. III/ Sec2)	Specific requirements of urinals (section 2- Stall urinals)
771- 1979 (Pt. IV)	Specific requirements of postmortem slabs.
771- 1979 (Pt. V)	Specific requirements of shower trays
771- 1979 (Pt. VI)	Specific requirements of bed pan sinks
771- 1981 (Pt. VII)	Specific requirements of slop sinks
774- 1984	Flushing cistern for water closet and urinals.
775- 1970	Cast iron brackets and supports for wash basin and sink.
778- 1984	Specifications for copper alloy gate & Globe check valves for water works
779- 1994	Water meters (domestic type)
781- 1984	Specifications for cast copper alloy screw down bib taps & stop cocks for water services
782- 1978	Specification for Caulking lead.
783- 1985	Code of practice for laying concrete pipes.
784- 2001	Pre-stressed concrete pipes.
884- 1985	Fire aid hose reel for firefighting (for fixed installation)
901 - 1988	Specification for couplings, double males & double female, instantaneous pattern for Fire Fighting
902 - 1992	Specification for suction hose couplings for Fire Fighting purposes.
903 - 1993	Couplings for fire hose delivery, branch pipe, nozzles specification
904 - 1983	Specification for 2 way and 3 way suction collecting heads for Fire Fighting purposes.
905 - 1980	Specification for delivery breechings, dividing and collecting instant tenuous pattern for Fire Fighting
906 - 1988	Specification for revolving branch pipe for Fire Fighting
907 - 1984	Specification for suction strainer, cylindrical type for Fire Fighting purposes.
908- 1975	Fire Hydrants, Stand post type
909- 1992	Specifications for underground fire hydrants, sluice valve type
940 - 1989	Portable Fire Extinguisher, water Type (Gas Cartridge) - Specification
941- 1985	Specification for Blower and Exhauster for Fire Fighting.
1172- 1993	Code of basic requirements for water supply, drainage and sanitation
1200-1979 (Pt. 16)	Method of measurements for Laying of water and sewer lines including appurtenant items.

Plumbing Works
Title – Material Specification

IS CODE	SUBJECT
1200-1981 (Pt. 19)	Method of measurements for Water supply, plumbing and drains.
1230	Specifications for CI Rain Water pipes
1239- 2004 (Pt I)	Specifications for Mild steel tubes
1239- 1992 (Pt. II)	Specifications for Mild steel Tubular & other wrought steel pipe fittings
1300- 1994	Phenol molding material specification
1536- 2001	Specifications for Centrifugally cast iron (spun) pressure pipes for water, gas and sewage
1537- 1976	Specifications for Vertically cast iron pressure pipes for water, gas and sewage
1538- 1993	Cast iron fittings for pressure pipes for water, gas and sewage
1700- 1973	Drinking fountains
1701- 1960	Combination valve , mixing valves
1703- 2000	Ball valve (horizontal plunger type) including floats for water supply.
1711- 1984	Self closing taps.
1726- 1991	Cast iron manhole covers and Frames.
1729- 2002	Cast /ductile iron drainage pipes & fittings for over ground NP pipeline S/S series.
1742- 1983	Code of practice for building drainage
1795- 1982	Pillar taps for water supply purposes
1879	Malleable Cast Iron Pipe Fittings
1978- 1982	Specification for line pipe (M S Seamless)
1979- 1985	Specification for high test line pipe
2065- 1983	Code of practice for water supply in buildings.
2097 - 1983	Specification for foam making branch pipe.
2104- 1981	Water meter boxes (domestic type)
2171 – 1999	Specification for portable fire extinguisher, dry powder (Cartridge Type)
2190- 1992	Code of practice for selection ,installation & maintenance of portable first-aid fire extinguishers
2267- 1995	Polystyrene molding and extension materials – specification
2326- 1987	Automatic flushing cistern for urinals
2373	Specification for Water Meter (Bulk type)
2379- 1990	Color code for identification of pipe lines.
2401- 1973	Code of practice for selection, installation & maintenance of domestic water meters
2470 (Pt. I to II)	Code of practice for installation of septic tanks
2470- 1985 (Pt. I)	Design criteria & construction
2470- 1985 (Pt. II)	Secondary Treatment & disposal of septic tank effluent
2527- 1984	Code of practice for fixing rain water gutters and down pipes for roof drainage.
2546 - 1974	Specification for galvanized Mild Steel Fire bucket.
2548- 1996(Pt. I)	Plastic water closet seats and covers.
2548- 1996(Pt. II)	Plastic water closet seats and covers.
2556 (Pt. 1 to XV)	Specification for Vitreous (Vitreous China) sanitary appliances.
2556- 1994 (Pt.1)	General requirements
2556- 1994 (Pt.2)	Specific requirements of wash down water-closets
2556- 2004 (Pt.3)	Specific requirements of squatting pans
2556- 2004 (Pt. 4)	Specific requirements of wash basins
2556- 1994 (Pt.5)	Specific requirements of laboratory sinks
2556- 1995(Pt.6)	Specific requirements of urinals & partition plate
2556- 1995 (Pt.7)	Specific requirements of accessories for sanitary appliances
2556- 1995 (Pt.8)	Specific requirements of pedestal close coupled & wash down and siphon water closets

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Title – Material Specification

IS CODE	SUBJECT
2556- 2004 (Pt.9)	Specific requirements of pedestal type bidets
2643- 1999	Type Threads where pressure tight joints are not mase on the threads dimension, tolerances and designation
2692- 1989	Specification for Ferrules for water services.
2800- 1991 (Pt. I)	Construction of tube well
2800- 1979 (Pt. II)	Testing of tube well
2871- 1983	Specification for Branch pipe, universal, for firefighting purposes
2878 - 2004	Fire Extinguisher, Carbon Dioxide Type (Portable and Trolley Mounted) – Specification.
2951 (Pt. I to II)	Recommendation for estimate of flow of liquids in closed conduits.
2951- 1965 (Pt. I)	Head loss in straight pipes due to frictional resistance
2951- 1965 (Pt. II)	Head loss in valves & fittings.
3006- 1979	Specification for Chemically resistant glazed S.W. pipes and Fitting
3076- 1985	Low density polyethylene pipes for potable water supply
3114- 1994	Code of practice for laying of Cast Iron pipes.
3311- 1979	Waste plug & its accessories for sinks & wash basins.
3328- 1993	Quality tolerances for water for swimming pools
3389- 1994	Urea formaldehyde molding materials
3486- 1966	Specification for Cast iron spigot and socket drain pipes
3489- 1985	Specifications for enameled steel bath tubs
3589- 2001	Specifications for steel pipes for water & sewage (168.3 to 2540 mm outside dia.)
3597- 1998	Method of test for concrete pipes.
3844- 1989	Code of practice for installation and maintenance of internal fire hydrants Hose reels in premises.
3950- 1979	Specification for Surface boxes for sluice valve.
3989- 1984	Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings & accessories.
4038- 1986	Foot valves for water works purposes.
4111 (Pt. I to V)	Code of practice for ancillary structures in sewage system.
4111- 1986 (Pt. I)	Manholes
4111- 1985 (Pt. II)	Flushing tanks
4111- 1985 (Pt. III)	Inverted siphon
4111- 1968 (Pt. IV)	Pumping stations & pumping mains (rising mains)
4111- 1993 (Pt. V)	Tidal out-falls
4120- 1967	Tubs and baths.
4127- 1983	Code of practice of laying of glazed stone ware pipes.
4308 - 2003	Dry Chemical Powder for Fighting B & C class Fires– Specification.
4350- 1967	Specification for concrete porous pipes for under drainage.
4733- 1972	Methods of sampling & test for sewage effluents
4736- 1986	Specification for hot –dip zinc coating on mild stele tubes.
4854 (Pt. I to III)	Glossary terms for valves and their parts
4854- 1969 (Pt. I)	Screw down stop, check & gate valves & their parts
4854- 1968 (Pt. II)	Plug valves & cocks & their parts
4854- 1974 (Pt. III)	Butterfly valves
4927- 1992	Unlined flax canvass hose for fire fighting
4947 - 1985	Specification for gas cartridge for use in Fire extinguishers.
4984- 1995	Specifications for HDPE pipes for water supply
4985- 2000	Specifications for un plasticized PVC pipes for potable water supplies
5290- 1993	Specifications for Landing valves.

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Title – Material Specification

IS CODE	SUBJECT
5312 (Pt. I)	Swing check type reflux (non return) valves
5312- 1984 (Pt. I)	Reflux (non return) valves – single door pattern
5329- 1983	Code of Practice for sanitary pipe work above ground for building
5330- 1984	Criteria for design for anchor blocks for pen-stocks with expansions joints.
5382- 1985	Specifications for rubber sealing rings for water, gas & sewer mains
5455- 1969	Cast iron steps for manholes
5600- 2002	Specifications for Sewage and drainage pumps
5611- 1987	Code of Practice for waste stabilization ponds (Facultative type)
5714- 1981	Specifications for Hydrant stand-pipe for fire fighting
5822- 1994	Code of Practice for laying of welded steel pipes for water supply
5961- 1970	Specifications for Cast Iron grating for drainage purposes
6234 - 2003	Portable fire Extinguisher water Type (Stored Pressure) – Specification.
6279- 1971	Equipment for grit removal
6280- 1971	Sewage screens
6295- 1986	COP for water supply & drainage in high altitude & / or sub-zero region
6392- 1971	Steel pipe flanges
6411- 1985	Specifications for gel coated glass fiber reinforced polyester resin bath tubs
6418- 1971	Cast Iron & malleable flanges for general engineering Purpose
6494- 1988	COP for water proofing of underground water tanks & swimming pools
6587- 1987	Specifications for Spun hemp yarn
7181- 1986	Horizontally Cast Iron Double Flanged pipe for water, gas & sewage.
7231- 1994	Specifications for Plastic Flushing Cisterns for water closet & urinals
7558- 1974	Code of Practice for domestic hot water installations
7634 (Pt. I to III)	Code of Practice for Plastic pipe work for potable water supplies
7634- 1975 (Pt. I)	Choice of materials & general recommendations
7634- 1975 (Pt. II)	Laying & jointing polyethylene (PE) pipes
7634- 2003 (Pt. III)	Laying & jointing un plasticized PVC pipes
7740- 1985	Code of Practice for road gullies
7834 (Pt. I to VIII)	Injection molded PVC socket fittings with solvent cement joints for water supplies
7834 - 1987(Pt. I)	General requirements
7834- 1987 (Pt. II)	Specific requirements for 45 0 elbows
7834- 1987 (Pt. III)	Specific requirements for 90 0 elbows
7834- 1987 (Pt. IV)	Specific requirements for 90 0 tees
7834- 1987(Pt. V)	Specific requirements for 45 0 tees
7834- 1987 (Pt. VI)	Specific requirements for sockets
7834- 1987(Pt. VII)	Specific requirements for unions
7834- 1987 (Pt. VIII)	Specific requirements for caps
8008 (Pt. I to VII)	Injection molded HDPE fittings for potable water supplies
8008- 2003 (Pt. I)	General requirements for fittings
8008- 1976 (Pt. II)	Specific requirements for 90 ⁰ bends
8008- 2003 (Pt. III)	Specific requirements for 90 ⁰ tees
8008- 2003 (Pt. IV)	Specific requirements for reducers
8008- 2003 (Pt. V)	Specific requirements for ferrule reducers
8008- 2003 (Pt. VI)	Specific requirements for pipe ends
8008- 2003 (Pt. VII)	Specific requirements for sandwich flanges
8090- 1976	Coupling, branch pipe, nozzle used in hose reel tubing for fire fighting
8329- 2000	Centrifugally cast (spun) ductile iron pressure pipes & fittings for water, gas & sewage

Plumbing Works
Title – Material Specification

IS CODE	SUBJECT
8413 (Pt. I)	Requirements for biological treatment equipment
8413- 1977 (Pt. I)	Trickling Filter
8718- 1978	Specifications for vitreous enameled steel kitchen sinks
8727- 1978	Specifications for vitreous enameled steel wash basin
8835- 1978	Guideline for planning and design of surface drains.
8931- 1993	Specifications for copper alloys Fancy single taps, combination tap assembly & stop valves for water services
9140- 1996	Method of sampling of vitreous & fire clay sanitary appliances
9293- 1991	Specifications for flax canvas
9338- 1984	Specifications for Cast Iron screw down stop valves and stop & check valves for water works purposes
9668- 1990	Code of practice for provision & maintenance of water supplies for Fire Fighting
9739- 1981	Specifications for Pressure reducing valves for Domestic water supply system.
9758- 1981	Flush valves and Fittings for water closets and urinals
9762- 1994	Specifications for polyethylene floats for float valves
9763- 2000	Specifications for Plastic Bib taps, pillar taps, angle valves and stop valves for hot & cold water service.
9972 - 2002	Specification for Automatic sprinkler Heads for Fire Protection Service.
10221- 1982	Code of practice for coating and wrapping of underground M.S. steel pipeline,
10500- 1991	Specification of Drinking water
11108 - 1984	Specification for portable fire Extinguisher Halon 1211 Type.
11189- 1985	Method of tube well development
11606 - 1986	Method for sampling of cast iron pipes and fittings.
11632 - 1986	Rehabilitation of Tube well
12183- 1987 (Pt. I)	Code of practice for Plumbing in multi-storied buildings (for water supply)
12231 - 1987	UPVC pipes for section & delivery lines of agricultural pumps–Specification.
12235 - 1986	Method of test for UPVC pipe for potable water supply
12288 - 1987	Code of practice for use and laying of Ductile Iron pipes.
12469 - 1988	Specifications for pumps
12592- 2002	Precast concrete frame & cover (SFRC frame & cover)
12701-1996	Specifications for rotational molded polyethylene water storage tanks
12709 - 1994	Glass fiber reinforce plastic(GRP) pipes, joints & fittings for use for potable water supply – Specification.
12818 - 1992	Spn. for UPVC ribbed screen casing & plain casing pipes for bore / tube well
12820 - 1989	Dimensional Req. of Rubber Gaskets for Mechanical Joints & push in joints for use with Cast Iron Pipes & fittings for carrying water, Gas & sewage.
13095 - 1991	Butterfly valves for general purposes
13114 - 1991	Spn. for forged brass gate, globe & check valves for water works purposes
13382-2004	Cast Iron specials for mechanical & push-on flexible joints for pressure pipelines for water, gas & sewage
13592- 1992	Specifications for PVC soil, waste & rain water (SWR) including ventilation pipes
13593 - 1992	UPVC pipes fittings for use with section and delivery lines for Agricultural pumps – Specification.
13916 – 1994	Code of practice for installation of GRP piping system.
13983-1994	Specifications for stainless steel kitchen sinks & drain boards for domestic purpose
14333-1996	Specification for HDPE pipes for sewerage system.
14402-1996	GRP pipes, joints & fittings – Specification.

Plumbing Works
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14735-1999	UPVC injection molded fittings for UPVC – SWR pipes – Specifications.
IS CODE	SUBJECT
14845- 2000	Resilient seated cast iron air relief valves for water works purposes – Spn
14846- 2000	Specifications for sluice valve for water works purposes (50 to 1200 mm size)
15265 – 2003	Specifications for flexible PVC pipes or polymer reinforcement thermo plastic hoses for suction and delivery lines for Agricultural pumps.
15328 – 2003	UPVC non pressure pipes for use in underground drainage and sewerage system – Specifications.
15450- 2004	Polyethylene/Aluminum/Polyethylene composite pressure pipes for hot and cold water supplies – Specifications.

1.3. MINIMUM WEIGHT OF MOST COMMONLY USED SANITARY APPLIANCES & WATER FITTINGS

The minimum unit weight of each fitting shall not be less than as given in the following table and tolerance for weight shall be as per relevant IS code.

SR	ITEM DESCRIPTION	NOMINAL SIZE/ THICKNESS	IS COD E	MIN UNIT WEIGHT
1	Brass non-fancy type Bib Tap Please see Table under relevant item for other sizes.	15mm	781- 1984	400 Grams
2	C.P. brass fancy type Bib Tap	15mm	8931- 1993	550 Grams
3a	Brass non-fancy types Stop cock – Internally threaded	15mm	781- 1984	330 Grams
3b	Brass non-fancy types Stop cock – Externally threaded	15mm	781- 1984	400 Grams
4	C.P. brass fancy types Stop cock	15mm	8931- 1993	550 Grams
5	C.P. brass concealed typed Stop cock	15mm	8931- 1993	750 Grams
6	C.P. brass fancy Pillar Tap	15mm	1795- 1982	650 Grams
7	C.P. brass waste coupling	32mm	3311- 1979	200 Grams
8	C.P. brass waste coupling	40mm	3311- 1979	250 Grams

Plumbing Works
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The minimum unit weight of each fitting shall not be less than as given in the following table which is used in General practice.

SR	ITEM DESCRIPTION	NOMINAL SIZE/ THICKNESS	MIN UNIT WEIGHT
1	C.P. brass fancy Shower rose	15mm	125 Grams
2	C.P. brass bottle trap	32mm.	500 Grams
3	C.P. brass bottle trap	40mm	550 Grams
4	C.P. brass Liquid soap dispenser		250 Grams
5	C.P. brass coat and hat hook		150 Grams
6	C.P. brass Towel rod bracket [pair]		100 Grams
7	C.P. brass Towel rod [600 mm long]	20mm	150 Grams
8	G.I. Clamps thickness for GI piping	2 MM	
9	MS Clamps thickness for CI piping	3 MM	
10	Rain water lead sheet flashing		38.00 kg/sqm
11	C.I. frame and cover for Gully Trap		7.50 kg.
12	S.S. grating for Nahani Trap		50 Grams
13	C.P. brass grating for Nahani Trap		190 Grams
14	C.P. Brass Dome shape grating		275 Grams

2. TECHNICAL SPECIFICATIONS

2.1. EARTH WORK AND BACKFILL

2.1.1. SCOPE OF WORK

The scope of work covered under this specifications pertains to excavation of foundations, trenches, pits and over areas, in all sorts of soils, soft and hard rock, correct to dimensions given in the drawing including shoring, protections of existing underground utilities if any, such as water lines, electric cables etc., dewatering and shoring if necessary, stacking the useful materials as directed within the lead specified, refilling around the foundation and into the plinth with selected useful excavated earth and disposing off the surplus earth/materials within specified lead and finishing the surface to proper levels, slopes and camber etc. all complete.

2.1.2. SITE CLEARANCE

Before the earth work is started the area coming under cutting and filling shall be cleared of all obstructions, loose stones, shrubs, rank vegetation, grass, brush-wood, trees and saplings of girth up to 30 cm. measured at a height of one meter above ground and rubbish removed up to a distance of 150 meters outside the periphery of the area under clearance. The roots of trees shall be removed to a minimum depth of 60 cm. below ground level, or a minimum of 30 cm. below formation level whichever is lower, and the hollows filled up with earth, leveled and rammed. This work is deemed to be included in the earth work items and no separate payment will be admissible for the work.

The trees of girth above 30 cm. measured at a height of one meter above ground, shall only be cut after permission of the Engineer-in-charge is obtained in writing. The roots shall also be removed as described in the preceding sub-Para. Payment for cutting and removing roots of such trees shall be made separately. Any material obtained from the site will be the property of the Department and the useful materials as decided by the Engineer- in-charge will be conveyed and properly stacked as directed within the lead specified.

2.1.3. SETTING OUT AND MAKING PROFILES

Masonry or concrete pillars will be erected at suitable points in the area to serve as bench marks for the execution of the work. These bench marks shall be connected with G. T. S. or any other permanent bench mark approved by the Engineer-in-charge. Necessary profiles with pegs, bamboos and strings or Burjis shall be made to show the correct formation levels before the work is started. The contractor shall supply labor and materials for setting out and making profiles and Burjis for the work at his own cost and the same shall be maintained during the excavation work. The Department will show grid Co-ordinate or other reference points. It shall be the responsibility of the contractor to set out centre lines correctly with reference to the drawings and install substantial reference marks. Checking of such alignment by the Department will not absolve the contractor from his responsibility to execute the work strictly in accordance with the drawings.

2.1.4. EARTHWORK

The contractor shall notify the Engineer-in-charge before starting excavation and before the ground is disturbed, to enable him to take existing levels for the purpose of measurements. The ground levels shall be taken at 5 to 15 meters intervals in uniformly sloping ground and at closer distance where local mounts, pits or undulations are met with, as directed by the Engineer-in-charge. The ground levels shall be recorded in field books and plotted on plans, which shall be signed by the Contractor and the Engineer-in-charge, before the earth work is actually started. The labor required for taking levels, shall be supplied by the Contractor at his own cost. The Contractor shall perform excavation in all types of soils, murrum, soft and hard rock, boulders etc. in foundation, over areas and in trenches to widths, lines, levels, grades and curves

as shown in the drawing or lesser widths, lines and levels as directed by the Engineer-in-charge and as per items in the schedule of quantities.

- 2.1.4.1. The item in the schedule of quantities shall specify the excavation in trenches for this purpose, the excavation in trenches for foundations and for pipes, cables etc. not exceeding 1.5 meter in width and for chambers, manhole, shafts, wells, cesspits and the like not exceeding 10 sqm. on plan and to any depth shall be described as Excavation in trenches for foundation, drains, pipes and cables and returning the excavated material to fill the trenches after pipes, cables etc, are laid and their joints tested and passed and disposal of surplus excavated material up to 50 m lead.
- 2.1.4.2. Excavation exceeding 1.5 meter in width as well as 10 sqm. On plan (excluding trenches for pipes, cables etc.) and exceeding 30 cm in depth shall be described as Excavation over areas.

2.1.5. CLASSIFICATION OF EARTH WORK

The earth work shall be classified under the following main categories and measured separately for each category.

1. All types of soils, murrum, boulders.
2. Soft rock.
3. Hard rock.

2.1.5.1. ALL TYPES OF SOILS, MURRUM, BOULD

This includes earth, murrum, top deposits of agricultural soil, reclaimed soil, clay, sand or any combination thereof and soft and hard murrum, shingle etc. which is loose enough to be removed with spades, shovel and pick axes. Boulders not more than 0.03 cum. in volume found during the course of excavation shall also fall under this classification.

2.1.5.2. EXCAVATION IN SOFT ROCK

This shall include all materials which are rock or hard conglomerate, all decomposed weathered rock, highly fissured rock, old masonry, boulders bigger than 0.03 cum. in volume but not bigger than 0.5 cum. and other varieties of soft rock which can be removed only with pick axes, crow bars, wedges and hammers with some difficulty. The mere fact that the contractor resorts to blasting and/or wedging and chiseling for reasons of his own, shall not mean the rock is classifiable as hard rock.

2.1.5.3. EXCAVATION IN HARD ROCK

This includes all rock other than soft rock mentioned in Para 2.1.5.1 b viz. soft rock, occurring in masses, boulders having approximate volume more than 0.5 cum. Plain or reinforced cement concrete, which can best be removed by blasting or chiseling and wedging where blasting cannot be permitted owing to any restriction at site.

2.1.5.3.1. EXCAVATION IN HARD ROCK BY BLASTING

Where blasting is permitted the excavation in rock shall be done by means of blasting. No heavy blasting will be permitted and only controlled/muffled blasting will be permitted at the discretion of the Engineer-in-Charge. The Contractor shall be governed by the relevant statutory laws, rules and regulations on explosives, pertaining to the acquisition, transport, storage, handling and use of explosive which shall be rigidly followed and shall obtain him all necessary materials and equipment for blasting. Blasting shall be executed through a licensed blaster with prior permission from police authorities. Prior to blasting sufficient notice shall be given to concern parties to avoid danger to people, materials and nearby structures. All the damages caused by careless blasting if any shall be made good by the contractor at his own expenses.

2.1.5.3.2. EXCAVATION IN HARD ROCK BY CHISELLING AND WEDGING

Where blasting is not permitted and if the Engineer-in-Charge so desires, the excavation shall be done by chiseling and wedging or any other agreed method.

NOTE: All the excavated hard rock obtained shall be stacked properly and neatly within the specified lead by the contractor as directed by the Engineer-in-Charge.

2.1.6. EXCAVATION

The excavation under all classifications in areas in trenches or in pits shall be carried out systematically. Cutting shall be done from top to bottom and no under-pining or undercutting will be allowed. The bottom and sides of excavation shall be dressed to proper level, slopes, steps, camber etc. by removing high spots, and ramming thoroughly as directed by the Engineer-in-charge.

All the excavation shall be carried out strictly to the dimensions given in the drawing. The width shall generally be of the width of mud mat concrete and depth as shown in drawing or as directed by the Engineer-in- Charge, according to availability of the desired bearing capacity of soil below. Any excavation if taken below the specified depths and levels, the contractor shall at his own cost fill up such overcut to the specified level with cement concrete 1:4:8 in case of excavation in all types of soils and with cement concrete 1:2:4 in case of excavation in soft and hard rock.

After the excavation is completed, the contractor shall notify the Engineer-in-Charge to that effect and no further work shall be taken up until the Engineer-in-Charge has approved the depth and dimensions and also the nature of foundation materials. Levels and measurements shall also be recorded prior to taking up any further work.

2.1.6.1. SIZES OF TRENCH FOR EXCAVATION FOR PIPE LINE :

Where the width of trench is not specified the following shall apply.

1. Up to 1.0 meter deep shall be arrived at by adding 25 cm to the external diameter of pipe (not socket/collar) cable, conduit etc where a pipe is laid on concrete bed/cushioning layer, the authorized width shall be the external diameter of the pipe (not socket/collar) plus 25 cm or the width of concrete bed/cushioning layer whichever is more.
2. For depths exceeding one meter, an allowance of 5 cm per meter of depth for each side of the trench shall be added to the authorized width (that is external diameter of pipe plus 25 cm) for excavation. This allowance shall apply to the entire depth of the trench. In firm soils up to a depth of 2 meters from the bottom. For depths greater than 2 meters, the excavation profiles shall be widened by allowing steps of 50 cm on either side after every two meters from bottom.
3. Where more than one pipe, cable, conduit etc. are laid, the diameter shall be reckoned as the horizontal distance from outside to outside of the outermost pipes, cable, conduit etc.
4. Where the soil is soft, loose or slushy, width of trench shall be suitably increased or side sloped or the soil shored-up as directed by the Engineer-In-Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer-In-charge regarding increase in the width of trench, sloping or shoring to be done for excavation in soft, loose or slushy soils.

2.1.6.2. SIZES OF TRENCH FOR EXCAVATION FOR CHAMBERS, MANHOLES, SHAFTS, WELLS, CESSPITS:

Authorized working space shall be special in each case. Where authorized working space is not so specified the following shall apply:

600 mm measured from the external face of substructure/walls (including protective measures like water proof plaster, tile cladding etc. if any) at lowest level, where extra working space is required.

2.1.7. SHORING

Unless separately provided for in the schedule of quantities, the quoted rate for excavation shall include excavation of slopes to prevent falling in soil by providing and/or fixing, maintaining and removing of shoring, bracing etc. The contractor would be responsible for the design of shoring for proper retaining of sides of trenches, pits etc. with due consideration to the traffic, superimposed loads etc. Shoring shall be of sufficient strength to resist the pressure and ensure safety from slips and to prevent damage to work and property and injury to persons. It shall be removed as directed after items for which it is required are completed. Should the slips occur, the slipped material shall be removed and slope dressed to a modified stable slope? Removal of the slipped earth will not be measured for payment.

2.1.8. DEWATERING

Unless specifically provided for as a separate item in the schedule of quantities, rate shall also include bailing or pumping out all water which may accumulate in the excavation during the progress of further works such as mud mat concrete, R.C. footings, shuttering etc. either due to seepage, springs, rain or any other cause and diverting surface flow by bunds or other means. Care shall be taken to ensure that the water discharged sufficiently away from the foundations to keep it free from nuisance to other works in the neighborhood.

2.1.9. DISPOSAL OF EXCAVATED MATERIALS

2.1.9.1. ANTIQUITES

Any finds of archaeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Engineer-in-Charge and shall be the property of the Government.

2.1.9.2. USEFUL MATERIALS

Any material obtained from the excavation which in the opinion of the Engineer-in-Charge is useful, shall be stacked separately in regular stacks as directed by the Engineer-in-Charge and shall be the property of the Government.

No material excavated from foundation trenches of whatever kind they may be are to be placed even temporarily nearer than about 3 m. from the outer edge of excavation. Discretion of the Engineer-in-Charge in such cases is final. All materials excavated will remain the property of the Department. Rate for excavation includes sorting out of the useful materials and stacking them separately as directed within the specific lead.

Materials suitable and useful for refilling or other use shall be stacked in convenient place but not in such a way as to obstruct free movement of materials, workers and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or other elevation shown on the plan or as directed by the Engineer-in-Charge. Materials not useful in anyway shall be disposed off, leveled and compacted as directed by the Engineer-in-charge within a specified lead. The site shall be left clean of all debris and leveled on completion.

2.1.10. REFILLING IN SIDES OF CHAMBERS, DRAINS ETC.

The back filling shall be done after the concrete or masonry has fully set and shall be done in such a way as not to cause under-thrust on any part of the structure. Where suitable excavated material is to be used for back filling, it shall be brought from the place where it was temporarily deposited and shall be used in refilling. The scope of work for back filling/ filling in sides of chambers and other areas shall include filling for all the excavation covered under the contract. Surplus earth available from the excavation, if

required, shall be used for refilling/ filling for filling the trenches for pipes cables buildings also within the specified lead mentioned in the item.

All timber shoring and form work left in the trenches, pits, floors etc. shall be removed after their necessity ceases and trash of any sort shall be cleared out from the excavation. All the space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface with approved materials in layers not exceeding 200 mm. in thickness, watered and well consolidated by means of rammers to at least 90% of the consolidation obtainable at optimum moisture content (Proctor density). Flooding with water for consolidation will not be allowed. Areas inaccessible to mechanical equipment such as areas adjacent to walls and columns etc. shall be tamped by hand rammer or by hand held power rammers to the required density. The backfill shall be uniform in character and free from large lumps, stones, shingle or boulder not larger than 80 mm. in any direction, salt and clods, organic or other foreign materials which might rot. The refilling in plinth and under floors shall be done in similar way in layers not exceeding 200 mm. thick and shall be well consolidated by means of mechanical or hand operated rammers as specified to achieve the required density.

Test to establish proper consolidation as required will be carried out by the Department at rates specified. Two tests per 50 sqm. Will be taken to ascertain the proper consolidation. The cost of tests carried out will be recovered from the contractor's bill.

2.1.11. REFILLING IN TRENCHES FOR PIPES, CABLES ETC.

Filling in trenches shall be commenced soon after the joints of pipes, cables; conduits etc. have been tested and passed. The space around the pipes, cables, conduits etc. shall be cleared of all debris, brick bats etc. Where the trenches are excavated in hard/soft soil, the filling shall be done with earth on the sides and top of pipes in layers not exceeding 20 cm in depth. Each layer shall be watered, rammed and consolidated. All clods and lumps of earth exceeding 8 cm in any direction shall be watered, rammed and consolidated. All clods and lumps of earth exceeding 8 cm in any direction shall be broken or removed before the excavated earth is used for filling. In case of excavation of trenches in ordinary/hard rock, the filling up to a depth of 30 cm above the crown of pipe, cable, conduits etc. shall be done with fine material like earth, murrum or pulverized/decomposed rock according to the availability at site. The remaining filling shall be done with boulders of size not exceeding 15 cm mixed with fine material like decomposed rock, murrum or earth as available to fill up the voids, watered, rammed and consolidated in layers not exceeding 30 cm. Excavated material containing deleterious material, salt peter earth etc. shall not be used for filling. Ramming shall be done with iron rammers where feasible and with blunt ends of crow bars where rammers cannot be used, Special care shall be taken to ensure that no damage is caused to the pipes, cables, conduits etc. laid in the trenches.

2.1.12. LEAD & LIFT

2.1.12.1. LEAD

The lead for disposal/deposition of excavated materials shall be as specified in the respective item of work. For the purpose of measurements of lead, the area to be excavated or filled or area on which excavated material is to be deposited/ disposed off shall be divided in suitable blocks and for each of the block, the distance between centre lines shall be taken as the lead which shall be measured by the shortest straight line route on the plan and not the actual route adopted.

2.1.12.2. LIFT

Lift shall be measured from ground level. Excavation up to 1.5 m depth below ground level and depositing excavated material on the ground shall be included in the item of earthwork for various kinds of soil. Extra lift shall be measured in unit of 1.5 m or part thereof. Obvious lift shall only be measured; that is lifts inherent in the lead due to ground slope shall not be measured except for lead up to 250 m. All excavation

shall be measured in successive stages of 1.5 m stating the commencing level. This shall not apply to cases where no lift is involved as in hill side cutting.

2.1.13. MODE OF MEASUREMENTS

- 2.1.13.1.1. All excavation in areas having depth more than 30 cm. pits, trenches etc. Shall be measured net. The dimensions for the purpose of payment shall be reckoned on the horizontal area of the excavation at the base for foundations of the walls, columns, footings, rafts or other foundations, multiplied by the mean depth from the surface of ground determined by levels. Excavation for side slopes will not be paid for. Excavation in areas having depths less than 30 cms. Shall be measured as surface excavation on square meter basis, mentioning the average depth of excavation.
- 2.1.13.1.2. Wherever direct measurements of rock excavation are not possible, volume of rock be calculated on the basis of length, breadth and depth of stacks made at site. The net volume shall be worked out by reducing it by 50%, taking the voids into consideration as 50%. Similarly to arrive at net quantity to be paid in the case of soil, reduction @ 20% of corresponding stack/truck measurements shall be made.
- 2.1.13.2. The rate for excavation shall include carting and disposing and leveling the excavated materials within the specified lead. The rate shall also be inclusive of cost of all tools, plants, explosives, shoring, dewatering at various stages, labor, materials etc. to complete all the operations specified.
- 2.1.13.3. The backfilling and consolidation in sides of foundation and in plinth with excavated material will not be paid for separately. The rate quoted for excavation shall be deemed to have been included the cost of stacking of excavated materials, conveying within the specified lead, picking of selected stacked materials, conveying it to the place of final backfill, compaction to the required proctor density etc.
- 2.1.13.4. Payment for filling and consolidation inside the trenches, sides of foundations, plinth etc. with selected materials brought by the contractor other than the excavated material, shall be paid for separately as per the rates in schedule of quantities which includes cost of such materials/ excavation, royalty, its conveyance within the specified lead, watering, consolidating, dressing etc. Actual quantity of consolidated filling shall be measured and paid in cubic meters up to two places of decimal.
- 2.1.13.5. The rate quoted in cum. for items of excavation is deemed to include the necessary additional quantity of excavation involved beyond the plan dimensions of the work which may be necessary to be carried out for carrying out the work in an engineering manner, decided upon by the contractor. Therefore no extra payment will be made for any excavation done other than the required quantity as per the plan dimension indicated in the drawings.
- 2.1.13.6. Measurements for excavation over areas shall be determined by levels or by “Dead men” or both at the discretion of the Engineer-in-Charge. If however the Engineer-in-Charge decides on measurement by levels, levels of site shall be jointly taken and recorded by the Engineer-in-Charge or his representatives and the contractor, before commencement of the work and after completion of the work and the quantity of work done shall be computed based on these levels. The volume of earth work shall be computed based on “Simpson’s formula” or any other approved method at the discretion of the Engineer-in-Charge.

2.1.14. MODE OF PAYMENT

The contract rate shall be for unit cubic meter of earth work.

2.2. PLAIN CEMENT CONCRETE

2.2.1. GENERAL

The specification covers the requirement of ordinary Cement Concrete of the specified proportion to be used for various concrete items.

2.2.2. MATERIAL

The material requirement for particular item shall be as per IS 456

2.2.3. CEMENT

Cement shall be OPC/PPC cement conforming to IS 269 & IS 1489 respectively. Cement shall be stored in dry godowns or sheds use of PPC slag cement as approved by the Engineer In-charge, out of construction with damp ground on a 0.6M height platform. Cement shall not be stored in the open. All cement shall be kept well stacked and no cement other than intended to use in the work, shall be used. The cement shall be stored as received and shall be consumed in the order in which consignments are received and shall not be stored for long periods. No clogged cement caused by dampness shall be used. Blended cement for finishing work shall be used with the prior approval of the Engineer In-charge.

2.2.4. FINE AGGREGATE

The sand shall be clean, well graded, hard, strong, durable and gritty particles of size 0.15 mm to 5 mm free from mica, dust, clay, kankar, soft or flaky particles and other deleterious materials. If the fine aggregate contain more than 4 percent of clay, dust or silt it shall be washed. Sea sand should not be used. The fineness modulus may range between 2.6 to 3.6.

2.2.5. COARSE AGGREGATE

All stone aggregate to be used for cement concrete shall be from approved sources. The aggregate shall be clean hard, strong and durable. It shall not contain soft, flaky thin or elongated pieces, alkali organic matter or other notorious matter. The specific gravity of the aggregate shall be between 2.5 to 2.7.

2.2.6. STORAGE, SCREENING AND WASHING

It shall be stored at the work site in such a manner as to prevent contamination. All aggregate shall be stored to convenient height on hard and dry platform. The contractor shall install screens, one for coarse aggregate and one for sand and shall thoroughly wash all aggregate if directed by Engineer-in-charge.

2.2.7. WATER

The water shall be conforming to IS 3025. The water shall be clean and free from deleterious matters such as acids, oils, alkalis, sugar and vegetable matter. Every attempt shall be made to use water that is fit for drinking and whenever possible, water shall be used direct from the supply mains. PH value of water shall not be less than 6.

2.2.8. PROPORTIONING OF MIX

In ordinary concrete although proportion of cement to fine and coarse aggregate is specified by volume, the quantity of cement shall be determined by weight assuming one bag of cement weighing 50 kg. Net to be equivalent to 35 Liters. Fine and coarse aggregate shall be measured by dry volume in suitable measuring boxes. The allowance shall be made for bulking in the fine aggregate due to moisture if any at the time of mixing. Water cement ratio will be such as will give concrete just sufficient workable to place and compact without difficulty.

2.2.9. MIXING

In all the cases concrete shall be mixed in a mechanical mixer at the site of work, mixer and other accessories should be in first class condition and well maintained throughout the construction. Mixing shall be continued till the homogeneous mixture is obtained but in no case mixing shall be done for less than 1.5 Minutes.

When hand mixing is permitted by Engineer-in-charge in any special condition, it shall be done on a smooth, hard and water tight, platform large enough to allow sufficient turning over of the ingredients of concrete after adding the water. The material shall be mixed in dry state and turned over until they are thoroughly and fully mixed homogeneously. In hand mixing, the quantity of cement shall be increased by 10 percent without any extra cost. Repapering or remixing of partially hardened concrete shall not be permitted.

2.2.10. PLACING

The concrete shall be transported in such a manner that there shall be no tendency for the segregation of the different ingredients and it shall not be dropped into position from the height greater than 1.00 meter and shall be placed within 30 minutes after mixing. It shall not be interfered when once it has become to set. When new concrete is to be placed on the already set concrete, the surface of the old concrete shall be thoroughly roughened & wetted before the new concrete is laid. Cement sand slurry (1:2) being laid over the surface of the old concrete which is roughened, washed and wetted. The stripped surface of concrete shall be smooth & sharp. Any honey combing, air holes, board marks etc, shall be finished smooth.

2.2.11. COMPACTION

The concrete shall be thoroughly compacted during depositing to get dense concrete. The concrete shall not be disturbed once it is set. For important works, the use of mechanical vibrator is essential. The vibrator shall not be less than 4000 to 5000 impulse per minute and shall be worked at an interval about 600 mm. Over vibration shall be avoided.

2.2.12. DEWATERING

The item rate shall include bailing or pumping out all water if accumulated during the progress of the work either from seepage, springs, rain or any other cause.

2.2.13. FORM WORK

The forms shall generally comply with IS 456 & IS 14687. The shuttering shall be of wood or metal. Before placing the concrete the inside of the forms which comes into contact with concrete shall be coated with mineral oil. The forms shall be erected in position firmly so that it should not be dislocated during concreting. The forms shall be removed without damaging the concrete structure after development of sufficient strength and taking consent of the Engineer- In-Charge.

2.2.14. DEFECTIVE CONCRETE

The defective concrete surface shall be made good as per the direction of Engineer- In-Charge at the contractor's own cost and charges.

2.2.15. WATERING AND CURING

All the concrete work shall be kept wet continuously for a period of least 14 days to prevent excessive evaporation. In hot and dry weather matting or gunny bags may be hung on outside of the concrete surface to keep moist.

2.2.16. THE RATE INCLUDES FOR

1. Installation and removal of scaffolding and shuttering.
2. Cost includes transporting, placing, compacting, curing and finishing cement concrete,
3. Necessary sampling and tests for materials and concrete.
4. Dewatering the pit or trench if found necessary till completion of work.
5. All labor, materials, use of equipment, tools and plants.

2.2.17. MODE OF MEASUREMENT

The measurement shall be for unit cubic meter of concrete or as specified in schedule of work. The concrete shall be measure for its length, breadth and depth. Deduction for pipe shall be made as per the actual outer dimension of the pipe.

2.2.18. MODE OF PAYMENT

The contract rate shall be for unit cubic meter of concrete or as specified in the schedule of work.

2.3. BRICK MASONARY

2.3.1. GENERAL

This specification covers requirement of the Brick Work in specified proportion of cement mortar.

2.3.2. BRICK

Brick shall generally confirm to IS 1077. All the bricks to be used in the work shall be well bunt clay brick of class 35, red color, homogeneous in texture, free from flaws, cracks and crevices. They shall have a frog of 10 mm. depth on one side of their flat faces. No brick after twenty four hours immersion in water shall absorb more than 25% of its own weight and strength should not be less than 3.5 MPa (35 kg/Sq.cm). The test report of the bricks shall be submitted to the Engineer-in-charge at the contractor's own cost, if required Brick shall be uniformly burnt throughout but not over burnt, shall give the clear metallic ringing sound when struck.

2.3.3. BRICK WORK

All bricks shall be thoroughly soaked in water before use till the bubbles ceases to come up. No half or quarter brick shall be used except as closures. The course shall be horizontal and the wall shall be raised to plumb. Joints in brick wall shall not exceed to 10mm thick. Brick work shall be uniformly raised around to heights as per drawings. All joints shall thoroughly flush with mortar at every course. Care shall be taken to see that the bricks are properly bedded and joint completely filled to full depth. No bat or cut bricks shall be used in the work unless absolutely required to give proper shape. Brick work shall be built in cement and sand mortar as specified in the schedule or as per drawing. The joints shall be raked for a depth of 10 mm to receive cement plaster.

2.3.4. DEWATERING

The item rate shall include bailing or pumping out all water which may accumulate during the progress of the work either from seepage, springs, rain or any other cause.

2.3.5. WATERING AND CURING

All the brick work shall be kept damp continuously for a period of 14 days to prevent excessive evaporation in hot and dry weather matting or gunny bags may hang on the outside of brick work & kept moist.

2.3.6. THE RATE INCLUDES FOR

1. Erecting, dismantling and removing the scaffolding and curing brick work for at least 14 days.
2. Dewatering the pit or trench if found necessary till completion of work.
3. Labor, materials, tools, paint etc. used in the work.

2.3.7. MODE OF MEASUREMENT

The measurement shall be for unit cubic meter of brick work or as specified in the schedule of work. The brick wall shall be measured for its length, breadth and depth.

2.3.8. MODE OF PAYMENT

The contract rate shall be for unit cubic meter or as specified in the schedule of work.

2.4. CEMENT PLASTER

2.4.1. GENERAL

This specification covers the requirement of the Cement plaster in the specified proportions.

2.4.2. CEMENT MORTAR

Cement and sand shall be mixed to the proportions as described in the schedule. Cement and sand shall be first mixed dry on the dry platform after which sufficient clean water shall be added to bring the whole mix into a plastic condition. No mortar which has started to set shall be used nor such mortar remixed with new one. It shall be removed from the work site at once.

2.4.3. PLASTERING

In all plaster work, mortar shall be firmly applied and well pressed into the joints on the surface and drubbed and leveled with a flat wooden rule to give required thickness. Long straight edge shall be freely used to ensure a perfectly plane and even surface. All corners must be finished to their true angle or rounded as directed. Cement plaster should be done in square or strips and shall be done from top to downward.

2.4.4. FLOATING COAT

The floating coat over the plaster shall be so done whenever specified in the item with neat cement to finish the surface so that cracks, crevices etc. are not developed in the plaster.

2.4.5. DEWATERING

The item rate shall include bailing or pumping out all water if accumulated during the progress of the work either from seepage, springs, rain or any other cause.

2.4.6. WATERING AND CURING

All the plaster work shall be kept damp continuously for a period of 14 days to prevent excessive evaporation. In hot and dry weather matting or gunny bag may be hung on the outside of the plaster in the beginning and kept moist.

2.4.7. THE RATE INCLUDES FOR

1. Erecting, dismantling and removing the scaffolding.
2. Preparation of the surface to receive the plaster of specified thickness and number of coats, curing etc.
3. Labor, materials, tools and plants used to complete the work.

2.4.8. MODE OF MEASUREMENT

The measurement shall be for unit square meter of cement plaster. The plaster shall be measured for its length, breadth / depth.

2.4.9. MODE OF PAYMENT

The contract rate shall be for unit square meter of plaster.

2.5. CUTTING OF ASPHALT ROAD AND PAVED YARD

2.5.1. GENERAL

This specification covers the scope of cutting and breaking the asphalt, concrete roads, paths etc. and making good to its original condition.

2.5.2. MATERIAL

Wherever cutting is done across public paths, roads etc. the orders of materials excavated shall be preserved in well manner and reinstatement shall be done in the same order and road brought to the original condition. The contractor shall make up for any deficiency in material at his own cost.

2.5.3. WORKMANSHIP

The cutting of road and paved yard shall be done as directed by the E-I-C, Ramming the sub-grade for piping work. The soling stones, spreading the metals to required thickness and making water bound with stone dust/ murrum as per requirement shall be reinstated to the original condition at his own cost.

2.5.4. THE RATE INCLUDES FOR

1. Cutting asphalt road, water bound macadam and soling and stacking usable material at site.
2. Ramming sub-grade for laying pipe line and making asphalt road in original condition after completion of work.
3. Labor, materials, tools and plants used to complete the work.

2.5.5. MODE OF MEASUREMENT

The measurement shall be for unit square meter. The cutting portion shall be measured for its length and breadth.

2.5.6. MODE OF PAYMENT

The contract rate shall be for unit square meter.

2.6. REMOVAL OF FOOT PATH TILES

2.6.1. GENERAL

This specification covers the scope of removing stone tiles from foot paths and re fixing the tiles as good to its original condition.

2.6.2. MATERIAL

Wherever cutting is done across public foot paths and roads, the orders of materials removed from foot paths shall be preserved in well manner and reinstatement shall be done in the same order and foot path brought to the original condition. The contractor shall make up for any deficiency in material at his own cost.

2.6.3. WORKMANSHIP

The foot path tiles shall be removed in required area required or as directed by the E-I-C. Ramming the sub-grade for laying and fixing the tiles after completion of work to the original condition with 1:3 cement mortars.

2.6.4. THE RATE INCLUDES FOR

1. Removing the stone tiles from foot paths and stacking at site.
2. Ramming sub-grade for re fixing the tiles including cement, sand, tiles etc.
3. Labor, materials, tools and plants used to complete the work.

2.6.5. MODE OF MEASUREMENT

The contract rate shall be for unit square meter and it shall be measured for its length and breadth.

2.6.6. MODE OF PAYMENT

The contract rate shall be for unit square meter.

2.7. REMOVAL OF KERB STONE

2.7.1. GENERAL

This specification covers the scope of removing road side kerbed stone and re fixing the kerbed stone as good to its original condition.

2.7.2. MATERIAL

Wherever cutting is done across public paths and roads, the order of materials shall be preserved in well manner and reinstatement shall be done in the same order and it shall be brought to the original condition. The contractor shall make up for any deficiency in material at his own cost.

2.7.3. WORKMANSHIP

The road side kerbed stone shall be removed to the required length or as directed by the E-I- C. Ramming the sub-grade for fixing the kerbed stone after completion of work in the original condition with 1:3 cement mortars.

2.7.4. THE RATE INCLUDES FOR

1. Removing the kerbed stone and stacking at site.
2. Ramming sub-grade for re fixing the kerbed stone including cement, sand, kerbed stone etc.
3. Labor, materials, tools and plants used to complete the work.

2.7.5. MODE OF MEASUREMENT

The measurement shall be for unit running meter and it shall be measured for its length.

2.7.6. MODE OF PAYMENT

The contract rate shall be for unit running meter,

3. SANITARY INSTALLATIONS

3.1. EUROPEAN/ ANGLO INDIA WATER CLOSET

3.1.1. GENERAL

The item pertains for providing white or color glazed vitreous chinaware European or Anglo Indian water closet with seat and cover of size and color as specified in the schedule including fixing.

3.1.2. MATERIAL

European type water closet shall be washing down pattern unless otherwise specified. Water closet shall be vitreous china conforming to IS 2556 (Part-I & II). The closet shall be of one piece construction and shall have minimum two hole of 6.5 mm diameter for fixing closet to floor. Closet shall have integral flushing rims of self draining type. Each water closet shall have an integral trap with either `S` or `P` outlet with and trap shall be uniform and smooth in order to enable an efficient flush. Plastic seat and cover shall be of black color or as specified, they shall have conformity to IS: 2548 Part I & II.

3.1.3. FIXING

The water closet pan shall be placed in position as shown in the drawing. If the pan trap is damaged during handling or fixing, it shall be replaced by the contractor at his own cost. The pan, soil pipe shall be jointed in 1:1 Cement Mortar with hemp yarn caulked. The gap between W.C. and floor shall be finished with white/matching cement and sand as directed. Seat and cover shall be fixed to the Pan by two corrosion resistance hinge with 65 mm shank and threaded to within 25 mm from of flange. Seat shall be fixed in level by providing the washers of rubber with non ferrous or stainless steel washer to bolt.

3.1.4. THE RATE INCLUDES FOR:

1. European type water closet with an integral `P` or `S` trap, plastic seat cover, etc. Jointing in 1:1 cement mortar with hemp yarn caulked.
2. Cutting hole in wall / slab / beam etc. wherever required. And making all damages good to original condition after completion of work
3. Testing the entire system and rectification of defect if any.
4. All necessary labor, material and use of tools.

3.1.5. MODE OF MEASUREMENT

The measurement shall be for each unit of W.C. fixed.

3.1.6. MODE OF PAYMENT

The contract rate shall be for each unit of W.C. fixed.

3.2. WASH BASIN

3.2.1. GENERAL

The item pertains for providing color or white glazed vitreous chinaware wash basin with or without pedestal of size and color as specified in the schedule including fixing.

3.2.2. MATERIAL

Wash basins shall be of vitreous china conforming to IS : 2556(Part-IV) of flat back or angle back as specified shall be of one piece construction including combined over flow, basin shall be provided with single or double tap holes of size 28 mm square or 30 mm rounded. Each basin shall have circular waste hole or 5 sq.cm slot type over flow. Pedestals for wash basin shall be exactly same glazing that of basin. Pedestal shall be capable of supporting the basin and completely recessed at the back to accommodate supply and waste pipes and fittings. The basin shall be supported on pan of C.I cantilever brackets conforming to IS 775. Use of MS angle or Tee Section as bracket is not permitted.

3.2.3. FIXING

The wash basin shall be fixed in position as indicated in the drawing. Basin shall be supported on a pair of

C.I brackets which is embedded in cement concrete (1:2:4) block 100 x 75 x 150 mm. Oval shape or round shape wash basins are required to be fixed in RCC platform with stone tapping either fully sunk in stone top or flush with stone topping.

The wall plaster on seat shall be cut to rest over the top edge of the basin so as not to leave any gap for water seepage through between wall plaster & skirting of basin. The gap between basin and wall shall be finished with white matching cement.

3.2.4. THE RATE INCLUDES FOR

1. Wash Basin with pair of C.I bracket as required.
2. Cutting hole in wall / slab / beam etc. wherever required. And making all damages good to original condition after completion of work.
3. All necessary material, labor and use of tools.

3.2.5. MODE OF MEASUREMENT

The measurement shall be for each unit of wash basing fixed.

3.2.6. MODE OF PAYMENT

The measurement shall be for each unit of wash basin fixed.

3.3. URINAL

3.3.1. GENERAL

The item pertains for providing color or white glazed vitreous chinaware urinal in single or range (1, 2 & 3) and size as specified in the schedule with necessary fittings and appliances including fixing.

3.3.2. MATERIAL

3.3.2.1. BOWL TYPE (WITH FLUSHING RIM)

Urinal basin shall be flat back or corner wall type lipped in front. The vitreous china conforming to IS 2556 (Part VI). Urinal shall have and integral flushing rim and inlet or supply horn for connecting flush pipe. Flushing rim and inlet shall be of the self draining type. At bottom of basin and outlet horn for connecting outlet shall be provided. The inside surface of the urinal shall be uniform and smooth throughout to ensure efficient flushing

3.3.2.2. BOWL TYPE FLAT BACK WITHOUT FLUSHING RIM

They shall be of vitreous china conforming to IS:2556 (Part-VI) constructed in one piece with providing slot or alternative fixing arrangement at flat back and where the integral flushing rim is not provided, they shall be provided with ridges inside the bowl to divert towards the front line of the urinal.

3.3.2.3. STALL URINALS

The stall urinal and its screen shall be glazed fire clay conforming IS: 771 (Part-III, Sec-2). The inside surface of stall and screen shall be regular and smooth throughout to ensure efficient flushing.

3.3.2.4. CP BRASS FLUSH PIPE

The flushing arrangement to urinals for single or in range shall be of CP brass with CP brass spreader of 15 mm dia conforming to IS: 407. The capacity of flush pipe for urinal in a range shall be as follows:

Nos. of urinals in	Capacity of flush tank	Size of C.P. brass Flush pipe	
		Main	Distribution
One	5 liters	15mm	15 mm
Two	10 liters	20 mm	15 mm
Three	10 liters	25 mm	15 mm

3.3.3. FIXING:

3.3.3.1. BOWL TYPE FLAT BACK URINAL WITHOUT FLUSHING RIM (Single or Range)

Urinal shall be fixed in position by using rawl plug, wooden plug, C.P screws etc. It shall be fixed at height of 65 cm from the standing level to the top of the lip of urinal or as directed by the Engineer-in-charge. Each urinal shall be connected with 32 mm size waste pipe which shall discharge into channel or a floor trap.

3.3.3.2. STALL URINALS

The lip of the stall urinal shall be flush with the finished floor level. The stall urinal shall be laid over a fine sand cushion on average 25 mm thickness. The gap between wall surface, finished floor level and urinals shall not be more than 3mm and filled with water proofing plastic compound.

3.3.3.3. CP BRASS FLUSHING ARRANGEMENT

The flushing arrangement to urinal in single or range shall be of CP brass from 25 mm dia to 15 mm dia and CP brass spreader of 15 mm size to each urinal including the cost of CP brass elbows, tees, coupling, crosses, clamps, clips, union CP brass check nut and screws etc. CP brass

3.3.4. THE RATE INCLUDES FOR

1. Glazed Urinals (single or in range) and CP brass pipe flushing arrangement including the cost of jointing material.
2. Cutting hole wherever required and making all damage good to original condition after completion of work.
3. Testing the entire system and rectification of defects if any.
4. All necessary materials, labor and use of tools.

3.3.5. MODE OF MEASUREMENT

The measurement shall be for each unit of urinal set (single or range) fixed.

3.3.6. MODE OF PAYMENT

The contract rate shall be for each unit of urinal set (single or range) fixed.

3.4. DIVISION PLATE / PARTITION PLATE

3.4.1. GENERAL

The item pertains for providing white or color glazed vitreous chinaware division plate of size and color as specified in the schedule including fixing.

3.4.2. MATERIAL

Division plate shall be white or color glazed of size as specified in the schedule, and shall conform to IS: 2556 PART VI

3.4.3. FIXING

Division plate shall be fixed vertically in position at proper height with expandable anchor fasteners, CP Brass screws, wooden plugs etc.

3.4.4. THE RATE INCLUDES FOR

1. Glazed division plate including the cost of CP brass screws, wooden plugs, expandable anchor fasteners etc.
2. All necessary labor, material and use of tools.

3.4.5. MODE OF MEASUREMENT

The measurement shall be for each unit of division plate fixed.

3.4.6. MODE OF PAYMENT

The contract rate shall be for each unit of division plate fixed.

3.5. TOILET PAPER ROLL HOLDER

3.5.1. GENERAL

The item includes providing white or color glazed vitreous chinaware toilet roll holder of size as mentioned in the schedule including fixing.

3.5.2. MATERIAL

The toilet paper roll holder shall be of CP brass or vitreous china on specified and of size and design as approved by the Engineer-in-charge. Toilet paper roll holder shall conform as per IS standard and should have ISI mark.

3.5.3. FIXING

Toilet paper roll holder shall be fixed in position by means of C.P brass covers and rawl plug embedded in the wall. Vitreous china toilet paper roll holder shall fix into the wall with 1:2 cement mortar. The pocket shall be cut in wall for toilet paper roll holder if not left finishing the gap with white/matching cement.

3.5.4. THE RATE INCLUDES FOR

1. Toilet paper roll holder, cement, sand, curing etc.
2. Cutting the pocket if they are not left.
3. All necessary labor, material and use of tools.

3.5.5. MODE OF MEASUREMENT

The measurement shall be for each unit of toilet paper roll holder fixed.

3.5.6. MODE OF PAYMENT

The contract rate shall be for each unit of toilet paper roll holder fixed.

3.6. PVC WATER INLET CONNECTION

3.6.1. GENERAL

The item pertains to providing color or white PVC water inlet connection for cistern and wash basins.

3.6.2. MATERIAL

PVC water inlet connection shall conform to IS specifications and shall be of standard pattern with nylon insulation of minimum 450 mm long with CP brass check nut at both the end and shall be able to withstand the testing pressure of 1 MPa (10 kg/sq.cm.)

3.6.3. FIXING

The PVC water inlet connection shall be fixed in position as indicated in the drawing or as directed by the Engineer-in-charge for flushing cistern and wash basins.

3.6.4. THE RATE INCLUDES FOR

1. Supplying and fixing of PVC water inlet connection.
2. All necessary labor, material and use of tools.

3.6.5. MODE OF MEASUREMENT

The measurement shall be for each unit of water inlet connection fixed.

3.6.6. MODE OF PAYMENT

The contract rate shall be for each unit of PVC water inlet connection fixed.

3.7. GLAZED FIRE-CLAY/ VITREOUS CHINA SINK

3.7.1. GENERAL

Item includes providing white or color glazed -fire clay sink for kitchen or vitreous china sink for lab as specified in the schedule of quantities including fixing.

3.7.2. MATERIAL

Laboratory sink shall be of vitreous china conforming to IS 2556 (PART-V) and kitchen sink shall be of glazed fire-clay conforming to IS 771 (Part-II) and shall have combined over flow of the weir type and invert shall be 30 mm below the top edge. These shall be of one piece construction and floor of sink shall gently slope towards the outlet. The outlet of sink should be suitable for waste fitting having flanges 88 mm diameter and waste hole of 65 mm diameter. The waster hole shall be either rebated or beveled having the depth of 10 mm. C.I brackets for supporting sink shall confirm to IS: 775.

3.7.3. FIXING

The sink shall be supported on C.I cantilever brackets, embedded in cement concrete 1:2:4 block of size 100 x 75 x 150 mm. Bracket shall be fixed in the position before dado work is done. The height of front edge of sink from floor level shall be 80 cm or as directed by the Engineer-in-charge. The gap between floor/ wall and sink shall finish with white cement.

3.7.4. THE RATE INCLUDES FOR

1. Sink & C.I brackets (Pair) cement, sand etc.
2. All necessary labor, material and use of tools.

3.7.5. MODE OF MEASUREMENT

The measurement shall be for each unit of sink fixed.

3.7.6. MODE OF PAYMENT

The contract rate shall be for each unit of sink fixed.

3.8. STAINLESS STEEL SINK

3.8.1. GENERAL

Item includes providing the stainless steel sink with or without drain board of size as specified in the schedule including fixing.

3.8.2. MATERIAL

The sink shall be manufactured from stainless steel of Salem or equivalent steel conforming to IS: 13983. Stainless steel sink shall be of one piece construction molded out of 19 SWG (1mm) stainless steel sheet of grade AISI 304 (18/8) with stainless steel choke – stop strainer (waste coupling) check nuts conforming to IS: 13983.

3.8.3. FIXING

The sink shall be fixed in position as indicated in the drawing. The sink shall be placed over the brackets or on the platform. Gap between sink and platform / wall shall be finished with white / matching cement.

3.8.4. THE RATE INCLUDES FOR

1. S.S. sink with waste coupling cement sand etc.
2. All necessary labor, material and use of tools.

3.8.5. MODE OF MEASUREMENT

The measurement shall be for each unit of Stainless Steel sink fixed.

3.8.6. MODE OF PAYMENT

The contract rate shall be for each unit Stainless Steel sink fixed.

3.9. SINK DRAIN BOARD

3.9.1. GENERAL

The item includes providing white or color glazed / fire clay drain board of size mentioned in the schedule fixing.

3.9.2. MATERIAL

The drain board shall be manufactured from stainless steel of Salem or equivalent steel conforming to IS: 13983. Stainless steel sink shall be of one piece construction and its thickness not less than 1 mm.

3.9.3. FIXING

The drain board shall be fixed in the position as indicated in the drawing. It shall be place over the brackets or on the platform. Gap between board and platform / wall shall be finished with white /matching cement.

3.9.4. THE RATE INCLUDES FOR

1. Drain board, cement, sand etc.
2. All necessary labor, material and use of tools.

3.9.5. MODE OF MEASUREMENT

The measurement shall be for each unit of drain board fixed.

3.9.6. MODE OF PAYMENT

The contract rate shall be for each unit of drain board fixed.

3.10. SOAP DISH

3.10.1. GENERAL

The item includes providing white or color glazed chinaware type soap dish of size as mentioned in the schedule including fixing.

3.10.2. MATERIAL

Soap Dish shall be of CP brass or vitreous China on specified and of size, design an approved by the Engineer-in-charge. Soap Dish shall conform to relevant IS standard and should have ISI certification mark.

3.10.3. FIXING

Soap Dish shall be fixed in position by means of C.P brass covers and rawl plug embedded in the wall. Vitreous china Soap Dish shall fixed into the wall with 1:2 cement mortar. The pocket shall be cut in wall, if not left, finishing the gap with white/matching cement.

3.10.4. THE RATE INCLUDES FOR

1. Soap dish, cement, sand, curing etc.
2. Cutting the pocket if they are not left.
3. All necessary labor, material and the use of tools.

3.10.5. MODE OF MEASUREMENT

The measurement shall be for each unit of soap dish fixed.

3.10.6. MODE OF PAYMENT

Contract rate shall be for each unit of soap dish fixed.

3.11. TOWEL ROD/TOWEL RING

3.11.1. GENERAL

The item includes providing Towel rod/ towel ring of size as mentioned in the schedule including fixing.

3.11.2. MATERIAL

Towel rail shall be of C.P brass with two CP brass bracket coated with chromium plating of thickness not less than grade No.2 of IS 4827. The size of rail shall be 600 mm x 20 mm dia unless otherwise specified in the schedule. Towel ring of CP brass with one CP brass bracket with thickness not less than Grade No.2 of IS 4827. The diameter of the ring shall be 175 mm unless otherwise specified in the schedule. The diameter of ring rod shall not be less than 8 mm.

3.11.3. FIXING

The towel rod/ ring shall be fixed to proper line and level as indicated in drawing with CP brass screws, wooden raw plug, drilling hole etc. and making good the wall to original condition after fixing the towel rod.

3.11.4. THE RATE INCLUDES FOR

1. Towel rod rail/ring CP brackets & screws etc.
2. All necessary labor, material and the use tools.

3.11.5. MODE OF MEASUREMENT

The measurement shall be for each unit of towel rod fixed.

3.11.6. MODE OF PAYMENT

The contract rate shall be for each unit of towel rod fixed.

3.12. SHOWER ROSE

3.12.1. GENERAL

The item pertains to provide chromium plated brass shower rose of specified dia with accessories including fixing.

3.12.2. MATERIAL

The shower rose shall be CP brass of approved and heavy quality. Its accessories shall conform to IS: 1239 Part II.

3.12.3. FIXING

Shower rose shall be fixed to be water supply pipe line with necessary G.I fittings etc. as required by the Engineer-in-charge. Jointing shall be done with the zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof at his risk & cost.

3.12.4. THE RATE INCLUDES FOR

1. Shower rose, bend, socket, union/nuts, nipple etc.
2. All necessary labor, material and the use of tools.

3.12.5. MODE OF MEASUREMENT

The measurement shall be for each unit of shower rose fixed.

3.12.6. MODE OF PAYMENT

The contract rate shall be for each unit of shower rose fixed.

3.13. BIB TAP, STOP COCK & ANGLE STOP COCKS

3.13.1. GENERAL

The item pertains to provide chromium plated brass bib tap and stop cock and angle stop cocks, free flanges (if joined to concealed pipe) including fixing

3.13.2. MATERIAL

Bib cock (Bib tap) is drawn off tap with a horizontal inlet and free out let and a stop cock is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. These shall be of size 15 mm sizes or as specified and shall be of screw down type. The closing device shall work by means of disc. Carrying a renewable non-metallic washer with shuts against the water pressure on seating right angles to the axis of the threaded spindle which operates it. The handle shall be crutch, butterfly or fancy design type securely fixed to the spindle. The tap shall open anti clock wise direction.

Brass bib taps and stop cocks and angle stop cocks shall conform to IS 781, they shall be polished bright. The minimum finished weight of different sizes of bib tap weight of 15 mm size bib tap and stop cock shall be as per table given below. They shall be sound and free from taps, blow whole and fitting. Internal & External surface shall be clean, smooth and free from sand and neatly dressed. Taps shall be nickel chromium plated and thickness of coating shall not be less than service grade No.2 of IS 4827 and plating shall be capable of taking high polish which shall not be easily tarnished.

MINIMUM FINISHED MASS OF BIB TAPS AND STOP VALVES AS PER IS 781:1984 (Reaffirmed 2001)

Size	Minimum Finished Mass			
	Bib Taps	Stop Valves		
		Internally threaded	Externally threaded	Mixed end
1	2	3	4	5
Mm	kg	kg	kg	Kg
8	0.250	0.220	0.250	0.235
10	0.330	0.330	0.350	0.325
15	0.400	0.330	0.400	0.365
20	0.750	0.675	0.750	0.710
25	1.250	1.180	1.300	1.250
32	-	1.680	1.800	1.750
40	-	2.090	2.250	2.170
50	-	3.700	3.850	3.750

Every tap complete with its component shall with stand an internally applied hydraulic pressure of 2 MPa (20 kg/sq.cm) maintained for a period of 2 minutes during the period it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof without any extra cost from contractor.

3.13.3. FIXING

Bib tap stop cock shall be fixed to the pipe line with C.P. brass or G.I. specials, if required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness.

3.13.4. THE RATE INCLUDES FOR

1. Bib tap and stop cock, special etc.
2. All necessary labor, material and the use of tools.

3.13.5. MODE OF MEASUREMENT

The measurement shall be for each unit of bib tap and stop cock fixed.

3.13.6. MODE OF PAYMENT

The contract rate shall be for each unit of bib tap or stop cock angle stop cock fixed.

3.14. COMBINATION TAP ASSEMBLY (WALL / PILLAR MOUNTED)

3.14.1. GENERAL

The item pertains to provide chromium plated brass combination tap assembly, wall mounted hot & cold mixing for bath, pillar mounted hot & cold mixing for sink ,basin, tub etc. including free flanges and fixing.

3.14.2. MATERIAL

The combination tap assembly shall be 15 mm nominal size or as specified in the schedule. It shall be of C.P. brass approved and heavy quality, and shall conform to IS 8931.

Combination tap assembly shall be chromium plated-brass and shall conform to IS 8931. The nominal size of combination tap assembly shall be 15 mm nominal size or as specified. Casting of combination tap assembly shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. Thickness of C.P coating shall not be less than service grade no.2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

Testing\ Combination tap assembly shall withstand and internally applied hydraulic pressure of 1.6Mpa (16 kg/sq.cm) for period of 1 minutes during which, it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof.

3.14.3. FIXING

Combination tap assembly shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness.

3.14.4. THE RATE INCLUDES FOR

1. Combination taps assembly (wall mounted / pillar mounted as specified in the schedule of work) including free flanges and fixing.
2. All necessary labor, material and the use of tools.

3.14.5. MODE OF MEASUREMENT

The measurement shall be for each unit of combination tap assembly fixed.

3.14.6. MODE OF PAYMENT

The contract rate shall be for each unit of combination tap assembly fixed.

3.15. PILLAR TAP (Non fancy & Fancy Type)

3.15.1. GENERAL

The item pertains to provide chromium plated brass pillar tap including fixing.

3.15.2. MATERIAL

The pillar tap shall be 15 mm nominal size or as specified in the schedule. Fancy type pillar tap shall be of C.P. brass approved quality and shall conform to I.S. 8931. Non fancy pillar tap shall be chromium plated-brass and shall conform to IS 1795. The nominal size of Pillar tap shall be 15 mm or as specified.

Casting of Pillar tap shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. The minimum of finish weight of Pillar tap shall not be less than 650 grams (body weight 250 gms, washer plate loose valve 150 gms and back nut 40 gms. Thickness of C.P coating shall not be less than service grade no.2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

3.15.3. TESTING

Pillar tap shall withstand and internally applied hydraulic pressure of 2 MPa (20 kg/sq.cm) for period of 2 minutes during which period, it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof without any extra cost from the contractor.

3.15.4. FIXING

Pillar tap shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness.

3.15.5. THE RATE INCLUDES FOR

1. Pillar tap including fixing.
2. All necessary labor, material and the use of tools.

3.15.6. MODE OF MEASUREMENT

The measurement shall be for each unit of pillar tap fixed.

3.15.7. MODE OF PAYMENT

The contract rate shall be for each unit of pillar tap fixed.

3.16. FLUSH VALVE

3.16.1. GENERAL

The item pertains to provide chromium plated brass flush valve or brass concealed type flush valve with necessary accessories including fixing. (Free flanges if joined to concealed pipes)

3.16.2. MATERIAL

The Flush valve shall be nominal diameter as specified in the schedule of quantities. It shall be of C.P. brass approved and heavy quality, and shall conform to I.S. 9758. The fresh valve shall have working pressure of 0.15 to 0.5 MPa. The valve shall be tested to a Hydraulic pressure of 2 MPa for 2 minutes.

3.16.3. FIXING

Flush value shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, sun yarn etc. A few turns of fine hemp yearn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof.

3.16.4. THE RATE INCLUDES FOR

1. Flush valve, connecting pipe, socket, union, nipple and wall flanges if connected to concealed pipe.
2. All necessary labor, material and the use of tools.

3.16.5. MODE OF MEASUREMENT

The measurement shall be for each unit of flush valve fixed.

3.16.6. MODE OF PAYMENT

The contract rate shall be for each unit of flush valve fixed.

3.17. WASTE COUPLING

3.17.1. GENERAL

The item pertains to provide chromium plated brass waste coupling including fixing.

3.17.2. MATERIAL

Waste Coupling shall conform to IS 3311. Waste fittings shall be of CP with thickness of CP coating not less than service Grade No.2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect to IS 2963 and shall sound, free from laps below, holes and fittings and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed. The waste fitting for wash basin shall be of nominal size of 32 mm and for sink shall be nominal size 50 mm.

3.17.3. FIXING

Waste coupling shall be fixed to wash basin, sink or urinal as ordered with necessary specials. Jointing shall be done with white zinc, yarn etc. A few turns of fine hemp yarn dipped in the linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof.

3.17.4. THE RATE INCLUDES FOR

1. Waste coupling with necessary specials.
2. All necessary labor, material and the use of tools.

3.17.5. MODE OF MEASUREMENT

The measurement shall be for each unit of waste coupling fixed.

3.17.6. MODE OF PAYMENT

The contract rate shall be for each unit of waste coupling fixed.

3.18. BOTTLE TRAP

3.18.1. GENERAL

The item pertains to provide chromium plated brass bottle trap including fixing.

3.18.2. MATERIAL

Bottle trap shall be of C.P with thickness of CP coating not less than service grade No. 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect of IS 2963 and shall be sound, free from laps below, holes and fittings and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed and be truly machined so that nut smoothly moves on the body. The Bottle trap for wash basin shall be of nominal size of 32 mm and for sink shall be nominal size 50 mm.

3.18.3. FIXING

Bottle trap shall be fixed to wash basin, sink or urinal as indicated in the drawing with necessary specials or as ordered by the Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall remake to make it leak proof.

3.18.4. THE RATE INCLUDES FOR

1. Bottle trap with necessary specials.

2. All necessary labor, material and the use of tools.

3.18.5. MODE OF MEASUREMENT

The measurement shall be for each unit of bottle trap fixed.

3.18.6. MODE OF PAYMENT

The contract rate shall be for each unit of bottle trap fixed.

3.19. COAT AND HAT HOOK

3.19.1. GENERAL

The item pertains to provide chromium plated brass coat and hat hook including fixing

3.19.2. MATERIAL

Coat & Hook shall be of three way type of approved and heavy quality. Coat & Hat Hook shall be CP brass and three way hook type or minimum six ways Patti type of 125 mm x 30 mm x 6mm size. CP coating shall not be less than service grade No.2 of IS 4827.

3.19.3. FIXING

The Coat and hat hook shall be fixed to proper line & level as indicated in drawing with CP brass screws.

3.19.4. THE RATE INCLUDES FOR

1. Coat and hat hook with CP screws etc.
2. All necessary labor, material and the use of tools.

3.19.5. MODE OF MEASUREMENT

The measurement shall be for each unit of coat and hat book fixed.

3.19.6. MODE OF PAYMENT

The contract rate shall be for each unit of coat and hook fixed.

3.20. FLUSHING CISTERN

3.20.1. GENERAL

The item pertains to provide white or color glazed chinaware / PVC / Cast Iron flushing cistern with all inside symphonic fitting including fixing.

3.20.2. MATERIAL

The flushing cistern shall be automatic or manually of rates high level or low level as specified for water closets and urinals.

Cisterns shall be of cast iron, vitreous china, enameled pressed steel conforming to IS 774 for Flushing Type and IS 2326 for Automatic flushing cistern and Plastic (IS 7231). Cistern shall be mosquito proof. All working parts shall be designed to operate smoothly and efficiently. The cistern shall have removable covers which shall fit closely on it and be screwed against top displacement where operating mechanism is attached to the cover. This may be made in two sections, but the section supporting the mechanism shall be securely fitted or screwed to the body. The outlet fitting of the cistern shall be securely connected to the cistern. The nominal internal diameter of the cistern outlet shall not be less than 32 mm and 38 mm for high level and low level respectively. Length of outlet cistern shall be 37 +/- 2 mm. Ball valve shall be screwed type 15 mm in diameter and shall confirm of IS 1703. The flat shall be made of polyethylene as specified in IS 9762. A high level cistern is intended to operate with minimum height of 125 cm and a low level cistern with maximum height of 30 cm between the top of the pan and under side of the cistern. A G.I

chain strong enough to sustain a sudden applied pull of 10 kg or a dead load of 50 kg without any apparent or permanent deformation of the chain rings shall be attached to the ring or hook of the level manually operated high level C.I cistern. In case of low level cistern handle shall be of CP brass. In case of Plastic cistern, operation of cistern shall be through Push Button at the top for dual system and beyond plastic handle.

The discharge rate of the cistern as per IS 774 shall be 10 +/- .5 liters 6 second and 5 +/- .5 liters in 3 second for cistern capacity 10 liters And 5 liters respectively. Flush pipe shall be of class `B` G.I pipe of 32 +/- mm diameter for high level. Polyethylene flush pipe shall be low density confirming to IS 3076 or high density confirming to IS 4984 or UPVC pipe confirming to IS 4965 of 40 mm outer diameter.

Over flow pipe shall be of G.I. / PVC with mosquito proof jali of 15 mm dia.

3.20.3. FIXING

The chinaware flushing cistern shall be placed over a pair of C.I. brackets. C.P. brass flush pipe shall be fixed to cistern and W.C. pan using check nut, spun yarn, cement mortar etc.

The cast iron flushing cistern shall be placed over a pair of C.I. or G.I. or PVC flush pipe of specified diameter shall be fixed to cistern and W.C. pan by using check nut, white zinc, spun yarn, cement mortar etc.

The PVC flushing cistern shall be placed or fixed as recommended by the manufacturer, PVC flush pipe of specified diameter shall be fixed to cistern and W.C. pan by using check nut, white zinc, spun yarn, cement mortar etc.

3.20.4. THE RATE INCLUDES FOR

1. Supply and fixing flush tank, flush pipe and over flow pipe.
2. Painting all the metallic parts with two coats of flat oil paint over a coat of primer.
3. Cutting hole in wall / slab / beam etc. wherever required and making good the same to original condition after fixing.
4. Cost of jointing materials such as zinc, spun yarn, cement mortar 1:1 etc.
5. Testing the entire system and rectification of defects, if any.
6. All necessary materials, labor and use of tools.

3.20.5. MODE OF MEASUREMENT

The measurement shall be for each unit of flushing cistern fixed as a whole.

3.20.6. MODE OF PAYMENT

The contract rate shall be for each unit flushing cistern fixed as a whole.

3.21. C.I. BRACKET

3.21.1. GENERAL

The item pertains to provide a pair of Cast Iron bracket for wash basin, sink, flushing cistern etc. including fixing.

3.21.2. FIXING

Brackets shall be embedded into or fixed to the wall with plugs, screws, nails etc. Hole shall be made in the wall, if they are not left for fixing the brackets and shall be made good after fixing. The gap shall be filled with 1:2 cement mortar and finishing shall be done with white / matching color cement.

3.21.3. THE RATE INCLUDES FOR

1. Supplying and fixing the brackets.
2. Painting brackets with two coats of flat oil paint over a coat of primer.

3. Cutting hole in wall beam etc. wherever required and making good the same to original condition after fixing.
4. All necessary materials, labor and use of tools.

3.21.4. MODE OF MEASUREMENT

The measurement shall be for each pair of bracket fixed included in the items of sink, wash basin, cistern etc. as specified in schedule of quantities.

3.21.5. MODE OF PAYMENT

The contract rate shall be for each pair of bracket fixed.

4. WATER SUPPLY SYSTEM:

4.1. PVC PIPING WORK FOR WATER SUPPLY

4.1.1. GENERAL

The item includes supplying of PVC pipes with fittings of specified diameter including laying, fixing, cutting, joining, painting etc. for vent, over flow, waste water pipe line etc.

4.1.2. MATERIAL

The pipes and fittings shall conform to series IV of IS 4985-1978, PVC pipes and fittings shall be free from cracks, flaws and defects and shall be able to withstand a pressure as mentioned in the schedule of quantities.

4.1.3. EXAMINING

Before laying the pipe line, it shall be first examined for damages and cracks, No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

4.1.4. CLEANING

All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and outside surfaces.

4.1.5. TRENCHES

The trench bottom shall be carefully examined for the presence of hard objects such as flints, rock projection or tree roots etc. Pipe shall be embedded in sand or soft soil, free from rock & gravel, back fill 150mm above the pipe shall also be of fine sand or soft soil. Pipe shall not be painted. The width of trench shall not be less than outside diameter of pipe plus 300 mm in case of gravel soils. Pipe shall be laid at least 900 mm below the ground level (measured from the surface of the ground to the top of pipe).

4.1.6. LAYING

The pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. The entire pipe shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length.

The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of day's work the open end shall be suitably plugged.

4.1.7. FIXING

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer-in-charge. The pipe shall be fixed with G.I. clamps not less than 2 mm thick or with suitable PVC clamps, The clamps shall be fixed into the wall with G.I. nails not less than 40 mm long and wooden gutties.

Spacing between clamps for fixing internal piping shall be as given below:

Pipe diameter	For Horizontal Runs	For Vertical Runs
20 mm	700 mm	1050 mm
25 mm	750 mm	1125 mm
32 mm	825 mm	1240 mm
40 mm	975 mm	1460 mm
50 mm	975 mm	1460 mm

4.1.8. MAKING JOINT

The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

4.1.9. DETACHABLE JOINT

Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

4.1.10. PAINTING

If mentioned in schedule of work, the exposed pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer. Underground pipe line shall not be painted.

4.1.11. DEWATERING

In case of underground pipes, the contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

4.1.12. TESTING

Solvent welded pipe shall not be pressure tested until at least 24 hours after the last solvent cemented joint has been done. All control valves shall be positioned open for the duration of the test and open end closed with water tight fittings. The testing pressure on completion of the work shall not be less than 1.5 times the working pressure of the pipes.

Pressure shall be applied either by hand pump or power driven pump. Pressure gauges shall be correctly positioned and closely observed to ensure that at no time are the test pressure exceeded. The systems shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents shall be open at all high points so that air may be expelled from the system during filling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supports under load. Pressure is reached. Without any additional requirement of make-up-water the test pressure should not fall more than 0.02 MPa (0.2 kg./sq.cm) at the end of one hour test duration.

4.1.13. THE RATE INCLUDES FOR

1. Supplying of PVC pipes and fittings of specified diameter.
2. Laying and cutting the pipe wherever necessary and wastage.
3. Fixing the pipe line with G.I. clamps not less than 2 mm thick and G.I./M.S. nails length not less than 40mm or with PVC clamps, screws, wooden gutties etc.
4. Making the solution joint, painting the pipe line if mentioned in schedule of quantities.
5. In case of underground piping, dewatering till completion of work.
6. All necessary materials, labor and use of tools.

4.1.14. MODE OF MEASUREMENT

The measurement shall be for unit running meter length of pipe line laid of fixed. The measurement shall be taken along the center line of pipe. No measurement shall be recorded separately for fittings, making joint, painting if mentioned in schedule of work and testing.

4.1.15. MODE OF PAYMENT

Unit length of pipe line laid or fixed.

4.2. GUN METAL/ BRASS COPPER ALLOY FULL WAY VALVE

4.2.0. GENERAL

The item includes provision of full way (gate or globe) valve of specified diameter as mentioned in the schedule including fixing. Full way valve is a valve suitable for controlling or stopping the flow in water supply lines.

4.2.1. MATERIAL

Full way valve shall be of either Brass fitted with a cast iron hand wheel or Gun metal fitted with a C.I. hand wheel or copper alloy as the case may be and shall be of Gate valve type opening full way and of the size as specified conforming to IS 778. The weight of the full way gate valve shall be as per the table given below with a tolerance of 5 percent.

Diameter in mm	Flanged arch (Kg)	Screwed arch (Kg)
15	1.021	0.567
20	1.503	0.680
25	2.495	1.077
32	3.232	1.559
40	4.082	2.268
50	6.691	3.232
65	10.149	6.804
80	13.381	8.845

4.2.2. FIXING

The valves shall be fixed in position in the pipeline as shown in the drawing or as directed with necessary socket or union, nuts etc. The screwed, flanged joint shall be made with few turns of fine hemp yarn dipped in linseed oil taken over the threaded ends to obtain complete water tightness.

4.2.3. TESTING

The joints shall be tested to a hydraulic pressure of 1 MPa (10 kg/cm²) along with the testing of pipe line.

4.2.4. THE RATE INCLUDES FOR

1. Valve, G.I. fittings, hemp yarn, linseed oil, zinc, fixing and testing.
2. All necessary labor, materials and use of tools.

4.2.5. MODE OF MEASUREMENT

The measurement shall be for each unit valve of specified diameter fixed.

4.2.6. MODE OF PAYMENT

The contract rate shall be for each unit of valve of specified diameter fixed. No extra payment shall be made for G.I. fittings used in fixing of the valve.

4.3. WATER METER

4.3.0. GENERAL

The item includes provision of Water meter with or without end flanges or non-return valve of specified diameter as mentioned in the schedule with strainer, sockets, flange, union, nuts etc. including fixing and testing.

4.3.1. MATERIAL

Water Meter shall conform to IS 779 (Domestic type) or IS 2373 (Bulk type) as specified in Schedule of Quantities and should have ISI certification mark. Non return valve and strainer shall be of the same

diameter as that of water meter. Strainer, sockets, flange, union, union nuts, rubber packing etc. shall be as per the description of item.

4.3.2. FIXING

Water meter shall be fixed in position on the inlet pipe line and the joints shall be made either screwed or flanged with necessary sockets, flanges and union nuts as required or as directed by the Engineer-in-charge.

4.3.3. SCREWED JOINT

A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tight joint.

4.3.4. FLANGED JOINT

The flange joint shall be made for flange type water meter and the joint shall be as per the specification of flanged joint.

4.3.5. TESTING

The joints shall be tested to a hydraulic pressure of 1 MPa (10 kg/cm²) along with testing of pipe line for a minimum duration of two hours.

4.3.6. THE RATE INCLUDES FOR

1. Water meter, hemp yarn, linseed oil, zinc, fixing and testing.
2. Supplying of strainer non-return valve, sockets, union nut etc.
3. Making screwed or flanged joints.
4. All necessary labor, material and use of tools.

4.3.7. MODE OF MEASUREMENT

The measurement shall be for each unit of water meter of specified diameter fixed.

4.3.8. MODE OF PAYMENT

The contract rate shall be for each unit Water Meter of specified diameter fixed. No extra payment shall be made towards making flanged and other joints and G.I. fittings used in fixing of the water meter.

4.4. PRESSURE REDUCING VALVE :

4.4.0. GENERAL

The item includes provision of pressure reducing valve of specified diameter as mentioned in the schedule including fixing.

4.4.1. MATERIAL

Pressure reducing valve is a device with suitable means of connection for insertion in a vertical pipe line for controlling the water pressure. Valve shall be of brass and shall be vertical flow type, conforming to IS 9739-1981.

4.4.2. FIXING

The valve shall be fixed in position on the pipe line as shown in the drawing or as directed. The screwed or flanged joint shall be made to obtain complete water tight joint.

4.4.3. TESTING

The joints shall be tested to a hydraulic pressure of 1MPa (10 kg/cm²) along with testing of pipe line for a minimum duration of 2 hrs.

4.4.4. THE RATE INCLUDES FOR

1. Supplying Valve including fixing and testing.
2. All necessary labor, materials and use of tools.

4.4.5. MODE OF MEASUREMENT

The measurement shall be for each unit of valve of specified diameter fixed.

4.4.6. MODE OF PAYMENT

The contract rate shall be for each unit of valve of specified diameter fixed.

4.4.7. MODE OF MEASUREMENT

The measurement shall be on the basis of IS 1538 for standard weight of specials and/or on the basis of actual unit weight for fixed specials.

4.4.8. MODE OF PAYMENT

The contract rate shall be on the basis of unit weight.

4.5. G M GATE VALVE CHAMBER :

4.5.0. GENERAL

The item includes construction of brick masonry valve chamber of size as specified in this schedule including providing M.S. /G.I. frame and cover over R.C.C pre-cast cover with or without surface box.

4.5.1. MATERIAL

Brick work, plastering, concreting etc. shall be as per general specification under section II. Precast RCC cover slab, surface box, C.I/M.S frame and cover etc. Shall be size and weight as specified in the schedule.

4.5.2. CONSTRUCTION

1. Foundation concrete of mix 1:4:8 shall be of 150 mm thick with 150 mm offset all round or as specified in the schedule.
2. Brick masonry in cement mortar 1:4 as specified.
3. Plastering inside and outside surfaces of walls in two courses using cement mortar 1:3 of thickness as specified mixed with water proofing compound of specified Quality including inner surfaces finished smooth with neat cement punning.

4.6. RCC PRECAST/CAST IRON COVERS

4.6.0.1. RCC PRECAST COVER (for chambers of size up to 600 x 600 mm)

Chamber cover shall be casted as shown in the drawing having minimum 75 mm thick in cement concrete 1:2:4 or as specified in the schedule by using nominal reinforcement 100 kg/ Cum of concrete including shuttering, finishing, curing, placing in position etc.

4.6.0.2. CAST IRON/ M.S COVER

Cast iron/M.S cover of specified size and weight shall be supplied and placed over the chamber as directed. The cover shall be painted with 3 coats of black bitumastic paint.

4.6.1. DEWATERING

The water accumulated in the pit due to rain, seepage, springs or any other cause during the progress of work shall be pumped/ bailed out till the completion of work.

4.6.2. THE RATE INCLUDES FOR

1. Bed concrete, Brick masonry, cement plaster, RCC pre-cast cover slab with or without surface box cast /MS cover etc.
2. Dewatering the trench or pit if necessary.

3. All necessary labor, materials and use of tools.

4.6.3. MODE OF MEASUREMENT

The measurement shall be for each unit of valve chamber of specified internal size and depth constructed.

4.6.4. MODE OF PAYMENT

The contract rate shall be for each unit of valve chamber of specified internal size and depth constructed.

4.6.5. RCC PRECAST/CAST IRON COVERS

4.6.5.1. RCC PRECAST COVER (for chambers of size above 1000 x 1000 mm)

Chamber cover shall be coated in minimum three equal parts or more as directed with lifting hooks as shown in the drawing. RCC slab shall be casted along with galvanized M.S. angle iron frame with stiffness and anchors made out of the sizes as specified in the schedule. The exposed portion of the angle frame shall be painted with the coats of silver paint over a coat of primer.

RCC pre-cast slab shall be of 100 mm thick (unless otherwise specified) in cement concrete 1:2:4 of size as specified in the drawing schedule by using nominal reinforcement 100 kg/ Cum of concrete including shuttering, curing etc. and shall be placed in position as directed. Cast iron road surface of prescribed weight shall be fixed to the cover slab during casting the slab for key rod operation.

Road surface box shall be of size 100x125x150 mm conforming to IS 3950 having hinged and weighting not less than 14 kg. The surface box shall be fixed on top of the RCC cover slab during the casting of slab for key rod operation. The surface box shall be painted with 3 coats of black bitumastic paint.

4.6.5.2. CAST IRON/ M.S COVER

Cast iron/M.S cover of specified size and weight shall be supplied and placed over the chamber as directed. The cover shall be painted with 3 coats of black bitumastic paint.

4.6.6. DEWATERING

The water accumulated in the pit due to rain, seepage, springs or any other cause during the progress of work shall be pumped/ bailed out till the completion of work.

4.6.7. THE RATE INCLUDES FOR

1. Bed concrete, Brick masonry, cement plaster, RCC pre-cast cover slab with or without surface box cast /MS cover etc.
2. Dewatering the trench or pit if necessary.
3. All necessary labor, materials and use of tools.

4.6.8. MODE OF MEASUREMENT

The measurement shall be for each unit of valve chamber of specified internal size and depth constructed.

4.6.9. MODE OF PAYMENT

The contract rate shall be for each unit of valve chamber of specified internal size and depth constructed.

4.7. AIR VALVE

4.7.0. GENERAL

The item includes supplying of single, double action or kinetic air Valve of specified diameter as mentioned in the schedule including fixing.

4.7.1. MATERIAL

The Air Valve shall be of heavy quality conforming to IS 14845 with IS certification mark and isolation valve.. The body, domes, covers, stuffing box, thrust plates, wedges, gland and cap shall be of cast iron not less than of grade 20 and inside working parts should be of any non-ferrous or ferrous materials.

4.7.2. FIXING

The Air Valve shall be fixed in position as indicated in the drawing or as directed. They shall be fitted by means of flange joints or screwed joint to the pipe line.

4.7.3. TESTING

The Air Valve and the joints shall be tested hydraulically to a minimum pressure as per testing clause of piping work. The testing shall be done along with the testing of pipe line.

4.7.4. THE RATE INCLUDES FOR

1. Supplying and fixing Air Valve of specified diameter and type.
2. Supplying G.I. pipe and fittings if required.
3. All necessary labor, material and use of tools.

4.7.5. MODE OF MEASUREMENT

The measurement shall be for each unit of Air Valve fixed C.I. and G.I. specials, making lead or flange joint etc. shall be measured under the relevant items.

4.7.6. MODE OF PAYMENT

The contract rate shall be for each unit of air valve fixed.

4.8. BUTTER FLY VALVE

4.8.0. GENERAL

The item includes supplying and fixing of butterfly valve of specified diameter as mentioned in the schedule.

4.8.1. MATERIAL

The butterfly valve shall be flanged type or as specified conforming to IS 13095 & BS - 5155. The valve shall be bubble tight, resilient sealed suitable for flow in either direction with accompanying flanges and steel handle.

4.8.2. FIXING

The butterfly valve shall be fixed to the pipe line in position as indicated in the drawing and as directed by the Engineer-In-Charge.

4.8.3. TESTING

The valve and the joints shall be tested to a minimum hydraulically pressure of 10kg/sqcm for a duration of two hours or as per testing clause of piping work. The testing shall be done along with the testing of pipe line. The leaky joints shall be rectified to the satisfaction of the Engineer-in-Charge.

4.8.4. THE RATE INCLUDES FOR

1. Supplying and fixing Butterfly Valve of specified diameter.
2. Supplying G.I. pipe and fittings if required.
3. All necessary labor, material and use of tools.

4.8.5. MODE OF MEASUREMENT

The measurement shall be for each unit of butterfly Valve fixed. C.I. And G.I. specials, making lead or flange joint etc. shall be measured under the relevant items.

4.8.6. MODE OF PAYMENT

The contract rate shall be for each unit of butterfly valve fixed.

5. DRAINAGE SYSTEM

5.1. UPVC- SWR PIPING WORK

5.1.0. GENERAL

The item includes supplying of UPVC soil, waste and rain water (SWR) and ventilation pipes with fittings of specified diameter including laying, fixing, cutting, joining, painting if required etc.

5.1.1. MATERIAL

The pipes shall conforming to IS 13592, UPVC - SWR (Type 'A' or 'B' as specified) and fittings conforming to IS 13591 shall be free from cracks, flaws and defects and shall be U. V. stabilized and able to withstand a pressure as mentioned in the schedule of work. Rubber sealing rings conforming to IS 5382 with lubricant for sliding socket joints as mentioned in the schedule of work.

5.1.2. EXAMINING

Before laying the pipe line, it shall be first examined for damages and cracks, No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

5.1.3. CLEANING

All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and outside surfaces.

5.1.4. LAYING

The pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. The entire pipe shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length.

The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of day's work the open end shall be suitably plugged.

5.1.5. FIXING

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer-in-charge. The pipe shall be fixed with G.I. clamps not less than 2.0 mm thick of with suitable UPVC clamps/clips, The clamps/clips shall be fixed into the wall with G.I. nails not less than 40 mm long and wooden gutties keeping the pipe about 15 mm clear of the wall.

5.1.6. MAKING JOINT

The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough or rubber sealing rings with lubricant for sliding socket joints. The pipe shall be cut to desired length. Care shall be taken that that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

5.1.7. DETACHABLE JOINT

Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

5.1.8. PAINTING

In case of underground piping, the pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer.

5.1.9. DEWATERING

In case of underground pipes, the contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

5.1.10. TESTING

The joints shall be tested by either smoke test for vertical stacks or 2.5 m head of water at the highest point of the section under test for horizontal drainage pipes. Smoke shall be pumped into the pipes at the lowest end from a smoke machine which consists of a below and burner. The material usually burnt is greasy cotton waste which gives out a clear pungent smoke which is easily detectable by sight as well as by smell, if there is leak at any point of the drain. The water head test shall be carried out by suitably plugging the lower end of the drain and the ends of the connection if any and filling the system with water. A knuckle bend shall be temporarily jointed to it so as to provide required test head, or the top may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitable for observation. The leaky joints shall be remade and section re-tested at no extra cost.

5.1.11. THE RATE INCLUDES FOR

1. Supplying of UPVC-SWR pipes and fittings of specified diameter.
2. Laying and cutting the pipe wherever necessary and wastage.
3. Fixing the pipe line with G.I. clamps not less than 2mm thick and G.I./M.S. nails length not less than 40mm or with UPVC clamps, screws, wooden gutties etc.
4. Making the solution joint and painting if mentioned in schedule of work the pipe line.
5. In case of underground pipes, dewatering if necessary till completion of work.
6. All necessary materials, labor and use of tools.

5.1.12. MODE OF MEASUREMENT

The measurement shall be for unit running meter length of pipe line laid or fixed. The measurement shall be taken along the center line of pipe. No measurement shall be recorded separately for fittings, making joint, painting if mentioned in schedule of work and testing.

5.1.13. MODE OF PAYMENT

The contract rate shall be for unit running meter length of pipe line laid or fixed.

5.2. PVC PIPING WORK

5.2.0. GENERAL

The item includes supplying of PVC pipes with fittings of specified diameter including laying, fixing, cutting, joining, painting etc. for vent, over flow, waste water pipe line etc.

5.2.1. MATERIAL

The pipes and fittings shall conform to series IV of IS 4985, PVC pipes and fittings shall be free from cracks, flaws and defects and shall be able to withstand a pressure as mentioned in the schedule.

5.2.2. EXAMINING

Before laying the pipe line, it shall be first examined for damages and cracks, No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

5.2.3. CLEANING

All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and outside surfaces.

5.2.4. LAYING

The pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. The entire pipe shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length.

The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of day's work the open end shall be suitably plugged.

5.2.5. FIXING

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer-in-charge. The pipe shall be fixed with G.I. clamps not less than 2 mm thick or with suitable PVC clamps, the clamps shall be fixed into the wall with G.I. nails not less than 40 mm long and wooden gutties. Spacing between clamps for fixing internal piping shall be as given below:

Pipe diameter	For Horizontal Runs	For Vertical Runs
20 mm	700 mm	1050 mm
25 mm	750 mm	1125 mm
32 mm	825 mm	1240 mm
40 mm	975 mm	1460 mm
50 mm	975 mm	1460 mm

5.2.6. MAKING JOINT

The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

5.2.7. DETACHABLE JOINT

Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

5.2.8. PAINTING

If mentioned in schedule of work, the pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer.

5.2.9. DEWATERING

In case of underground pipes, the contract rate shall include bailing or pumping out all the water till completion of work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

5.2.10. TESTING

The joints shall be tested by either smoke test for vertical stacks or 2.5 m head of water at the highest point of the section under test for horizontal drainage pipes. Smoke shall be pumped into the pipes at the lowest end from a smoke machine which consists of a below and burner .The material usually burnt is greasy cotton waste which gives out a clear pungent smoke which is easily detectable by sight as well as by smell, if there is leak at any point of the drain. The water head test shall be carried out by suitably plugging the lower end of the drain and the ends of the connection if any and filling the system with water. A knuckle bend shall be temporarily jointed to it so as to provide required test head , or the top may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitable for observation. The leaky joints shall be remade and section re-tested at no extra cost.

5.2.11. THE RATE INCLUDES FOR

1. Supplying of PVC pipes and fittings of specified diameter.
2. Laying and cutting the pipe wherever necessary and wastage.
3. Fixing the pipe line with G.I. clamps not less than 2mm thick and G.I./ M.S. nails length not less than 40mm or with PVC clamps, screws, wooden gutties etc.
4. Making the solution joint and painting the pipe line if mentioned in schedule of work.

5. In case of underground piping, dewatering if necessary till completion of work.
6. All necessary materials, labor and use of tools.

5.2.12. MODE OF MEASUREMENT

The measurement shall be for unit running meter length of pipe line laid of fixed. The measurement shall be taken along the center line of pipe. No measurement shall be recorded separately for fittings, making joint, painting and testing.

5.2.13. MODE OF PAYMENT

The contract rate shall be for unit running meter length of pipe line laid or fixed.

5.3. GULLY TRAP

5.3.0. GENERAL

The item includes provision of S.W. Gully trap with C.I. frame including construction of Gully Trap Chamber.

5.3.1. MATERIAL

The Gully Trap shall be of salt glazed stoneware with 150 mm nominal square inlet or as specified in the schedule with 100mm diameter outlet. Brick work, plastering, concreting shall be as per general specifications under section-II.

5.3.2. CONSTRUCTION

1. Internal dimension of the Gully trap chamber shall be as specified in the schedule.
2. Foundation of 1:4:8 concrete shall be 150 mm thick, and shall have 100mm offset.
3. Brick masonry shall be of 230 mm thick in cement mortar 1:6 and masonry shall be plastered with 15mm thick plaster in 1:3 cement mortars inside and outside surface with smooth finish.

5.3.3. C.I. FRAME AND COVER

C.I. frame and cover shall be fixed with the cement concrete 1:2:4 at the top of Gully trap chamber, the weight of frame and cover shall not be less than 7.5 kg. and they shall be painted with two coats of black bitumastic paint.

5.3.4. DEWATERING

The contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

5.3.5. THE RATE INCLUDES FOR

1. Supplying of stoneware gully trap with C.I. frame and cover.
2. Concreting, brick work, plastering, fixing frame and cover.
3. Dewatering if necessary till completion of work.
4. All necessary materials, labor and use of tools.

5.3.6. MODE OF MEASUREMENT

The measurement shall be for unit of Gully Trap chamber of specified internal size and depth constructed including stoneware Gully Trap and C.I. frame and cover fixed.

5.3.7. MODE OF PAYMENT

The contract rate shall be for unit of Gully Trap chamber constructed as a whole.

5.4. RAIN WATER GRATING

5.4.0. GENERAL

The item includes supplying of cast iron grating of specified diameter including fixing and painting.

5.4.1. MATERIAL

The rain water grating shall be Cast Iron with closed grained without any casting defects. The thickness should be uniform throughout, one shaped C.I. grating.

5.4.2. FIXING

C.I. rain water grating shall be fixed in position with 1:1 cement mortar.

5.4.3. THE RATE INCLUDES FOR

1. The cast iron rain water grating cement, sand etc.
2. Fixing the grating.
3. All necessary materials, labor and use of tools.

5.4.4. MODE OF MEASUREMENT

The measurement shall be for each unit of grating fixed.

5.4.5. MODE OF PAYMENT

The contracts rate shall be for each unit of grating fixed.

5.5. INSPECTION CHAMBER

5.5.0. GENERAL

The item includes provision of brick masonry Inspection Chamber of internal size as specified in the schedule.

5.5.1. MATERIAL

Concreting, Brick work, plastering etc, shall be as per specification as given in general specification under section II.

5.5.2. CONSTRUCTION

1. Internal dimensions and initial depth shall be as specified in the schedule or as shown in the drawing.
2. Foundation of 1:2:4 concrete shall be 150 mm thick and shall have 150 mm offset.
3. The concrete 1:2:4 shall be laid to necessary shapes to form the channel for the pipe being received in the channel. It shall be of appropriate diameter and shall be half round. The sides shall be kept sloping towards the channel.
4. Brick masonry shall be 230 mm thick in cement mortar 1:2 or as specified in the schedule of work, making brick tapering for longitudinal wall 450 mm from top of cover of the chamber.
5. Brick masonry shall be rendered with 20 mm thick plaster in cement mortar 1:1 or as specified in the schedule of work inside and outside surfaces in two courses and inside surface finished smooth with neat cement punning.

5.5.3. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.5.4. THE RATE INCLUDES FOR

1. Concreting in foundation, forming the channels, constructing brick masonry and plastering over the brick work, and finishing smooth in side surfaces.
2. Cutting existing stoneware/RCC Hume pipe line to facilitate construction the Inspection chamber.
3. Dewatering the pit if found necessary till completion of work.
4. All necessary labor, materials and use of tools.

5.5.5. MODE OF MEASUREMENT

The measurement shall be for an Inspection chamber of specified finished internal size and initial depth measured vertically from top of the frame and cover to the invert of chamber. Extra for additional depth or rebate for lesser depth shall be measured in R.M.

5.5.6. MODE OF PAYMENT

The contract rate shall be for unit Inspection chamber of specified internal size and initial depth Extra/Rebate for additional/lesser depth respectively shall be paid in RM.

5.6. CIRCULAR MANHOLE

5.6.0. GENERAL

The item includes provision of brick masonry Circular manhole of internal size as specified in the schedule.

5.6.1. MATERIAL

Concreting, Brick work, plastering etc. Shall be as per specification as given in general specification under section II.

5.6.2. CONSTRUCTION

1. Internal dimensions and initial depth shall be as specified in the schedule of work or as shown in the drawing.
2. Foundation of 1:2:4 concrete shall be 300 mm thick and shall have 300 mm offset.
3. The concrete 1:2:4 shall be laid to necessary shapes to form the channel for the pipe being received in the channel. It shall be of appropriate diameter and shall be half round. The sides shall be kept sloping towards the channel.
4. Brick masonry shall be in cement mortar 1:2 or as specified in the schedule of work. One meter height from top shall be conical in shape and shall be constructed in 230 mm thick brick masonry and remaining height shall be 345mm thick in cylindrical shape.
5. Brick masonry shall be rendered with 20 mm thick plaster in cement mortar 1:1 or as specified in the schedule of work inside and outside surfaces in two courses and inside surface finished smooth with neat cement punning.

5.6.3. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.6.4. THE RATE INCLUDES FOR

1. Concreting in foundation, forming the channels, constructing brick masonry and plastering over the brick work and finishing smooth inside surfaces.
2. Cutting existing stoneware/RCC Hume pipe line to facilitate construction of new manhole.
3. Dewatering the pit if found necessary till completion of work.
4. All necessary labor, materials and use of tools.

5.6.5. MODE OF MEASUREMENT

The measurement shall be for one circular manhole of specified finished internal size and initial depth measured vertically from top of the frame and cover to the invert of manhole. Extra over for additional depth or rebate for lesser depth shall be measured in R.M.

5.6.6. MODE OF PAYMENT

The contract rate shall be for unit circular manhole of specified internal size and initial depth, Extra/Rebate for additional/lesser depth respectively shall be paid in RM.

5.7. EXTRA DEPTH FOR INSPECTION CHAMBER AND MANHOLE

5.7.0. GENERAL

The item includes provision for extra depth of Inspection Chamber and manholes of brick masonry.

5.7.1. MATERIAL

Concreting, Brick work, plastering etc. Shall be as per specification as given in general specification under section II.

5.7.2. CONSTRUCTION

Extra depth for inspection chamber and manhole shall be constructed as per Inspection Chamber & Circular Manhole.

5.7.3. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.7.4. THE RATE INCLUDES FOR

1. Constructing brick masonry and plastering over the brick work.
2. Dewatering the pit if found necessary till completion of work.
3. All necessary labor, materials and use of tools.

5.7.5. MODE OF MEASUREMENT

The measurement shall be for unit meter depth or part thereof for inspection chamber/ circular manhole constructed. Depth of manhole or chamber shall be measured from top of the frame and cover to the invert level of manhole deducting the initial depth of at manhole/ chamber. Extra for additional depth or rebate for lesser depth shall be measured in R.M.

5.7.6. MODE OF PAYMENT

The contract rate shall be for unit meter depth of inspection chamber/ circular manhole constructed.

5.8. DROP CONNECTION

5.8.0. GENERAL

The item includes provision of drop connection of salt glazed of nominal diameters as specified in schedule of quantities including 1:2:4 cement concrete encased to pipe all round.

5.8.1. MATERIAL

Concreting, mortar for jointing the pipes, hemp yarn, salt glazed stoneware pipes and specials like bends, tees, crosses (double tees), plugs caps etc. of specified diameter shall be of grade 'A' or 'AA' conforming to IS 651. All the pipes and fitting shall be free from pin holes, cracks and other imperfections and should have be free from pin holes, cracks and other imperfections and should have the glossy finish in salt glazing, necessary form work for encasing the pipe.

5.8.2. DAMAGED MATERIAL

Any material found damaged or cracked shall not be used in the work and contractor has to replace the same from the site at his own cost and charges.

5.8.3. LAYING, FIXING, JOINTING, CLEANING, TESTING

Above shall be done as specified in clause 5.18.00 i.e. salt glazed stone ware piping work.

5.8.4. ENCASING THE PIPE LINE

After the joints and pipes have been proved to be water tight then pipe line shall be embedded in cement concrete as specified in the schedule of quantities and as shown in drawings including necessary Form work.

5.8.5. DEWATERING

The contractor rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.8.6. THE RATE INCLUDES FOR

1. Stone ware pipe with specials viz. bends, tees, crosses (double tees), plugs, caps etc. cement mortar 1:1 and spun yarn
2. Laying, jointing and testing the pipe line including cutting & wastage
3. Concreting and formwork for encasing
4. Dewatering if found necessary till completion of work.
5. All necessary labor, materials and use of tools.

5.8.7. MODE OF MEASUREMENT

The measurement shall be for one drop connections of specified nominal dia. of pipe & depth of drop connection shall be measured vertically from the bed level of drop pipe cleaning chamber (i.e. finished top of bed concrete) to the invert level of manhole or chamber. Extra/Rebate for additional/lesser than the initial depth respectively shall be measured in RM.

5.8.8. MODE OF PAYMENT

The Contract rate shall be for one drop connection of specified nominal diameter & depth as specified in the schedule & drawings.

5.9. EXTRA OVER DEPTH FOR DROP CONNECTION

5.9.0. GENERAL

The item includes provision of extra depth for drop connection including providing and laying salt glazed stone ware pipe & specials, 1:2:4 (or as specified in schedule) cement concrete for on casing the pipe all round square in shape all as specified in drawings & schedule.

5.9.1. MATERIAL

Concreting, mortar for jointing the pipes, hemp yarn, salt glazed stoneware pipes and specials of specified diameter shall be of grade 'A' or 'AA' class and conforming to IS 651-1971. All the pipes and fittings shall be free from pin holes. Cracks & other imperfection and should have the glossy finish of salt glazing, necessary form work encasing the pipes.

5.9.2. DAMAGE / MATERIALS

This clause shall be as per clause 5.21 salt glazed stone ware piping work.

5.9.3. LAYING, FIXING JOINTING, CLEANING AND FIXING

This clause shall be as per clause 5.21 i.e. salt glazed stone ware piping work.

5.9.4. ENCASING THE PIPE LINE

After the joints and pipes have been proved to be water tight then pipe line shall be embedded in cement concrete as specified in the schedule of quantities and as shown in drawings including necessary Form work.

5.9.5. DEWATERING

The contractor rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.9.6. THE RATE INCLUDES FOR

1. S.W. pipe with specials, cement mortar 1:1 and spun yarn.
2. Laying, jointing and testing the pipe line including cutting and wastage.
3. Concreting and form work for encasing
4. Dewatering if found necessary till completion of work.

5.9.7. MODE OF MEASUREMENT

The depth of drop connection shall be measured vertically from the bed level of drop pipe cleaning chamber (i.e. finished top of bed concrete) to the invert level of manhole or chamber and initial depth shall be deducted.

5.9.8. MODE OF PAYMENT

Contract rate shall be for unit meter depth or part thereof for drop connection.

5.10. DROP PIPE CLEANING CHAMBER

5.10.0. GENERAL

The item includes construction of brick masonry valve chamber of size as specified in this schedule including providing M.S. / G.I. frame and cover over R.C.C pre-cast cover with or without surface box.

5.10.1. MATERIAL

Brick work, plastering, concreting etc. shall be as per general specification under section II. Precast RCC cover slab, surface box, C.I/M.S frame and cover etc. Shall be size and weight as specified in the schedule.

5.10.2. CONSTRUCTION

1. Foundation concrete of mix 1:2:4 shall be of 150 mm thick with 150 mm offset all round or as specified in the schedule.
2. Brick masonry in cement mortar 1:2 as specified.
3. Plastering inside and outside surfaces of walls in two courses using cement mortar 1:1 of thickness as specified mixed with water proofing compound of specified Quality including inner surfaces finished smooth with neat cement punning.

5.10.3. RCC PRECAST/CAST IRON COVERS

5.10.3.1. RCC PRECAST COVER (for chambers of size up to 600 x 600 mm)

Chamber cover shall be casted as shown in the drawing having minimum 75 mm thick in cement concrete 1:2:4 or as specified in the schedule by using nominal reinforcement @ 100 kg/ Cum. of concrete including shuttering, finishing, curing, placing the cover in position as directed by Engineer-in-charge.

5.10.3.2. CAST IRON/ M.S COVER

Cast iron/ M.S cover of specified size and weight shall be supplied and placed over the chamber as directed. The cover shall be painted with 3 coats of black bitumastic paint.

5.10.4. DEWATERING

The water accumulated in the pit due to rain, seepage, springs or any other cause during the progress of work shall be pumped/ bailed out till the completion of work.

5.10.5. THE RATE INCLUDES FOR

1. Bed concrete, Brick masonry, cement plaster, RCC pre-cast cover / MS cover etc.
2. Dewatering the trench or pit if necessary.
3. All necessary labor, materials and use of tools.

5.10.6. MODE OF MEASUREMENT

The measurement shall be for each unit of chamber of specified internal size and depth constructed.

5.10.7. MODE OF PAYMENT

The contract rate shall be for each unit of chamber of specified internal size and depth constructed.

5.11. C.I. FRAME AND COVER FOR MANHOLES

5.11.0. GENERAL

The item includes supply LD/MD/HD/EHD/C.I. Frame and cover as specified in schedule including fixing and painting.

5.11.1. MATERIAL

C.I. Frame and cover shall conform to IS 1720 and shall have IS certification mark with grade LD/MD/HD/EHD and the weight of frame and cover shall not be less than as specified in the schedule.

5.11.2. FIXING

Frame shall be fixed in the cement concrete 1:2:4 for bearing course and capping on the brick masonry wall of the chamber of manhole and finishing shall be done in 1:2 cement plaster finished smooth with neat cement.

5.11.3. PAINTING

The frame and cover shall be painted with two coats of approved black bitumastic anticorrosive paint over a coat of primer.

5.11.4. THE RATE INCLUDES FOR

1. C.I. frame and cover cement concrete, cement plaster, painting etc.
2. All necessary labor, material and use of tools.

5.11.5. MODE OF MEASUREMENT

The measurement shall be for C.I. Frame & cover on actual unit weight basis.

5.11.6. MODE OF PAYMENT

The contract rate shall be for C.I. Frame and cover on actual unit weight basis.

5.12. PRECAST CONCRETE FRAME AND COVER FOR MANHOLES

5.12.0. GENERAL

The item includes supply LD/ MD/ HD/ EHD factory made precast steel fiber reinforced concrete (SFRC) frame and cover as specified in schedule including fixing and placing.

5.12.1. MATERIAL

The precast frame and cover shall be of steel fiber reinforced concrete (SFRC) conforming to IS: 12592 and shall be of approved make. The frame and cover shall be of LD/ MD/ HD/ EHD grade, size and thickness as mentioned in the description of the item. The defective Frame and cover shall be replaced by the contractor at his own cost and charges.

5.12.2. FIXING

Frame shall be fixed in cement concrete 1:2:4 for bearing course & capping on the top of masonry wall of chamber or manhole and finishing shall be done in 1:2 cement plaster finished smooth with neat cement.

5.12.3. THE RATE INCLUDES FOR

1. Precast S.F.R.C. Frame and cover, cement concrete, cement plaster etc.
2. All necessary labor, material and use of tools.

5.12.4. MODE OF MEASUREMENT

The measurement shall be for unit set of Precast S.F.R.C. Frame and cover fixed.

5.12.5. MODE OF PAYMENT

The contract rate shall be for unit set of Precast S.F.R.C. Frame and cover fixed.

5.13. CAST IRON STEPS / RUNGS

5.13.0. GENERAL

The item includes supplying of cast iron steps including fixing and painting

5.13.1. MATERIAL

The steps shall be of cast iron and minimum 150 mm wide. The minimum weight of each step shall not be less than 5 kg or as specified in the schedule.

5.13.2. FIXING

The steps shall be fixed in brick masonry wall with 1:2:4 cement concrete with 75 mm cement concrete cover at all around the step. The first step shall be 450 mm below from top surface of structure and next shall be fixed 300 mm centre to centre in two rows at 300 mm distance or as shown in the drawing.

5.13.3. PAINTING

The projected portion of the cast iron step shall be painted with two coats of approved black bitumastic anti corrosive paint over a coat of primer.

5.13.4. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.13.5. THE RATE INCLUDES FOR

1. C.I. Steps cement concrete and painting etc.
2. Dewatering if found necessary till completion of work.
3. All necessary labor, material and use of tools.

5.13.6. MODE OF MEASUREMENT

The measurement for C.I. steps shall be on actual unit weight basis or unit C.I. step fixed as specified in the schedule.

5.13.7. MODE OF PAYMENT

The contract rate for C.I. steps shall be on actual unit weight basis or unit C.I. step fixed.

5.14. SALT GLAZED STONE WARE PIPING WORK

5.14.0. GENERAL

The item includes supplying, laying and fixing the salt glazed Stone ware pipes with necessary fittings of specified diameter including laying, jointing etc.

5.14.1. MATERIAL

Salt glazed stoneware pipes and specials of specified diameter shall be of grade "A" or "AA" conforming to IS 651. All the pipes and fitting shall be free from pin holes, cracks and other imperfections and should have the glossy finish of salt glazing.

5.14.2. DAMAGED MATERIAL

Any material found damaged or cracked shall not be used in the work contractor has to replace the same from the site at his own cost and charge.

5.14.3. TRENCHES

The trench shall be so dug that the pipe can be laid to the required alignment and at the required depth. When the pipe line is under road way, a minimum cover of 900 mm is recommended for adoption, but it may be modified to suit local conditions.

Unless otherwise specified by the Engineer-in-Charge, the width at bottom of trenches for different diameters of pipe laid at different depths shall be as given below:-

1. For all diameters, up to an average depth of 1200 mm, width of trench in mm shall be equal to diameter of pipe plus 300 mm.
2. For all diameters for depths above of 1200 mm, width of trench in mm shall be equal to the diameter of pipe plus 400 mm
3. Notwithstanding (a) & (b) above, the total width of trench shall not be less than 750 mm for depths exceeding 900 mm. The width of trench in the upper reaches shall be increased as described in sub head under “Earth Work.”

5.14.4. LAYING AND FIXING

Pipes shall be laid carefully to the correct alignment, levels and gradient and care shall be taken to prevent for entering the sand, earth or other foreign material into the pipes during laying. The pipes between manholes shall be laid truly in straight line, without vertical or horizontal undulations.

All inverts shall be laid from sight rails fixed at the true levels, with proper boning rods, The pipes shall be laid sockets facing up the gradient, alignment at the lower end and with the socket resting in the concrete bed if specified. Each pipe shall be laid singly and no pipe shall be laid until the trench has been excavated up to the required depth for a distance of 5 meter in front of the pipes to be laid.

5.14.5. JOINTING

Spun yarn soaked in cement wash shall be passed round the spigot and spigot inserted in the socket, the spun yarn shall then be caulked with 1:1 cement mortar with a little water, pressed into the joint with hand and finished at 45 degree the mortar shall be cured for seven days.

The following table shows the details of materials used for jointing the S.W. pipe.

Internal dia of pipe (mm)	Depth of socket in mm	Depth of yarn in mm	Depth of C.M. paste in mm
100	50	20	33
150	56	30	30
230	65	30	35

5.14.6. CLEANING

Interior surface of the pipes and fittings shall be cleaned off from all dirt, cement mortar and superfluous materials.

5.14.7. TESTING

The joints of S.W. Pipe line shall be tested for a minimum 2.50 meter water head over the crown of the highest pipe between the two manholes. The lower end shall be plugged water tight. Water shall then be filled in the inspection chamber or manhole at the upper end of the line with 2.50 meter depth of water over the crown. If it is found the certain pipe joints are leaking, the water shall be drained off and joints shall be re-caulked. The hydraulic test shall be carried out in accordance with IS 4127.

5.14.8. ENCASING THE PIPE LINE

After the joints and pipes have been proved to be water tight then pipe line shall be embedded in cement concrete if specified to the extent of one half of external diameter of the pipes as directed, the concrete

being made to slope away towards the sides of the foundations bed. Refilling shall be done with fine selected materials and shall be done in layers not exceeding 150mm thick, watered, consolidated and rammed properly, as specified.

5.14.9. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.14.10. THE RATE INCLUDES FOR

1. S.W. Pipes with specials, cement mortar 1:1 and spun yarn.
2. Laying, jointing and testing the pipe line including cutting and wastage.
3. Dewatering if found necessary till completion of work.
4. All necessary labor, materials and use of tools.

5.14.11. MODE OF MEASUREMENT

The measurement shall be for unit meter length of pipe line laid. The pipe shall be measured along the center line over all fittings. The measurement does not include for encasement of the pipe, which will be paid the relevant item.

5.14.12. MODE OF PAYMENT

The contract rate shall be for unit meter S.W. pipe line laid.

5.15. SEWER TRAP

5.15.0. GENERAL

The item includes supplying, laying and fixing the Stone ware sewer trap of specified diameter including fixing, jointing and embedding.

5.15.1. MATERIAL

Sewer trap shall be salt glazed of stoneware of specified diameter and shall be of grade "A" or "AA" conforming to IS 651. Sewer trap should be free from pin holes, cracks and other imperfections and should have the glossy finish of salt glazing.

5.15.2. DAMAGED MATERIAL

Any material found damaged or cracked shall not be used in the work and contractor has to replace the same from the site at his own cost and charge.

5.15.3. FIXING

Sewer trap shall be laid carefully to the correct alignment, levels and gradient and care shall be taken to prevent for entering the sand, earth or other free material into the trap during laying. The trap shall be on bedded in CC 1:2:4 including necessary form work.

5.15.4. TESTING

The testing shall be done along the testing of sewer line with the same specification.

5.15.5. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.15.6. THE RATE INCLUDES FOR

1. S.W. sewer trap, cement mortar 1:1 and spun yarn.
2. Laying, jointing on bedding in CC 1:2:4
3. Dewatering if found necessary till completion of work.
4. All necessary labor, materials and use of tools.

5.15.7. MODE OF MEASUREMENT

The measurement shall be for each unit of sewer trap fixed.

5.15.8. MODE OF PAYMENT

The contract rate shall be for each unit of sewer trap fixed.

5.16. GREASE TRAP CHAMBER

5.16.0. GENERAL

The item includes provision of brick masonry Grease Trap Chamber of internal size as specified in schedule of work.

5.16.1. MATERIAL

Concreting, Brick work, plastering etc. Shall be as per specifications given in general specification under section-II.

5.16.2. CONSTRUCTION

1. Internal dimensions and depth shall be as specified in the schedule of work.
2. 150 mm thick foundation shall be in 1:4:8 cement concrete and shall have 150 mm offset from outer surface of brick wall.
3. Brick masonry shall be in cement mortar 1:4.
4. Brick masonry shall be plastered with 20 mm thick cement mortar 1:3 inside and outside surfaces in two courses, inside surface finished smooth with neat cement punning.

5.16.3. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.16.4. THE RATE INCLUDES FOR

Concreting in foundation, constructing brick masonry and plastering over the brick work. Dewatering the trench or pit if found necessary till completion of work. All necessary labor, materials and use of tools.

5.16.5. MODE OF MEASUREMENT

The measurement shall be for each unit of grease trap chamber of specified internal size and depth constructed.

5.16.6. MODE OF PAYMENT

The contract rate shall be for each unit of grease trap chamber of specified internal size.

5.17. CONNECTION WITH DOMESTIC SEWER

5.17.0. GENERAL

The item includes the provisions of connecting sewer line with existing sewer line chamber or manhole including cutting, breaking of masonry, road surface and making good to the original condition of the damages.

5.17.1. MATERIAL

Concreting, Brick work, plastering etc. Shall be as per specification as given in general specification of section II.

5.17.2. MAKING CONNECTION

1. Breaking or cutting the road surface for sewer connection.
2. Restoring all the excavated items in proper manner as directed by the Engineer-in-charge

3. Cutting the brick masonry wall to required size of existing manhole or inspection chamber.
4. Connecting the sewer line to the chamber or manhole.
5. Making good to the original condition all the damages after completion of sewer connection.
6. Disposing off all the superfluous material as directed.

5.17.3. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.17.4. THE RATE INCLUDES FOR

1. Cutting the road surface as required and making good.
2. Restoring all the excavated materials and disposal of superfluous materials.
3. Cutting the manhole masonry, making good masonry and other damages to the original condition according to the bye-laws.
4. Dewatering if found necessary till completion of work.
5. All the necessary labor, materials and use of tools.

5.17.5. MODE OF MEASUREMENT

The measurement shall be for one job.

5.17.6. MODE OF PAYMENT

The contract rate shall be for one job.

5.18. CONNECTION WITH MUNICIPAL SEWER LINE

5.18.0. GENERAL

The item includes the provisions of connecting sewer line with existing municipal sewer line chamber or manhole including cutting, breaking of masonry, road surface and making good to the original condition of the damages.

5.18.1. MATERIAL

Concreting, brick work, plastering etc. shall be as per specification as given in general specification under section II.

5.18.2. MAKING CONNECTION

1. Breaking or cutting the road surface for sewer connection.
2. Restoring all the excavated items in proper manner as directed by the Engineer-in-charge.
3. Cutting the brick masonry wall to required size of municipal manhole or inspection chamber.
4. Connecting the sewer line to the chamber or manhole of Municipal sewer line.
5. Making well to the original condition all the damages after completion of sewer connection.
6. Disposing off all the superfluous materials as directed.
7. All necessary labor, materials and use of tools.

5.18.3. DEWATERING

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.18.4. MUNICIPAL CHARGES

The contractor shall obtain the necessary permission for connecting the sewer line to the municipal sewer from the concerned authorities. He shall pay all necessary charges towards the connection given by the municipality.

5.18.5. THE RATE INCLUDES FOR

1. Cutting the road surface as required and making good.
2. Restoring all the excavated materials and disposal of superfluous materials.

3. Cutting the manhole masonry, making good masonry and other damages to the original condition according to the bye-laws.
4. All the municipal charges towards connection.
5. Dewatering if found necessary till completion of work.
6. All necessary labor, material and use of tools.

5.18.6. MODE OF MEASUREMENT

The measurement shall be for one job.

5.18.7. MODE OF PAYMENT

The contract rate shall be for one job.

6.0 TECHNICAL DATA SHEET FOR DOMESTIC / FLUSHING WATER SUPPLY:

SR.NO	PARTICULAR	SPECIFICATIONS
1.0	DOMESTIC / FLUSHING WATER HYDRO PNEUMATIC TANK	
1.1	Capacity	As per BOQ
1.2	No. of Unit	As per BOQ
1.3	Material of Construction	M.S. conforming to IS 2062 / FRP
1.4	Shell thickness	8 mm / Suitable for 8 Kg/cm ² pressure rating.
1.5	Dished end thickness	10 mm/ Suitable for 10 Kg/cm ² pressure rating.
1.6	Test Pressure	10 kg / cm ² minimum
1.7	Painting	Epoxy
1.8	Type of Air Compressor	Oil free, Teflon coated / Inbuilt Air cell
1.9	Tank outlet size	As per Manufacture's configuration
2.0	PUMPS	
2.1	Type	In line vertical / centrifugal end suction or monoblock
2.2	Number of Units	As per BOQ
2.3	Design capacity of each pump Main Pump	As per BOQ
2.4	Total head at design capacity	As per BOQ
2.5	Suction Pressure at rated capacity (NPSHa)	Positive Suction
2.6	Total duration of operation	Continuous
2.7	Speed	1500 / 2900 RPM
2.8	Location	Indoor
2.9	FEATURE OF CONSTRUCTION	
2.9.1	Impeller	Closed

Plumbing Works
Title – Material Specification

SR.NO	PARTICULAR	SPECIFICATIONS	
2.9.2	Shaft	Coupled	
2.9.3	Drive Transmission	Direct	
2.9.4	Seal	Gland Packing	
2.9.5	Mounting	Common base plate	
2.9.6	No. of stage	Single	
2.9.7	Starter Pump	DOL / VFD	
2.9.8	Flange drilling	As per BS 10, Table D, flat face with off centre bolt holes	
2.10	LIQUID DATA		
2.10.1	Liquid handled	Water	
2.10.2	Specific gravity	1.0	
2.10.3	Temperature	Ambient temp.	
2.11	MATERIAL OF CONSTRUCTION	(AS INDICATED IN BOQ OR AS SPECIFIED BLEOW IF NOT GIVEN IN BOQ)	
2.11.1	Base plate	M.S. IS 226	
2.11.2	Pump Casing	C.I.	
2.11.3	Impeller	SS CF 8 M	
2.11.4	Shaft	S.S AISI 410	
2.11.5	Wearing Ring	SS 316	
2.11.6	Painting	Epoxy	
2.11.7	Hardware in contact with water	Hot dipped galvanized	
2.11.8	Companion flanges	M.S., BS 10, Table D	
2.12	ACCESSORIES & SERVICES REQUIRED		
2.12.1	Base Plate	YES	
2.12.2	Foundation bolts	YES	
2.12.3	Companion flanges	YES	
2.12.4	Spare parts required	YES	
2.12.5	Maintenance tools required	YES	
3.0	Cut in pressure	Working Pump (As per IS)	Stand by Pump (As per IS)
4.0	Cut off pressure	Working Pump (As per IS)	Stand by Pump (As per IS)
5.0	INDUCTION MOTOR		
5.1	Type	Squirrel cage Induction	

SR.NO	PARTICULAR	SPECIFICATIONS
5.2	Mfg. Standard	IS 325
5.3	Rated Voltage	415 Volts, 3 Phase, 50 Hz., AC
5.4	Voltage and frequency variation	± 10% voltage variation ± 5% frequency variation ± 10% combined voltage and frequency variation
5.5	Speed in RPM	1500/2900 RPM
5.6	Class of Insulation	Class B
5.7	Degree of Protection	IP 55
6.0	Suction & delivery piping	MS, hot dipped galvanized, Class 'C'
7.0	Suction, delivery valves & header valves	Required, flanged Cast Iron valves with SS internal parts Make : Kirloskar / KSB / ZOLOTO/AUDCO/ FLOVEL Flanged Ball / Butterfly valve on suction and delivery of each pump & Flanged Non slam, spring operated dual plate type check valve on delivery side of each pump & on header
8.0	Control Panel	With Starter. One pump of similar rating shall have VFD Required with all protections & sequential timer for main pumps Also required Finolex / CCI / Gloster make cable from motor to panel
9.0	Level Indicator	Required for 0-5 mtr. Range and shall be panel mounted and interlocking with pump
10.0	Pressure switch	Provided for each pump
11.0	Pressure Gauge	Required at delivery of each pump & on header. Range 0-7 kg/cm ²
12.0	Gaskets	'Champion ' make
13.0	Hardware	Zinc coated

7.0 CENTRIFUGAL PUMPS

SCOPE:

This specification covers the supply, installation, testing & commissioning of Centrifugal type (monoblock/moonset/End suction) pumps. The scope also includes delivery piping upto Discharge Header with necessary pipe, fittings, etc. Each pump shall have isolation gun metal gate valve & NRV at delivery side. The pipe shall be GI class B.

CODES AND STANDARDS:

The design and manufacture of the pump shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed.

DESIGN FEATURES:

The pump shall be capable of developing required total head at rated capacity.

Impeller shall be enclosed type and shall be dynamically balanced.

The pump shall have non overloading characteristics.

The pump shall have positive suction.

CONSTRUCTIONAL FEATURES:

The casing shall be of rigid construction and shall have central delivery pipe.

The casing shall be of Cast Iron.

The pump shall have very small length suction and delivery pipe connections which will result in minimum friction loss in case of moonset pumps.

Impeller shall be of one piece and shall be of SS CF 8 M.

The shaft shall be of S.S. and its surface shall be properly finished.

Shaft sleeves shall be provided to protect shaft from any damage.

Bearing shall be ball or roller type.

Mechanical seal shall be provided to avoid any leakage.

INSPECTION AND TESTING:

The pump shall be offered for visual inspection before dispatch.

Material test certificates for the various pump components shall be furnished for purchaser's approval.

Hydrostatic test shall be carried out at 1.5 times the maximum discharge pressure.

All the tests shall be witnessed by purchaser.

DRAWINGS:

Following drawings shall be furnished by the vendor:

- 1) Overall dimensional drawing.
- 2) Cross-sectional drawings with Bill of Material and Material of Construction

TECHNICAL SPECIFICATIONS FOR CENTRIFUGAL PUMPS

SR. NO.	PARTICULAR	SPECIFICATIONS
1.0	Type	Centrifugal Monoblock / Monoset / End suction
2.0	Number of Units	As per BOQ
3.0	Design capacity of each pump	As per BOQ
4.0	Total head at design capacity	As per BOQ
5.0	Total duration of operation	As per BOQ
6.0	Speed	2900 RPM

Plumbing Works
Title – Material Specification

SR. NO.	PARTICULAR	SPECIFICATIONS
7.0	Location	Raw water Pumps : Centrifuga monoblock/End suction make up water Pumps in the U.G. Tank HVAC make up compartment : Centrifugal moonset
8.0	FEATURE OF CONSTRUCTION	
8.1	Impeller	Enclosed
8.2	Shaft	Coupled
8.3	Drive Transmission	Direct
8.4	Seal	Mechanical
8.5	Mounting	Base plate
8.6	No. of stage	Single
8.7	Nozzle orientation A. Suction B. Discharge	Side suction Top discharge
8.8	Starter	DOL for upto 5 KW & Star / Delta for more than 5 KW rating
8.9	Flange drilling	As per BS 10, Table F, raised face with off center bolt holes
9.0	LIQUID DATA	
9.1	Liquid handled	HVAC make up soft Water
9.2	Specific gravity	1.0
9.3	Temperature	Ambient temp.
10.0	MATERIAL OF CONSTRUCTION	
10.1	Base plate	M.S. IS 226
10.2	Pump Casing	Cast Iron
10.3	Impeller	SS CF8 M
10.4	Shaft	S.S AISI 410
10.5	Wearing Ring	S.S AISI 410
10.6	Painting	Epoxy
10.7	Hardware in contact with water	Hot dipped galvanized
10.8	Companion flanges	M.S., BS 10, Table F
10.9	Make	KSB / KIRLOSKAR/GROUNDFOSS
11.0	ACCESSORIES & SERVICES REQUIRED	
11.1	Base Plate	YES
11.2	Foundation bolts	YES
11.3	Companion flanges	YES
11.4	Spare parts required	YES
11.5	Maintenance tools required	YES
12.0	MOTOR :	
12.1	Power Supply	230 / 415 Volts, 3 phase, 50 Hz. AC
12.2	Class of Insulation	Class B
12.3	Degree of Protection	IP 55
13.0	Delivery piping	GI, Class 'B'
14.0	Delivery valves & header valves	Gun Metal flanged valves Make : AUDCO / ZOLOTO / KSB / IVC

SR. NO.	PARTICULAR	SPECIFICATIONS
		For monoset pump : Flanged Ball / Butterfly valve on delivery side of each pump & Flanged Non Return Valve on delivery side of each pump & on header For monoblock / end suction pump : Flanged Ball / Butterfly valve on suction & delivery side of each pump & Flanged Non Return Valve on delivery side of each pump & on header
15.0	Starter Panel	Required with pump interlocking with respect to tank levels. Also required Finolex / Polycab make cables up to starter panel.
16.0	Level Indicator	Required for 0-5mtr. Range and shall be panel mounted and interlocking with pump and over head tank.
17.0	Pressure Gauge	Required at delivery of each pump & on header. 0 –7 kg/sq.cm

8.0 WATER TREATMENT PLANT

SCOPE:

This specification covers the Supply, Installation, Testing & Commissioning of Water Treatment Plant which will have Domestic treatment which may include Filtration, chlorination, etc. & Softening plant for HVAC make up with all interconnections, piping to inlet, outlet, overflow, back wash & drain, fittings, valves, and instrumentation required to install the plant completely.

DESIGN BASIS:

Water Treatment Plant is designed to produce soft water @ flow rate as specified in BOQ.

SOURCE OF WATER:

The source of raw water is from municipality or through bore wells using bore pump system for extraction.

RAW WATER ANALYSIS:

Sr. No.	Test	Result
1.0	Total Hardness (Assume)	600 ppm

END WATER QUALITY

Treated Water from the softening plant would be as below:

Sr. No.	Test	Result
For Domestic	Total Hardness	< 100 ppm
	Total dissolved Solids	< 500 ppm
For HVAC	Total Hardness	< 10 ppm

The END WATER quality could be achieved should the mentioned technical specifications are adhered to during the procurement and installation of the system.

TECHNICAL DATA SHEET:

	ITEM DESCRIPTION	DESIGN SPECIFICATION
1.	Quantity	As per BOQ.
2.	MOC of Vessel	As per manufacturer design
3.	Interconnecting Piping & Valves	
4.	Frontal Piping & Fittings	M.S.
5.	Manual Valves	Multi Port Valve
	Filtration	
6.	Flow Rate	As per BOQ
7.	Type of Unit	To be provided by Vendor
8.	Design pressure	2-3 Kg/cm ²
9.	Detail of Backwash	To be provided by Vendor
10.	Filter media Detail	To be provided by Vendor
11.	Size of inlet & outlet nozzle	To be provided by Vendor
12.	Vessel Detail	To be provided by Vendor
13.	Any other treatment required according to source water analysis	To be provided by Vendor
	Softener	
1	Flow rate	As per BOQ
2	Design pressure	2-3 Kg/cm ²
3	Size of inlet & outlet nozzle	To be provided by Vendor
4	Vessel Detail	To be provided by Vendor
5	Resin	
	Quantity	To be furnished by vendor
b.	Make	Ion Exchange or equivalent
c.	Operation Mode	Manual
d.	Regeneration Mode	Manual
e.	Regeneration Media (NaCl)	Saturated Salt Brine
f.	Quantity of Salt	To be furnished by vendor
g.	OBR	To be furnished by vendor
h.	Salt Preparation Tank	To be furnished by vendor

9.0 Solar Hot water system

Supply Fixing, testing and commissioning Solar Hot water system as per given tender specifications, indirect type of capacity **30000 liters** per day complete with J type flat plate collector with 35 Risers for the liquid to flow enclosed in a marine grade all aluminum housing with cover of glass top, double ceramic coated tank, magnesium sacrificial anode, cold flow water stratifier, The system is closed type with auto temperature cum pressure relief valves on cold and hot side and pressure relief valve on the closed circuit. The system has to be supplied with hot and cold copper pipes with interconnectors; powder coated mounting frames and Hartgard close circuit fluid. including with all necessary accessories etc. complete with supporting stand & electric backup.

Codes and Standards

Solar hot water systems shall comply with Australian Standard AS2712 or equivalent to American/ DIN standard, and

manufactured under a Quality Assurance System complying with ISO 9001. Technical design, construction quality and measurement of performance (accelerate ageing, continuous control) all shall be done as per AS 2712.

Solar Panels

A nominal aperture area of 2 m² (approx.) of collector surface shall be provided for every 150 liters of stored water.

Absorber

The collector will be designed for use with closed circuit technology and must be suitable for installation where radiation levels are medium & high.

The collector absorber shall be made from treated pressed steel forming 25mm headers and 35 multi-flow risers.

For increasing the absorption and decreasing emissions from the absorber, the manufactured absorber plate shall be either black polyester powder coat or black chrome plated with an Absorptivity factor of 0.95 and an Emittance factor of 0.01+0.03 for the black chrome.

Collector Tray

The absorber shall lie in a tray with a cover of glass on top. The collector tray shall be made of 0.7 mm marine grade aluminum alloy stable and well insulated with a minimum of 55 mm thick polyester. This shall withstand high temperatures that might come up over the summer when there is no hot water consumption (stagnation)

The collector construction shall be sealed from any water ingress.

Storage Tank

The gained energy out the sun shall be stored in a storage tank where we can be used at any time of the day. The storage tank should be well insulated with CFC free polyurethane foam in order to keep hot water inside it hotter for longer periods.

In order to protect the insulation from damage, an outer case of 0.4 mm thick aluminum of marine grade shall be provided. For those days when there is insufficient solar energy, a thermostat operated electric booster of 2.4 kW must be provided inside the storage tank. The booster shall cut in to maintain hot water temperatures round the clock. The booster shall cut-out again when thermostat set point is reached.

The tank shall be made from 2.5 mm steel and must be suitable for mains pressure. The storage tank shall be coated or lined from inside with 2 coats of ceramic lining, to prevent corrosion. It must be able to withstand a working pressure of 1000 kPa and shall be tested to 2100 kPa

The storage cylinder shall be fitted with a minimum 20 mm sacrificial Magnesium Anode to be able to last for a minimum of 5 years.

Installation

Solar hot water collectors must be installed on roof with tilt and exposed to direct sun (without shadowing). They should be tilted towards equator (south direction) with angles upto 30 degree C. Single unit or multiple units can be connected together in parallel to cover the desired daily hot water load.

The system shall also be equipped with all necessary safety devices that guarantee the system function in a proper way without problems. Such safety devices shall involve cold inlet relief valve and Pressure & Temperature relief valves. A pressure reduction valve should also be fitted to maintain the incoming pressure less than 850 kPa. The Pressure & Temperature relief valve shall be set to relieve water at 1000kPa and/or 99 degree C.

The storage tank shall be equipped with all necessary fittings on cold and hot water side, in order to connect with piping network (by the specialist contractor).

It is contractors responsibility to ensure that all civil, electrical, mechanical (piping etc) and all work related to solar water heater system are done according to the specifications. All hot water piping shall be adequately insulated to ensure minimum heat losses during re-circulation. A hot water circulation pump set (with 24 hrs timer) shall be provided to ensure continuous hot water availability in the ring.

10 WATER TANK

GENERAL SPECIFICATIONS FOR WATER TANK

GENERAL

Construction of water tank, septic tank and up flow filter is required to be done very carefully with good quality materials. Dense, well compacted concrete of required strength has to be achieved in order to make water tight compartment. The slope in the bed of tank, invert levels of insert, and also the levels of partition and baffle walls should be properly maintained for proper flow of liquid.

TESTING OF WATER TANK

After construction of tank, it shall be tested for leak proof ness. The tank shall be first filled with water up to the top of wall. The water level should not drop more than 50 mm within 48 hours. If the drop of water level is found more than 50 mm the defective and leakage point shall be rectified to the full satisfaction of the Engineer-in-charge.

COMMISSIONING

Before commissioning the septic tank, a little quantity of digested sludge, horse or cow dung may be added as a seed sludge to start functioning of bacterial activity in sewage.

BACK FILLING

The back filling shall be done as per specification after satisfactory testing of the tanks. Back filling shall be done in layers all around the tank and above the roof slab of the tank up to the height / depth as directed by the Engineer-in-charge.

CLEANING OF WATER TANK

The cleaning of the tank shall be done by manually or by Hydro dynamic mechanism with low or high pressure as directed. Potable water, approved disinfectant etc. shall be used for cleaning of water tank before use.

DEWATERING

The contract rate shall include bailing or pumping out all the water if any accumulated during the progress of work either from rain, seepage, springs or any other cause till completion of the work.

MODE OF MEASUREMENT

The work shall be measured under relevant item in the schedule of quantities and paid for. Quoted rates are deemed to include for dewatering, back filling testing and commissioning of water tank, septic tank and up-flow filter.

MODE OF PAYMENT

No additional payments shall be made towards dewatering back filling & commissioning. pipe line shall be paid under the relevant item.

LIST OF APPROVED MAKES:

Sr. No.	Item	Approved Make
1	SWR PVC PIPE & FITTINGS 6 KG CM ² ; FITTINGS : 6 KG CM ² ECO. DRAIN PIPE & FITTINGS	ASTRAL / SUPREME/PRINCE SUPREME/ ASTRAL
2	GULLY TRAP	GIRCO / TIRUMALA / SONIA/ SUPREME/ ASTRAL
3	STONE WARE PIPES FOR INTERNAL UNDER GROUND DRAIN PIPE	GIRCO / TIRUMALA / SONIA
4	RCC HUME PIPES EXTERNAL MAIN UNDER GROUND PIPE	INDIAN HUME PIPE / PRANALI
5	C.I. PIPE & FITTINGS	NICO OR EQ.
6	PPR PIPES & PPR FITTINGS	SUREME/PRINCE/
7	M.S/G.I. PIPES FOR WATER SUPPLY	TATA / JINDAL/ SWASTIK
8	ASTM/CPVC PIPE & FITTINGS FOR WATER SUPPLY	ASTRAL / SUPREME/ASHIRWAD /
9	COMPOSITE PLUMBING PIPE & COMPOSITE FITTINGS	KITEC OR EQ.
10	G.I. PIPES FITTINGS WATER SUPPLY	DRP-M / R-BRAND / ZOLOTO
11	GI TO GI JOINTS	CHAMPION / EQUIVALENT
12	SOLVENT CEMENT	SUPREME / KISSAN / FINOLEX
13	BALL VALVES	LEADER / ZOLOTO / AUDCO
14	WHEEL VALVES	LEADER / ZOLOTO/AUDCO
15	DCV / NRV	ZOLOTO/SPIREX/AUDCO
16	TAR	SHALIBIND / TIKIBOND-BS
17	SELF PRIMING SEWAGE PUMPS	HBD / GRUNDFOS
18	VALVES	AUDCO/ZOLOTO / R.B. / KBL / KSB
19	PUMPS	KIRLOSKAR / GRUNDFOSS/XYLEM
20	STARTER	SIEMENS / L&T
21	PRESSURE GAUGE	BELLS / H GURU
22	BOTTLE TRAP & WASTE COUPLING	JAQUAR / CERA/KOHLER
23	DEWATERING PUMPS	GROUNDFOSS/KIRLOSKAR/ KSB
24	HYDROPNEUMATIC SYSTEM	GRUNDFOSS OR EQUIVALENT
25	SANITARY FIXTURES	HINDWARE / CERA /PARRYWARE
26	EOT CRANE WITH HOIST	INDEF / ELECTROMECH / SAFEX / WH- BRADY / EQUIVALENT
27	METALLIC BELLOWS	BELLOW FLEX / PRICISION / DHRUV / B.D. ENGR.
28	R.O.PLANT	ION EXCHANGE /POWER H2O / THERMAX

Plumbing Works
Title – Material Specification

Sr. No.	Item	Approved Make
29	SOFTENER PLANT	ION EXCHANGE /POWER H2O / THERMAX
30	SOLAR SYSTEM	SOAHEART/MAMTA ENG/URMI/ATA-BP
31	ELECTRIC GEYSER	A-O SMITH/ RACOLD/SPHERHOT
32	HOT WATER GENERATOR	THERMAX/A.O.SMITH / KEPL OR EQUIVALNET
33	SEWAGE TREATMENT PLANT	THERMAX / ION EXCAHNGE / EQUIVALNET

NOTE : (1) Equivalent makes shall be approved by PMC before procurement
(2) Make & Model No. of Sanitary & Bath Fixtures will be finalized by the Architect.

M01 Providing and Fixing Anglo Indian/ Universal W/c Closet Suite (With Flush Tank) With 'P' Trap Hindware - Universal WC 20012, Cera - Universal - 2061 & Parryware-Universal-C0271. Comprising of : (A) Best Indian made white glazed vitreous Chinaware european water closet, with wash down pattern of approved make with trap as mentioned conforming to IS:2556-Part-II bearing ISI mark fixed to floor with necessary CP brass screws No. 8x37 etc. (B) Concealed type flushing cistern with 15mm dia stop cock of Jaquar make continental series and including making connections to WC and cistern with CP wall flange with adjustable screw for with matching chromium plated. (C) Black plastic seat and cover of approved make with CP pillar hinges conforming to IS:2548. Complete all as specified above with approved fittings.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

M02 Providing and Fixing Indian make wash hand basin Size 550 X 400 mm (with CP bottle trap) Comprising of : A) Best Indian make white glazed vitreous chinaware wash hand basin of Hindware-Cleo-10012(Without pedestal), Cera-Canon-1012 & Parryware-Titan range-C0432/36-(Without pedestal) with single tap hole supported on a pair of painted CI brackets b) One 15mm CP brass pillar cock of Jaquar make continental series approved make with hot or cold water indication C) One 15mm heavy quality flexible PVC inlet pipe connection with CP brass hexagonal check nuts with washer at both ends. D) One 15mm CP brass angle-cock/stop cock Jaquar make continental series . E) One 32mm heavy quality CP brass waste coupling Jaquar make continental series F) One 32mm heavy quality CP brass bottle trap Jaquar make continental series with extension piece and wall flange. G) One 32mm medium quality GI waste pipe with specials from extension piece of the bottle trap to the floor trap, length not exceeding 1 mtr concealed in wall.holes at appropriate places for inlet, outlet, over- flow, scour pipes etc.including providing necessary check nut systems for connecting the GI / PVC pipes / fittings, including fixing required ball valve (to be paid seperately) & connecting individual tank to a manifold line system (which will be paid seperately) etc. all complete, but without fittings and the base support for tank, using: H) One no. 40mm GI bend and 40mm dia 250mm long GI pipe connection waste pipe to floor trap. All as per specifications and as directed with approved fittings. Note The quoted rate should be inclusive of Wall flanges , extension nipples, etc.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M03 Providing and Fixing in position Flat back urinal comprising of : A) White glazed vitreous chinaware of approved make Flat back urinal of size 430mmX300mm with necessary fixtures of Hindware - Urinal - 60002,Cera-Flat Back-5005 & Parryware - New Magnum-C0575 B) CP brass distribution pipe and spreader of best approved quality to the urinal with necessary CP brass specials, clamps etc., one for each urinal in a range.C) One number 32mm CP brass waste coupling of Jaquar make model no. ALD 709 one

for each urinal D) One number 32mm PVC waste pipe and specials from each urinal to floor trap / half round channel. Complete all as specified with approved fittings Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M04 Providing and fixing best Indian make kitchen sink without drain board comprising of: A) Best Indian make glazed fire clay kitchen sink of approved make of size 600X450X250mm conforming to IS:771 Part II supported on painted CI brackets conforming to IS: 775 B) One 40mm heavy quality CP brass waste coupling. C) One 32mm PVC waste pipe bent to shape length not exceeding 1m to discharge into the floor trap through 40mm GI elbow, 40mm dia 250mm long GI medium class pipe connecting to floor trap. D) Providing and Fixing Single lever Deck Mount Kitchen Sink Mixer with Swinging spout, in Polished Chrome of approved make and conforming to Manufacturers Standards. Kitchen Sink Mixer: Jaquar FLR-5173B . Complete all as specified with approved fittings.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M05 Providing and Fixing Urinal Flush Valve Urinal Flush Valve Jaquar make catalogue No. PRS-077 with wall flange etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M06 Providing and Fixing 2-Way Brass Bib Tap JAQUAR make catalogue no, FLR 5041N etc., Complete appas per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M07 Providing and Fixing Health Faucet of JAQUAR make catalogue No. ALD-573 with metal hose and holder etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M08 Providing and Fixing in position Granite partition slab for urinals, size 610X1150mm, 18mm thick (tolerance + \ - 1mm) mirror polished on both sides and machine cut edges with exposed corners rounded etc all as per specifications.Note : The quoted rate should be inclusive of chasing in the wall and fixing with cement and matching pigment.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M09 Providing and Fixing in position best quality approved make bevelled edge Mirror of size 550 x 400mm mounted on 6mm thick plain asbestos sheet/ E- Board / Bison Panel backing with 4no.s of CP brass cap screws and washers fixed to walls with necessary plugs etc. all per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M10 Providing and Fixing in position 15mm n.b. Jaquar make continental series bib tap Catalogue no. CON-0490KN all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M11 Providing and Fixing in position approved best Indian make heavy quality screw down Gun metal Gate valve of 25 mm n.b. of Zoloto make with hand wheel of following sizes conforming to IS:778 and bearing ISI mark including testing, making good the leakages etc. complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M12 Providing and Fixing in position approved best Indian make heavy quality screw down Gun metal Gate valve of 40 mm n.b. of Zoloto make with hand wheel of following sizes conforming to IS:778 and bearing ISI mark including testing, making good the leakages etc. complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M13 Providing and Fixing in position approved best Indian make heavy quality screw down Gun metal Gate valve of 50 mm n.b. of Zoloto make with hand wheel of following sizes conforming to IS:778 and bearing ISI mark including testing, making good the leakages etc. complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M14 Providing, laying, jointing, fixing, testing, painting, commissioning 50 mm dia GI pipes, medium grade conforming to IS: 1239 including GI specials, cutting the pipes to the required lengths, threading, jointing the pipes, chasing the walls, and floors, making the holes, clamping to walls using wooden spacers or clamps and restoring the same to the original conditions, necessary excavation, testing, refilling etc., Rates shall be inclusive of painting GI pipes and fittings with two coats of anticorrosive bitumastic paint of approved quality and coating the pipes with hezzaine ropes/threads for underground protection of pipes. etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M15 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad For Internal Works - 15mm Outer dia , having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints for concealed works including cutting chases and making good the wall etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M16 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad For Internal Works - 20 mm Outer dia , having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints for concealed works including cutting chases and making good the wall etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M17 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad For Internal Works - 25 mm Outer dia , having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints for concealed works including cutting chases and making good the wall etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M18 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad For Internal Works - 32 mm Outer dia , having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints for concealed works including cutting chases and making good the wall etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M19 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad of 15 mm dia Exposed on wall , having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints complete as per direction of Engineer in charge etc for Internal Works Exposed on wall with 15mm Outer dia

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M20 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad of 20 mm dia Exposed on wall , having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints complete as per direction of Engineer in charge etc

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M21 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad of 25 mm dia Exposed on wall, having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints complete as per direction of Engineer in charge.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M22 Providing and fixing Chlorinated Polyvinyl chloride (CPVC) pipes Astral/ Supreme/Ashirwad of 32 mm dia Exposed on wall, having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings including fixing pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including of joints complete as per direction of Engineer in charge etc .

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M23 Providing ,laying ,fixing,testing,commissioning threaded 32 mm n.b PVC schedule 40 confirming ASTM-D-1785 Astral/ Supreme/Prince makes with specials ,cutting the pipes to the required lengths,threading, jointing the pipes using teflon tape chasing the wall using the walls and floors , making the holes,clamping to walls using the wooden spacers or clamps and restoring the same to the original conditions , necessary excavation ,testing ,refilling etc.complete all as specified and directed and as per manufacturer's specifications and as per direction of Engineer in charge etc .,

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M24 Providing ,laying ,fixing,testing,commissioning threaded 40 mm n.b PVC schedule 40 confirming ASTM-D-1785 Astral/ Supreme/Prince makes with specials ,cutting the pipes to the required lengths,threading, jointing the pipes using teflon tape chasing the wall using the walls and floors , making the holes,clamping to walls using the wooden spacers or clamps and restoring the same to the original conditions , necessary excavation ,testing ,refilling etc.complete all as specified and directed and as per manufacturer's specifications and as per direction of Engineer in charge etc ..

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M25 Providing and fixing UPVC floor trap with 75 mm dia outlet "Prince" or "Supreme" make,including connection with PVC soil/waste pipe necessary 150 mm thick CC 1:2:4 for embedding the trap including providing and fixing top rail and strainer on the top of the trap etc. complete all as specified and directed.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M26 Supply,Laying and fixing in position under floor against wall in chases 75 MM dia (Min Wall thk 3.2 mm) PVC SWR drainage pipe and specials rings confirming to TYPE B of IS 13592 Prince or Supreme Or Finolex as per manufacturer specification including cutting the pipes to required lengths necessary excavation,chasing and restoring to original conditions ,testing,etc Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M27 Supply, Laying and fixing in position under floor against wall in chases 110 MM dia (Min Wall thk 3.2 mm) PVC SWR drainage pipe and specials rings confirming to TYPE B of IS 13592 Prince or Supreme Or Finolex as per manufacturer specification including cutting the pipes to requires lengths necessary excavation, chasing and restoring to original conditions ,testing,etc Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M27-A Supply, Laying and fixing in position under floor against wall in chases 160 MM dia (Min Wall thk 3.2 mm) PVC SWR drainage pipe and specials rings confirming to TYPE B of IS 13592 Prince or Supreme Or Finolex as per manufacturer specification including cutting the pipes to requires lengths necessary excavation, chasing and restoring to original conditions ,testing,etc Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M28 Providing and laying in trench reinforced concrete non-pressure 250mm IS class NP-3 pipes 250mm diameter of following internal diameter at a depth from 1.5 m to 3 m on RCC cradle if specified (to the level and slope) and jointing with collars and butt-ends prepared for collar joints, including filling the joints with CM 1:1 and testing of joints, etc., complete (RCC cradle and excavation and backfilling shall be measured and paid for separately in relevant tender item). Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M29 Construction of valve chamber of size 600 x 600mm, up to 750mm deep comprising of 230mm thick brick walls using first class country brick walls in CM 1:5 over a bed of 150mm thick PCC 1:3:6 (using 40mm size metal) with 75mm projections around beyond the masonry faces, plastered with CM 1:3, mixed with waterproofing compound as per manufacturer's specifications 12mm thick on internal, external top surfaces and internal and top exposed surfaces finished smooth with a floating coat of neat cement, providing and fixing painted light duty double seal CI frame and cover of size 600 x 450mm weighing about 50- 52Kgs conforming to IS 1726 with locking arrangement fixing the frame in RCC 1:2:4 including cost of necessary steel reinforcement, fabricating, form work, curing, etc, complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M30 Providing and Fixing in position best quality salt stoneware gully trap of size 100mm square with 100mm outlet; conforming to IS:651 embedded in plain cement concrete 1:3:6 (20mm Metal), providing and fixing 100mm square CI grating on top of the trap, all the above encased in a chamber of 300 x 300mm built with 115mm thick brick masonry using first class country bricks in CM 1:3, over a bed of CC 1:4:8 using 40mm size metal 100mm thick, plastering with CM 1:3, 13mm thick inside, outside, exposed top surfaces and Internal and top exposed surfaces finished smooth with a floating coat of neat cement, Providing and fixing CI frame and cover of size 300 x 300mm weighing not less than 7Kgs fixing the frame in PCC 1:2:4 using 20mm stone metal including painting the frame and cover with 3-coats of anticorrosive black bitumastic painting etc. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M31 Construction of Manhole of clear dimension 1200X900mm in 230mm thick brick masonry using first class country bricks in CM 1:3 over a bed of 200mm thick CC1:2:4, plastering with CM 1:2, 12mm thick on internal, external surfaces and Internal, top exposed surfaces finished smooth with a floating coat of neat cement, RCC 1:2:4 with necessary steel reinforcement as per drawing to support CI frame and cover of size 610X455mm weighing about 50- 52Kgs conforming to IS:1726 in CC1:2:4 and CI steps painting with 3-coats of anticorrosive, black bitumastic paint, encasing of sewer connection to manhole with PCC 1:2:4 etc. Complete all as specified and directed for initial depth of 1.0mtr .Note: CC 1:2:4 in the above Item is by using 20mm graded aggregate obtained from approved quarry

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M32 Providing and fixing CI frame and cover 500mm dia of Neco weighing about 50- 52Kgs conforming to IS:1726 ,etc. complete as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M33 Providing & fixing Medium duty CI frame and cover 500mm dia of Neco weighing not less than 116Kgs conforming to IS:1726 all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M34 Extra over Item no. M31 for constructing additional depth of manhole of size 1200 x 900mm beyond the initial depth of 1mtr for brick work at one & half bricks size, cement concrete, plastering, providing and fixing CI steps, dewatering etc. Complete up to a minimum depth of 1mtr. Complete all as per specifications.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M35 Making connection from existing water valve chamber, including tapping and making connection to existing live water supply line, including providing elbow and isolation valve etc., Complete as directed by EIC.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

M36 Making connection to existing soak well / Drainage system for proposed sewerage line, including making drop connection if required, safe drilling / making hole to existing inlet chamber, finishing, etc., all as per direction of engineer-in-charge.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for