

GOVERNMENT OF CHHATTISGARH
PUBLIC HEALTH ENGINEERING DEPARTMENT



UNIFIED SCHEDULE OF RATES [PART - I]
FOR
WATER SUPPLY, SEWERAGE WORKS



IN FORCE FROM 07/02/2015

Issued
By
Engineer in Chief
Public Health Engineering Department
Raipur, Chhattisgarh

PREFACE

It is a matter of great pleasure to announce that Public Health Engineering Department of C.G. Govt is going to issue/launch its own Unified scheduled of rates for the civil, mechanical and electrical works related to the department. The USOR has prepared in two volumes. The first volume is meant for works of water supply and sewerage and second volume for the works related to Tube well drilling. The USOR will facilitate the preparation of realistic estimates and will bring the uniformity among the rates and specifications of various water supply and sewerage schemes to be implemented by the Public Health Engineering Department in Chhattisgarh state.

Since year 2000, the formation of new state of Chhattisgarh, the department was using the USOR of MadhyaPradesh State. It was felt essential to frame a new USOR pertaining to the various aspects and conditions like labour, markets, approaches etc. in the Chhattisgarh State. In order to materialize the task, a high level committee, chaired by the Chief Engineer, with team of two Superintending Engineers of civil and E&M wing of the Department, one Executive Engineer and two Assistant Engineer's from civil was formed. After high level scrutiny, M/s khaira associates, Bhopal was selected as the out sourcing agency to complete the preparation of USOR based on ground realities and exhaustive market survey for collection of base rates of various items. The specifications for various items prepared in conformation with the latest versions of IS codes, CPHEEO Manuals and as per the prevailing best practices. The rate analysis conforms to the CPWD norms.

Twenty new chapters on survey, UPVC, HDPE, PVC-U, GRP, M.S., BWSC, PCCP, PSCP, PE-AL-PE, smooth flow pipes, intake well, water treatment plants, sewerage treatment plants, outdoor transformers, ground service reservoir, elevated reservoirs, water meters and submersible pumps etc are included in this USOR. This step will open the doors to welcome and encourage the use of new pipes and new technology in the field of Public Health Engineering Department.

I extend My thanks to the New USOR preparation Committee headed by Shri H.S.Dhingra, Chief Engineer, Members Shri R.K. Choubey, Shri A.K. Sahu and Shri F.L. Mandloi, Superintending Engineers, Member Secretary Shri S.B.Bapat Executive Engineer, Shri R.R. Vishwakarma and Ms. Ashalata Gupta Assistant Engineers, Shri N.L. Suman, Shri N.K.Chouhan & Shri K.K. Dewangan, Shri Virendra Vaishnav and Shri P.N. Chitnawis Sub Engineers & Shri Kamlesh Kumar Sahu typist for their Commendable efforts in preparing this Unified Schedule of Rates.

All possible efforts have been exercised and cautions have been taken to make the USOR foolproof and useful in all respect. Even though if any discrepancy, deviations are observed may kindly be intimated to the undersigned for the consideration.



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GENERAL NOTES

- 1 Rate for completed items include the cost of following :-
 - 1.1 All material, labour, workmanship, templates, tools, hire and running charges of plants & machinery required to complete the work, unless specified otherwise.
 - 1.2 All lead & lift of materials required for execution of work inclusive of charges like duties, cess, tax, royalty etc.
 - 1.3 Provision for erection, removal of centring form works, scaffolding, benching, ladders and all other applications etc, required for execution of the work, unless otherwise specified.
 - 1.4 Provision for necessary covering to protect the work/structure from inclement weather etc. and damage arising from falling of materials or rains, fire etc shall be the responsibility of the contractor.
 - 1.5 Curing wherever required including arrangement of water and also including its lead or lift whatsoever.
- 2 The mode of measurements shall be as per provisions contained in the relevant chapters and in specifications/relevant IS codes.
- 3 All materials shall Conform to the relevant prevailing Indian Standard Specifications. All material before use in works shall require approval of the Engineer in charge, who will get them sampled, tested as per relevant IS code at contractor's cost and samples so approved shall be kept in the office of the concerned Engineer-in-charge till finalization of the work.
- 4 Material obtained from excavation shall be the property of the Department.
- 5 Hard Rock available from excavation, shall be used for conversion into coarse aggregates or for other construction material and shall be issued to the contractor on the rate as decided by competent authority.

6 Cement :-

- 6.1 Where contract provides for cement to be arranged by the Contractor himself, only I.S.I. Marked cement for OPC (Ordinary Portland Cement) as per IS 269 for 33 grade cement, IS 8112 for 43 grade cement, IS 12269 for 53 grade cement & IS 455-1989 for PSC (Portland Slag Cement) specifications shall be allowed to be used in the work subject to the prescribed tests.
 - 6.2 Make of cement shall be got approved by the Engineer-in-charge. The engineer in charge shall get cement tested as per relevant IS codes, at the cost of the contractor, before use in work.
 - 6.3 For pre-stressed concrete works where the strength of concrete required is more than M-30, then O.P.C. 53 grade cement Conforming to relevant IS code shall be used.
 - 6.4 In specific cases requiring higher grade of strength, use of Ordinary Portland Cement (OPC) should be invariably ensured.
 - 6.5 The arrangement for necessary equipment and testing shall have to be made by the contractor himself at site, as decided by the Engineer-in-Charge. All expenses shall be borne by the contractor.
 - 6.6 Any lot of cement brought to site by the contractor, would be permitted to be used in the work only after the satisfactory results of the tests, under the supervision of the Engineer-in- Charge or his authorised representative. The record of the test results shall be maintained in register mentioned in subsequent Para.
- 7 If any item of work is found not up to the prescribed standard but the Engineer-in-charge is of the opinion that the same is structurally adequate and can be accepted at a reduced rate, then in such case, the Engineer-in-charge shall submit proposal for the same, supported by an analysis in justification thereof, through proper channel to the Superintending Engineer of the Public Health Engineering Department to obtain his approval expeditiously (ordinarily within 15 days). The approved analysis along with orders of the Superintending Engineer should be appended to the final bill of the contractor.

- 8 In case of any dispute in the provisions of the specifications and the schedule of rates given in USOR, the decision of Engineer-in-Chief, PHED, Chhattisgarh will be final and binding on all.
- 9 (a) Rates of items would apply for work order/piece work system also.
(b) Rates payable for any work to be done departmentally then rates should be reduced by 10.33% (contractor profit 10% + T&P charge 2%) & 1% labour welfare cess (on total cost of the item including contractor profit, T&P & overhead expenses).
- 10 Interpretations :- The Engineer-in-Chief, PHED, Chhattisgarh shall be the sole deciding Authority as to the meaning, interpretation and implications of various provisions in this schedule of rates. His decision shall be final and binding on all concerned.
- 11 Safety :- The contractor shall be fully and solely responsible for making all the safety arrangements pertaining to the work. The contractor shall be fully responsible and liable in all respects for any accidents and subsequent legal action initiated by any party including the department.
- 12 For every work latest IS codes with up to date amendments shall be applicable.
- 13 Minimum labour rate shall be as decided by labour Commissioner Chhattisgarh.
- 14 All commodity prices are based on price index.
- 15 The materials such as pipes, specials, valves etc either supplied by Department or by the contractor shall Conform to the specification mentioned in the schedule of rates and should invariably Conform to the relevant I.S. or B.S. standards/ material of best quality available in the market shall only to be used.
- 16 The work shall be executed in accordance with the PHED, C.G. specifications. In all cases, the latest revision of the Indian standards/codes for pipes, specials, valves and other construction material etc. shall also be referred to. Latest CPHEEO manual, published by the Ministry of Urban Development, Govt. of India shall also be applicable. In case of any discrepancy, the decision of Engineer-in-Chief, PHED, C.G. shall be final.

- 17 Complete: The provision of all such materials and labour and the performance of all such workmanship which may be necessary for the proper execution of the work in best workmanship and manner but not particularly described in the items of schedule of rates.
- 18 Best: shall mean that in the opinion of the Engineer-in-Charge, there is no superior material or article or class of workmanship available in the market.
- 19 No alternative materials other than specified will generally be allowed to be used in the works except when their use becomes absolutely necessary in the interest of work on such grounds as non-availability in the market due to reasons beyond control.
- 20.1 The rates of all material are inclusive of excise duty.
- 20.2 The rates of all material are also inclusive of central sales tax, VAT, entry tax, loading - unloading & transportation FOR destination.
- 21 The labour only provided in the Schedule of Rates includes the cost of all labour including necessary handling of the materials at site of work and all workmanship. The labour rates adopted for preparation of USOR are inclusive of provision for weekly holiday.
- 22 The rates for completed items in the schedule of rates include the following.
- | | |
|---|---|
| 1 | 1% water charges |
| 2 | 2% for T & P |
| 3 | 3% for over head charges |
| 4 | 10% for contractor's profit |
| 5 | 1% labour welfare cess (on total cost of the item including contractor profit, T&P & overhead expenses) |

- 23 (a) Rates for transportation in Chapter No. 32 (Miscellaneous) "Carriage of Material" includes :-
(i) Loading and unloading
(ii) Stacking at suitable places as directed by the Engineer-in-charge, the weights of the container of any material shall be ignored.
- 24 Capacity of ESR/GSR to be constructed shall be rounded out to nearest 1000 litres - always on higher side i.e. if required capacity is 1,24,685 litres, it shall be rounded to 1,25,000 litres Similarly, if required capacity is 6,24,080 litres, it shall be rounded to 6,25,000 litres.
- 25 Capacity of Unconventional/ Conventional Treatment Plants shall be rounded to nearest 0.5 MLD always on higher side i.e. if WTP of 2.37 MLD is required, it shall be rounded to 2.5 MLD. For WTP having capacity less than 0.5 MLD, package type W.T.P. should be considered.
- 26 Security money for testing should be kept at 10% of the value of the pipe line work. After testing of the complete pipe line system to the satisfaction of the Engineer-in-charge the same shall be released.
- 27 For detailed specification refer to specifications prepared by the Public Health Engineering Department, Chhattisgarh State, relevant IS codes, CPHEEO manual of Govt. of India on water supply & treatment and CPHEEO manual of Govt. of India on sewerage treatment with upto date amendements. Where ever the relevant IS codes are not specifically mentioned but required IS codes are pertaining to the works, shall form the part of specifications.

CHAPTER 1 SURVEY

1 Applicable codes :

IS No.	Title
273 - 1990	Picks and beaters (Third revision) reaffirmed 2006
1492 - 1970	Metric surveying chains (first revision) (with 2 amendments) (Reaffirmed 1998)
1759 - 1986	Powrahs (Second revision) reaffirmed 2002
1779 - 1961	4 - Metre levelling staff, folding type (reaffirmed 2006)
1842 - 1961	Surveying chain pins (arrows) (reaffirmed 2006)
1955 - 1961	Prismatic compass, liquid, (Reaffirmed 2006)
1957 - 1961	Prismatic compass, non-liquid (reaffirmed 2006)
2286 - 1963	Ranging rods (reaffirmed 2006)
2976 - 1964	Optical theodolite (reaffirmed 2000)
2988 - 1995	Venire theodolite (with 3 amendments) (reaffirmed 2007)
4080 - 1994	Specification for Vertical staff gauges. (reaffirmed 2000)
4590 - 1980	Secondary level (First revision) (reaffirmed 2006)
5497 - 1983	Guide for topographical surveys for river valley projects (reaffirmed 2005)
5510 - 1969	Guide for soil survey for river valley projects (reaffirmed 2005)
8330 - 2004	Telescopic tripod for surveying instruments.

2 Length of the survey will be measured along the lines on which particular type of survey is to be done. For example, for chain and compass survey, it would be the length along which the chaining and compassing is to be done. For levelling, it would be the total length of the lines along which levels are to be taken.

3.1 The rate are based on the following average daily progress that can be normally achieved under average conditions by one survey party :-

Item	Head works
Chain and compass survey	2 km
Levelling (above 15m interval)	2 km

3.2 The labour strength of one survey party for chain and compass survey considered in (a) above is 12 mazdoors (3 for ranging, 1 for preparing pegs, 1 peg man, 2 chainmen, 1 compass man, 2 axe men for removing, obstacles, 1 waterman and 1 watchman for watch and ward of camp).

For levelling (above 15m interval) the labour strength considered is 8 mazdoors (2 chain and tape man, 1 staff man, 1 instrument man, 1 umbrella man, 1 waterman and 2 axe men for removing obstacles).

3.3 In very difficult terrain and special circumstances where the progress may be less special sanction for the rate should be obtained from the Superintending Engineer and the provisions for the same be made in the estimate.

4 To carry out survey for item No. 1.1 to 1.6 by Total Station Electronic Instrument the rates will be increased by 15% for Computer Engineer, other computer staff, computer stationary & plotting by computer as directed by Engineer-in-Charge & additional 10% for profit of the contractor.

5 Measurement:

The survey work shall be measured in Km/Hectare. No payment shall be made for surveying equipments.

6 Rates

6.1 The rates include charges for all tools & plants, survey equipments, other appliances etc. required for the work.

6.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc.

CHAPTER 1 - SURVEY

S.No.	Particulars of Items	Unit	Rates (in Rs.)
1.1	Chain and compass survey	Km	1038.00
1.2	Chain and theodolite survey	Km	1038.00
1.3	Theodolite work involving fixing of stones at every tenth chain, tangent apex and vertex point of final alignment.	Km	2076.00
1.4	Fly levelling for fixing temporary bench marks :		
1.4.1	Up to 15m interval	Km	1038.00
1.4.2	Above 15m interval	Km	519.00
1.5	Levelling Head works		
1.5.1	Below 5m interval (for basin survey and dam seat survey)	Km	1730.00
1.5.2	5 to 10m interval	Km	1384.00
1.5.3	more than 10 but up to 15m interval	Km	1038.00
1.5.4	Above 15m interval	Km	692.00
1.6	Double levelling for transfer of bench marks:		
1.6.1	Up to 15m interval	Km	4152.00
1.6.2	Above 15m interval	Km	2076.00
1.7	Total Station Survey Detailed Geo referenced topographical mapping and development of graphic database for any selected area using digital state of art total station, automatic levels grid size 30 M x 30 M etc. as per site condition requirement and as directed by the Engineer-in-charge including transfer of entire area data to computer system in different Geo referenced layer/themes using features of standard software. Compatible with urban area project system design software packages including supply of soft copies and 5 hard copies in appropriate scale complete.		
1.7.1	Upto 5 Hect.	Hect.	1500.00
1.7.2	5 Hect to 10 Hect.	Hect.	1000.00
1.7.3	10 Hect to 25 Hect.	Hect.	750.00
1.7.4	Above 25 Hect.	Hect.	500.00
1.7.5	Add extra in above for following grid levels in place of 30 mtr x 30 mtr grid size :		

1.7.5.1	Grid size 10mtr. X 10mtr.	Hect.	200.00
1.7.5.2	Grid size 20mtr. X 20mtr.	Hect.	100.00
1.8	Boring holes with auger for preparing trial pit for the investigation of the type of soil up to a depth of 3.5 m in any soil.		
1.8.1	For 20 cm dia holes	Each	137.00
1.8.2	For 25 cm dia holes	Each	168.00
1.8.3	Add to or deduct from the rate for the trial holes of 3.5 m depth if the trial holes are deeper or shallower.		
1.8.3.1	For 20 cm dia holes	m	39.00
1.8.3.2	For 25 cm dia holes	m	48.00

CHAPTER- 2 ALLIED CIVIL WORKS

- 1 Earth work shall be done as per IS 1200 (Part-1) : 1992
- 2 Excavation shall be done as per safety codes IS 3764 : 1992
- 3 Concrete work shall be done as per IS 456 : 2000
- 4 Cement shall be used as IS standard given below :-
 - 4.1 When the strength of concrete required is up to M-20, then O.P.C. Conforming to IS 269-1989 or P.S.C. conforming to IS 455 may be used.

 - 4.2 When the strength of concrete required is more than M-20 but up to M-30, then O.P.C. Conforming to IS : 8112 - 1989 or P.S.C. conforming to IS 455 shall be used.

 - 4.3 Pozzolona cement is now being widely produced all over country. This may be used in structures contact with water as per I.S. code. In specific cases requiring higher grade of strength, use of or P.S.C. conforming to IS 455 should invariably be ensured.

 - 4.4 For pre-stressed concrete works if the strength of concrete required is more than M-30, then O.P.C. Conforming to IS : 12269-1987 shall be used.
- 5 Steel shall be used as per IS standard given below :-
 - 5.1 Mild steel and medium tensile steel bars shall Conform to IS :432 (Part- I : 1982)
 - 5.2 High strength deformed steel bars & wire for concrete reinforcement shall Conform to IS : 1786 - 1985 superseding IS 1139 - 1966. This bars are popularly known as TMT (Thermo-Mechanically Treated) bars.
 - 5.3 Hard drawn steel wire fabric shall Conform to IS : 1566.
 - 5.4 Rolled steel made from structural steel shall Conform to IS : 226.
- 6 Sand

Sand shall not contain dust, lumps, soft or flaky materials. Fine aggregate having positive alkali silica reaction shall not be used. All fine aggregate shall confirm to IS : 383. The fineness modular of fine aggregate shall neither be less than 2.0 nor greater than 3.5. Sand to be used in work shall conform to IS 1542-1960 for plaster and IS 166-1965 for masonry work.
- 7 Coarse aggregate
 - 7.1 Coarse aggregate consist of clear, hard, strong, dense, nonporous and durable pieces of crushed stone. They shall not consist pieces of elongated particles salt, alkali, vegetable matter or other deleterious material.

7.2 All coarse aggregate shall conform to IS : 383 & tests for conformity shall be carried out as per IS: 2386 Part I to VIII. The maximum value of flakiness index for coarse aggregate shall not exceed 35%. The coarse aggregate shall satisfy the following requirement of grading.

I.S. Sieve	Percentage by Weight Passing the Sieve		
	40mm	20mm	12.5mm
63mm	100	--	--
40mm	95 – 100	100	--
20mm	30 - 70	95 – 100	100
12.5mm	--	--	90 – 100
10mm	10 – 35	25 – 55	40 – 85
4.75mm	0 – 5	0 – 10	0 – 10

8 Bricks

8.1 Common burnt clay bricks should be as per IS:1077 classes of common burnt bricks used in water supply are as under :-

8.2 Class: Classes of Common Burnt Clay Bricks as under :

Class Designation	Average Compressive strength not less than	
	N/mm ²	Kgf/cm ² (aprox)
25	25.0	250
20	20.0	200

8.3 Fly ash brick

Clay Fly Ash Bricks: The clay fly ash bricks shall conform to IS 13757. The bricks shall be sound, compact and uniform in shape and colour. Bricks shall have smooth rectangular faces with sharp and square corners. The bricks shall be free from visible cracks, flaws, warpage, nodules of free lime and organic matter, the bricks shall be hand or machine moulded. The bricks shall have frog of 100 mm in length 40 mm width and 10 to 20 mm deep on one of its flat sides. If made by extrusion process may not be provided with frogs. Fly Ash shall conform to grade I or grade II of IS 3812.

8.4 Hollow concrete blocks

Hollow concrete block having one or more large holes or cavities (Open cavity or close cavity) having the solid material between 50 and 75 percent of the total volume of the block calculated from the overall dimensions shall conform to IS 2185 (Part-I) - 1979. (Reaffirmed 2003)

9 Mortar

9.1 The mortar mixing shall preferably be done in mechanical mixer operated manually or by power. Hand mixing can be restored to as long as uniform density of the mix and its strength are assured subject to prior approval of Engineer-in-charge.

9.2 Hand mixing operation, if permitted, carried out on clean water tight platform when cement and sand shall be first mixed dry in required proportion several times till the mixture is of uniform. Minimum quantity of water shall be added to bring the mortar to the consistency of stiff paste.

9.3 Mortar shall be mixed only in such quantity as required for immediate use. The mortar normally be considered to use within 30 minutes. Mortar remains unused after 30 minutes shall be rejected and removed from site.

10 Plaster

Plastering shall be started from top towards bottom. Wooden screeds 75mm wide and of the thickness of the plaster shall be fixed vertically 2.5 to 4 meter. apart to act as gauge and guide in applying plaster. The mortar shall be laid on the wall between the screeds using the plasters float and pressing the mortar so that packed joints are properly filled. The plaster shall there be finished off with a wooden straight edge reaching across the screeds. The straight edge shall be worked on the screeds with small upward and side ways motion 50mm to 75mm at a time. Finally, the surface shall be finished off with a plasters wooden float. Metal floats shall not be used.

Curing shall be commenced as soon as mortar used for finishing has hardened sufficiently and not to be damaged during curing. It shall be kept wet for a period of at least 7 days.

11 Form work :-

11.1 Form work shall include all temporary form for forming concrete of shape with all props, staging, centring required for support.

11.2 All material shall Conform to relevant I.S. specifications

11.3 Form work shall be constructed with metal or timber, for metal all bolts should be counter sunk.

11.4 The form work should be robust and strong and joint shall be leak proof. Staging must have cross bracing and diagonal bracing in both direction.

11.5 The rates include provision of gradient in form work for terrace roof and gradient shall be provided necessarily for water drained out quickly and effectively. Concrete shall not be freely dropped into place from height exceeding 1.50 meter. And it shall be compacted in its final position within 30 minutes of its discharge from mixer. It shall be compacted thoroughly by vibration or other means during placing so as to produce a dense homogenous void free mass having required surface finish.

11.6 No plaster is permitted on the concrete surface. Bottom and side surfaces shall give a uniform in textured smooth surface and good appearance. Concrete having rough non-uniform texture and honey combing in more than 5% area shall be rejected and payment for the form work shall not be made.

12 Ministry of Shipping, road transport & highways has published specifications for road and bridge works prepared by Indian road congress. Relevant section used in item 2.8 are given as under:

12.1 Section 300 covers specifications for earth work, erosion control & drainage.

12.2 Section 2100 covers specifications for open foundations.

13 **Excavation And Preparation of Trench**

13.1 The rates for various items of civil works given in this chapter shall be applicable for the civil works connected with laying and jointing of water supply and sewerage pipeline works only. These rates shall not be applicable for the items of civil works for which the rates has already given in the relevant chapters.

13.2 The trenches shall run in perfectly straight line between points or manholes, as shown on the approved drawings.

13.3 The excavation of the trench shall be commenced at the downstream end of the sewer and be continued up the gradient.

13.4 The trench shall be excavated only so far in advance of pipe laying as specified by the Engineer-in-charge. It shall usually be so regulated as to enable the excavation to be completed about one day in advance of pipe laying.

13.5 The trench shall be so shored and drained that the workmen may work there in safely and efficiently.

13.6 The trench shall be kept free from water. Excavation below water table shall be done after dewatering trenches. The discharge of the trench dewatering pumps shall be conveyed either to discharge channels or to natural drains.

13.7 The excavation shall be carried out with manual labour or with suitable mechanical equipment as approved by the Engineer-in-charge.

13.8 When the pipeline is under a roadway, a minimum cover of 100 cm is recommended for adoption but it may be modified to suit local conditions and in case of A.C. pipe a cover of at least 1.25 m is provided. Where the pipe line or drains crosses the road, the road crossing shall be excavated half at a time, the 2nd half being, commenced after the pipes have been laid in the 1st half and the trench refilled. Necessary safety measures for traffic as directed shall be adopted. All water mains; cables etc. met within the course of excavation shall be carefully protected and supported. Care shall be taken not to disturb the electrical and communicator cable met with during course of excavation, removal of which is necessary shall be arranged by the engineer in charge.

- 13.9 Trench shall be of sufficient width to provide a free working space on either side of pipe. At the bottom between the faces, it shall be such as to provide not less than 200 mm clearance on either side of pipe. Additional width shall have to be provided at position of sockets, flanges, D.Joints for jointing. Depth of pit at such places shall also be sufficient to permit finishing of joints.
- 13.10 In obtaining the formation of the bottom of the trenches in case of sewer line, the usual method of using sight rails and boning rods shall be adopted during the whole of the process. The sight rails shall be fixed at all changes of direction of gradient and at suitable intervals, which may not be more than 15 meters apart, before excavation is started. The centre line shall be marked on each horizontal rail, which is fixed at true level.
- 13.11 The excavation shall be boned in at least once in every 2 meters, the foot of the boning rod being set on a block of wood of the exact thickness of the material of the pipes.
- 13.12 Except where special foundations are to be provided, the trench shall be excavated in accordance with one of the following alternatives as may be considered appropriate by the Engineer in charge.
- 13.12.1 The trench shall be excavated to the exact gradient specified so that no making of the sub grade by back filling is required and the concrete bed, where required, may be prepared with greatest ease giving a uniform and continuous bearing and support for the pipe.
- 13.12.2 When the bottom of the trench at the specified gradient is found to be unstable or to include ashes and cinders, all types of refuse, vegetable or other organic material, or large pieces or fragments of inorganic material, they shall be removed to the satisfaction of the Engineer in charge. Before laying the concrete bed, where necessary, the specific gradient shall be attained by back filling with an approved material in compacted layers of 8 cm. The layers shall then be tamped as directed by the Engineer in Charge.
- 13.12.3 The bed of the trench, if in soft or made up earth, shall be well watered and rammed before laying the pipes and the depression. If any shall be properly filled with approved earth and consolidated in 20 cm layer.
- 13.12.4 The bed of the trench, if in B.C. soil, shall be excavated 20cm more than the normal depth and then filled up by moorum.
- 13.13 If the sides of the trench are not vertical the toes of the said slopes shall end at the top of the pipe and practically, vertical sided trench shall be dug from these down to the sub grade.
- 13.14 The bottom of the trench shall be properly trimmed off to present a plain surface and all irregularities shall be levelled.

- 13.15 Where rock and large stone or boulders are encountered the trench shall be trimmed to a depth of at least 8 cm below the level at which the bottom of the barrel of the pipe is to be laid and the trench brought back to the required grade by filling with selected fine sand or broken stone (passing sieve of 12.5 mm aperture size) and compacted so as to provide a smooth bedding for the pipes.
- 13.16 After the Excavation of the trench is completed hollows shall be cut at required position to receive the socket of the pipe and these hollows shall be of sufficient depth to ensure that the bearer of the pipe shall rest throughout their entire length on the solid ground and that sufficient space left for joining the under side of the pipe joint. These socket holds shall be refilled with sand after joining the pipe.
- 13.17 Where the bottom of the trench at sub grade is found to consist of material which is unstable to such a degree that, in the opinion of the Engineer in charge, it cannot be removed and replaced with an approved material thoroughly compacted in place to support the pipe properly, a suitable foundation for the consist of piling, timbers or other materials, in accordance with plan prepared by the Engineer in charge shall be constructed.
- 13.18 Trench excavation in rock in inhabited areas should be done by hammering and chiselling or other appropriate mechanical means but not by blasting.
- 13.19 Excavation for trenches in rock by blasting shall be permitted only in open areas, with the permission of local authority, after the Engineer in charge has satisfied himself that there is no danger to persons or property if blasting is done in that area.
- 13.20 Proper precautions shall be taken for the protection of persons or property during blasting.
- 13.21 The hours of blasting shall be fixed by the Engineer in charge.
- 13.22 The procedure of blasting shall conform to the requirements of local administration controlling authority.
- 13.23 Open cut deep trenches in bad ground shall be sheeted and braced as required by local municipal regulations and as may be necessary to protect life, property or the work for which no extra payment shall be made.
- 13.24 When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting for which no extra payment shall be made.
- 13.25 Engineering in charge shall have the right to order the sheeting to be driven to the full depth of the trench or to such additional depths as may be required for the protection of the work, as per manual on water supply and sewage and sewage treatment for which no extra payment shall be made.

- 13.26 Where the soil in the lower limits of a trench has the necessary stability, the Engineer in charge at his discretion, may permit stopping of the driving of sheeting at some designated elevation above the trench bottom for which no extra payment shall be made.
- 13.27 Sheeting done in trenches near heavy or important buildings shall be left in ground, if any settlement of the building is anticipated as per direction of Engineer in Charge and for which no extra payment shall be made.
- 13.28 Sheeting and bracing which have been ordered left in place should be removed for a distance of 90 cm. below the established street level or the existing surface of the street whichever is lower for which no extra payment shall be made.
- 13.29 Trench bracing, except that which has been left in place may be removed after the back filling has been completed or has been brought up to such an elevation as to permit its safe removal for which no extra payment shall be made.
- 13.30 Sheeting and bracing may be removed before filling the trench, but only in such manner as will ensure the adequate protection of the completed work and adjacent structures.
- 13.31 All surface materials which in the opinion of the Engineer in charge, are suitable for reuse in restoring the surface, shall be kept separate from the general excavation material as directed by the Engineer in charge.
- 13.32 The excavated material shall be not placed within one meter or half of the depth of the trench, whichever is greater, from the edge of the trench. The excavated material shall be separated and stacked so that in refilling it may be re laid and compacted in the order to the satisfaction of the Engineer in charge.
- 13.33.1 If the hard rock is found throughout the depth, then the trench after pipe laying should be filled up with good excavated earth except B.C. soil, if available within 50 m lead, on either side of pipe and up to 30 cm above the pipe and remaining depth shall be filled up with excavated hard rock. The balance hard rock shall be compulsorily issued to the contractor at such issue rate, which are specified in the contract agreement, after maintaining proper M.A.S. account. If good soil and hard rock in excavation is obtained, then suitable action as explained above shall be taken accordingly.
If hard rock in excavation is obtained throughout the length and no good soil is obtained on either side within 50m of excavation then it shall be filled up by moorum and payment shall be made as per Item No.- 2.11. In this case overall rock shall be compulsorily issued on the rates, to be specified in the contract agreement, after maintaining proper M.A.S. account. Payment shall be regulated as per terms of agreement at appropriate rate.
- 13.33.2 In case of B.C. soil the side of pipe and filling above 30 cm of pipe shall be done by moorum and balance depth shall be filled up by excavated B.C. soil.

- 13.34 Unless otherwise specified by the Engineer in charge, the width at bottom of trenches for different diameter of pipes laid at different depths shall be as given below :-
(a) For all diameters up to an average depth of 120 cm, width of trench in cm = diameter of pipe+30cm.
(b) For all diameters for depths above 120cm, width of trench in cm = diameter of pipe+40 cm.
(c) Not with standing (a) & (b) the total width of trench should not be less than 75 cm for depth exceeding 90 cm.
- 13.35 Hydrants under pressure, surface boxes, fire or other utility controls shall be left unobstructed and accessible until the work is completed.
- 13.36 Gutters shall be kept clear or other satisfactory provisions made for street drainage and natural watercourses shall not be obstructed.
- 13.37 To protect person from injury and to avoid danger to property, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the road way.
- 13.38 All materials, piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricade and shall be protected by proper lights when the visibility is poor.
- 13.39 The rules and regulations or the local authority regarding safety provisions shall be observed.
- 13.40 The work shall be carried in such a manner, which will cause the least interruption to traffic, and the road or street may be closed in such a manner that it causes the least interruption to the traffic.
- 13.41 Where it is necessary for traffic to cross open trenches, suitable cross over planks shall be provided.
- 13.42 Suitable signs indicating that a street is closed shall be placed and necessary detour signs for the proper maintenance of traffic shall be provided.
- 13.43 Temporary support, adequate protection and maintenance of all underground and surface structure, drains, sewers and other obstructions encountered in the progress of the work shall be provided under the direction of the Engineer in charge.
- 13.44 The structure, which may have to be disturbed, shall be restored upon completion of the work.
- 13.45 Trees, shrubbery, fences, poles and all other property and surface structures shall be protected unless their removal is shown on the drawing or authorised by the Engineer in charge.

- 13.46 Root of trees within a distance of about 0.5m from the site of the pipeline shall be removed or killed for which no extra payment shall be made.
- 13.47 No valve or other control of the existing serving shall operated without the permission of the Engineer in charge.
- 13.48 The rates include the element of hire and running charges of all types of plants, machinery & equipment, required to complete the work, unless specified otherwise.
- 13.49 The rates also include the element of testing of samples of various materials brought by contractor for use on the work, as well as other necessary test for item of work as stipulated in the specifications.
- 13.50 The work should not be accepted in any case if the contractor fails to observe the instruction of department regarding testing of material.
- 13.51 Before making any payment, it will be responsibility of the officer making payment to assure that all tests are as per prescribed frequency have been carried out and found as per requirement.
- 13.52 The contractor shall have to provide bound ruled register named as site order book it shall be kept in the charge of Deptt. Supervisory staff inspecting officer will enter their remarks in this book which will be noted by contractor or his authorized representative for compliance.
- 14 Measurements :-
Measurements shall be taken for complete finished item as per details given in specification.
- 15 Rates :-
Rates include labour, material, equipment and machineries required for completion of items.

CHAPTER 2 - ALLIED CIVIL WORKS

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2.1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering and ramming and disposal of excavated earth lead up to 50 meters and lift up to 1.5m, disposal earth to be levelled, neatly dressed.	Per cum	144.00
2.2	Earth work in Excavation for pipe trench in Hard Soil areas including dressing, watering and ramming and disposal of Excavated earth lead up to 50 meters and lift up to 1.5m, disposal earth to be levelled, neatly dressed.	Per Cum	191.00
2.3	Earth work in Excavation for pipe trench in laterite soil areas including dressing, watering and ramming and disposal of Excavated earth lead up to 50 meters and lift up to 1.5m, disposal earth to be levelled, neatly dressed.	Per Cum	276.00
2.4	For muddy area extra rate for Item No. 2.1 (The extra percentage rate is applicable in respect of each item but limited to quantities of works executed in these difficult conditions).	Per cum	20%
2.5	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable one up to 50 m lead and lift up to 1.5 m.		
	(a) Soft rock with or without blasting or bituminous pavement / cement concrete road.	Per cum	334.00
	(b) Hard rock requiring blasting.	Per cum	410.00
	(c) Hard rock requiring chiselling / where blasting is prohibited.	Per cum	476.00
2.6	Extra for every additional lift of 1.5m or part there of		
2.6.1	All Kind of soil (over item 2.1 to 2.3.)	Per Cum	48.00
2.6.2	Ordinary Soft & Hard Rock (over item 2.5)	Per Cum	86.00
2.7	Extra for every additional lead up to 50 m or part thereof over item 2.1 to 2.5.	Per cum	50.00
2.8	Earth work in excavation of foundation for structures as per drawing and technical specification including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material etc. and as per relevant clause of section 300 & 2100.		
	Ordinary soil		
2.8.1	up to 3 m depth	Per cum	129.00
2.8.2	3.0 m to 6.0 m depth	Per cum	148.00
2.8.3	Above 6 m depth	Per cum	180.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2.9	Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like.	Per KL	51.00
2.10.1	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils	Per cum	59.00
2.10.2	Filling available excavated earth in trenches, lead up to 50m and lift up to 1.5m in all kind of soil excluding watering and ramming.	Per Cum	45.00
2.11	Filling with murum / river sand for pipe bedding or over the pipe including supply .	Per cum	620.00
2.12	Demolishing stone rubble masonry in cement mortar in any mix including stacking of serviceable material and disposal of unserviceable material with in 50 meter lead.	Cum	378.00
2.13	Demolishing stone rubble masonry in lime mortar including stacking of serviceable material and disposal of unserviceable material with in 50 meter lead	Cum	226.00
2.14	Dismantling stone slab paving of any thickness in cement or lime mortar of any ratio including all leads and lifts.	Sqm	44.00
2.15	Dismantling kharanja of any thickness in cement mortar of any mix.	Sqm	38.00
2.16	(a) Fixing in cement mortar 1:6 (1 cement : 6 sand) stone slab 30 mm thick.	Sqm	119.00
	(b) Labour only for fixing of stone set paving of any thickness.	Sqm	53.00
	(c) Fixing in C.M. 1:6 Kharanja of any thickness	Sqm.	113.00
	(d) Labour only for fixing of stone in Kharanja.	Sqm	52.00
2.17	Cutting of Water bound macadam road including disposal of material within 50m lead.	Cum	236.00
2.18	Cutting of bituminous road including disposal of material within 50m lead.	Cum	317.00
2.19	Demolishing C.C./R.C.C. work by mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50m, lead.	Cum	700.00
2.20	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centring and shuttering (with 40mm nominal size graded stone aggregate)		
2.20.1	In foundation and plinth		
1	M-5	cum	2721.00
2	M-7.5	cum	2957.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
3	M-10	cum	3267.00
4	M-15	cum	3823.00
2.20.2	In walls & Superstructure up to 4 meter. height above plinth:		
1	M-10	cum	3265.00
2	M-15	cum	3985.00
2.20.3	Providing plain cement concrete M-10 nominal mix with 40mm maximum size stone aggregate in foundation (excluding form work) as per relevant I.S. Standard.		
1	Base concrete for columns	cum	3790.00
2.21	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone excluding cost of centring & shuttering.		
2.21.1	In Plinth & foundation		
1	M-10	cum	3325.00
2	M-15	cum	4031.00
3	M-20	cum	4484.00
2.21.2	In walls and superstructure up to 4 meter. height above plinth (with 20mm nominal graded metal) excluding the cost of centring shuttering.		
1	M-10 (Nominal mix)	cum	3411.00
2	M-15 (Nominal mix)	Cum	3947.00
3	M-20 (Nominal Mix)	Cum	4382.00
4	M-25 (design mix)	cum	4964.00
2.22	Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including concrete laying, cost of centring, shuttering, finishing and including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge. M-20 grade design mix reinforced cement concrete by using 405 kg. of cement per cum of concrete. All work up to plinth level excluding the cost of reinforcement.		
1	RCC Grade M20	cum	5094.00
2	RCC Grade M25	cum	5116.00
3	RCC Grade M30	cum	5170.00
4	RCC Grade M35	cum	5290.00
2.23	Providing and laying Plain/ Reinforcement cement concrete in sub structure or complete section including cost of form work staging/bracing and shuttering complete as per drawing and technical specification and as per relevant I.S. Standard (Height above average ground level).		
2.23.1	PCC Grade M-20		
1	Height up to 5m	cum	4742.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2	Height beyond 5m and up to 10m	cum	4839.00
2.23.2	PCC Grade M-25		
1	Height up to 5m	cum	5357.00
2	Height beyond 5m and up to 10m	cum	5467.00
3	Height above 10m	cum	5630.00
2.23.3	PCC Grade M30		
1	Height up to 5m	cum	5425.00
2	Height beyond 5m and up to 10m	cum	5524.00
3	Height above 10m	cum	5672.00
2.23.4	RCC Grade M20		
1	Height up to 5m	cum	5388.00
2	Height beyond 5m and up to 10m	cum	5486.00
3	Height above 10m	cum	5633.00
2.23.5	RCC Grade M25		
1	Height up to 5m	cum	5424.00
2	Height beyond 5m and up to 10m	cum	5523.00
3	Height above 10m	cum	5671.00
2.23.6	RCC Grade M30		
1	Height up to 5m	cum	5494.00
2	Height beyond 5m and up to 10m	cum	5594.00
3	Height above 10m	cum	5744.00
2.23.7	RCC Grade M35		
1	Height up to 5m	cum	5550.00
2	Height beyond 5m and up to 10m	cum	5651.00
3	Height above 10m	cum	5802.00
2.24	Providing and Laying plain/ Reinforcement cement concrete in super structure ring beam Dom, walls, beam etc section including cost of form work staging/bracing and shuttering complete as per drawing and technical specification and as per relevant clauses of I.S. Standard including pumping charges of concrete.		
2.24.1	RCC Grade M20		
1	Height up to 5m	cum	6164.00
2	Height beyond 5m and up to 10m	cum	6411.00
3	Height above 10m	cum	6657.00
2.24.2	RCC Grade M25		
1	Height up to 5m	cum	6281.00
2	Height beyond 5m and up to 10m	cum	6533.00
3	Height above 10m	cum	6784.00
2.24.3	RCC Grade M 30		

S.No.	Particulars of Items	Unit	Rates (in Rs.)
1	Height up to 5m	cum	6424.00
2	Height beyond 5m and up to 10m	cum	6681.00
3	Height above 10m	cum	6938.00
2.25	STEEL		
2.25.1	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage.		
2.25.1.1	Sub structure	Kg	55.00
2.25.1.2	Super structure	Kg	62.00
2.25.2	Steel work in single section i/c cutting, hoisting, fixing in position and applying a primary coat of lead paint. In R.S. Joint in flat iron/angle/ tee/channel/ square/round bar.	Kg	57.00
2.25.3	Steel work in riveted /bolted in built-up section truss and frame i/c cutting/hoisting/fixing in position and applying a priming coat of paint. In R.S. Joint in flat iron /angle /tee/ channel / square / round bar.	Kg	61.00
2.25.4	Steel work is welded in built-up section tee & frame i/c cutting hoisting/fixing and painting with red lead paint. (i) In R.S. Joint in flat iron /angle / channel / bar.	Kg	71.00
2.25.5	Supplying, Fitting and placing un-coated HYSD bar reinforcement in foundation complete as per drawing and technical specification and relevant clauses of section	Kg	55.00
2.25.6	Supplying, Fitting and placing un-coated HYSD bar reinforcement in Sub - structure complete as per drawing and technical specification and relevant clauses of section 1600	Kg	55.00
2.25.7	Supplying, Fitting and placing un-coated HYSD bar reinforcement in Super - structure complete as per drawing and technical specification and relevant clauses of section 1600	Kg	56.00
2.26	CEMENT MORTAR		
1	Cement Mortar 1:3 (1 Cement : 3 sand)	Cum	3489.00
2	Cement Mortar 1:4 (1 Cement : 4 sand)	Cum	2801.00
3	Cement Mortar 1:5 (1 Cement : 5 sand)	Cum	2430.00
4	Cement Mortar 1:6 (1 Cement : 6 sand)	Cum	2112.00
5	Cement Mortar 1:8 (1 Cement : 8 sand)	Cum	1843.00
2.27	BRICK WORK		
2.27.1	Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm ² and water absorption not more than 25% in foundation & plinth.		
1	In Cement Mortar 1:3	Cum	3357.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2	In Cement Mortar 1:4	Cum	3155.00
3	In Cement Mortar 1:5	Cum	3046.00
4	In Cement Mortar 1:6	Cum	2953.00
2.27.2	Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm ² and water absorption not more than 20% above plinth level up to four meter height including cost of form work.		
1	In Cement Mortar 1:3	Cum	3400.00
2	In Cement Mortar 1:4	Cum	3200.00
3	In Cement Mortar 1:5	Cum	3091.00
4	In Cement Mortar 1:6	Cum	2998.00
2.27.3	Extra rate for Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm ² and water absorption not more than 20% above four meter height.	Cum	81.00
2.27.4	Half brick work with well burnt chimney bricks crushing strength not less than 40kg/cm ² and water absorption not more than 20% in superstructure including cost of form work up to floor 2 level.		
1	Cement mortar 1:4	Sqm	437.00
2	Cement mortar 1:6	Sqm	417.00
2.27.5	Brick work with open bhatta bricks having crushing strength not less than 20 Kg/ cm ² and water absorption not more than 25 % in foundation of plinth. In cement mortar 1:8	Cum	2823.00
2.28	PLASTER		
2.28.1	12mm thick cement plaster in single coat including finishing even, smooth and curing including cost of form work complete.		
1	1:3(Cement 1: Sand 3)	Sqm	109.00
2	1:4(Cement 1: Sand 4)	Sqm	104.00
3	1:5(Cement 1: Sand 5)	Sqm	103.00
4	1:6(Cement 1: Sand 6)	Sqm	99.00
2.28.2	15mm thick cement plaster in single coat finished even, smooth and curing including cost of form work complete.		
1	in CM 1:3	Sqm	128.00
2	in CM 1:4	Sqm	122.00
3	in CM 1:5	Sqm	120.00
4	in CM 1:6	Sqm	118.00
2.28.3	Neat cement punning	Sqm	25.00
2.29	18mm thick cement plaster in 2 coats under layer 12mm CM 1:5 (1 cement:5 coarse sand) and top layer 6mm thick cement plaster 1:3 (1 cement:3 fine sand) finished even, smooth and curing including cost of form work complete.	Sqm	145.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2.30	20 mm thick cement plaster in single coat including finishing even, smooth and curing complete		
1	Cement Mortar 1:3 (1 Cement : 3 Sand)	Sqm	158.00
2	Cement Mortar 1:4 (1 Cement : 4 Sand)	Sqm	113.00
3	Cement Mortar 1:5 (1 Cement : 5 Sand)	Sqm	106.00
4	Cement Mortar 1:6 (1 Cement : 6 Sand)	Sqm	100.00
	FORM WORK		
2.31	Providing and fixing form work i/c centring shuttering, strutting, staging, propping, bracing etc. complete and i/c/removal of formwork.		
2.31.1	Foundation / footing / column base / plinth beam of any shape and size up to plinth level	Sqm	139.00
2.31.2	Wall of any thickness including attached plastered etc.	Sqm	218.00
2.32	Providing and fixing form work i/c centring shuttering, strutting, staging, propping, bracing etc. complete and i/c/removal of formwork and up to 4 mtr height		
2.32.1	Beam / Lintel / Cantilever / Walls	Sqm	222.00
2.32.2	Column (Rectangular / Square / Circular) Pillars, abutments posts and stairs	Sqm	285.00
	HEAD WORKS		
2.33	Excavation in general in In soft soil, soft murum, sand, hard murum, sand, hard murum with boulders in wet or dry condition for Head Works i.e. Intake well, Connecting Pipe, Jack Well, Pump House, Supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surface excavated stuff within a radius of 0.5km as directed by Engineer - in-charge, etc. complete excluding refilling.		
2.33.1	For Head work on River or Dam	Cum	185.00
2.33.2	For Head Works on Nallah or any other site Lift	Cum	155.00
2.33.3	Add for each additional lift of 1.5 M	Cum	13.00
2.34	Excavation in general in hard material comprising of soft rock, hard rock, Manjara rock, etc, by blasting/controlled blasting/ chiselling as required in wet or dry condition for Head Works i.e. Intake Well, Connecting Pipe, Jack Well, Pump House, supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surplus excavated stuff within a radius of 0.5km as directed by Engineer-in-charge, excluding refilling.		
2.34.1	For head work on river or dam	Cum	508.00
2.34.2	For head or nallah or any other site	Cum	399.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2.34.3	Add for each additional lift of 1.5 M	Cum	38.00
2.35	Excavation in general in soft material comprising of soft soil, soft murum, sand, hard murum with boulders in wet or dry condition for Head Works and allied works by well sinking process for average depth of 12M and lead of 150M including shoring, barricading, guarding, refilling, disposing of surplus excavated stuff as directed by Engineer-in-Charge, etc. complete.		
2.35.1	Diameter up to and including 3M	Cum	436.00
2.35.2	Diameter more than 3 M	Cum	347.00
2.36	Desilting the Supply Well, Intake Well / Head Works, sump of water supply/ sewerage works etc For every additional lift beyond initial lift of 9.0 M and lead up to 150M as required beyond the work site, stacking, spreading, including necessary guarding, etc. complete, as directed by Engineer-in-charge.	Cum	162.00
2.37	Providing stone soling in 15cm to 20 cm thick layers	Cum	330.00
2.38	Providing and filling in sand boxing in pipeline or for foundation with sand of approved quality including watering compaction, initial lead up to 5.0km etc. complete.	Cum	674.00
2.39	Excavation of DUG-WELL/SEPTIC TANK ETC.		
2.39.1	Excavation in soft or ordinary soil including 50m lead and 1.5m lift with dressing. (As per Item No. 2.1)		144.00
2.39.2	Excavation in hard soil/murum - murum mixed with boulder etc. including 50 m lead and 1.5 m lift with dressing. (As per Item No.- 2.2)	Cum	191.00
2.39.3	Add Extra in items 2.39.1 to 2.39.2 above for depth.		
	(a) Beyond 1.5 m to 3 m	Cum	24.00
	(b) Beyond 3 m to 4.5 m	cum	49.00
	(c) Beyond 4.5 m to 6 m	Cum	73.00
	(d) Beyond 6 m to 7.5 m	cum	97.00
	(e) Beyond 7.5 to 9 m	cum	122.00
	(f) Beyond 9 m to 10.5 m	cum	146.00
	(g) Beyond 10.5 m to 12 m	cum	170.00
	(h) Beyond 12 m to 13.5 m	cum	195.00
	(i) Beyond 13.5 m to 15 m	cum	219.00
	(j) Beyond 15 m to 16.5 m	cum	244.00
	(k) Beyond 16.5 m to 18 m	cum	268.00
	(l) Beyond 18 m to 19.5 m	cum	292.00
	(m) Beyond 19.5 m to 21 m	cum	317.00
	(n) Beyond 21 m to 22.5 m	cum	341.00
	(o) Beyond 22.5 m to 24 m	cum	365.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
2.39.4	Excavation in hard rock including 50 m lead and 1.5 m lift-		
	(a) Blasting permitted	cum	407.00
	(b) Blasting prohibited (i.e. wedged and chiselled)	cum	483.00
2.39.5	Add extra in items Nos. 2.39.4 above for depth.		
	(a) Beyond 1.5 m to 3 m	cum	39.00
	(b) Beyond 3 m to 4.5 m	cum	77.00
	(c) Beyond 4.5 m to 6 m	cum	116.00
	(d) Beyond 6 m to 7.5 m	cum	154.00
	(e) Beyond 7.5 to 9 m	cum	193.00
	(f) Beyond 9 m to 10.5 m	cum	232.00
	(g) Beyond 10.5 m to 12 m	cum	270.00
	(h) Beyond 12 m to 13.5 m	cum	309.00
	(i) Beyond 13.5 m to 15 m	cum	347.00
	(j) Beyond 15 m to 16.5 m	cum	386.00
	(k) Beyond 16.5 m to 18 m	cum	425.00
	(l) Beyond 18 m to 19.5 m	cum	463.00
	(m) Beyond 19.5 m to 21 m	cum	502.00
	(n) Beyond 21 m to 22.5 m	cum	540.00
	(o) Beyond 22.5 m to 24 m	cum	579.00
	(p) Beyond 24 m to 25.5 m	cum	618.00
	(q) Beyond 25.5 m to 27 m	cum	656.00
	(r) Beyond 27 m to 28.5 m	cum	695.00
	(s) Beyond 28.5 m to 30 m	cum	733.00
2.40	CLEANING OF DUG-WELL		
2.40.1	Cleaning of open well/step well by removal of refuse materials, vegetable, silt, mud, rubbles, etc excluding pumping of water from well.	cum	49.00
2.40.2	Extra rate for lifting the material during the cleaning of well for every 1.5m additional depth	Cum	4.00
2.41	Cutting Kharanja road and making good the same including supply of extra quantities of Kharanja, murum.	Sqm	59.00
2.42	Brick work with burnt clay fly-ash brick as per IS 13757-1993 of class designation 75 in superstructure above plinth level up to floor two level in : Cement mortar 1:4(1 cement : 4 coarse sand)	Cum	2841.00
2.43	Brick work with Hollow concrete block having size (400x150x200mm) or other size as per IS 2185 (Part-I) in Boundary wall in Cement mortar 1:4 (1 cement : 4 coarse sand)	Cum	4905.00
2.44	Supplying and filling in plinth under floors including, watering, ramming consolidating and dressing complete.		
2.44.1	Crusher Stone Dust	Cum	673.00

CHAPTER 3
CAST IRON SOCKET AND SPIGOT PIPES AND SPECIALS WITH LEAD JOINTS

- 1 C.I. Pipes shall Conform to IS: 1536 -1989 duly inspected and tested and having BIS certification mark.
- 2 Specials shall Conform to IS: 1538 - 1993 duly inspected and tested and having BIS certification mark.
- 3 jointing material lead shall Conform to IS:782 - 1978 duly inspected and tested and having BIS certification mark.
- 4 Code of practice for laying of cast iron pipes shall be as per IS:3114 - 1994
- 4.1 Methods for sampling of Cast Iron Pipes & fittings shall be as per IS : 11606
- 5 Each pipe shall have the following mark either cast, stamped or indelibly painted on it. Following Marking may be done on the socket faces of pipe centrifugally cast in metal mould or on the outside of the socket or on the barrel of pipe centrifugally cast in sand mould:-
 - a) Manufacturer's name, initials or identification mark;
 - b) The nominal diameter;
 - c) Class reference;
 - d) Mass of Pipe
 - e) The last two digits of the year of manufacture.
- 6 The pipes and fittings shall be inspected for defects and be rung with a light hammer, preferably while suspended, to detect cracks. Smearing the outside with chalk dust helps the location of cracks. If doubt persists further Conformation may be obtained by pouring a little kerosene which seeps through and shows on the outer surface.
- 7 Tolerance for thickness and length of pipe shall be acceptable as given below :

Tolerance on Thickness		
	Dimensions	Tolerance in mm
a)	Wall thickness	- (1+0.05 e)

Where e = is the thickness of the wall in millimetres

Tolerance on Length

	Type of Casting	Tolerance in mm
a)	Socket and spigot, and plain ended pipes	± 100

- 8 Tolerance in length and thickness of specials shall be as given below :

Tolerances on thickness

The tolerances on the wall thickness and flange thickness of fittings are limited as follows

	Dimension	Tolerance, mm
	Wall thickness	- (2 + 0.05 e)

Where
e = the standard thickness of the wall in millimetres

Tolerances on Lengths

The tolerances on lengths of fittings, normally manufactured, shall be as follows :

Type of fittings	Nominal Dia	Tolerance (mm)
Socket fittings and spigot pieces	Up to and including 450 mm	± 20
	All diameters	± 10

9 Laying :

Laying of pipes and fittings/specials includes all precautions to guard against possible damaged to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

10 Measurement:

The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and enumerated and paid for separately. The portion of the pipe within the collar at the joints shall not be included in the length of pipe work.

11 Rates

- 11.1 The rates include charges for all tools & plants, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in positions as per approved drawing.
- 11.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials, and other causes.

CHAPTER 3- CAST IRON SOCKET AND SPIGOT PIPES AND SPECIALS WITH LEAD JOINTS

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
			LA Class	A Class	B Class
3.1	Providing, laying and jointing of following socket and spigot cast iron (Spun) Pipes including testing of joints, cost of pipes and jointing materials etc. complete. [socket & spigot cast iron (spun) pipes shall Conform to IS 1536 : 2001 and laying work shall Conform to IS 3114 : 1994, Pig lead shall Conform to IS 782:1978]				
	80mm diameter	RM	1296.00	1403.00	1504.00
	100mm diameter	RM	1576.00	1726.00	1842.00
	125mm diameter	RM	1986.00	2159.00	2369.00
	150mm diameter	RM	2409.00	2629.00	2830.00
	200mm diameter	RM	3513.00	3798.00	4103.00
	250mm diameter	RM	4708.00	5129.00	5487.00
	300mm diameter	RM	6060.00	6601.00	7128.00
	350mm diameter	RM	7601.00	8222.00	8897.00
	400mm diameter	RM	9256.00	10086.00	10872.00
	450mm diameter	RM	11392.00	11590.00	13430.00
	500mm diameter	RM	13291.00	14436.00	15595.00
	600mm diameter	RM	17713.00	19280.00	20856.00
	700mm diameter	RM	22771.00	24808.00	26783.00
	750mm diameter	RM	25498.00	27803.00	30148.00
	800mm diameter	RM	28606.00	31082.00	33611.00
	900mm diameter	RM	34771.00	37840.00	40972.00
	1000mm diameter	RM	41726.00	45467.00	49101.00
	1050mm diameter	RM	45499.00	53756.00	57800.00
3.2	Labour for laying in position socket & spigot cast iron (Spun) pipes. [Laying work shall Conform to IS 3114 : 1994]				
	80mm diameter	RM	57.00	62.00	68.00
	100mm diameter	RM	72.00	78.00	86.00
	125mm diameter	RM	93.00	101.00	112.00
	150 mm diameter	RM	116.00	127.00	140.00
	200mm diameter	RM	170.00	184.00	202.00
	250mm diameter	RM	230.00	250.00	274.00
	300mm diameter	RM	296.00	323.00	347.00
	350mm diameter	RM	374.00	405.00	442.00
	400mm diameter	RM	455.00	496.00	540.00
	450mm diameter	RM	549.00	602.00	655.00
	500mm diameter	RM	642.00	698.00	761.00
	600mm diameter	RM	858.00	935.00	1022.00
	700mm diameter	RM	1106.00	1203.00	1316.00
	750mm diameter	RM	1233.00	1345.00	1483.00
	800mm diameter	RM	1377.00	1498.00	1651.00
	900mm diameter	RM	1683.00	1833.00	2014.00
	1000mm diameter	RM	2026.00	2209.00	2415.00
	1050mm diameter	RM	2318.00	2523.00	2799.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
3.3	Jointing of following socket & spigot cast iron (spun) pipes and specials class 'LA' 'A' and 'B' including labour & cost of jointing materials (i.e. pig lead and spun yarn) etc. and testing of the joints complete. [Caulking lead shall Conform to IS 782 : 1978]		
	80mm diameter	Each	313.00
	100mm diameter	Each	389.00
	125mm diameter	Each	465.00
	150mm diameter	Each	562.00
	200mm diameter	Each	802.00
	250mm diameter	Each	985.00
	300mm diameter	Each	1169.00
	350mm diameter	Each	1324.00
	400mm diameter	Each	1555.00
	450mm diameter	Each	2126.00
	500mm diameter	Each	2272.00
	600mm diameter	Each	2916.00
	700mm diameter	Each	3327.00
	750mm diameter	Each	3738.00
	800mm diameter	Each	4519.00
	900mm diameter	Each	5100.00
	1000mm diameter	Each	5885.00
	1050mm diameter	Each	6288.00
3.4	Labour for jointing of socket & spigot cast iron (spun) pipes and specials class 'LA' 'A' and 'B' including testing of joints but excluding cost of jointing materials (i.e. pig lead and spun yarn). [Conforming to IS 3114 : 1994,]		
	80mm diameter	Each	86.00
	100mm diameter	Each	107.00
	125mm diameter	Each	129.00
	150mm diameter	Each	130.00
	200mm diameter	Each	173.00
	250mm diameter	Each	216.00
	300mm diameter	Each	260.00
	350mm diameter	Each	261.00
	400mm diameter	Each	346.00
	450mm diameter	Each	389.00
	500mm diameter	Each	410.00
	600mm diameter	Each	562.00
	700mm diameter	Each	605.00
	750mm diameter	Each	648.00
	800mm diameter	Each	690.00
	900mm diameter	Each	777.00
	1000mm diameter	Each	862.00
	1050mm diameter	Each	892.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
3.5	Providing and laying in position double socket cast iron 90° bend. [Conforming to IS 1538 - 1993 , IS 3114 : 1994		Medium Class	Heavy Class
	80mm diameter	Each	NA	1500.00
	100mm diameter	Each	1917.00	2000.00
	125mm diameter	Each	2584.00	2751.00
	150mm diameter	Each	3417.00	3584.00
	200mm diameter	Each	5251.00	5585.00
	250mm diameter	Each	7585.00	8169.00
	300mm diameter	Each	10419.00	11253.00
	350mm diameter	Each	13333.00	14451.00
	400mm diameter	Each	17165.00	18682.00
	450mm diameter	Each	21157.00	23153.00
	500mm diameter	Each	26985.00	29540.00
	600mm diameter	Each	39600.00	43591.00
	700mm diameter	Each	55647.00	61475.00
	750mm diameter	Each	64828.00	71774.00
	800mm diameter	Each	79791.00	88497.00
	900mm diameter	Each	105402.00	117404.00
	1000mm diameter	Each	134985.00	150453.00
	1100mm diameter	Each	170824.00	189841.00
	1200mm diameter	Each	212325.00	235992.00
3.6	Providing and laying in position 45° bend double socket cast iron. [Conforming to IS 1538 -1993 , IS 3114 : 1994]		Medium Class	Heavy Class
	80mm diameter	Each	NA	1500.00
	100mm diameter	Each	1917.00	2000.00
	125mm diameter	Each	2501.00	2667.00
	150mm diameter	Each	3251.00	3417.00
	200mm diameter	Each	4834.00	5168.00
	250mm diameter	Each	6918.00	7418.00
	300mm diameter	Each	9419.00	10086.00
	350mm diameter	Each	11816.00	12694.00
	400mm diameter	Each	15010.00	16127.00
	450mm diameter	Each	18283.00	19800.00
	500mm diameter	Each	22913.00	24750.00
	600mm diameter	Each	32893.00	35767.00
	700mm diameter	Each	45348.00	49420.00
	750mm diameter	Each	52294.00	57164.00
	800mm diameter	Each	63900.00	69902.00
	900mm diameter	Each	82834.00	91033.00
	1000mm diameter	Each	105064.00	115629.00
	1100mm diameter	Each	130928.00	144198.00
	1200mm diameter	Each	161441.00	177416.00
3.7	Providing and laying in position double socket cast iron 22½° bend. [Conforming to IS 1538 - 1993 , IS 3114 : 1994]		Medium Class	Heavy Class
	80mm diameter	Each	NA	1334.00
	100mm diameter	Each	1667.00	1750.00
	125mm diameter	Each	2167.00	2251.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	150mm diameter	Each	2834.00	2917.00
	200mm diameter	Each	4251.00	4418.00
	250mm diameter	Each	6001.00	6251.00
	300mm diameter	Each	7919.00	8335.00
	350mm diameter	Each	9820.00	10379.00
	400mm diameter	Each	12375.00	13093.00
	450mm diameter	Each	14850.00	15728.00
	500mm diameter	Each	18522.00	19640.00
	600mm diameter	Each	26267.00	28023.00
	700mm diameter	Each	35608.00	38162.00
	750mm diameter	Each	41276.00	43991.00
	800mm diameter	Each	49700.00	53419.00
	900mm diameter	Each	63731.00	68718.00
	1000mm diameter	Each	80129.00	86553.00
	1100mm diameter	Each	102105.00	107092.00
	1200mm diameter	Each	124335.00	130759.00
3.8	Providing and laying in position double socket cast iron 11¼° bend. [Conforming to IS 1538 - 1993 , IS 3114 : 1994]			
			Medium Class	Heavy Class
	80mm diameter	Each	1167.00	1250.00
	100mm diameter	Each	1500.00	1584.00
	125mm diameter	Each	2000.00	2084.00
	150mm diameter	Each	2584.00	2667.00
	200mm diameter	Each	3834.00	4001.00
	250mm diameter	Each	5418.00	5585.00
	300mm diameter	Each	7168.00	7418.00
	350mm diameter	Each	8782.00	9181.00
	400mm diameter	Each	11018.00	11497.00
	450mm diameter	Each	13093.00	13732.00
	500mm diameter	Each	16367.00	17165.00
	600mm diameter	Each	22913.00	24111.00
	700mm diameter	Each	30817.00	32574.00
	750mm diameter	Each	35368.00	37444.00
	800mm diameter	Each	42347.00	45136.00
	900mm diameter	Each	54180.00	57646.00
	1000mm diameter	Each	67619.00	72015.00
	1100mm diameter	Each	83425.00	88497.00
	1200mm diameter	Each	101260.00	107346.00
3.9	Providing and laying in position all socket cast iron Tees (all sizes in Millimetres) Body x Branch Dia. [Conforming to IS 1538 -1993 , IS 3114 : 1994]			
			Medium Class	Heavy Class
	80x80	Each	1602.00	1675.00
	100x80	Each	1966.00	2039.00
	100x100	Each	2111.00	2184.00
	125x80	Each	2475.00	2621.00
	125x100	Each	2621.00	2767.00
	125x125	Each	2840.00	2985.00
	150x80	Each	3131.00	3276.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	150x100	Each	3276.00	3422.00
	150x125	Each	3422.00	3640.00
	150x150	Each	3640.00	3859.00
	200x80	Each	4587.00	4878.00
	200x100	Each	4733.00	5024.00
	200x125	Each	4878.00	5169.00
	200x150	Each	5097.00	5388.00
	200x200	Each	5606.00	5897.00
	250x80	Each	6407.00	6844.00
	250x100	Each	6553.00	6990.00
	250x125	Each	6771.00	7208.00
	250x150	Each	6990.00	7426.00
	250x200	Each	7426.00	7863.00
	250x250	Each	7936.00	8446.00
	300x80	Each	8664.00	9319.00
	300x100	Each	8737.00	9392.00
	300x125	Each	8955.00	9611.00
	300x150	Each	9101.00	9756.00
	300x200	Each	9683.00	10339.00
	300x250	Each	10193.00	10921.00
	300x300	Each	10848.00	11577.00
	350x200	Each	13493.00	14530.00
	350x250	Each	14131.00	15169.00
	350x300	Each	14850.00	15888.00
	350x350	Each	15568.00	16686.00
	400x200	Each	16926.00	18283.00
	400x250	Each	17564.00	18922.00
	400x300	Each	18203.00	19640.00
	400x350	Each	19001.00	20438.00
	400x400	Each	19959.00	21397.00
	450x250	Each	21876.00	23552.00
	450x300	Each	22594.00	24271.00
	450x350	Each	23392.00	25069.00
	450x400	Each	24191.00	25867.00
	450x450	Each	25149.00	26905.00
	500x250	Each	26107.00	28422.00
	500x300	Each	26826.00	29141.00
	500x350	Each	27624.00	29939.00
	500x400	Each	28422.00	30817.00
	500x450	Each	29380.00	31775.00
	500x500	Each	30498.00	32973.00
	600x300	Each	38003.00	41596.00
	600x350	Each	38801.00	42394.00
	600x400	Each	39759.00	43352.00
	600x450	Each	40717.00	44390.00
	600x500	Each	41755.00	45428.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	600x600	Each	44230.00
	700x350	Each	53332.00
	700x400	Each	54290.00
	700x450	Each	55328.00
	700x500	Each	56366.00
	700x600	Each	58521.00
	700x700	Each	61315.00
	750x400	Each	62353.00
	750x450	Each	63471.00
	750x500	Each	64589.00
	750x600	Each	66744.00
	750x700	Each	69219.00
	750x750	Each	70976.00
	800x400	Each	75734.00
	800x450	Each	76833.00
	800x500	Each	78016.00
	800x600	Each	80552.00
	800x700	Each	83172.00
	800x750	Each	84524.00
	800x800	Each	86553.00
	900x450	Each	98893.00
	900x500	Each	100077.00
	900x600	Each	102866.00
	900x700	Each	105740.00
	900x750	Each	107092.00
	900x800	Each	108614.00
	900x900	Each	112502.00
	1000x500	Each	126195.00
	1000x600	Each	128899.00
	1000x700	Each	132280.00
	1000x750	Each	133717.00
	1000x800	Each	135323.00
	1000x900	Each	138535.00
	1000x1000	Each	143100.00
	1100x600	Each	163047.00
	1100x700	Each	166513.00
	1100x750	Each	168457.00
	1100x800	Each	170316.00
	1100x900	Each	173613.00
	1100x1000	Each	177247.00
	1100x1100	Each	182572.00
	1200x600	Each	203196.00
	1200x700	Each	206408.00
	1200x750	Each	208352.00
	1200x800	Each	210465.00
	1200x900	Each	214523.00
	1200x1000	Each	218242.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	1200x1100	Each	222045.00	235146.00
	1200x1200	Each	228131.00	241232.00
3.10	Providing and laying in position all socketed cast iron crosses (all sizes in millimetre). [Conforming to IS 1538 - 1993 , IS 3114 : 1994]			
			Medium Class	Heavy Class
	80	Each	2179.00	2255.00
	100	Each	2781.00	2931.00
	125	Each	3758.00	3908.00
	150	Each	4810.00	5035.00
	200	Each	7290.00	7665.00
	250	Each	10296.00	10897.00
	300	Each	13978.00	14805.00
3.11	Providing and laying in position socket & spigot cast iron tapers (Reducer) (all sizes in mm). [Conforming to IS 1538 - 1993 , IS 3114 : 1994]			
			Medium Class	Heavy Class
	100x80	Each	1092.00	1165.00
	125x80	Each	1456.00	1529.00
	125x100	Each	1529.00	1675.00
	150x80	Each	1820.00	1966.00
	150x100	Each	1893.00	2039.00
	150x125	Each	2039.00	2257.00
	200x100	Each	2694.00	2912.00
	200x125	Each	2840.00	3058.00
	200x150	Each	3058.00	3276.00
	250x125	Each	3859.00	4077.00
	250x150	Each	4004.00	4296.00
	250x200	Each	4441.00	4805.00
	300x150	Each	5388.00	5825.00
	300x200	Each	5897.00	6407.00
	300x250	Each	6407.00	7062.00
	350x200	Each	7777.00	8425.00
	350x250	Each	8425.00	9154.00
	350x300	Each	9073.00	9964.00
	400x250	Each	10612.00	11584.00
	400x300	Each	11422.00	12475.00
	400x350	Each	12232.00	13448.00
	450x350	Each	13691.00	14987.00
	450x400	Each	14663.00	16121.00
	500x350	Each	15716.00	17093.00
	500x400	Each	16688.00	18227.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	500x450	Each	17741.00	19442.00
	600x400	Each	22278.00	24303.00
	600x450	Each	23412.00	25599.00
	600x500	Each	24627.00	26976.00
	700x500	Each	29568.00	32242.00
	700x600	Each	32323.00	35401.00
	750x600	Each	36373.00	39857.00
	750x700	Each	39695.00	43664.00
	800x600	Each	38153.00	41693.00
	800x700	Each	41300.00	45390.00
	800x750	Each	43109.00	47436.00
	900x700	Each	49402.00	53965.00
	900x750	Each	51212.00	58370.00
	900x800	Each	53100.00	56089.00
	1000x800	Each	60258.00	65844.00
	1000x900	Each	64349.00	70642.00
	1100x900	Each	73317.00	79610.00
	1100x1000	Each	74969.00	81262.00
	1200x900	Each	83701.00	89994.00
	1200x1000	Each	85274.00	91568.00
	1200x1100	Each	86848.00	93456.00

3.12 Providing and laying in position
Double Socket cast iron tapers
(reducer) (all sizes in mm).
[Conforming to IS 1538 - 1993 , IS
3114 : 1994]

		Medium Class	Heavy Class
100x80	Each	1092.00	1311.00
125x80	Each	1456.00	1966.00
125x100	Each	1529.00	2184.00
150x80	Each	1820.00	2257.00
150x100	Each	1893.00	2475.00
150x125	Each	2039.00	2767.00
200x100	Each	2694.00	3131.00
200x125	Each	2840.00	3422.00
200x150	Each	3058.00	3713.00
250x125	Each	3859.00	4223.00
250x150	Each	4004.00	4514.00
250x200	Each	4441.00	5242.00
300x150	Each	5388.00	5461.00
300x200	Each	5897.00	6116.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	300x250	Each	6407.00	6917.00
	350x200	Each	7777.00	9478.00
	350x250	Each	8425.00	10612.00
	350x300	Each	9073.00	11827.00
	400x250	Each	10612.00	12070.00
	400x300	Each	11422.00	13286.00
	400x350	Each	12232.00	14663.00
	450x350	Each	13691.00	15797.00
	450x400	Each	14663.00	17255.00
	500x350	Each	15716.00	17984.00
	500x400	Each	16688.00	19523.00
	500x450	Each	17741.00	20738.00
	600x400	Each	22278.00	24303.00
	600x450	Each	23412.00	25113.00
	600x500	Each	24627.00	26895.00
	700x500	Each	29568.00	31432.00
	700x600	Each	32323.00	35401.00
	750x600	Each	36373.00	38074.00
	750x700	Each	39695.00	42287.00
	800x600	Each	35872.00	39412.00
	800x700	Each	39726.00	43817.00
	800x750	Each	42086.00	46413.00
	900x700	Each	44918.00	49481.00
	900x750	Each	47436.00	54594.00
	900x800	Each	51448.00	54437.00
	1000x800	Each	55145.00	60730.00
	1000x900	Each	60022.00	66316.00
	1100x900	Each	68990.00	75284.00
	1100x1000	Each	70642.00	76936.00
	1200x900	Each	79060.00	85668.00
	1200x1000	Each	80948.00	87241.00
	1200x1100	Each	82914.00	89208.00

3.13 Providing and laying in position cast iron collars. [Conforming to IS 1538 - 1993 , IS 3114 : 1994]

		Medium Class	Heavy Class
80mm diameter	Each	947.00	1019.00
100mm diameter	Each	1165.00	1238.00
125mm diameter	Each	1529.00	1602.00
150mm diameter	Each	1966.00	2039.00
200mm diameter	Each	2767.00	2912.00
250mm diameter	Each	3786.00	4004.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	300mm diameter	Each	4951.00	5169.00
	350mm diameter	Each	6765.00	7080.00
	400mm diameter	Each	8103.00	8653.00
	450mm diameter	Each	9991.00	10463.00
	500mm diameter	Each	11879.00	12508.00
	600mm diameter	Each	16127.00	16992.00
	700mm diameter	Each	21161.00	22263.00
	750mm diameter	Each	23915.00	25173.00
	800mm diameter	Each	28423.00	30007.00
	900mm diameter	Each	35342.00	37342.00
	1000mm diameter	Each	43177.00	45594.00
	1100mm diameter	Each	52095.00	54596.00
	1200mm diameter	Each	62431.00	64932.00

3.14 Providing and laying in position cast iron socket caps. [Conforming to IS 1538 - 1993 , IS 3114 : 1994]

Heavy Class

80mm diameter	Each	510.00
100mm diameter	Each	655.00
125mm diameter	Each	874.00
150mm diameter	Each	1092.00
200mm diameter	Each	1747.00
250mm diameter	Each	2475.00
300mm diameter	Each	3349.00
350mm diameter	Each	4942.00
400mm diameter	Each	6238.00
450mm diameter	Each	7858.00
500mm diameter	Each	9559.00
600mm diameter	Each	13853.00
700mm diameter	Each	19037.00
750mm diameter	Each	22035.00
800mm diameter	Each	26541.00
900mm diameter	Each	34232.00
1000mm diameter	Each	43445.00
1100mm diameter	Each	53926.00
1200mm diameter	Each	65760.00

3.15 Providing and laying in position cast iron plugs. [Conforming to IS 1538 - 1993 , IS 3114 : 1994]

Medium Class

Heavy Class

80mm diameter	Each	139.00	208.00
100mm diameter	Each	208.00	277.00
125mm diameter	Each	346.00	416.00
150mm diameter	Each	554.00	624.00
200mm diameter	Each	901.00	970.00
250mm diameter	Each	1386.00	1524.00
300mm diameter	Each	1940.00	2079.00
350mm diameter	Each	2900.00	3129.00
400mm diameter	Each	3892.00	4121.00
450mm diameter	Each	4961.00	5266.00
500mm diameter	Each	6182.00	6564.00
600mm diameter	Each	9159.00	9693.00
700mm diameter	Each	13051.00	13738.00
750mm diameter	Each	15341.00	16104.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	800mm diameter	Each	19313.00	20217.00
	900mm diameter	Each	25230.00	26380.00
	1000mm diameter	Each	32379.00	33776.00
	1100mm diameter	Each	40926.00	42570.00
	1200mm diameter	Each	50541.00	52349.00
3.16	Providing and laying in position sizes of socket & spigot or all socketed cast iron specials class MEDIUM or HEAVY which do not appear in above items of schedule. [Conforming to IS 1538 - 1993 , IS 3114 : 1994]			
			Medium Class	Heavy Class
	80mm to 300mm dia	Kg	76.00	76.00
	Above 300mm Dia	Kg	80.00	80.00
3.17	Labour for laying in position double socket cast iron 45° bends. [Conforming to IS 3114 : 1994]		Medium Class	Heavy Class
	80mm diameter	Each	NA	24.00
	100mm diameter	Each	30.00	32.00
	125mm diameter	Each	40.00	42.00
	150mm diameter	Each	51.00	54.00
	200mm diameter	Each	77.00	82.00
	250mm diameter	Each	110.00	118.00
	300mm diameter	Each	149.00	160.00
	350mm diameter	Each	195.00	210.00
	400mm diameter	Each	248.00	267.00
	450mm diameter	Each	302.00	327.00
	500mm diameter	Each	379.00	409.00
	600mm diameter	Each	544.00	591.00
	700mm diameter	Each	750.00	817.00
	750mm diameter	Each	865.00	945.00
	800mm diameter	Each	998.00	1092.00
	900mm diameter	Each	1294.00	1422.00
	1000mm diameter	Each	1641.00	1806.00
	1100mm diameter	Each	2045.00	2252.00
	1200mm diameter	Each	2522.00	2771.00
3.18	Labour for laying in position double socket cast iron 90° bends. [Conforming to IS 3114 : 1994]		Medium Class	Heavy Class
	80mm diameter	Each	NA	24.00
	100mm diameter	Each	30.00	32.00
	125mm diameter	Each	41.00	44.00
	150mm diameter	Each	54.00	57.00
	200mm diameter	Each	83.00	88.00
	250mm diameter	Each	120.00	129.00
	300mm diameter	Each	165.00	178.00
	350mm diameter	Each	220.00	239.00
	400mm diameter	Each	284.00	309.00
	450mm diameter	Each	350.00	383.00
	500mm diameter	Each	446.00	489.00
	600mm diameter	Each	655.00	721.00
	700mm diameter	Each	920.00	1017.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	750mm diameter	Each	1072.00	1187.00
	800mm diameter	Each	1246.00	1382.00
	900mm diameter	Each	1646.00	1834.00
	1000mm diameter	Each	2108.00	2350.00
	1100mm diameter	Each	2668.00	2965.00
	1200mm diameter	Each	3317.00	3686.00

3.19 Labour for laying in position double socket cast iron 22½°. bends. [Conforming to IS 3114 : 1994]

		Medium Class	Heavy Class
80mm diameter	Each	NA	21.00
100mm diameter	Each	26.00	28.00
125mm diameter	Each	34.00	36.00
150mm diameter	Each	45.00	46.00
200mm diameter	Each	67.00	70.00
250mm diameter	Each	95.00	99.00
300mm diameter	Each	125.00	132.00
350mm diameter	Each	162.00	172.00
400mm diameter	Each	205.00	217.00
450mm diameter	Each	246.00	260.00
500mm diameter	Each	306.00	325.00
600mm diameter	Each	434.00	463.00
700mm diameter	Each	589.00	631.00
750mm diameter	Each	683.00	727.00
800mm diameter	Each	776.00	834.00
900mm diameter	Each	995.00	1073.00
1000mm diameter	Each	1252.00	1352.00
1100mm diameter	Each	1595.00	1673.00
1200mm diameter	Each	1942.00	2042.00

3.20 Labour for laying in position double socket cast iron 11¼ ° bends. [Conforming to IS 3114 : 1994]

		Medium Class	Heavy Class
80mm diameter	Each	NA	20.00
100mm diameter	Each	24.00	25.00
125mm diameter	Each	32.00	33.00
150mm diameter	Each	41.00	42.00
200mm diameter	Each	61.00	63.00
250mm diameter	Each	86.00	88.00
300mm diameter	Each	114.00	118.00
350mm diameter	Each	145.00	152.00
400mm diameter	Each	182.00	190.00
450mm diameter	Each	217.00	227.00
500mm diameter	Each	271.00	284.00
600mm diameter	Each	379.00	399.00
700mm diameter	Each	510.00	539.00
750mm diameter	Each	585.00	619.00
800mm diameter	Each	661.00	705.00
900mm diameter	Each	846.00	900.00
1000mm diameter	Each	1056.00	1125.00
1100mm diameter	Each	1303.00	1382.00
1200mm diameter	Each	1582.00	1677.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
			Medium Class	Heavy Class
3.21	Labour for laying in position all socket cast iron, tees (all Sizes in mm). [Conforming to IS 3114 : 1994]			
	80x80	Each	29.00	30.00
	100x80	Each	36.00	37.00
	100x100	Each	38.00	40.00
	125x80	Each	45.00	48.00
	125x100	Each	48.00	50.00
	125x125	Each	51.00	54.00
	150x80	Each	57.00	59.00
	150x100	Each	59.00	62.00
	150x125	Each	62.00	66.00
	150x150	Each	66.00	70.00
	200x80	Each	83.00	88.00
	200x100	Each	86.00	91.00
	200x125	Each	88.00	94.00
	200x150	Each	92.00	98.00
	200x200	Each	102.00	107.00
	250x80	Each	116.00	124.00
	250x100	Each	119.00	127.00
	250x125	Each	123.00	131.00
	250x150	Each	127.00	135.00
	250x200	Each	135.00	143.00
	250x250	Each	144.00	153.00
	300x80	Each	157.00	169.00
	300x100	Each	158.00	170.00
	300x125	Each	162.00	174.00
	300x150	Each	165.00	177.00
	300x200	Each	176.00	187.00
	300x250	Each	185.00	198.00
	300x300	Each	197.00	210.00
	350x200	Each	223.00	240.00
	350x250	Each	234.00	251.00
	350x300	Each	246.00	263.00
	350x350	Each	257.00	276.00
	400x200	Each	280.00	302.00
	400x250	Each	290.00	313.00
	400x300	Each	301.00	325.00
	400x350	Each	314.00	338.00
	400x400	Each	330.00	354.00
	450x250	Each	362.00	389.00
	450x300	Each	374.00	401.00
	450x350	Each	387.00	415.00
	450x400	Each	400.00	428.00
	450x450	Each	416.00	445.00
	500x250	Each	432.00	470.00
	500x300	Each	444.00	482.00
	500x350	Each	457.00	495.00
	500x400	Each	470.00	510.00

S.No.	Particulars of Items	Unit		Rates (in Rs.)
	500x450	Each	486.00	525.00
	500x500	Each	504.00	545.00
	600x300	Each	628.00	688.00
	600x350	Each	642.00	701.00
	600x400	Each	657.00	717.00
	600x450	Each	673.00	734.00
	600x500	Each	691.00	751.00
	600x600	Each	731.00	795.00
	700x350	Each	882.00	962.00
	700x400	Each	898.00	980.00
	700x450	Each	915.00	998.00
	700x500	Each	932.00	1015.00
	700x600	Each	968.00	1050.00
	700x700	Each	1014.00	1098.00
	750x400	Each	1031.00	1129.00
	750x450	Each	1050.00	1147.00
	750x500	Each	1068.00	1167.00
	750x600	Each	1104.00	1203.00
	750x700	Each	1145.00	1244.00
	750x750	Each	1174.00	1274.00
	800x400	Each	1183.00	1297.00
	800x450	Each	1200.00	1315.00
	800x500	Each	1219.00	1333.00
	800x600	Each	1258.00	1373.00
	800x700	Each	1299.00	1415.00
	800x750	Each	1320.00	1438.00
	800x800	Each	1352.00	1471.00
	900x450	Each	1545.00	1701.00
	900x500	Each	1563.00	1719.00
	900x600	Each	1607.00	1765.00
	900x700	Each	1652.00	1810.00
	900x750	Each	1673.00	1833.00
	900x800	Each	1697.00	1855.00
	900x900	Each	1757.00	1918.00
	1000x500	Each	1971.00	2176.00
	1000x600	Each	2013.00	2219.00
	1000x700	Each	2066.00	2275.00
	1000x750	Each	2089.00	2299.00
	1000x800	Each	2114.00	2322.00
	1000x900	Each	2164.00	2373.00
	1000x1000	Each	2235.00	2445.00
	1100x600	Each	2547.00	2753.00
	1100x700	Each	2601.00	2807.00
	1100x750	Each	2631.00	2837.00
	1100x800	Each	2660.00	2866.00
	1100x900	Each	2712.00	2918.00
	1100x1000	Each	2769.00	2975.00
	1100x1100	Each	2852.00	3058.00
	1200x600	Each	3174.00	3379.00
	1200x700	Each	3224.00	3429.00
	1200x750	Each	3254.00	3459.00
	1200x800	Each	3287.00	3492.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	1200x900	Each	3351.00	3556.00
	1200x1000	Each	3409.00	3614.00
	1200x1100	Each	3468.00	3676.00
	1200x1200	Each	3563.00	3768.00
3.22	Labour for laying in position all socket cast iron crosses. (all sizes in mm. [Conforming to IS 3114 : 1994]).			
			Medium Class	Heavy Class
	80mm diameter	Each	38.00	40.00
	100mm diameter	Each	49.00	51.00
	125mm diameter	Each	66.00	69.00
	150mm diameter	Each	84.00	88.00
	200mm diameter	Each	128.00	135.00
	250mm diameter	Each	181.00	191.00
	300mm diameter	Each	246.00	260.00
3.23	Labour for laying in position socket and spigot cast iron tapers, (reducer) (all Sizes in mm). [Conforming to IS 3114 : 1994]			
			Medium Class	Heavy Class
	100x80	Each	20.00	21.00
	125x80	Each	26.00	28.00
	125x100	Each	28.00	30.00
	150x80	Each	33.00	36.00
	150x100	Each	34.00	37.00
	150x125	Each	38.00	41.00
	200x100	Each	49.00	53.00
	200x125	Each	51.00	55.00
	200x150	Each	55.00	59.00
	250x125	Each	70.00	74.00
	250x150	Each	73.00	78.00
	250x200	Each	81.00	87.00
	300x150	Each	98.00	106.00
	300x200	Each	107.00	116.00
	300x250	Each	116.00	128.00
	350x200	Each	127.00	137.00
	350x250	Each	137.00	149.00
	350x300	Each	148.00	162.00
	400x250	Each	173.00	189.00
	400x300	Each	186.00	203.00
	400x350	Each	199.00	219.00
	450x350	Each	223.00	244.00
	450x400	Each	239.00	263.00
	500x350	Each	256.00	279.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	500x400	Each	272.00	297.00
	500x450	Each	289.00	317.00
	600x400	Each	363.00	396.00
	600x450	Each	382.00	417.00
	600x500	Each	401.00	440.00
	700x500	Each	482.00	525.00
	700x600	Each	527.00	577.00
	750x600	Each	593.00	650.00
	750x700	Each	647.00	712.00
	800x600	Each	640.00	700.00
	800x700	Each	693.00	762.00
	800x750	Each	724.00	796.00
	900x700	Each	829.00	906.00
	900x750	Each	859.00	980.00
	900x800	Each	891.00	941.00
	1000x800	Each	1011.00	1105.00
	1000x900	Each	1080.00	1186.00
	1100x900	Each	1230.00	1336.00
	1100x1000	Each	1258.00	1364.00
	1200x900	Each	1405.00	1510.00
	1200x1000	Each	1431.00	1537.00
	1200x1100	Each	1458.00	1568.00

3.24 Labour for laying in position Double Socket cast iron tapers (Reducer) (all sizes in mm). [Conforming to IS 3114 : 1994]

		Medium Class	Heavy Class
100x80	Each	20.00	24.00
125x80	Each	26.00	36.00
125x100	Each	28.00	40.00
150x80	Each	33.00	41.00
150x100	Each	34.00	45.00
150x125	Each	37.00	50.00
200x100	Each	49.00	57.00
200x125	Each	51.00	62.00
200x150	Each	55.00	67.00
250x125	Each	70.00	77.00
250x150	Each	73.00	82.00
250x200	Each	81.00	95.00
300x150	Each	98.00	99.00
300x200	Each	107.00	111.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	300x250	Each	116.00	125.00
	350x200	Each	127.00	154.00
	350x250	Each	137.00	173.00
	350x300	Each	148.00	193.00
	400x250	Each	173.00	197.00
	400x300	Each	186.00	217.00
	400x350	Each	199.00	239.00
	450x350	Each	223.00	257.00
	450x400	Each	239.00	281.00
	500x350	Each	256.00	293.00
	500x400	Each	272.00	318.00
	500x450	Each	289.00	338.00
	600x400	Each	363.00	396.00
	600x450	Each	382.00	409.00
	600x500	Each	401.00	438.00
	700x500	Each	482.00	512.00
	700x600	Each	527.00	577.00
	750x600	Each	593.00	621.00
	750x700	Each	647.00	689.00
	800x600	Each	602.00	661.00
	800x700	Each	667.00	735.00
	800x750	Each	706.00	779.00
	900x700	Each	754.00	830.00
	900x750	Each	796.00	916.00
	900x800	Each	863.00	914.00
	1000x800	Each	926.00	1019.00
	1000x900	Each	1007.00	1113.00
	1100x900	Each	1158.00	1264.00
	1100x1000	Each	1186.00	1291.00
	1200x900	Each	1327.00	1438.00
	1200x1000	Each	1359.00	1464.00
	1200x1100	Each	1392.00	1497.00

3.25 Labour for laying in position cast Iron Collars. [Conforming to IS 3114 : 1994]

		Medium Class	Heavy Class
80mm diameter	Each	17.00	18.00
100mm diameter	Each	21.00	22.00
125mm diameter	Each	28.00	29.00
150mm diameter	Each	36.00	37.00
200mm diameter	Each	50.00	53.00
250mm diameter	Each	69.00	73.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	300mm diameter	Each	90.00	94.00
	350mm diameter	Each	114.00	119.00
	400mm diameter	Each	136.00	145.00
	450mm diameter	Each	168.00	176.00
	500mm diameter	Each	199.00	210.00
	600mm diameter	Each	271.00	285.00
	700mm diameter	Each	355.00	374.00
	750mm diameter	Each	401.00	422.00
	800mm diameter	Each	450.00	475.00
	900mm diameter	Each	560.00	591.00
	1000mm diameter	Each	684.00	722.00
	1100mm diameter	Each	825.00	865.00
	1200mm diameter	Each	989.00	1028.00

3.26 Labour for laying in position socketed cast iron caps. [Conforming to IS 3114 : 1994]

			Heavy Class
80mm diameter	Each		9.00
100mm diameter	Each		12.00
125mm diameter	Each		16.00
150mm diameter	Each		20.00
200mm diameter	Each		32.00
250mm diameter	Each		45.00
300mm diameter	Each		61.00
350mm diameter	Each		81.00
400mm diameter	Each		102.00
450mm diameter	Each		128.00
500mm diameter	Each		156.00
600mm diameter	Each		226.00
700mm diameter	Each		310.00
750mm diameter	Each		359.00
800mm diameter	Each		415.00
900mm diameter	Each		535.00
1000mm diameter	Each		679.00
1100mm diameter	Each		842.00
1200mm diameter	Each		1027.00

3.27 Labour for laying in position cast iron plugs. [Conforming to IS 3114 : 1994]

		Medium Class	Heavy Class
80mm diameter	Each	3.00	4.00
100mm diameter	Each	4.00	5.00
125mm diameter	Each	7.00	8.00
150mm diameter	Each	11.00	12.00
200mm diameter	Each	17.00	18.00
250mm diameter	Each	26.00	29.00
300mm diameter	Each	37.00	40.00
350mm diameter	Each	50.00	54.00
400mm diameter	Each	67.00	71.00
450mm diameter	Each	86.00	91.00
500mm diameter	Each	107.00	114.00
600mm diameter	Each	158.00	168.00
700mm diameter	Each	226.00	238.00
750mm diameter	Each	265.00	279.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	800mm diameter	Each	310.00	325.00
	900mm diameter	Each	405.00	424.00
	1000mm diameter	Each	520.00	543.00
	1100mm diameter	Each	657.00	684.00
	1200mm diameter	Each	812.00	841.00

3.28 Labour for laying in position sizes of socket & spigot or all socketed cast iron standard specials class 'MEDIUM' or 'HEAVY' Which do not appear in above items of the schedule. [Conforming to IS 3114 : 1994]

	Unit	Medium Class	Heavy Class
80 mm to 1200 mm Dia	Kg	1.00	1.00

CHAPTER - 4
CAST IRON TYTON PIPES WITH TYTON JOINTS

- 1 C.I. Pipes shall Conform to IS: 1536 - 2001 duly inspected and tested and having BIS certification mark.
- 2 Specials shall Conform to IS: 1538 - 1993 with upto date amendement duly inspected and tested and having BIS certification mark.
- 3 Tyton rubber sealing ring/Tyton rubber gasket shall be as per IS:5382- 1985 duly inspected and tested and having BIS certification mark.
- 4 The rings shall be homogeneous, free from porosity, frit, excessive blooms, blisters or other visible surface imperfections. The fin or flash shall be reduced as much possible and in any case the thickness of it shall not exceed 0.4 mm and the width 0.8 mm. Unless otherwise specified, the materials shall be black.
- 5 Rubber ring tyton joints shall be used for jointing of CI pipe lines outside the building and other external water supply installations. Wherever required, for internal water supply piping arrangements with CI pipes, shall be connected by flanged joints.
- 6 Laying of pipe shall be as per clause IS:3114 - 1994
Laying of pipes and fittings/specials includes all precautions to guard against possible damaged to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.
- 7 **Measurement**
The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and enumerated and paid separately. The portion of the pipe within the collar at the joints shall not be included in the length of pipe work.
- 8 **Rates**
 - 8.1 The rates include charges for all tools & plants, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in positions as per approved drawing.
 - 8.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials, and other causes.

CHAPTER 4 - CAST IRON TYTON PIPES WITH TYTON JOINTS

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
4.1	Providing, laying and jointing cast iron tyton pipes with tyton joints including testing of joints, cost of pipes and jointing materials etc complete. [Cast iron (tyton) pipes shall Conform to IS 1536 : 2001 and rubber sealing rings shall Conform to IS 5382:1985)		LA Class	A Class	B Class
	80mm diameter	RM	1237.00	1338.00	1443.00
	100mm diameter	RM	1503.00	1651.00	1766.00
	125mm diameter	RM	1898.00	2069.00	2277.00
	150mm diameter	RM	2303.00	2521.00	2721.00
	200mm diameter	RM	3359.00	3641.00	3944.00
	250mm diameter	RM	4521.00	4938.00	5293.00
	300mm diameter	RM	5833.00	6370.00	6892.00
	350mm diameter	RM	7339.00	7954.00	8623.00
	400mm diameter	RM	8951.00	9773.00	10553.00
	450mm diameter	RM	10962.00	11160.00	12982.00
	500mm diameter	RM	12838.00	13973.00	15122.00
	600mm diameter	RM	17117.00	18670.00	20232.00
	700mm diameter	RM	22094.00	24113.00	26070.00
	750mm diameter	RM	24741.00	27025.00	29350.00
	800mm diameter	RM	27691.00	30145.00	32652.00
	900mm diameter	RM	33710.00	36752.00	39856.00
	1000mm diameter	RM	40512.00	44220.00	47822.00
	1050mm diameter	RM	44769.00	48881.00	52891.00
4.2	Labour for laying in position cast iron tyton pipes.		LA Class	A Class	B Class
	80mm diameter	RM	57.00	62.00	68.00
	100mm diameter	RM	72.00	78.00	86.00
	125mm diameter	RM	93.00	101.00	112.00
	150mm diameter	RM	116.00	127.00	140.00
	200mm diameter	RM	170.00	184.00	202.00
	250mm diameter	RM	230.00	250.00	274.00
	300mm diameter	RM	296.00	323.00	347.00
	350mm diameter	RM	374.00	405.00	442.00
	400mm diameter	RM	455.00	496.00	540.00
	450mm diameter	RM	549.00	602.00	655.00
	500mm diameter	RM	642.00	698.00	761.00
	600mm diameter	RM	858.00	935.00	1022.00
	700mm diameter	RM	1106.00	1203.00	1316.00
	750mm diameter	RM	1233.00	1345.00	1483.00
	800mm diameter	RM	1377.00	1498.00	1651.00
	900mm diameter	RM	1683.00	1833.00	2014.00
	1000mm diameter	RM	2026.00	2209.00	2415.00
	1050mm diameter	RM	2318.00	2523.00	2799.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
4.3	Jointing of tyton pipes of class 'LA' 'A' and 'B' including testing of joints and cost of jointing materials (i.e. Rubber Gasket and Soap solution etc.). [Conform to IS 5382: 1985]		
	80mm diameter	Each	76.00
	100mm diameter	Each	87.00
	125mm diameter	Each	106.00
	150mm diameter	Each	136.00
	200mm diameter	Each	180.00
	250mm diameter	Each	250.00
	300mm diameter	Each	297.00
	350mm diameter	Each	337.00
	400mm diameter	Each	429.00
	450mm diameter	Each	466.00
	500mm diameter	Each	581.00
	600mm diameter	Each	699.00
	700mm diameter	Each	927.00
	750mm diameter	Each	1059.00
	800mm diameter	Each	1180.00
	900mm diameter	Each	1300.00
	1000mm diameter	Each	1625.00
	1050mm diameter	Each	1808.00
4.4	Labour for jointing of tyton pipes class 'LA' 'A' and 'B' including testing of joints but excluding cost of Rubber Gasket.		
	80mm diameter	Each	40.00
	100mm diameter	Each	47.00
	125mm diameter	Each	53.00
	150mm diameter	Each	78.00
	200mm diameter	Each	93.00
	250mm diameter	Each	126.00
	300mm diameter	Each	132.00
	350mm diameter	Each	140.00
	400mm diameter	Each	162.00
	450mm diameter	Each	170.00
	500mm diameter	Each	191.00
	600mm diameter	Each	200.00
	700mm diameter	Each	219.00
	750mm diameter	Each	242.00
	800mm diameter	Each	250.00
	900mm diameter	Each	271.00
	1000mm diameter	Each	289.00
	1050mm diameter	Each	296.00

CHAPTER - 5
CAST IRON PIPES AND SPECIALS WITH FLANGED JOINTS

- 1 The Horizontal Cast C.I. double flanged pipes shall Conform to IS 7181-1986 (reaffirmed 2005) duly inspected and tested and having BIS certification mark.
- 2 The C.I. fittings shall Conform to IS - 1538- 1993 duly inspected and tested and having BIS certification mark.
- 3 Method of sampling of cast iron pipes & fittings shall Conform to IS 11606-1986.
- 4 Specification for rubber and insertions shall Conform to IS 1638.
- 5 Code of structural steel in general building construction (for nuts and bolts) shall Conform to IS 800.
- 6 Flanged pipes centrifugally cast with screwed/welded flanges shall Conform to IS 1536-2001

7 Tolerance :

7.1 Tolerance on thickness-

The tolerances on the wall thickness of pipes and flange thickness of pipes shall be as follows:

Dimension	Tolerance mm
Wall thickness	$-(1 + 0.05e)$
Flange thickness	$\pm(2 + 0.05b)$
Where e = Thickness of pipe in mm, and b = Thickness of flange in mm	

7.2 Tolerance on Mass of fittings-

The mass of fittings are given in the specification prepared by the department. Tolerance on mass of fittings shall be as below :-

(i) The permissible tolerances on standard mass of fittings shall be ± 8 percent except for bends, fittings with more than one branch and non-standard fittings, in which case the tolerance shall be ± 12 percent. Fittings of a heavier mass than the maximum may be accepted provided they comply in every other respect with the requirement of this standard.

7.3 Permissible Deviation in double flanged cast iron pipe (Horizontal) from a straight Line:- The pipes shall be straight. When rolled along two gantries separated by approximately two thirds the lengths of the pipes to be checked, the maximum deviation fm, shall be thus
 $fm < 1.25L$.

- 8 Laying of pipes and fittings/specials includes all precautions to guard against possible damaged to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

- 9 **Fixing** means laying in specified position to ensure interconnection between all flanged pipes, fittings and valves. It is also to ensure that the bolt holes of two flanges of the pipe/ fittings are correctly aligned.

10 Measurement :

The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and enumerated & paid for separately.

11 Rates :

- 11.1** The rates include the charge for all tools and plant such as chain pulley blocks and other appliances etc. required for lifting and laying the pipes and specials in position.
- 11.2** The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials and other causes.
- 11.3** The rates include provision of handling, storing under cover as required and returning of empty cases or container to the store without any extra cost, for such materials as may be supplied by the Department.

CHAPTER 5 -CAST IRON PIPES AND SPECIALS WITH FLANGED JOINTS

S.No.	Particulars of Items	Unit	Rates (in Rs.)
5.1	Providing and fixing double flanged cast iron (horizontal cast) pipe as per IS : 7181 of <u>One Meter</u> length.		
	80mm diameter	Each	1929.00
	100mm diameter	Each	2397.00
	125mm diameter	Each	3098.00
	150mm diameter	Each	3616.00
	200mm diameter	Each	5176.00
	250mm diameter	Each	6950.00
	300mm diameter	Each	8913.00
	350mm diameter	Each	12162.00
	400mm diameter	Each	14849.00
	450mm diameter	Each	17729.00
	500mm diameter	Each	20812.00
	600mm diameter	Each	27977.00
	700mm diameter	Each	36454.00
	750mm diameter	Each	41351.00
5.2	Labour only for fixing including positioning of pipe cleaning of pipes/flange ends, local carriage for pipe at site etc. double flanged cast iron (horizontal cast) pipe as per IS : 7181 of <u>One Meter</u> length.		
	80mm diameter	Each	32.00
	100mm diameter	Each	40.00
	125mm diameter	Each	52.00
	150mm diameter	Each	60.00
	200mm diameter	Each	86.00
	250mm diameter	Each	116.00
	300mm diameter	Each	148.00
	350mm diameter	Each	203.00
	400mm diameter	Each	248.00
	450mm diameter	Each	296.00
	500mm diameter	Each	347.00
	600mm diameter	Each	467.00
	700mm diameter	Each	608.00
	750mm diameter	Each	690.00
5.3	Providing and fixing double flanged cast iron (horizontal cast) pipe as per IS : 7181 of <u>Two Meter</u> length.		
	80mm diameter	Each	3279.00
	100mm diameter	Each	4129.00
	125mm diameter	Each	5356.00
	150mm diameter	Each	6347.00
	200mm diameter	Each	9094.00
	250mm diameter	Each	12417.00
	300mm diameter	Each	16098.00
	350mm diameter	Each	21276.00
	400mm diameter	Each	25949.00
	450mm diameter	Each	31183.00
	500mm diameter	Each	36467.00
	600mm diameter	Each	48903.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	700mm diameter	Each	63361.00
	750mm diameter	Each	71629.00
5.4	Labour only for fixing including positioning of pipe cleaning of pipes/flange ends, local carriage for pipe at site etc. double flanged cast iron (horizontal cast) pipe as per IS : 7181 of Two Meter length.		
	80mm diameter	Each	56.00
	100mm diameter	Each	70.00
	125mm diameter	Each	91.00
	150mm diameter	Each	108.00
	200mm diameter	Each	154.00
	250mm diameter	Each	211.00
	300mm diameter	Each	272.00
	350mm diameter	Each	361.00
	400mm diameter	Each	440.00
	450mm diameter	Each	529.00
	500mm diameter	Each	618.00
	600mm diameter	Each	829.00
	700mm diameter	Each	1074.00
	750mm diameter	Each	1215.00
5.5	Providing and fixing double flanged cast iron (horizontal cast) pipe as per IS : 7181 of <u>2.75 M</u> length		
	80mm diameter	Each	4282.00
	100mm diameter	Each	5416.00
	125mm diameter	Each	7027.00
	150mm diameter	Each	8423.00
	200mm diameter	Each	12062.00
	250mm diameter	Each	16395.00
	300mm diameter	Each	21471.00
	350mm diameter	Each	28024.00
	400mm diameter	Each	34173.00
	450mm diameter	Each	41149.00
	500mm diameter	Each	48062.00
	600mm diameter	Each	64403.00
	700mm diameter	Each	83289.00
	750mm diameter	Each	94060.00
5.6	Labour only for fixing including positioning of pipe cleaning of pipes/flange ends, local carriage for pipe at site etc. double flanged cast iron (horizontal cast) pipe as per IS : 7181 of 2.75 Meter length.		
	80mm diameter	Each	73.00
	100mm diameter	Each	93.00
	125mm diameter	Each	120.00
	150mm diameter	Each	143.00
	200mm diameter	Each	206.00
	250mm diameter	Each	280.00
	300mm diameter	Each	367.00
	350mm diameter	Each	479.00
	400mm diameter	Each	584.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	450mm diameter	Each	703.00
	500mm diameter	Each	822.00
	600mm diameter	Each	1101.00
	700mm diameter	Each	1424.00
	750mm diameter	Each	1608.00
5.7	Jointing of double flanged cast iron (horizontal cast) pipes and specials class 'A' and 'B' including labour & cost of jointing materials (i.e. Bolt, Nuts and Rubber insertions) including testing of joint etc. complete [Conform to IS 800 for Nuts & Bolts & IS 1638 for rubber insertions:]		
	80mm diameter	Each	84.00
	100mm diameter	Each	144.00
	125mm diameter	Each	161.00
	150mm diameter	Each	189.00
	200mm diameter	Each	211.00
	250mm diameter	Each	317.00
	300mm diameter	Each	329.00
	350mm diameter	Each	436.00
	400mm diameter	Each	627.00
	450mm diameter	Each	707.00
	500mm diameter	Each	867.00
	600mm diameter	Each	1138.00
	700mm diameter	Each	1390.00
	750mm diameter	Each	1620.00
5.8	Labour for jointing of flanged cast iron pipes and specials class 'A' and 'B' including testing of joints but excluding cost of jointing materials (i.e. Bolts & Nut, Rubber insertion)		
	80mm diameter	Each	23.00
	100mm diameter	Each	32.00
	125mm diameter	Each	38.00
	150mm diameter	Each	44.00
	200mm diameter	Each	51.00
	250mm diameter	Each	64.00
	300mm diameter	Each	66.00
	350mm diameter	Each	76.00
	400mm diameter	Each	85.00
	450mm diameter	Each	87.00
	500mm diameter	Each	89.00
	600mm diameter	Each	98.00
	700mm diameter	Each	104.00
	750mm diameter	Each	112.00
5.9	Labour only for jointing double flanged horizontally cast iron pipes and specials in vertical or inclined direction including testing of joints but excluding cost of jointing materials (i.e. bolts, nuts and rubber insertion sheet) [Conform to IS 800 IS 1638:]		

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
5.9.1	80mm to 750mm dia in truly vertical position		200% above the rates provided vide item No. 5.2, 5.4 & 5.6	
5.9.2	In inclined position at inclination 45% & above		100% above rates provided vide item No. 5.2, 5.4 & 5.6	
5.9.3	In inclined position at inclination less than 45%		Same as rates provided vide item No. 5.2, 5.4 & 5.6	
5.10	Providing & Laying in position cast iron flanged sockets (Conforming to IS 1538)		Medium Class	Heavy Class
	80mm diameter	Each	875.00	948.00
	100mm diameter	Each	1094.00	1166.00
	125mm diameter	Each	1385.00	1458.00
	150mm diameter	Each	1823.00	1895.00
	200mm diameter	Each	2624.00	2697.00
	250mm diameter	Each	4228.00	4520.00
	300mm diameter	Each	5395.00	5759.00
	350mm diameter	Each	7404.00	7877.00
	400mm diameter	Each	9137.00	9688.00
	450mm diameter	Each	10555.00	11185.00
	500mm diameter	Each	12839.00	13627.00
	600mm diameter	Each	17407.00	18431.00
	700mm diameter	Each	22763.00	24102.00
	750mm diameter	Each	25835.00	27332.00
	800mm diameter	Each	29301.00	30798.00
	900mm diameter	Each	35996.00	37493.00
	1000mm diameter	Each	44188.00	45684.00
	1100mm diameter	Each	67818.00	68133.00
	1200mm diameter	Each	79633.00	80420.00
5.11	Providing and laying in position cast iron flanged spigot (tail piece) [Conform to IS 1538]		Medium Class	Heavy Class
	80mm diameter	Each	802.00	866.00
	100mm diameter	Each	948.00	1021.00
	125mm diameter	Each	1239.00	1385.00
	150mm diameter	Each	1531.00	1677.00
	200mm diameter	Each	2552.00	2843.00
	250mm diameter	Each	3426.00	3864.00
	300mm diameter	Each	4374.00	4957.00
	350mm diameter	Each	5719.00	6396.00
	400mm diameter	Each	6923.00	7826.00
	450mm diameter	Each	8202.00	9255.00
	500mm diameter	Each	9782.00	10986.00
	600mm diameter	Each	15125.00	17081.00
	700mm diameter	Each	19639.00	22198.00
	750mm diameter	Each	22273.00	25132.00
	800mm diameter	Each	25358.00	28218.00
	900mm diameter	Each	31002.00	34237.00
	1000mm diameter	Each	37774.00	41536.00
	1100mm diameter	Each	57338.00	61552.00
	1200mm diameter	Each	68249.00	72764.00
5.12	Providing and laying in position cast iron double flanged 90° bends [Conform to IS 1538]		Medium Class	Heavy Class

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	80mm diameter	Each	903.00	978.00
	100mm diameter	Each	1204.00	1279.00
	125mm diameter	Each	1580.00	1731.00
	150mm diameter	Each	2182.00	2333.00
	200mm diameter	Each	3386.00	3687.00
	250mm diameter	Each	4891.00	5418.00
	300mm diameter	Each	6772.00	7525.00
	350mm diameter	Each	9544.00	10630.00
	400mm diameter	Each	12570.00	14044.00
	450mm diameter	Each	15596.00	17536.00
	500mm diameter	Each	20019.00	22502.00
	600mm diameter	Each	30417.00	34296.00
	700mm diameter	Each	43918.00	49582.00
	750mm diameter	Each	51832.00	58583.00
	800mm diameter	Each	61221.00	69058.00
	900mm diameter	Each	82481.00	91482.00
	1000mm diameter	Each	109251.00	119804.00
	1100mm diameter	Each	140754.00	152703.00
	1200mm diameter	Each	178930.00	191965.00
5.13	Providing and laying in position cast iron double flanged 45° bends [Conform to IS 1538]			Heavy Class
	80mm diameter	Each		1053.00
	100mm diameter	Each		1354.00
	125mm diameter	Each		1881.00
	150mm diameter	Each		2558.00
	200mm diameter	Each		4063.00
	250mm diameter	Each		6020.00
	300mm diameter	Each		8428.00
	350mm diameter	Each		8923.00
	400mm diameter	Each		11561.00
	450mm diameter	Each		14355.00
	500mm diameter	Each		17924.00
	600mm diameter	Each		26537.00
	700mm diameter	Each		37633.00
	750mm diameter	Each		44383.00
	800mm diameter	Each		51755.00
	900mm diameter	Each		67351.00
	1000mm diameter	Each		87292.00
	1100mm diameter	Each		110260.00
	1200mm diameter	Each		137417.00
5.14	Providing and laying in position cast iron double flanged 90° Duck Foot Bend. [Conform to IS 1538]		Medium Class	Heavy Class
	80mm diameter	Each	1505.00	1580.00
	100mm diameter	Each	1881.00	1956.00
	125mm diameter	Each	2558.00	2709.00
	150mm diameter	Each	3386.00	3537.00
	200mm diameter	Each	5267.00	5568.00
	250mm diameter	Each	7826.00	8352.00
	300mm diameter	Each	10986.00	11739.00
	350mm diameter	Each	15988.00	17107.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	400mm diameter	Each	20944.00	22463.00
	450mm diameter	Each	25980.00	27979.00
	500mm diameter	Each	33095.00	35653.00
	600mm diameter	Each	50122.00	54119.00
5.15	Providing and laying in position cast iron all flanged Tees (all sizes in mm) Body x Branch. [Conform to IS 1538]		Medium Class	Heavy Class
	80x80	Each	1528.00	1605.00
	100x80	Each	1758.00	1911.00
	100x100	Each	1834.00	1987.00
	125x80	Each	2216.00	2445.00
	125x100	Each	2445.00	2598.00
	125x125	Each	2522.00	2751.00
	150x80	Each	2904.00	3133.00
	150x100	Each	2980.00	3210.00
	150x125	Each	3133.00	3439.00
	150x150	Each	3286.00	3592.00
	200x80	Each	4280.00	4738.00
	200x100	Each	4356.00	4814.00
	200x125	Each	4585.00	5044.00
	200x150	Each	4738.00	5197.00
	200x200	Each	5120.00	5655.00
	250x80	Each	6114.00	6801.00
	250x100	Each	6190.00	6878.00
	250x125	Each	6419.00	7107.00
	250x150	Each	6649.00	7336.00
	250x200	Each	7031.00	7795.00
	250x250	Each	7566.00	8330.00
	300x80	Each	8330.00	9323.00
	300x100	Each	8483.00	9476.00
	300x125	Each	8635.00	9629.00
	300x150	Each	8865.00	9858.00
	300x200	Each	9323.00	10393.00
	300x250	Each	9858.00	10928.00
	300x300	Each	10393.00	11539.00
	350x200	Each	11972.00	13311.00
	350x250	Each	12288.00	13627.00
	350x300	Each	13390.00	14808.00
	350x350	Each	13784.00	15359.00
	400x200	Each	14887.00	16620.00
	400x250	Each	15202.00	16935.00
	400x300	Each	16383.00	18274.00
	400x350	Each	16856.00	18825.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	400x400	Each	17407.00	19376.00
	450x250	Each	18274.00	20479.00
	450x300	Each	19455.00	21818.00
	450x350	Each	19928.00	22370.00
	450x400	Each	20400.00	22842.00
	450x450	Each	20873.00	23315.00
	500x250	Each	22133.00	24811.00
	500x300	Each	23472.00	26308.00
	500x350	Each	24024.00	26938.00
	500x400	Each	24575.00	27489.00
	500x450	Each	25048.00	28041.00
	500x500	Each	25599.00	28592.00
	600x300	Each	32609.00	36705.00
	600x350	Each	33397.00	37414.00
	600x400	Each	34027.00	38202.00
	600x450	Each	34500.00	38753.00
	600x500	Each	35051.00	39304.00
	600x600	Each	36311.00	40643.00
	700x350	Each	44897.00	50568.00
	700x400	Each	45527.00	51277.00
	700x450	Each	46236.00	51986.00
	700x500	Each	46866.00	52695.00
	700x600	Each	48126.00	54034.00
	700x700	Each	49780.00	55688.00
	750x400	Each	52143.00	58760.00
	750x450	Each	52773.00	59390.00
	750x500	Each	53640.00	60335.00
	750x600	Each	54664.00	61359.00
	750x700	Each	55688.00	62383.00
	750x750	Each	56712.00	63407.00
	800x400	Each	62702.00	70601.00
	800x450	Each	63360.00	71342.00
	800x500	Each	64100.00	72164.00
	800x600	Each	65664.00	73810.00
	800x700	Each	67227.00	75374.00
	800x750	Each	68132.00	76361.00
	800x800	Each	69202.00	77431.00
	900x450	Each	79488.00	89774.00
	900x500	Each	80640.00	91008.00
	900x600	Each	82286.00	92818.00
	900x700	Each	83931.00	94546.00
	900x750	Each	84919.00	95534.00
	900x800	Each	85906.00	96521.00
	900x900	Each	87305.00	97920.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	1000x500	Each	104174.00	114871.00
	1000x600	Each	106148.00	116681.00
	1000x700	Each	108452.00	118985.00
	1000x750	Each	109358.00	119890.00
	1000x800	Each	110263.00	120795.00
	1000x900	Each	111579.00	122112.00
	1000x1000	Each	113966.00	124498.00
	1100x600	Each	131163.00	141696.00
	1100x700	Each	133220.00	143753.00
	1100x750	Each	134455.00	144987.00
	1100x800	Each	135442.00	145975.00
	1100x900	Each	135771.00	146304.00
	1100x1000	Each	136594.00	147127.00
	1100x1100	Each	139392.00	149924.00
	1200x600	Each	163337.00	173869.00
	1200x700	Each	165312.00	175844.00
	1200x750	Each	166381.00	176914.00
	1200x800	Each	167698.00	178231.00
	1200x900	Each	168768.00	179300.00
	1200x1000	Each	170496.00	180205.00
	1200x1100	Each	171895.00	181604.00
	1200x1200	Each	176256.00	185965.00
5.16	Providing and laying in position cast iron double flanged Tapers (all size in mm) Body x Branch. [Conform to IS 1538]		Medium Class	Heavy Class
	100x80	Each	828.00	903.00
	125x80	Each	1354.00	1505.00
	125x100	Each	1505.00	1655.00
	150x80	Each	1580.00	1731.00
	150x100	Each	1731.00	1881.00
	150x125	Each	1881.00	2032.00
	200x100	Each	2182.00	2333.00
	200x125	Each	2333.00	2558.00
	200x150	Each	2558.00	2784.00
	250x125	Each	2859.00	3085.00
	250x150	Each	3010.00	3311.00
	250x200	Each	3461.00	3762.00
	300x150	Each	3537.00	3838.00
	300x200	Each	3988.00	4364.00
	300x250	Each	4515.00	4891.00
	350x200	Each	6223.00	6853.00
	350x250	Each	6853.00	7562.00
	350x300	Each	7562.00	8349.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	400x250	Each	7719.00	8586.00
	400x300	Each	8507.00	9452.00
	400x350	Each	9373.00	10397.00
	450x300	Each	9216.00	10240.00
	450x350	Each	10318.00	11421.00
	450x400	Each	11264.00	12445.00
	500x350	Each	11342.00	12603.00
	500x400	Each	12366.00	13705.00
	500x450	Each	13233.00	14651.00
	600x400	Each	14966.00	16541.00
	600x450	Each	15753.00	17486.00
	600x500	Each	17014.00	18825.00
	700x500	Each	20007.00	22133.00
	700x600	Each	22606.00	24969.00
	750x600	Each	24102.00	26623.00
	750x700	Each	27096.00	29931.00
	800x600	Each	26700.00	29418.00
	800x700	Each	29737.00	32775.00
	800x750	Each	31016.00	34214.00
	900x700	Each	33175.00	36612.00
	900x750	Each	34614.00	38211.00
	900x800	Each	36852.00	40609.00
	1000x800	Each	41409.00	45565.00
	1000x900	Each	44766.00	49323.00
	1100x900	Each	50122.00	54679.00
	1100x1000	Each	54918.00	59475.00
	1200x1000	Each	60994.00	65550.00
	1200x1100	Each	66110.00	70666.00
5.17	Providing and laying in position all flanged cast iron crosses [Conform to IS 1538]		Medium Class	Heavy Class
	80mm diameter	Each	1911.00	2063.00
	100mm diameter	Each	2369.00	2598.00
	125mm diameter	Each	3133.00	3515.00
	150mm diameter	Each	4127.00	4585.00
	200mm diameter	Each	6419.00	7107.00
	250mm diameter	Each	9323.00	10317.00
	300mm diameter	Each	12609.00	13756.00
5.18	Providing and laying in position all flanged cast iron blank flanges [Conform to IS 1538]			Heavy Class

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	80mm diameter	Each	365.00	
	100mm diameter	Each	437.00	
	125mm diameter	Each	583.00	
	150mm diameter	Each	802.00	
	200mm diameter	Each	1166.00	
	250mm diameter	Each	1677.00	
	300mm diameter	Each	2333.00	
	350mm diameter	Each	3236.00	
	400mm diameter	Each	4139.00	
	450mm diameter	Each	5042.00	
	500mm diameter	Each	6396.00	
	600mm diameter	Each	9481.00	
	700mm diameter	Each	13319.00	
	750mm diameter	Each	15576.00	
	800mm diameter	Each	18435.00	
	900mm diameter	Each	23552.00	
	1000mm diameter	Each	30550.00	
	1100mm diameter	Each	37924.00	
	1200mm diameter	Each	46954.00	
5.19	Labour for laying in position cast iron flanged sockets excluding cost of the cast iron flanged socket.		Medium Class	Heavy Class
	80mm diameter	Each	16.00	17.00
	100mm diameter	Each	20.00	21.00
	125mm diameter	Each	25.00	27.00
	150mm diameter	Each	34.00	35.00
	200mm diameter	Each	48.00	50.00
	250mm diameter	Each	78.00	83.00
	300mm diameter	Each	99.00	106.00
	350mm diameter	Each	126.00	134.00
	400mm diameter	Each	156.00	165.00
	450mm diameter	Each	180.00	190.00
	500mm diameter	Each	219.00	232.00
	600mm diameter	Each	296.00	314.00
	700mm diameter	Each	387.00	410.00
	750mm diameter	Each	440.00	465.00
	800mm diameter	Each	499.00	524.00
	900mm diameter	Each	613.00	638.00
	1000mm diameter	Each	752.00	778.00
	1100mm diameter	Each	1154.00	1160.00
	1200mm diameter	Each	1355.00	1369.00
5.20	Labour for laying in position cast iron flanged Spigot excluding cost of the cast iron flanged spigot.		Medium Class	Heavy Class
	80mm diameter	Each	15.00	16.00
	100mm diameter	Each	17.00	19.00
	125mm diameter	Each	23.00	25.00
	150mm diameter	Each	28.00	31.00
	200mm diameter	Each	47.00	52.00
	250mm diameter	Each	63.00	71.00
	300mm diameter	Each	80.00	91.00
	350mm diameter	Each	102.00	114.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	400mm diameter	Each	123.00	139.00
	450mm diameter	Each	146.00	165.00
	500mm diameter	Each	174.00	196.00
	600mm diameter	Each	269.00	304.00
	700mm diameter	Each	350.00	395.00
	750mm diameter	Each	397.00	448.00
	800mm diameter	Each	452.00	503.00
	900mm diameter	Each	552.00	610.00
	1000mm diameter	Each	673.00	740.00
	1100mm diameter	Each	1022.00	1097.00
	1200mm diameter	Each	1216.00	1296.00
5.21	Labour for laying in position cast iron double flanged 90° Bend excluding cost of the cast iron double flanged 90 degree bend.		Medium Class	Heavy Class
	80mm diameter	Each	16.00	17.00
	100mm diameter	Each	21.00	23.00
	125mm diameter	Each	28.00	31.00
	150mm diameter	Each	39.00	42.00
	200mm diameter	Each	60.00	66.00
	250mm diameter	Each	87.00	97.00
	300mm diameter	Each	121.00	134.00
	350mm diameter	Each	165.00	184.00
	400mm diameter	Each	217.00	243.00
	450mm diameter	Each	269.00	303.00
	500mm diameter	Each	346.00	389.00
	600mm diameter	Each	526.00	593.00
	700mm diameter	Each	759.00	857.00
	750mm diameter	Each	896.00	1012.00
	800mm diameter	Each	1058.00	1193.00
	900mm diameter	Each	1425.00	1581.00
	1000mm diameter	Each	1888.00	2070.00
	1100mm diameter	Each	2432.00	2638.00
	1200mm diameter	Each	3092.00	3317.00
5.22	Labour for laying in position cast iron double flanged 45° bend excluding cost of the cast iron double flanged 45 degree bend.			Heavy Class
	80mm diameter	Each		19.00
	100mm diameter	Each		24.00
	125mm diameter	Each		34.00
	150mm diameter	Each		46.00
	200mm diameter	Each		72.00
	250mm diameter	Each		107.00
	300mm diameter	Each		150.00
	350mm diameter	Each		154.00
	400mm diameter	Each		200.00
	450mm diameter	Each		248.00
	500mm diameter	Each		310.00
	600mm diameter	Each		459.00
	700mm diameter	Each		650.00
	750mm diameter	Each		767.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	800mm diameter	Each		894.00
	900mm diameter	Each		1164.00
	1000mm diameter	Each		1508.00
	1100mm diameter	Each		1905.00
	12000mm diameter	Each		2374.00
5.23	Labour for laying in position cast iron double flanged 90° duck foot bend excluding cost of the cast iron double flanged 90 degree duck foot bend.		Medium Class	Heavy Class
	80mm diameter	Each	27.00	28.00
	100mm diameter	Each	34.00	35.00
	125mm diameter	Each	46.00	48.00
	150mm diameter	Each	60.00	63.00
	200mm diameter	Each	94.00	99.00
	250mm diameter	Each	139.00	149.00
	300mm diameter	Each	196.00	209.00
	350mm diameter	Each	268.00	287.00
	400mm diameter	Each	351.00	377.00
	450mm diameter	Each	436.00	469.00
	500mm diameter	Each	555.00	598.00
	600mm diameter	Each	841.00	908.00
5.24	Labour for laying in position cast iron all flanged tees (all sizes in mm) excluding cost of the cast iron double flanged tees (all sizes in mm). Body x Branch		Medium Class	Heavy Class
	80x80	Each	27.00	28.00
	100x80	Each	31.00	34.00
	100x100	Each	32.00	35.00
	125x80	Each	39.00	43.00
	125x100	Each	43.00	46.00
	125x125	Each	44.00	48.00
	150x80	Each	51.00	55.00
	150x100	Each	52.00	56.00
	150x125	Each	55.00	60.00
	150x150	Each	58.00	63.00
	200x80	Each	75.00	83.00
	200x100	Each	76.00	84.00
	200x125	Each	80.00	88.00
	200x150	Each	83.00	91.00
	200x200	Each	90.00	99.00
	250x80	Each	107.00	119.00
	250x100	Each	109.00	121.00
	250x125	Each	113.00	125.00
	250x150	Each	117.00	129.00
	250x200	Each	123.00	137.00
	250x250	Each	133.00	146.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	300x80	Each	146.00	164.00
	300x100	Each	149.00	166.00
	300x125	Each	151.00	169.00
	300x150	Each	156.00	173.00
	300x200	Each	164.00	182.00
	300x250	Each	173.00	192.00
	300x300	Each	182.00	202.00
	350x200	Each	204.00	227.00
	350x250	Each	209.00	232.00
	350x300	Each	228.00	252.00
	350x350	Each	235.00	261.00
	400x200	Each	253.00	283.00
	400x250	Each	259.00	288.00
	400x300	Each	279.00	311.00
	400x350	Each	287.00	320.00
	400x400	Each	296.00	330.00
	450x250	Each	311.00	349.00
	450x300	Each	331.00	371.00
	450x350	Each	339.00	381.00
	450x400	Each	347.00	389.00
	450x450	Each	355.00	397.00
	500x250	Each	377.00	422.00
	500x300	Each	400.00	448.00
	500x350	Each	409.00	459.00
	500x400	Each	418.00	468.00
	500x450	Each	426.00	477.00
	500x500	Each	436.00	487.00
	600x300	Each	555.00	625.00
	600x350	Each	568.00	637.00
	600x400	Each	579.00	650.00
	600x450	Each	587.00	660.00
	600x500	Each	597.00	669.00
	600x600	Each	618.00	692.00
	700x350	Each	764.00	861.00
	700x400	Each	775.00	873.00
	700x450	Each	787.00	885.00
	700x500	Each	798.00	897.00
	700x600	Each	819.00	920.00
	700x700	Each	847.00	948.00
	750x400	Each	888.00	1000.00
	750x450	Each	898.00	1011.00
	750x500	Each	913.00	1027.00
	750x600	Each	930.00	1044.00
	750x700	Each	948.00	1062.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	750x750	Each	965.00	1079.00
	800x400	Each	1022.00	1150.00
	800x450	Each	1032.00	1162.00
	800x500	Each	1044.00	1176.00
	800x600	Each	1070.00	1203.00
	800x700	Each	1095.00	1228.00
	800x750	Each	1110.00	1244.00
	800x800	Each	1127.00	1262.00
	900x450	Each	1295.00	1463.00
	900x500	Each	1314.00	1483.00
	900x600	Each	1341.00	1512.00
	900x700	Each	1367.00	1540.00
	900x750	Each	1384.00	1556.00
	900x800	Each	1400.00	1573.00
	900x900	Each	1422.00	1595.00
	1000x500	Each	1697.00	1872.00
	1000x600	Each	1729.00	1901.00
	1000x700	Each	1767.00	1939.00
	1000x750	Each	1782.00	1953.00
	1000x800	Each	1796.00	1968.00
	1000x900	Each	1818.00	1990.00
	1000x1000	Each	1857.00	2028.00
	1100x600	Each	2137.00	2309.00
	1100x700	Each	2171.00	2342.00
	1100x750	Each	2191.00	2362.00
	1100x800	Each	2207.00	2378.00
	1100x900	Each	2212.00	2384.00
	1100x1000	Each	2225.00	2397.00
	1100x1100	Each	2271.00	2443.00
	1200x600	Each	2661.00	2833.00
	1200x700	Each	2693.00	2865.00
	1200x750	Each	2711.00	2882.00
	1200x800	Each	2732.00	2904.00
	1200x900	Each	2750.00	2921.00
	1200x1000	Each	2778.00	2936.00
	1200x1100	Each	2801.00	2959.00
	1200x1200	Each	2872.00	3030.00
5.25	Labour for laying in position cast iron double flanged Tapers (all sizes in mm) excluding cost of the cast iron double flanged Tapers (all sizes in mm). Body x Branch		Medium Class	Heavy Class
	100x80	Each	15.00	16.00
	125x80	Each	24.00	27.00
	125x100	Each	27.00	29.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	150x80	Each	28.00	31.00
	150x100	Each	31.00	34.00
	150x125	Each	34.00	36.00
	200x100	Each	39.00	42.00
	200x125	Each	42.00	46.00
	200x150	Each	46.00	50.00
	250x125	Each	51.00	55.00
	250x150	Each	54.00	59.00
	250x200	Each	62.00	67.00
	300x150	Each	63.00	68.00
	300x200	Each	71.00	78.00
	300x250	Each	80.00	87.00
	350x200	Each	106.00	117.00
	350x250	Each	117.00	129.00
	350x300	Each	129.00	142.00
	400x250	Each	131.00	146.00
	400x300	Each	145.00	161.00
	400x350	Each	160.00	177.00
	450x300	Each	157.00	174.00
	450x350	Each	176.00	194.00
	450x400	Each	192.00	212.00
	500x350	Each	193.00	215.00
	500x400	Each	210.00	233.00
	500x450	Each	225.00	249.00
	600x400	Each	255.00	282.00
	600x450	Each	268.00	298.00
	600x500	Each	290.00	320.00
	700x500	Each	341.00	377.00
	700x600	Each	385.00	425.00
	750x600	Each	410.00	453.00
	750x700	Each	461.00	509.00
	800x600	Each	448.00	493.00
	800x700	Each	499.00	550.00
	800x750	Each	520.00	574.00
	900x700	Each	556.00	614.00
	900x750	Each	581.00	641.00
	900x800	Each	618.00	681.00
	1000x800	Each	694.00	764.00
	1000x900	Each	751.00	827.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	1100x900	Each	841.00	917.00
	1100x1000	Each	921.00	997.00
	1200x1000	Each	1023.00	1099.00
	1200x1100	Each	1109.00	1185.00
5.26	Labour for laying in position all flanged cast iron crosses excluding cost of the all flanged cast iron crosses.		Medium Class	Heavy Class
	80mm diameter	Each	34.00	36.00
	100mm diameter	Each	42.00	46.00
	125mm diameter	Each	55.00	62.00
	150mm diameter	Each	72.00	80.00
	200mm diameter	Each	113.00	125.00
	250mm diameter	Each	164.00	181.00
	300mm diameter	Each	221.00	241.00
5.27	Labour for laying in position cast iron blank flanges excluding cost of the cast iron blank flanges.			Heavy Class
	80mm diameter	Each		7.00
	100mm diameter	Each		8.00
	125mm diameter	Each		11.00
	150mm diameter	Each		15.00
	200mm diameter	Each		21.00
	250mm diameter	Each		31.00
	300mm diameter	Each		43.00
	350mm diameter	Each		58.00
	400mm diameter	Each		74.00
	450mm diameter	Each		90.00
	500mm diameter	Each		114.00
	600mm diameter	Each		169.00
	700mm diameter	Each		237.00
	750mm diameter	Each		278.00
	800mm diameter	Each		328.00
	900mm diameter	Each		420.00
	1000mm diameter	Each		544.00
	1100mm diameter	Each		676.00
	1200mm diameter	Each		837.00
5.28	Providing and laying in position sizes of flanged cast iron standard specials class medium or heavy which does not appear in above items of the schedule.		Medium Class	Heavy Class
	80mm to 300mm dia	Kg	72.00	72.00
	Above 300mm Dia	Kg	76.00	76.00
5.29	Labour for laying in position sizes of flanged cast iron standard specials which do not appear in above items of the schedule excluding the cost of the special.			
	80mm to 1200mm	Kg	1.00	

CHAPTER- 6

DUCTILE IRON PRESSURE PIPES AND SPECIALS WITH TYTON JOINTS

- 1 (i) Centrifugally cast (spun) Ductile Iron pressure pipes shall Conform to IS 8329-2000 duly inspected and tested and having BIS certification mark.
(ii) The Cement Mortar lining in the pipe shall be as per IS - 11906-1986.
- 2 Ductile Iron fittings for pressure pipes shall Conform to IS 9523-2000 duly inspected and tested and having BIS certification mark.
- 3 Rubber sealing rings shall Conform to IS 5382-2000 duly inspected and tested and having BIS certification mark.
- 4 The laying of D.I. Pipe shall Conform to IS - 12288 - 1987.

- 5 Permissible Deviation from a straight line :-
The pipes shall be reasonably straight. When the pipe is rolled along gantries, separated by distance approximately two-thirds the length of the pipe to be checked, the maximum deviation from a straight line in mm shall not be greater than 1.25 times the length L, in meters of the pipe; thus:

$$f_m \leq 1.25 \times L$$

Where

f_m = maximum deviation from straight line, and

L = length of the pipe.

- 6 Marking on pipes
Each pipe shall have as cast or stamped or legibly and indelibly painted on it with the following appropriate marks:
 - (a) Indication of the source of manufacture:
 - (b) the nominal diameter
 - (c) Class reference :
 - (d) The last two digits of the year of manufacture:
 - (e) The non-standard length of the pipe if specially ordered:
 - (f) Where applicable, an indication of length over which the pipe is suitable for cutting on site: and
 - (g) A short white line at the spigot end of the Pipe with push-on joint in sizes DN 700 and above, to indicate the major axis of the spigot.
 - (h) on the socket faces of pipe centrifugally cast in metal mould, and
 - (i) on the outside of the socket or on the barrel of pipe centrifugally cast in sand mould.
- 7 Marking on fittings
Each fittings shall have as cast, stamped or indelibly painted on it, the following appropriate mark's.
 - (a) Indication of the source of manufacture.
 - (b) The nominal diameter
 - (c) The last two digits of the year of manufacture.
 - (d) PN rating of flanges when applicable, and
 - (e) Any other mark required by the purchaser.
 - (f) Marking may be done on the barrel of castings or on the outside of the sockets.
 - (g) The fittings may also be marked with the Standard Mark.
- 8 Bedding of Pipes:

The trench bottom shall be even and smooth so as to provide a proper support for the pipe over its entire length, and shall be free from stones, lumps, roots and other hard objects that may endure the pipe or coating. Holes shall be dug in the trench bottom to accommodate sockets so as to ensure continuous contact between the trench and the entire pipe barrel between socket holes.

9 Laying of DI Pipes :-

9.1 Laying of pipes and fittings/specials includes all precautions to guard against possible damaged to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

9.2 Pipes should be lowered into the trench with tackle suitable for the weight of pipes. For smaller sizes, up to 200 mm nominal bore, the pipe may be lowered by the use of ropes but for heavier pipes suitable mechanical equipment have to be used.

10 Tolerance of Length

The tolerance on length of pipes shall be as follows:

Type of Casting	Tolerance mm
(i) Socket and spigot and plain ended pipes	± 100
(ii) Flanged pipes	± 10

11 Rubber gasket

11.1 The material of rubber gaskets for use with mechanical joints and push-on-joints shall Conform to IS : 5382, unless otherwise agreed between the manufacturer and the purchaser.

11.2 In the case of push-on-joints for sizes "DN 600" and above the sockets may be with or without centring rings.

11.3 Marking - Each sealing ring or packing or both shall be marked indelibly with :

- (a) The manufacturer's name or trade-mark, if any;
- (b) The month and year of manufacture; and
- (c) The type followed by a word, 'Water'.

12 Tyton Joints (Rubber Ring Joints)

12.1 Tyton joint is sturdy push on type joint. The sockets of the pipes to receive tyton joints are specially designed to contain elongated grooved gasket. The inside contour of the socket bell provides a seat for the circular rubber ring in a modified bulb shaped gasket. An internal ridge in the socket fits into the groove of the gasket. A slight taper on the plain end (chamfer) of the pipe facilitates assembly.

12.2 Flanged Joints

Flanged cast iron pipes, screwed / welded flanged cast iron pipes and flanged specials are joint by means of flanges. The jointing material used between flanges shall be rubber insertion 3 mm thick. Each bolt should be tighten a little at a time taking care to tighten diametrically opposite bolts alternatively. The practice of fully tightening the bolts one after another is highly undesirable.

13 Measurement

All measurements should be of the finished work.

14 Rates

- 14.1 The rates include charges for all tools and plant, chain pulley blocks, other appliances etc. required for lifting and laying of the pipes and specials in position as per approved drawings.
- 14.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials, and other causes.
- 14.3 The rate include provision of handling, storing under cover as required and returning of empty cases or container to PHE Department stores without any extra cost, for such materials as may be supplied by the department.

CHAPTER 6 - DUCTILE IRON PRESSURE PIPES AND SPECIAL WITH TYTON JOINTS

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.1	Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-7) Conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/85 including testing of joint (laying Conforming to IS 12288 : 1987)		
	80mm diameter	RM	909.00
	100mm diameter	RM	1017.00
	150mm diameter	RM	1356.00
	200mm diameter	RM	1829.00
	250mm diameter	RM	2417.00
	300mm diameter	RM	2993.00
	350mm diameter	RM	3807.00
	400mm diameter	RM	4870.00
	450mm diameter	RM	5674.00
	500mm diameter	RM	6618.00
	600mm diameter	RM	8318.00
	700mm diameter	RM	12096.00
	750mm diameter	RM	14076.00
	800mm diameter	RM	15776.00
	900mm diameter	RM	19250.00
	1000mm diameter	RM	23121.00
	1100mm diameter	RM	26981.00
	1200mm diameter	RM	30526.00
	1400mm diameter	RM	37551.00
6.2	Labour for laying in position socket & spigot Ductile Iron(k-7) pressure pipes. [Conform to IS 12288:1987]		
	80mm diameter	RM	11.00
	100mm diameter	RM	12.00
	150mm diameter	RM	18.00
	200mm diameter	RM	24.00
	250mm diameter	RM	32.00
	300mm diameter	RM	40.00
	350mm diameter	RM	54.00
	400mm diameter	RM	64.00
	450mm diameter	RM	76.00
	500mm diameter	RM	87.00
	600mm diameter	RM	117.00
	700mm diameter	RM	153.00
	750mm diameter	RM	168.00
	800mm diameter	RM	192.00
	900mm diameter	RM	229.00
	1000mm diameter	RM	285.00
	1100mm diameter	RM	335.00
	1200mm diameter	RM	392.00
	1400mm diameter	RM	467.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.3	Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-9) Conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/85 including testing of joint (laying Conforming to IS 12288 : 1987)		
	80mm diameter	RM	1019.00
	100mm diameter	RM	1040.00
	150mm diameter	RM	1542.00
	200mm diameter	RM	2146.00
	250mm diameter	RM	2851.00
	300mm diameter	RM	3629.00
	350mm diameter	RM	4950.00
	400mm diameter	RM	5503.00
	450mm diameter	RM	6905.00
	500mm diameter	RM	8208.00
	600mm diameter	RM	10778.00
	700mm diameter	RM	13986.00
	750mm diameter	RM	15654.00
	800mm diameter	RM	17152.00
	900mm diameter	RM	20971.00
	1000mm diameter	RM	24692.00
	1100mm diameter	RM	29924.00
	1200mm diameter	RM	33335.00
	1400mm diameter	RM	40419.00
6.4	Labour for laying in position socket & spigot Ductile Iron (k-9) pressure pipes. [Conform to IS 12288:1987]		
	80mm diameter	RM	12.00
	100mm diameter	RM	14.00
	150mm diameter	RM	20.00
	200mm diameter	RM	28.00
	250mm diameter	RM	38.00
	300mm diameter	RM	48.00
	350mm diameter	RM	64.00
	400mm diameter	RM	76.00
	450mm diameter	RM	90.00
	500mm diameter	RM	104.00
	600mm diameter	RM	139.00
	700mm diameter	RM	173.00
	750mm diameter	RM	191.00
	800mm diameter	RM	209.00
	900mm diameter	RM	257.00
	1000mm diameter	RM	308.00
	1100mm diameter	RM	351.00
	1200mm diameter	RM	395.00
	1400mm diameter	RM	418.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.5	Providing rubber ISI marked gasket (push on) joints to DI class k-7, k-8 and k-9 pipes & DI specials including testing of joints and cost of jointing materials (rubber ISI marked Gasket (push on) joint as per IS-5382/85 and soap solution etc.)		
	80mm diameter	Each	75.00
	100mm diameter	Each	79.00
	150mm diameter	Each	119.00
	200mm diameter	Each	166.00
	250mm diameter	Each	220.00
	300mm diameter	Each	279.00
	350mm diameter	Each	319.00
	400mm diameter	Each	404.00
	450mm diameter	Each	447.00
	500mm diameter	Each	560.00
	600mm diameter	Each	682.00
	700mm diameter	Each	913.00
	750mm diameter	Each	1043.00
	800mm diameter	Each	1170.00
	900mm diameter	Each	1282.00
	1000mm diameter	Each	1617.00
	1100mm diameter	Each	1808.00
	1200mm diameter	Each	1811.00
	1400mm diameter	Each	2045.00
6.6	Labour Charges for jointing DI class k-7, k-8 and k-9 pipes & DI specials including joints but excluding cost of Rubber Gasket. (push on) [Conform to IS 12288:1987]		
	80mm diameter	Each	39.00
	100mm diameter	Each	39.00
	150mm diameter	Each	61.00
	200mm diameter	Each	79.00
	250mm diameter	Each	96.00
	300mm diameter	Each	114.00
	350mm diameter	Each	122.00
	400mm diameter	Each	135.00
	450mm diameter	Each	148.00
	500mm diameter	Each	166.00
	600mm diameter	Each	175.00
	700mm diameter	Each	192.00
	750mm diameter	Each	210.00
	800mm diameter	Each	218.00
	900mm diameter	Each	227.00
	1000mm diameter	Each	245.00
	1100mm diameter	Each	253.00
	1200mm diameter	Each	262.00
	1400mm diameter	Each	279.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.7	Providing and Laying ductile iron PN-1.6 type flanged sockets Conforming to IS-9523/2000 having dimension as per table 23 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	624.00
	100mm	Each	705.00
	150mm	Each	1086.00
	200mm	Each	1544.00
	250mm	Each	2012.00
	300mm	Each	2711.00
	350mm	Each	4641.00
	400mm	Each	5678.00
	450mm	Each	7024.00
	500mm	Each	8665.00
	600mm	Each	13964.00
	700mm	Each	21037.00
	750mm	Each	23799.00
	800mm	Each	27949.00
	900mm	Each	34399.00
	1000mm	Each	45778.00
	1100mm	Each	50566.00
	1200mm	Each	52985.00
	1400mm	Each	55744.00
6.8	Labour charges only for Laying Ductile Iron PN-1.6 type flanged sockets Conforming to IS-9523/2000 having dimension as per table 23 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	20.00
	100mm	Each	22.00
	150mm	Each	30.00
	200mm	Each	34.00
	250mm	Each	49.00
	300mm	Each	69.00
	350mm	Each	93.00
	400mm	Each	121.00
	450mm	Each	153.00
	500mm	Each	177.00
	600mm	Each	221.00
	700mm	Each	340.00
	750mm	Each	418.00
	800mm	Each	480.00
	900mm	Each	541.00
	1000mm	Each	677.00
	1100mm	Each	819.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	1200mm	Each	968.00
	1400mm	Each	1252.00
6.9	Providing and Laying ductile iron PN-1.6 type flanged spigot Conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	624.00
	100mm	Each	777.00
	150mm	Each	1237.00
	200mm	Each	1771.00
	250mm	Each	2465.00
	300mm	Each	3310.00
	350mm	Each	5742.00
	400mm	Each	7283.00
	450mm	Each	9025.00
	500mm	Each	11263.00
	600mm	Each	16244.00
	700mm	Each	25428.00
	750mm	Each	28856.00
	800mm	Each	32256.00
	900mm	Each	38554.00
	1000mm	Each	48271.00
	1100mm	Each	57996.00
	1200mm	Each	67735.00
	1400mm	Each	80839.00
6.10	Labour only for Laying Ductile Iron PN-1.6 type flanged Spigot Conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	20.00
	100mm	Each	22.00
	150mm	Each	30.00
	200mm	Each	34.00
	250mm	Each	49.00
	300mm	Each	64.00
	350mm	Each	84.00
	400mm	Each	108.00
	450mm	Each	133.00
	500mm	Each	148.00
	600mm	Each	177.00
	700mm	Each	258.00
	750mm	Each	364.00
	800mm	Each	443.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	900mm	Each	480.00
	1000mm	Each	615.00
	1100mm	Each	819.00
	1200mm	Each	968.00
	1400mm	Each	1252.00
6.11	Providing & laying Ductile iron Mechanical joint collar with follower glands Conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	1201.00
	100mm	Each	1459.00
	150mm	Each	2451.00
	200mm	Each	3071.00
	250mm	Each	4651.00
	300mm	Each	5458.00
	350mm	Each	9366.00
	400mm	Each	11514.00
	450mm	Each	13238.00
	500mm	Each	15723.00
	600mm	Each	19894.00
	700mm	Each	37102.00
	750mm	Each	41573.00
	800mm	Each	47484.00
	900mm	Each	55511.00
	1000mm	Each	71844.00
	1100mm	Each	81699.00
	1200mm	Each	91579.00
	1400mm	Each	105013.00
6.12	Labour only for Laying Ductile Iron Mechanical Joint collar with follower glands Conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	33.00
	100mm	Each	40.00
	150mm	Each	63.00
	200mm	Each	78.00
	250mm	Each	106.00
	300mm	Each	136.00
	350mm	Each	186.00
	400mm	Each	235.00
	450mm	Each	272.00
	500mm	Each	315.00
	600mm	Each	399.00
	700mm	Each	597.00
	750mm	Each	681.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	800mm	Each	787.00
	900mm	Each	944.00
	1000mm	Each	1205.00
	1100mm	Each	1477.00
	1200mm	Each	1775.00
	1400mm	Each	2433.00
6.13	Providing & Laying Ductile Iron Double Socket 90° Bends Conforming to IS-9523/2000 having dimension as per table 15 of IS-9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	644.00
	100mm	Each	787.00
	125mm	Each	1073.00
	150 mm	Each	1430.00
	200mm	Each	2289.00
	250mm	Each	3224.00
	300mm	Each	4655.00
	350mm	Each	8556.00
	400mm	Each	11041.00
	450mm	Each	14520.00
	500mm	Each	17999.00
	600mm	Each	27931.00
	700mm	Each	48803.00
	750mm	Each	56398.00
	800mm	Each	67719.00
	900mm	Each	89645.00
	1000mm	Each	118791.00
	1100mm	Each	128878.00
	1200mm	Each	138983.00
	1400mm	Each	152779.00
6.14	Labour charges for Laying Ductile Iron Double Socket 90° Bends Conforming to IS-9523/2000 having dimension as per table 15 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	17.00
	100mm	Each	20.00
	125mm	Each	28.00
	150 mm	Each	37.00
	200mm	Each	59.00
	250mm	Each	88.00
	300mm	Each	125.00
	350mm	Each	165.00
	400mm	Each	211.00
	450mm	Each	275.00
	500mm	Each	339.00
	600mm	Each	515.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	700mm	Each	752.00
	750mm	Each	908.00
	800mm	Each	1009.00
	900mm	Each	1348.00
	1000mm	Each	1834.00
	1100mm	Each	2338.00
	1200mm	Each	2861.00
	1400mm	Each	3881.00
6.15	Providing & Laying Ductile Iron Double Socket 45° Bends Conforming to IS-9523/2000 having dimension as per table 16 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	572.00
	100mm	Each	715.00
	125mm	Each	930.00
	150 mm	Each	1144.00
	200mm	Each	1863.00
	250mm	Each	2505.00
	300mm	Each	3507.00
	350mm	Each	6363.00
	400mm	Each	7961.00
	450mm	Each	10544.00
	500mm	Each	12736.00
	600mm	Each	19681.00
	700mm	Each	33668.00
	750mm	Each	38186.00
	800mm	Each	45925.00
	900mm	Each	60188.00
	1000mm	Each	79969.00
	1100mm	Each	89838.00
	1200mm	Each	99721.00
	1400mm	Each	113128.00
6.16	Labour charges for Laying Ductile Iron Double Socket 45° Bends Conforming to IS-9523/2000 having dimension as per table 16 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	15.00
	100mm	Each	18.00
	125mm	Each	24.00
	150 mm	Each	29.00
	200mm	Each	51.00
	250mm	Each	66.00
	300mm	Each	92.00
	350mm	Each	119.00
	400mm	Each	156.00
	450mm	Each	202.00
	500mm	Each	248.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	600mm	Each	363.00
	700mm	Each	495.00
	750mm	Each	624.00
	800mm	Each	679.00
	900mm	Each	917.00
	1000mm	Each	1185.00
	1100mm	Each	1471.00
	1200mm	Each	1772.00
	1400mm	Each	2402.00
6.17	Providing & Laying Ductile Iron Double Socket 22.5° Bends Conforming to IS-9523/2000 having dimension as per table 17 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	501.00
	100mm	Each	644.00
	125mm	Each	858.00
	150 mm	Each	1073.00
	200mm	Each	1647.00
	250mm	Each	2149.00
	300mm	Each	3008.00
	350mm	Each	5270.00
	400mm	Each	6568.00
	450mm	Each	8451.00
	500mm	Each	10238.00
	600mm	Each	15705.00
	700mm	Each	25996.00
	750mm	Each	29006.00
	800mm	Each	35159.00
	900mm	Each	44208.00
	1000mm	Each	56981.00
	1100mm	Each	66820.00
	1200mm	Each	76677.00
	1400mm	Each	89993.00
6.18	Labour charges for Laying Ductile Iron Double Socket 22.5° Bends Conforming to IS-9523/2000 having dimension as per table 17 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	13.00
	100mm	Each	17.00
	125mm	Each	22.00
	150 mm	Each	28.00
	200mm	Each	44.00
	250mm	Each	59.00
	300mm	Each	81.00
	350mm	Each	99.00
	400mm	Each	128.00
	450mm	Each	158.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	500mm	Each	189.00
	600mm	Each	290.00
	700mm	Each	385.00
	750mm	Each	468.00
	800mm	Each	523.00
	900mm	Each	669.00
	1000mm	Each	880.00
	1100mm	Each	1137.00
	1200mm	Each	1412.00
	1400mm	Each	1951.00
6.19	Providing & Laying Ductile Iron Double Socket 11.25° bends Conforming to IS-9523/2000 having dimension as per table 18 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	501.00
	100mm	Each	644.00
	125mm	Each	787.00
	150 mm	Each	1001.00
	200mm	Each	1502.00
	250mm	Each	2006.00
	300mm	Each	2722.00
	350mm	Each	4672.00
	400mm	Each	5765.00
	450mm	Each	7367.00
	500mm	Each	8751.00
	600mm	Each	13316.00
	700mm	Each	21414.00
	750mm	Each	23679.00
	800mm	Each	29211.00
	900mm	Each	36528.00
	1000mm	Each	47772.00
	1100mm	Each	57483.00
	1200mm	Each	67210.00
	1400mm	Each	80257.00
6.20	Labour charges for Laying Ductile Iron Double Socket 11.25° bends Conforming to IS-9523/2000 having dimension as per table 18 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	13.00
	100mm	Each	17.00
	125mm	Each	20.00
	150 mm	Each	26.00
	200mm	Each	39.00
	250mm	Each	55.00
	300mm	Each	73.00
	350mm	Each	86.00
	400mm	Each	106.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	450mm	Each	147.00
	500mm	Each	165.00
	600mm	Each	242.00
	700mm	Each	315.00
	750mm	Each	385.00
	800mm	Each	429.00
	900mm	Each	550.00
	1000mm	Each	697.00
	1100mm	Each	825.00
	1200mm	Each	970.00
	1400mm	Each	1240.00
6.21	Providing & Laying Ductile Iron All socket Tees Conforming to IS-9523/2000 having dimension as per table 21 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS- 9523/2000. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80x80 mm	Each	859.00
	100x80 mm	Each	1002.00
	100x100 mm	Each	1074.00
	150x80 mm	Each	1432.00
	150x100 mm	Each	1503.00
	150x150 mm	Each	1790.00
	200x80 mm	Each	2004.00
	200x100 mm	Each	2147.00
	200x150 mm	Each	2434.00
	200x200 mm	Each	2863.00
	250x80 mm	Each	2505.00
	250x100 mm	Each	2649.00
	250x150 mm	Each	3006.00
	250x200 mm	Each	3366.00
	250x250 mm	Each	3937.00
	300x100 mm	Each	3579.00
	300x200 mm	Each	4438.00
	300x300 mm	Each	5512.00
	350x80 mm	Each	5769.00
	350x100 mm	Each	5769.00
	350x150 mm	Each	6564.00
	350x200 mm	Each	7360.00
	350x250 mm	Each	8255.00
	350x300 mm	Each	9051.00
	350x350 mm	Each	9946.00
	400x80 mm	Each	6664.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	400x100 mm	Each	6962.00
	400x150 mm	Each	7758.00
	400x200 mm	Each	8653.00
	400x250 mm	Each	10045.00
	400x300 mm	Each	10543.00
	400x350 mm	Each	12233.00
	400x400 mm	Each	12731.00
	450x100 mm	Each	8653.00
	450x200 mm	Each	11338.00
	450x250 mm	Each	11537.00
	450x300 mm	Each	12731.00
	450x350 mm	Each	15317.00
	450x400 mm	Each	15715.00
	450x450 mm	Each	16411.00
	500x100 mm	Each	10145.00
	500x150 mm	Each	12035.00
	500x200 mm	Each	12233.00
	500x350 mm	Each	16709.00
	500x400 mm	Each	17107.00
	500x500 mm	Each	20190.00
	600x150 mm	Each	16610.00
	600x200 mm	Each	16809.00
	600x300 mm	Each	21881.00
	600x400 mm	Each	22478.00
	600x500 mm	Each	27948.00
	600x600 mm	Each	29838.00
	700x150 mm	Each	26628.00
	700x200 mm	Each	28114.00
	700x250 mm	Each	27123.00
	700x300 mm	Each	34430.00
	700x400 mm	Each	34802.00
	700x700 mm	Each	50159.00
	750x400 mm	Each	81315.00
	750x750 mm	Each	56847.00
	800x200mm	Each	34802.00
	800x400 mm	Each	44339.00
	800x600 mm	Each	63783.00
	800x800 mm	Each	68737.00
	900x100 mm	Each	42605.00
	900x150 mm	Each	42852.00
	900x200 mm	Each	42976.00
	900x400 mm	Each	54247.00
	900x600 mm	Each	81989.00
	900x900 mm	Each	89792.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	1000x200 mm	Each	54990.00
	1000x400 mm	Each	68118.00
	1000x600 mm	Each	106512.00
	1000x1000 mm	Each	117113.00
6.22	Labour charges for Laying Ductile Iron All socket Tees Conforming to IS-9523/2000 having dimension as per table 21 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80x80 mm	Each	23.00
	100x80 mm	Each	27.00
	100x100 mm	Each	28.00
	150x80 mm	Each	38.00
	150x100 mm	Each	40.00
	150x150 mm	Each	47.00
	200x80 mm	Each	53.00
	200x100 mm	Each	57.00
	200x150 mm	Each	64.00
	200x200 mm	Each	76.00
	250x80 mm	Each	66.00
	250x100 mm	Each	70.00
	250x150 mm	Each	80.00
	250x200 mm	Each	91.00
	250x250 mm	Each	104.00
	300x100 mm	Each	95.00
	300x200 mm	Each	117.00
	300x300 mm	Each	146.00
	350x80 mm	Each	110.00
	350x100 mm	Each	110.00
	350x150 mm	Each	125.00
	350x200 mm	Each	140.00
	350x250 mm	Each	157.00
	350x300 mm	Each	172.00
	350x350 mm	Each	189.00
	400x80 mm	Each	127.00
	400x100 mm	Each	133.00
	400x150 mm	Each	148.00
	400x200 mm	Each	165.00
	400x250 mm	Each	191.00
	400x300 mm	Each	201.00
	400x350 mm	Each	233.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	400x400 mm	Each	242.00
	450x100 mm	Each	165.00
	450x200 mm	Each	216.00
	450x250 mm	Each	220.00
	450x300 mm	Each	242.00
	450x350 mm	Each	292.00
	450x400 mm	Each	299.00
	450x450 mm	Each	312.00
	500x100 mm	Each	193.00
	500x150 mm	Each	229.00
	500x200 mm	Each	233.00
	500x350 mm	Each	318.00
	500x400 mm	Each	326.00
	500x500 mm	Each	384.00
	600x150 mm	Each	316.00
	600x200 mm	Each	320.00
	600x300 mm	Each	416.00
	600x400 mm	Each	428.00
	600x500 mm	Each	532.00
	600x600 mm	Each	568.00
	700x150 mm	Each	407.00
	700x200 mm	Each	430.00
	700x250 mm	Each	415.00
	700x300 mm	Each	526.00
	700x400 mm	Each	532.00
	700x700 mm	Each	767.00
	750x400 mm	Each	579.00
	750x750 mm	Each	869.00
	800x200mm	Each	532.00
	800x400 mm	Each	678.00
	800x600 mm	Each	975.00
	800x800 mm	Each	1051.00
	900x100 mm	Each	651.00
	900x150 mm	Each	655.00
	900x200 mm	Each	657.00
	900x400 mm	Each	829.00
	900x600 mm	Each	1253.00
	900x900 mm	Each	1372.00
	1000x200 mm	Each	841.00
	1000x400 mm	Each	1041.00
	1000x600 mm	Each	1628.00
	1000x1000 mm	Each	1253.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.23	Providing & Laying Ductile Iron Double Socket branch flange Tee Conforming to IS-9523/2000 having dimension as per table 21 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80x80	Each	1006.00
	100x80	Each	1161.00
	100x100	Each	1238.00
	150x80	Each	1625.00
	150x100	Each	1598.00
	150x150	Each	2089.00
	200x80	Each	2244.00
	200x100	Each	2399.00
	200x150	Each	2786.00
	200x200	Each	3250.00
	250x80	Each	2786.00
	250x100	Each	2941.00
	250x150	Each	3405.00
	250x200	Each	3947.00
	250x250	Each	4566.00
	300x80	Each	3714.00
	300x100	Each	3869.00
	300x150	Each	4411.00
	300x200	Each	4953.00
	300x250	Each	5649.00
	300x300	Each	6423.00
	350x100	Each	6176.00
	350x200	Each	7823.00
	350x350	Each	11117.00
	400x80	Each	7000.00
	400x100	Each	7308.00
	400x150	Each	8235.00
	400x200	Each	9161.00
	400x300	Each	11323.00
	400x400	Each	14308.00
	450x100	Each	9058.00
	450x250	Each	12352.00
	450x450	Each	12816.00
	500x100	Each	10602.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	500x200	Each	12867.00
	500x400	Each	18837.00
	500x500	Each	23058.00
	600x200	Each	17602.00
	600x400	Each	34365.00
	600x600	Each	45756.00
	700x200	Each	39439.00
	700x400	Each	53865.00
	750 x 400	Each	61116.00
	750 x 750	Each	88055.00
	800x200	Each	54894.00
	800x400	Each	69575.00
	800x600	Each	96164.00
	800x800	Each	106236.00
	900x200	Each	64773.00
	900x400	Each	83317.00
	900x600	Each	120372.00
	900x900	Each	140484.00
	1000x200	Each	84819.00
	1000x400	Each	105482.00
	1000x600	Each	166741.00
	1000x1000	Each	185557.00
	1100x400	Each	127642.00
	1100x600	Each	212787.00
	1200x600	Each	259095.00
	1200x800	Each	305458.00
	1200x1000	Each	351869.00
	1400x600	Each	305570.00
	1400x800	Each	351935.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	1400x1000	Each	398300.00
6.24	Labour charges for Laying Ductile Iron Double Socketed Branch Flange Tee Conforming to IS-9523/2000 having dimension as per table 21 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80x80	Each	25.00
	100x80	Each	28.00
	100x100	Each	30.00
	150x80	Each	40.00
	150x100	Each	41.00
	150x150	Each	51.00
	200x80	Each	55.00
	200x100	Each	58.00
	200x150	Each	68.00
	200x200	Each	79.00
	250x80	Each	68.00
	250x100	Each	72.00
	250x150	Each	83.00
	250x200	Each	96.00
	250x250	Each	111.00
	300x80	Each	91.00
	300x100	Each	94.00
	300x150	Each	107.00
	300x200	Each	121.00
	300x250	Each	138.00
	300x300	Each	157.00
	350x100	Each	113.00
	350x200	Each	143.00
	350x350	Each	204.00
	400x80	Each	128.00
	400x100	Each	134.00
	400x150	Each	151.00
	400x200	Each	168.00
	400x300	Each	207.00
	400x400	Each	262.00
	450x100	Each	166.00
	450x250	Each	226.00
	450x450	Each	341.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	500x100	Each	194.00
	500x200	Each	236.00
	500x400	Each	345.00
	500x500	Each	422.00
	600x200	Each	322.00
	600x400	Each	449.00
	600x600	Each	632.00
	700x200	Each	413.00
	700x400	Each	553.00
	750 x 400	Each	602.00
	750 x 750	Each	943.00
	800x200	Each	536.00
	800x400	Each	698.00
	800x600	Each	1037.00
	800x800	Each	1120.00
	900x200	Each	658.00
	900x400	Each	850.00
	900x600	Each	1318.00
	900x900	Each	1452.00
	1000x200	Each	843.00
	1000x400	Each	1064.00
	1000x600	Each	1691.00
	1000x1000	Each	1923.00
	1100x400	Each	1271.00
	1100x600	Each	1742.00
	1200x600	Each	2055.00
	1200x800	Each	2423.00
	1200x1000	Each	2838.00
	1400x600	Each	2534.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	1400x800	Each	2904.00
	1400x1000	Each	3274.00
6.25	Providing & Laying Ductile Iron Double Socket Reducer Conforming to IS-9523/2000 having dimension as per table 21 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	100x80	Each	573.00
	150x80	Each	932.00
	150x100	Each	932.00
	200x100	Each	1433.00
	200x150	Each	1437.00
	250x150	Each	2011.00
	250x200	Each	1833.00
	300x150	Each	2725.00
	300x200	Each	2725.00
	300x250	Each	2510.00
	350x200	Each	4981.00
	350x250	Each	4784.00
	350x300	Each	4490.00
	400x250	Each	6172.00
	400x300	Each	5973.00
	400x350	Each	5473.00
	450x350	Each	7363.00
	450x400	Each	6867.00
	500x350	Each	9262.00
	500x400	Each	8667.00
	600x400	Each	13407.00
	600x500	Each	12190.00
	700x500	Each	31727.00
	700x600	Each	28565.00
	750x500	Each	35582.00
	750x600	Each	33111.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	800x600	Each	41492.00
	800x700	Each	37960.00
	900x700	Each	54163.00
	900x800	Each	49168.00
	1000x800	Each	67970.00
	1000x900	Each	62733.00
	1100x1000	Each	68336.00
	1200x1000	Each	73931.00
	1400x1000	Each	87901.00
6.26	Labour charges for Laying ductile iron double socket reducer Conforming to IS-9523/2000 having dimension as per table 20 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	100x80	Each	16.00
	150x80	Each	26.00
	150x100	Each	28.00
	200x100	Each	40.00
	200x150	Each	44.00
	250x150	Each	59.00
	250x200	Each	55.00
	300x150	Each	77.00
	300x200	Each	77.00
	300x250	Each	71.00
	350x200	Each	103.00
	350x250	Each	101.00
	350x300	Each	99.00
	400x250	Each	123.00
	400x300	Each	119.00
	400x350	Each	107.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	450x350	Each	143.00
	450x400	Each	135.00
	500x350	Each	188.00
	500x400	Each	178.00
	600x400	Each	277.00
	600x500	Each	246.00
	700x500	Each	366.00
	700x600	Each	341.00
	750x500	Each	388.00
	750x600	Each	357.00
	800x600	Each	491.00
	800x700	Each	444.00
	900x700	Each	618.00
	900x800	Each	501.00
	1000x800	Each	719.00
	1000x900	Each	709.00
	1100x1000	Each	737.00
	1200x1000	Each	757.00
	1400x1000	Each	788.00
6.27	Providing and Laying ductile iron PN-1.0 type flanged sockets Conforming to IS-9523/2000 having dimension as per table 23 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	561.00
	100mm	Each	634.00
	150mm	Each	981.00
	200mm	Each	1401.00
	250mm	Each	1822.00
	300mm	Each	2451.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	350mm	Each	4186.00
	400mm	Each	5117.00
	450mm	Each	6311.00
	500mm	Each	7792.00
	600mm	Each	12591.00
	700mm	Each	19016.00
	750mm	Each	21539.00
	800mm	Each	25227.00
	900mm	Each	31114.00
	1000mm	Each	41418.00
	1100mm	Each	51206.00
	1200mm	Each	61011.00
	1400mm	Each	74250.00
6.28	Labour only for Laying Ductile Iron PN-1.0 type flanged sockets Conforming to IS-9523/2000 having dimension as per table 23 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	17.00
	100mm	Each	19.00
	150mm	Each	30.00
	200mm	Each	42.00
	250mm	Each	55.00
	300mm	Each	72.00
	350mm	Each	93.00
	400mm	Each	115.00
	450mm	Each	127.00
	500mm	Each	153.00
	600mm	Each	223.00
	700mm	Each	388.00
	750mm	Each	496.00
	800mm	Each	505.00
	900mm	Each	643.00
	1000mm	Each	827.00
	1100mm	Each	1033.00
	1200mm	Each	1255.00
	1400mm	Each	1718.00
6.29	Providing and Laying ductile iron PN-1.0 type flanged spigot Conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	562.00
	100mm	Each	702.00
	150mm	Each	1124.00
	200mm	Each	1616.00
	250mm	Each	2247.00
	300mm	Each	3016.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	350mm	Each	5214.00
	400mm	Each	6605.00
	450mm	Each	8186.00
	500mm	Each	10223.00
	600mm	Each	14772.00
	700mm	Each	23206.00
	750mm	Each	26255.00
	800mm	Each	29279.00
	900mm	Each	35101.00
	1000mm	Each	43903.00
	1100mm	Each	53668.00
	1200mm	Each	63440.00
	1400mm	Each	76590.00
6.30	Labour only for Laying Ductile Iron PN-1.0 type flanged Spigot Conforming to IS-9523/2000 having dimension as per table 24 of IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS-9523/2000. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	18.00
	100mm	Each	23.00
	150mm	Each	37.00
	200mm	Each	53.00
	250mm	Each	73.00
	300mm	Each	94.00
	350mm	Each	121.00
	400mm	Each	149.00
	450mm	Each	183.00
	500mm	Each	219.00
	600mm	Each	311.00
	700mm	Each	553.00
	750mm	Each	613.00
	800mm	Each	647.00
	900mm	Each	834.00
	1000mm	Each	1012.00
	1100mm	Each	1195.00
	1200mm	Each	1385.00
	1400mm	Each	1758.00
6.31	Providing, Laying & Jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 1m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	5862.00
	100mm	Each	7160.00
	125mm	Each	8777.00
	150mm	Each	10367.00
	200mm	Each	14489.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	250mm	Each	19734.00
	300mm	Each	23732.00
	350mm	Each	29069.00
	400mm	Each	35037.00
	450mm	Each	42552.00
	500mm	Each	49942.00
	600mm	Each	61734.00
	700mm	Each	89489.00
	750mm	Each	101599.00
	800mm	Each	109817.00
	900mm	Each	131976.00
	1000mm	Each	200800.00
	1100mm	Each	276464.00
	1200mm	Each	384295.00
	1400mm	Each	610805.00
6.32	Providing, Laying & jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 2m. for class K-9 with inside cement mortar, lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	8026.00
	100mm	Each	8967.00
	125mm	Each	9873.00
	150mm	Each	12900.00
	200mm	Each	17857.00
	250mm	Each	24238.00
	300mm	Each	29399.00
	350mm	Each	35774.00
	400mm	Each	43175.00
	450mm	Each	52191.00
	500mm	Each	61626.00
	600mm	Each	76965.00
	700mm	Each	109605.00
	750mm	Each	123212.00
	800mm	Each	133761.00
	900mm	Each	161650.00
	1000mm	Each	235500.00
	1100mm	Each	316396.00
	1200mm	Each	429725.00
	1400mm	Each	661762.00
6.33	Providing , Laying and Jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 3m for class K-9 with inside cement mortar, lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	9052.00
	100mm	Each	10773.00
	125mm	Each	13116.00
	150mm	Each	15433.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	200mm	Each	21240.00
	250mm	Each	28742.00
	300mm	Each	35081.00
	350mm	Each	42408.00
	400mm	Each	51246.00
	450mm	Each	61764.00
	500mm	Each	73446.00
	600mm	Each	92196.00
	700mm	Each	129808.00
	750mm	Each	145758.00
	800mm	Each	158497.00
	900mm	Each	191540.00
	1000mm	Each	270845.00
	1100mm	Each	381980.00
	1200mm	Each	484961.00
	1400mm	Each	714175.00
6.34	Providing, Laying and Jointing welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS 8329/2000 in the length of 4m for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	10654.00
	100mm	Each	12602.00
	125mm	Each	15300.00
	150mm	Each	17973.00
	200mm	Each	24602.00
	250mm	Each	33253.00
	300mm	Each	40742.00
	350mm	Each	49147.00
	400mm	Each	59246.00
	450mm	Each	71335.00
	500mm	Each	85062.00
	600mm	Each	107530.00
	700mm	Each	150239.00
	750mm	Each	168250.00
	800mm	Each	182980.00
	900mm	Each	221525.00
	1000mm	Each	305949.00
	1100mm	Each	422325.00
	1200mm	Each	531076.00
	1400mm	Each	820730.00
6.35	Providing, Laying and Jointing welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 4.5m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	11442.00
	100mm	Each	13505.00
	125mm	Each	16389.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	150mm	Each	19247.00
	200mm	Each	26286.00
	250mm	Each	35512.00
	300mm	Each	43575.00
	350mm	Each	52499.00
	400mm	Each	63213.00
	450mm	Each	76120.00
	500mm	Each	90870.00
	600mm	Each	115248.00
	700mm	Each	160490.00
	750mm	Each	193847.00
	800mm	Each	195292.00
	900mm	Each	236453.00
	1000mm	Each	323511.00
	1100mm	Each	482539.00
	1200mm	Each	599632.00
	1400mm	Each	979603.00
6.36	Providing, Laying and Jointing welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 5m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	12176.00
	100mm	Each	14432.00
	125mm	Each	17486.00
	150mm	Each	20516.00
	200mm	Each	27969.00
	250mm	Each	37778.00
	300mm	Each	46420.00
	350mm	Each	55934.00
	400mm	Each	67317.00
	450mm	Each	81003.00
	500mm	Each	96817.00
	600mm	Each	123077.00
	700mm	Each	170885.00
	750mm	Each	190954.00
	800mm	Each	207652.00
	900mm	Each	251628.00
	1000mm	Each	341271.00
	1100mm	Each	462818.00
	1200mm	Each	577563.00
	1400mm	Each	927551.00
6.37	Providing, Laying and Jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 5.2m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	12731.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	100mm	Each	14978.00
	125mm	Each	16110.00
	150mm	Each	21296.00
	200mm	Each	29027.00
	250mm	Each	39201.00
	300mm	Each	48176.00
	350mm	Each	58052.00
	400mm	Each	69858.00
	450mm	Each	84062.00
	500mm	Each	100491.00
	600mm	Each	127731.00
	700mm	Each	177358.00
	750mm	Each	198224.00
	800mm	Each	215524.00
	900mm	Each	261330.00
	1000mm	Each	354402.00
	1100mm	Each	491164.00
	1200mm	Each	609580.00
	1400mm	Each	1001627.00
6.38	Labour only for Laying welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 1m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm		45.00
	100mm	Each	53.00
	125mm		68.00
	150mm	Each	79.00
	200mm	Each	108.00
	250mm	Each	114.00
	300mm	Each	186.00
	350mm	Each	223.00
	400mm	Each	263.00
	450mm	Each	311.00
	500mm	Each	360.00
	600mm	Each	485.00
	700mm	Each	621.00
	750mm	Each	720.00
	800mm	Each	795.00
	900mm	Each	1018.00
	1000mm	Each	1302.00
	1100mm	Each	1667.00
	1200mm	Each	2134.00
	1400mm	Each	3706.00
6.39	Labour only for Laying welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS: 8329/2000 in the length of 2m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	80mm	Each	73.00
	100mm	Each	87.00
	125mm	Each	108.00
	150mm	Each	131.00
	200mm	Each	177.00
	250mm	Each	231.00
	300mm	Each	294.00
	350mm	Each	330.00
	400mm	Each	382.00
	450mm	Each	437.00
	500mm	Each	479.00
	600mm	Each	610.00
	700mm	Each	838.00
	750mm	Each	931.00
	800mm	Each	1126.00
	900mm	Each	1232.00
	1000mm	Each	1476.00
	1100mm	Each	1744.00
	1200mm	Each	2256.00
	1400mm	Each	5157.00
6.40	Labour only for Laying welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS: 8329/2000 in the length of 3m. for class K-9 with inside cement mortar, lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	102.00
	100mm	Each	122.00
	125mm	Each	152.00
	150mm	Each	182.00
	200mm	Each	247.00
	250mm	Each	317.00
	300mm	Each	403.00
	350mm	Each	437.00
	400mm	Each	500.00
	450mm	Each	563.00
	500mm	Each	597.00
	600mm	Each	736.00
	700mm	Each	1054.00
	750mm	Each	1276.00
	800mm	Each	1508.00
	900mm	Each	2156.00
	1000mm	Each	3083.00
	1100mm	Each	4347.00
	1200mm	Each	5729.00
	1400mm	Each	8111.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.41	Labour only for Laying welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS: 8329/2000 in the length of 4m. for class K-9 with inside cement mortar, lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	133.00
	100mm	Each	156.00
	125mm	Each	194.00
	150mm	Each	233.00
	200mm	Each	317.00
	250mm	Each	404.00
	300mm	Each	511.00
	350mm	Each	544.00
	400mm	Each	618.00
	450mm	Each	689.00
	500mm	Each	715.00
	600mm	Each	861.00
	700mm	Each	1271.00
	750mm	Each	1563.00
	800mm	Each	1871.00
	900mm	Each	2746.00
	1000mm	Each	4037.00
	1100mm	Each	5935.00
	1200mm	Each	8724.00
	1400mm	Each	13268.00
6.42	Labour only for Laying and Jointing welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS: 8329/2000 in the length of 4.5m. for class K-9 with inside cement mortar, lining for the sizes/dia pipe. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	147.00
	100mm	Each	173.00
	125mm	Each	216.00
	150mm	Each	259.00
	200mm	Each	352.00
	250mm	Each	447.00
	300mm	Each	565.00
	350mm	Each	598.00
	400mm	Each	677.00
	450mm	Each	751.00
	500mm	Each	774.00
	600mm	Each	924.00
	700mm	Each	1379.00
	750mm	Each	1696.00
	800mm	Each	2055.00
	900mm	Each	3062.00
	1000mm	Each	4562.00
	1100mm	Each	6798.00
	1200mm	Each	10129.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	1400mm	Each	16206.00
6.43	Labour only for Laying welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS: 8329/2000 in the length of 5m. for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	171.00
	100mm	Each	202.00
	125mm	Each	202.00
	150mm	Each	297.00
	200mm	Each	409.00
	250mm	Each	556.00
	300mm	Each	707.00
	350mm	Each	894.00
	400mm	Each	1077.00
	450mm	Each	1294.00
	500mm	Each	1530.00
	600mm	Each	2052.00
	700mm	Each	2554.00
	750mm	Each	2911.00
	800mm	Each	3166.00
	900mm	Each	3925.00
	1000mm	Each	6085.00
	1100mm	Each	8260.00
	1200mm	Each	13575.00
	1400mm	Each	19756.00
6.44	Labour only for Laying welded double flanged centrifugal cast (spun) ductile Iron pressure pipes Conforming to IS:8329/2000 in the length of 5.2m for class K-9 with inside cement mortar lining for the sizes/dia pipes. (laying Conforming to IS 12288 : 1987)		
	80mm	Each	177.00
	100mm	Each	209.00
	125mm	Each	258.00
	150mm	Each	308.00
	200mm	Each	423.00
	250mm	Each	573.00
	300mm	Each	728.00
	350mm	Each	916.00
	400mm	Each	1101.00
	450mm	Each	1319.00
	500mm	Each	1554.00
	600mm	Each	2077.00
	700mm	Each	2597.00
	750mm	Each	2597.00
	800mm	Each	3246.00
	900mm	Each	4705.00
	1000mm	Each	6824.00
	1100mm	Each	9894.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
	1200mm	Each	14347.00
	1400mm	Each	20803.00
6.45	Providing & Laying Ductile Iron All Socketed crosses Conforming to IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing etc. complete as directed by Engineer-in-charge. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80mm	Each	4174.00
	100mm	Each	5217.00
	150mm	Each	8692.00
	200mm	Each	12527.00
	250mm	Each	17392.00
	300mm	Each	23660.00
	350mm	Each	36399.00
	400mm	Each	45300.00
	450mm	Each	57316.00
	500mm	Each	69468.00
	600mm	Each	97007.00
	700mm	Each	167215.00
	750mm	Each	198514.00
	800mm	Each	236228.00
	900mm	Each	306751.00
	1000mm	Each	392278.00
6.46	Labour for Laying Ductile Iron All Socketed crosses Conforming to IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing etc. complete as directed by Engineer-in-charge. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80mm	Each	39.00
	100mm	Each	49.00
	150mm	Each	79.00
	200mm	Each	123.00
	250mm	Each	165.00
	300mm	Each	231.00
	350mm	Each	295.00
	400mm	Each	367.00
	450mm	Each	467.00
	500mm	Each	561.00
	600mm	Each	824.00
	700mm	Each	1120.00
	750mm	Each	1267.00
	800mm	Each	1513.00
	900mm	Each	1981.00
	1000mm	Each	2522.00

S. No.	Particulars of Items	Unit	Rate (in Rs.)
6.47	Providing & Laying Ductile Iron All Flanged crosses Conforming to IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing etc. complete as directed by Engineer-in-charge. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80mm	Each	1592.00
	100mm	Each	2010.00
	150mm	Each	3267.00
	200mm	Each	4775.00
	250mm	Each	7874.00
	300mm	Each	11057.00
	350mm	Each	18711.00
	400mm	Each	23362.00
	450mm	Each	28979.00
	500mm	Each	36341.00
	600mm	Each	52240.00
	700mm	Each	32640.00
	750mm	Each	107005.00
	800mm	Each	138861.00
	900mm	Each	173647.00
	1000mm	Each	217031.00
6.48	Labour for Laying Ductile Iron All Flanged crosses Conforming to IS-9523/2000 in the nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing etc. complete as directed by Engineer-in-charge. (laying Conforming to IS 12288 : 1987) (All sizes in mm)		
	80mm	Each	47.00
	100mm	Each	59.00
	150mm	Each	96.00
	200mm	Each	140.00
	250mm	Each	231.00
	300mm	Each	325.00
	350mm	Each	426.00
	400mm	Each	531.00
	450mm	Each	652.00
	500mm	Each	827.00
	600mm	Each	1188.00
	700mm	Each	1489.00
	750mm	Each	1636.00
	800mm	Each	1882.00
	900mm	Each	2424.00
	1000mm	Each	3002.00
6.49	Providing & Supplying D.I. Specials & Fittings For all types of specials, bends, tees.. etc.		
6.49.1	80 to 300 mm dia	Kg.	70.00
6.49.2	350 mm and above dia	Kg.	109.00

CHAPTER- 7

UNPLASTICIZED PVC (UPVC) PIPES & FITTINGS FOR POTABLE WATER SUPPLY

- 1 Unplasticized PVC pipes for potable water supply shall be as per IS 4985-2000 duly inspected and tested and having BIS certification mark.
- 2 Selection, Handling, storage and installation of UPVC Pipes shall be as per IS 7634 (Part-3) - 2003
- 3 Specification of Injection Moulded PVC socket fittings with solvent cement joints shall be as per IS 7834 (Part-I to VIII) - 1987.
- 4 Visual Appearance
 - (i) The colour of the pipes shall be light grey. Slight variations in the appearance of the colour are permitted.
 - (ii) The internal and external surfaces of the pipe shall be smooth, clean and free from grooving and other defects. Slight shallow longitudinal grooves or irregularities in the pipe shall be permissible provided the wall thickness remains within the permissible limits.
 - (iii) Each pipe may also be marked with the standard mark of BIS certification.
- 5 Storage
 - (i) PVC solvent cement should be stored in a cool place except when actually in use at the site. The solvent cement has a limited self life when not stored in hermetically sealed containers.
 - (ii) Pipes should be stacked on a surface flat and free from sharp objects, stones or projection in order to avoid deformation or damage. Ends of pipes should be protected from abrasion and chipping.
- 6 In rocky area 15 cm. cushion of sand or murum below and above the pipes should be provided as per IS 7634 (Part III) : 2003. (See Drawing No.-3)
- 7 Marking

Each pipe shall be clearly and indelibly marked in ink/paint or hot embossed on white base at intervals of not more than 3 meters, in colour as indicated below.

 - (a) Manufacturer's name or trade-mark
 - (b) Out side diameter,
 - (c) Class of pipe and pressure rating
 - (d) Batch and lot number
 - (e) The word plumbing in the case of plumbing pipes.
 - (f) Each pipe may also be marked with the standard mark BIS certification.

Class of Pipe	Working pressure Kg/sqcm	Colour of Marking
Class 2	4	Blue
Class 3	6	Green
Class 4	8	Brown
Class 5	10	Yellow

- 8 Marking of fittings
 - (i) All fittings shall be clearly and indelibly marked at a prominent place visible even after the installation of the fittings with the following :
 - (a) Manufacturer's identification mark, and
 - (b) Size of the fitting and the appropriate class (working pressure) of IS : 4985 - 1988 to which the pressure rating of the fitting corresponds.

(ii) PVC fittings also Conforming to specific requirements as prescribed in the relevant clause of the standard may also be marked with the standard Mark.

- 9 The work shall be executed in accordance with the specifications and all relevant latest IS codes.
- 10 Laying of pipes and fittings/specials includes all precautions to guard against possible to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects while suspended. Laying of pipes perfectly true in alignment and to gradient etc.
- 11 Measurement
All measurement should be of the finished work only. The net length of pipes as laid or fixed shall be measured in running meters correct to 10mm. Specials shall be excluded and measured and paid separately. The portion of the pipe inside the joints shall not be included in the length of pipe work. Excavation, refilling, masonry and concrete work wherever required shall be measured and paid for separately under relevant items of work.
- 12 Rates
 - 12.1 The rate include the charges for all tools and plants and other appliances required for lifting, laying and jointing of pipes, specials and fittings in position as per approved drawings.
 - 12.2 The rate includes provision for use of all coverings etc. to protect the works from inclement weather etc. and damages from fall of materials and other causes.
 - 12.3 The rate includes provision of handling, storing as required and returning of empty bags or containers to the departmental stores, without any extra cost for such materials as may be supplied by the department.

CHAPTER 7 - UNPLASTICIZED PVC (UPVC) PIPES & FITTINGS FOR POTABLE WATER SUPPLY

S.No.	Particulars of Items	Unit	Rates (in Rs.)			
			4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²
7.1	Providing, laying and jointing following UPVC pipes with solvent cement joint for 4, 6, 8 and 10 kg/ sq. cm. pressures including testing of joints, cost of jointing materials etc. complete in all respect. [Conform to IS 4985:2000 and IS 7634 (PT-3)		4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²
	90 mm dia.	RM.	121.00	144.00	196.00	223.00
	110 mm dia.	RM.	173.00	215.00	285.00	327.00
	140 mm dia.	RM.	286.00	357.00	493.00	541.00
	160 mm dia.	RM.	376.00	456.00	628.00	705.00
	180 mm dia.	RM.	474.00	567.00	800.00	873.00
	200 mm dia.	RM.	592.00	723.00	979.00	1134.00
	250 mm dia	RM.	632.00	1154.00	1559.00	1847.00
	315 mm dia	RM.	963.00	1876.00	2413.00	2979.80
7.2	Labour for laying in position following UPVC pipes of 4, 6, 8 and 10Kg/Sqcm. pressure.		4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²
	90 mm dia.	RM.	4.00	4.00	4.00	4.00
	110 mm dia.	RM.	4.00	4.00	4.00	4.00
	140 mm dia.	RM.	4.00	4.00	4.00	4.00
	160 mm dia.	RM.	6.00	6.00	6.00	6.00
	180 mm dia.	RM.	6.00	6.00	6.00	6.00
	200 mm dia.	RM.	6.00	6.00	6.00	6.00
	250 mm dia	RM.	7.00	7.00	7.00	7.00
	315 mm dia	RM.	7.00	7.00	7.00	7.00
7.3	Providing, Solvent Cement Joints to UPVC Pipes and fittings of 4, 6, 8 and 10 Kg/Sq cm. Pressure including testing of joints and cost of jointing materials (i.e. socket, coupler & solvent cement) [Conform to IS 7634 (PT-3) : 2003]		4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²
	90 mm dia.	Each	15.00	15.00	15.00	15.00
	110 mm dia.	Each	17.00	17.00	17.00	17.00
	140 mm dia.	Each	24.00	24.00	24.00	24.00
	160 mm dia.	Each	28.00	28.00	28.00	28.00
	180 mm dia.	Each	35.00	35.00	35.00	35.00
	200 mm dia.	Each	41.00	41.00	41.00	41.00
	250 mm dia	Each	60.00	60.00	60.00	60.00
	315 mm dia	Each	70.00	70.00	70.00	70.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)			
			4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²
7.4	Labour for providing solvent cement joints to UPVC pipes and fittings of 4, 6, 8 and 10Kg /Sq cm. Pressure including testing of joints but excluding cost of jointing materials (i.e. coupler and solvent cement) [Conform to IS 4985:2000 and IS 7634 (PT-3)]					
	90 mm dia.	Each	9.00	9.00	9.00	9.00
	110 mm dia.	Each	9.00	9.00	9.00	9.00
	140 mm dia.	Each	11.00	11.00	11.00	11.00
	160 mm dia.	Each	13.00	13.00	13.00	13.00
	180 mm dia.	Each	17.00	17.00	17.00	17.00
	200 mm dia.	Each	21.00	21.00	21.00	21.00
	250 mm dia	Each	30.00	30.00	30.00	30.00
	315 mm dia	Each	34.00	34.00	34.00	34.00
7.5	Providing and laying in position following UPVC bends suitable for 4, 6, 8 and 10 Kg/Sq. cm. pressure pipes. [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]					
	90 mm dia.	Each	98.00	109.00	162.00	210.00
	110 mm dia.	Each	167.00	156.00	250.00	322.00
	140 mm dia.	Each	367.00	483.00	588.00	862.00
	160 mm dia.	Each	524.00	695.00	1051.00	1130.00
	180 mm dia.	Each	786.00	1001.00	1231.00	1750.00
	200 mm dia.	Each	1060.00	1357.00	2016.00	2039.00
	250 mm dia	Each	2049.00	3208.00	-	5237.00
	315 mm dia	Each	4045.00	6362.00	-	10370.00
7.6	Providing and laying in position following UPVC Tees, suitable for 4, 6, 8 and 10 Kg/Sq.cm. Pressure pipes. [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]					
	90 mm dia.	Each	40.00	60.00	81.00	96.00
	100 mm dia.	Each	70.00	106.00	142.00	155.00
	140 mm dia.	Each	151.00	182.00	213.00	255.00
	160 mm dia.	Each	165.00	225.00	368.00	441.00
	180 mm dia.	Each	377.00	445.00	513.00	615.00
	200 mm dia.	Each	582.00	667.00	751.00	842.00
	250 mm dia	Each	667.00	752.00	837.00	928.00
	315 mm dia	Each	753.00	838.00	923.00	1014.00
7.7	Providing and laying in position following UPVC flanged tail pieces suitable for 4, 6, 8 and 10 Kg./Sq. cm. Pressure pipes. [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]					
	90 mm dia.	Each	22.00	46.00	70.00	91.00
	110 mm dia.	Each	43.00	63.00	82.00	142.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)			
	140 mm dia.	Each	81.00	105.00	112.00	230.00
	160 mm dia.	Each	90.00	127.00	164.00	261.00
	180 mm dia.	Each	103.00	148.00	194.00	336.00
	200 mm dia.	Each	129.00	182.00	235.00	425.00
	250 mm dia	Each	156.00	216.00	276.00	514.00
	315 mm dia	Each	184.00	251.00	318.00	604.00
7.8	Providing and laying in position following UPVC end Cap (plugs) suitable for 4, 6, 8 and 10 Kg/Sq cm. Pressure pipes. [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]	4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²	
	90 mm dia.	Each	21.00	22.00	23.00	28.00
	110 mm dia.	Each	22.00	28.00	34.00	45.00
	140 mm dia.	Each	27.00	37.00	57.00	86.00
	160 mm dia.	Each	61.00	73.00	85.00	116.00
	180 mm dia.	Each	79.00	95.00	132.00	183.00
	200 mm dia.	Each	116.00	134.00	152.00	198.00
	250 mm dia	Each	154.00	174.00	192.00	238.00
	315 mm dia	Each	192.00	215.00	233.00	279.00
7.9	Providing and laying in position UPVC coupler suitable for 4, 6, 8 and 10 Kg/Sq. cm. Pressure pipes [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]	4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²	
	90 mm dia.	Each	26.00	39.00	52.00	55.00
	110 mm dia.	Each	46.00	61.00	77.00	96.00
	140 mm dia.	Each	75.00	119.00	164.00	183.00
	160 mm dia.	Each	127.00	165.00	203.00	262.00
	180 mm dia.	Each	159.00	244.00	329.00	365.00
	200 mm dia	Each	217.00	314.00	410.00	518.00
	250 mm dia	Each	275.00	715.00	0.00	1160.00
	315 mm dia	Each	334.00	1421.00	0.00	2311.00
7.10	Providing and laying in position of following UPVC Reducers suitable for 4, 6, 8 and 10 Kg/Sq cm. Pressure pipes. [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]	4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²	
	110x90 mm dia.	Each	41.00	43.00	46.00	61.00
	140x90 mm dia.	Each	50.00	58.00	68.00	76.00
	160x90 mm dia.	Each	55.00	64.00	100.00	88.00
	140x110 mm dia.	Each	58.00	60.00	87.00	97.00
	160x110 mm dia.	Each	60.00	76.00	101.00	137.00
	160x140 mm dia.	Each	61.00	79.00	160.00	193.00
	180x90 mm dia	Each	61.00	97.00	125.00	150.00
	180x110 mm dia	Each	65.00	103.00	158.00	213.00
	180x140 mm dia	Each	78.00	120.00	184.00	249.00
	180x160 mm dia	Each	87.00	135.00	206.00	277.00
	200x110 mm dia.	Each	143.00	158.00	174.00	236.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)			
	200x140 mm dia	Each	143.00	181.00	199.00	241.00
	200x160 mm dia	Each	248.00	214.00	233.00	253.00
	200x180 mm dia	Each	231.00	241.00	249.00	299.00
	250x200 mm dia	Each	249.00	392.00	540.00	690.00
	315x250 mm dia	Each	233.00	704.00	957.00	1209.00
7.11	Labour for laying in position all types of UPVC fittings such as bends, tees, plugs etc. for following UPVC pipes. [Conform to IS 4985:2000 and IS 7634 (PT-3) :2003, IS 7834 (PT-I to VIII: 1987]		4Kg/Cm ²	6Kg/Cm ²	8 Kg/Cm ²	10Kg/Cm ²
	90 mm dia.	Each	3.00	3.00	3.00	3.00
	110 mm dia.	Each	3.00	3.00	3.00	3.00
	140 mm dia.	Each	3.00	3.00	3.00	3.00
	160 mm dia.	Each	3.00	3.00	3.00	3.00
	180 mm dia.	Each	4.00	4.00	4.00	4.00
	200 mm dia.	Each	4.00	4.00	4.00	4.00
	250 mm dia	Each	5.00	5.00	5.00	5.00
	315 mm dia	Each	6.00	6.00	6.00	6.00
7.12	Providing and Supplying of UPVC Pipes (4 Kg./sq.cm) ISI marked as per IS 4985/2000 duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.					
	63mm	RM.			38.00	
	75mm	RM.			59.00	
	90mm	RM.			82.00	
	110mm	RM.			115.00	
	125mm	RM.			167.00	
	140mm	RM.			223.00	
	160mm	RM.			280.00	
	180mm	RM.			367.00	
	200mm	RM.			464.00	
	225mm	RM.			582.00	
	250mm	RM.			745.00	
	280mm	RM.			619.00	
	315mm	RM.			784.00	

S.No.	Particulars of Items	Unit	Rates (in Rs.)
7.13	Providing and Supplying of UPVC Pipes (6 Kg./sq.cm) ISI marked as per IS 4985/2000 duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	50mm	RM.	46.00
	63mm	RM.	72.00
	75mm	RM.	100.00
	90mm	RM.	138.00
	110mm	RM.	209.00
	125mm	RM.	301.00
	140mm	RM.	351.00
	160mm	RM.	447.00
	180mm	RM.	557.00
	200mm	RM.	713.00
	225mm	RM.	937.00
	250mm	RM.	1141.00
	280mm	RM.	1462.00
	315mm	RM.	1863.00
7.14	Providing and Supplying of UPVC Pipes (10 Kg./sq.cm) ISI marked as per IS 4985/2000 duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	50mm	RM.	62.00
	63mm	RM.	111.00
	75mm	RM.	158.00
	90mm	RM.	217.00
	110mm	RM.	321.00
	125mm	RM.	433.00
	140mm	RM.	535.00
	160mm	RM.	697.00
	180mm	RM.	863.00
	200mm	RM.	1124.00
	225mm	RM.	1449.00
	250mm	RM.	1835.00
	280mm	RM.	2343.00
	315mm	RM.	2968.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	UPVC SPECIALS AS PER IS 7834 (Part-I to Part-VIII) /1987, IS 7634 (Part-III) & IS 4985/2000 suitable for 4,6 & 10 Kg/sq.cm		
7.15	Providing and Supplying of UPVC Threaded Coupler duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	63 mm x 50 mm	Each	34.00
	75 mm x 50 mm	Each	47.00
	90 mm x 80 mm	Each	74.00
	110 mm x 100 mm	Each	115.00
	140 mm x 125 mm	Each	194.00
7.16	Providing and Supplying of Unequal Tee, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	63 mm x 50 mm	Each	23.00
	75 mm X 50 mm	Each	26.00
	90 mm x 50 mm	Each	38.00
	90 mm x 63 mm	Each	45.00
	90 mm x 75 mm	Each	56.00
	110 mm x 50 mm	Each	60.00
	110mm x 63 mm	Each	63.00
	110 mm x 90mm	Each	69.00
	140mm x 50 mm	Each	89.00
	140 mm x 63 mm	Each	95.00
	140 mm x 90 mm	Each	98.00
	140 mm x 110 mm	Each	100.00
	160 mm x 50 mm	Each	115.00
	160 mm x 63 mm	Each	136.00
	160 mm x 90 mm	Each	156.00
	160 mm x 110mm	Each	178.00
	160 mm x140 mm	Each	404.00
7.17	Providing and Supplying of UPVC Reducer Coupler, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	63 mm x 50 mm	Each	31.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	75 mm x 63 mm	Each	41.00
	90 mm x 63 mm	Each	48.00
	90 mm x 75 mm	Each	69.00
	110 mm x 63 mm	Each	79.00
	110 mm x 75 mm	Each	90.00
	110 mm x 90 mm	Each	97.00
	140 mm x 63 mm	Each	115.00
	140 mm x 90 mm	Each	138.00
	140 mm x 110 mm	Each	160.00
	160 mm x 110 mm	Each	240.00
	160 mm x 140 mm	Each	305.00
7.18	Providing and Supplying of UPVC Reducer Multi Stage, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	90 mm x 63 mm	Each	31.00
	110 mm x 63 mm	Each	51.00
	110 mm x 75 mm	Each	59.00
	110 mm x 90 mm	Each	63.00
	140 mm x 90 mm	Each	90.00
7.19	Providing and Supplying of UPVC Reducer Fabricated duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	75 mm x 63 mm	Each	81.00
	90 mm x 75 mm	Each	127.00
	110 mm x 90 mm	Each	197.00
	140 mm x 110 mm	Each	332.00
	160 mm x 140 mm	Each	515.00
7.20	Providing and Supplying of Saddle Piece, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	63 mm x 20 mm	Each	70.00
	75 mm x 20 mm	Each	90.00
	90 mm x 20 mm	Each	105.00
	110 mm x 20 mm	Each	117.00
	140 mm x 20 mm	Each	131.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	160 mm x 20 mm	Each	158.00
7.21	Providing and Supplying of UPVC Couplers Fabricated (4 Kg./Sq.cm), duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	-
	40 mm	Each	-
	50 mm	Each	8.00
	63 mm	Each	13.00
	75 mm	Each	21.00
	90 mm	Each	32.00
	110 mm	Each	41.00
	140 mm	Each	76.00
	160 mm	Each	109.00
	200 mm	Each	188.00
7.22	Providing and Supplying of UPVC Couplers Fabricated (6 Kg./Sq.cm), duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	-
	40 mm	Each	-
	50 mm	Each	8.00
	63 mm	Each	18.00
	75 mm	Each	29.00
	90 mm	Each	35.00
	110 mm	Each	47.00
	140 mm	Each	111.00
	160 mm	Each	149.00
	200 mm	Each	276.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
7.23	Providing and Supplying of UPVC Bends Fabricated (4 Kg./Sq.cm), duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	-
	40 mm	Each	14.00
	50 mm	Each	21.00
	63 mm	Each	24.00
	75 mm	Each	38.00
	90 mm	Each	66.00
	110 mm	Each	115.00
	140 mm	Each	291.00
	160 mm	Each	437.00
	200 mm	Each	785.00
7.24	Providing and Supplying of UPVC Bends Fabricated (6 Kg./Sq.cm), duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	13.00
	40 mm	Each	15.00
	50 mm	Each	25.00
	63 mm	Each	53.00
	75 mm	Each	83.00
	90 mm	Each	104.00
	110 mm	Each	150.00
	140 mm	Each	470.00
	160 mm	Each	678.00
	200 mm	Each	1327.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
7.25	Providing and Supplying of UPVC Equal Tee Fabricated (4 Kg./Sq.cm), duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	9.00
	25 mm	Each	15.00
	32 mm	Each	19.00
	40 mm	Each	27.00
	50 mm	Each	34.00
	63 mm	Each	40.00
	75 mm	Each	45.00
	90 mm	Each	48.00
	110 mm	Each	86.00
	140 mm	Each	149.00
	160 mm	Each	184.00
	200 mm	Each	553.00
7.26	Providing and Supplying of UPVC Equal Tee Fabricated (6 Kg./sq.cm) BIS 10124/1982 Part-V, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	11.00
	25 mm	Each	16.00
	32 mm	Each	21.00
	40 mm	Each	31.00
	50 mm	Each	38.00
	63 mm	Each	45.00
	75 mm	Each	49.00
	90 mm	Each	56.00
	110 mm	Each	101.00
	140 mm	Each	175.00
	160 mm	Each	217.00
	200 mm	Each	650.00
7.27	Providing and Supplying of UPVC Couplers (Mould) BIS 7834/1975 Part-VI, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	11.00
	40 mm	Each	15.00
	50 mm	Each	19.00
	63 mm	Each	36.00
	75 mm	Each	39.00
	90 mm	Each	59.00
	110 mm	Each	103.00
	140 mm	Each	110.00
	160 mm	Each	120.00
	200 mm	Each	475.00
7.28	Providing and Supplying of UPVC Elbow (Mould) BIS 7834/1975 Part-VI, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	10.00
	32 mm	Each	16.00
	40 mm	Each	27.00
	50 mm	Each	45.00
	63 mm	Each	55.00
	75 mm	Each	71.00
	90 mm	Each	138.00
	110 mm	Each	183.00
	140 mm	Each	394.00
	160 mm	Each	560.00
	200 mm	Each	1041.00
7.29	Providing and Supplying of UPVC Male Threaded Adopter, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	7.00
	32 mm	Each	11.00
	40 mm	Each	17.00
	50 mm	Each	26.00
	63 mm	Each	42.00
	75 mm	Each	49.00
	90 mm	Each	67.00
	110 mm	Each	111.00
	140 mm	Each	135.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	160 mm	Each	246.00
	200 mm	Each	267.00
7.30	Providing and Supplying of UPVC End Cap, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading /unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	-
	40 mm	Each	10.00
	50 mm	Each	12.00
	63 mm	Each	14.00
	75 mm	Each	18.00
	90 mm	Each	19.00
	110 mm	Each	25.00
	140 mm	Each	33.00
	160 mm	Each	68.00
	200 mm	Each	128.00
7.31	Providing and Supplying of UPVC Tail piece without flange (BIS marked), duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
	20 mm	Each	-
	25 mm	Each	-
	32 mm	Each	11.00
	40 mm	Each	12.00
	50 mm	Each	14.00
	63 mm	Each	18.00
	75 mm	Each	24.00
	90 mm	Each	31.00
	110 mm	Each	53.00
	140 mm	Each	99.00
	160 mm	Each	145.00
	200 mm	Each	645.00

CHAPTER- 8

PIPE APPURTENANCES - C.I. & D.I. VALVES, MJ SPECIALS

- 1 Sluice valves for water works purposes (50 to 1200 mm size) shall be as per IS 14846 - 2000 duly inspected and tested and having BIS certification mark.
- 2 Butterfly valves for General purpose shall be as per IS 13095 - 1991 duly inspected and tested and having BIS certification mark.
- 3 Installation and maintenance of sluice valves shall be as per IS 2685 - 1971.
- 4 Non return valve/reflux valve shall be as per IS 5312 - 2003 (Part I & II) duly inspected and tested and having BIS certification mark.
- 5 Air valve shall be as per IS 14845 - 2000 duly inspected and tested and having BIS certification mark.
- 6 All Joints shall Conform to relevant Indian Standards.
- 7 Marking & testing
 - (i) The standard marking and packing of the valves shall be done as per IS : 14846. The direction of rotation for OPEN/CLOSE position shall be marked on the hand wheel and on the bonnet of the valve.
 - (ii) Testing of sluice valve should be done for close end in accordance with IS : 14846.
 - (iii) All the valves should be inspected for flaw detection test in accordance with the IS: 14846.
- 8
 - (i) All grit and foreign matters are removed from the inside of the valves before placing in pipes.
 - (ii) All the four faces are thoroughly cleaned and coated with a thin layer of mineral grease.
 - (iii) It is important to check tightening of gland with a pair of inside callipers. Clearance between the top of the stuffing box and the underside of the gland should be uniform on all the sides.
- 9 **Fixing** means laying in specified position to ensure interconnection between all flanged pipes, fittings and valves. It is also to ensure that the bolt holes of two flanges of the pipe/ fittings are correctly aligned.
- 10 Cast Iron Sluice Gate as per IS-13349.
- 10.1 APPLICATION:

Wall thimble mounted Sluice gates are used either for isolation of flow from a sump / chamber to a closed conduit or to another sump / chamber or for isolation of flow from a conduit to a sump / chamber. Standard sluice gates have to be modified to make them suitable for modulation application and hence standard sluice gates should not be used for modulation application.
- 10.2 SALIENT FEATURES:
 - 10.2.1 Flange back frame gate suitable for mounting on the face of a Cast iron Wall thimble using studs and with a gasket between gate frame and wall thimble flange.

- 10.2.2 Wall thimble to have cross section “F” and depth of 150 mm for the gate size up to and including 600 mm and depth of 300 mm for the gate size above 600 mm unless until specified otherwise. Gates having square / rectangular opening to be provided with thimble having square/ rectangular opening aperture with square / rectangular flange for gate frame mounting.
- 10.2.3 Square shaped natural rubber Gasket with predrilled holes for positioning in between machined face of wall thimble flange and frame flange.
- 10.2.4 Open top frame provided with short length extension guides to support ½ vertical height of the slide when the slide is in full open position.
- 10.2.5 Frame specially designed to permit front access for tightening of thimble mounting nuts so as to enable mounting of gates side by side or near corners.
- 10.2.6 Rigid shutter designed to withstand the applicable water head. Shutter to be provided with cast integral pocket to house the stem-connecting block, which connects the spindle to the shutter for up and down operation.
- 10.2.7 Seat facing fitted on machined Plain Surface of frame and shutter-using counter sunk screws for better fitments.
- 10.2.8 The spindle is provided with square / trapezoidal threading with the threaded length being approximately 400mm more than the height of waterway opening.
- 10.2.9 Operation of gates by means of manual lift mechanism comprise of pillar mounted geared gate operating mechanism suitable for opening / closing of gate by a single person with an effort not exceeding 20 Kgs on the hand wheel / crank handle.
- 10.2.10 Economical and faster erection due to flange back design.

11 Measurement

All measurements should be of the finished work

12 Rates

- 12.1 The rates include all tools and plants, chain pulley block, other appliances etc. required for lifting and laying the valves in position as per approved drawings.
- 12.2 The rates include provision and use of all coverings etc. to protect, the works from inclement weather etc. from damaging by fall of materials and due to other causes.
- 12.3 The rates include provision of handling and storing under cover as required and returning of empty cases or containers if any to the departmental stores without any extra cost, for such materials as may be supplied by the department.

CHAPTER 8 - PIPE APPURTENANCES - C.I. & D.I. VALVES, MJ SPECIALS

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
8.1	Providing & fixing of Cast iron double flanged sluice valves as per I.S.:14846-2000 fitted with cast iron cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete. (Steel Spindle)		PN-1.0	PN-1.6
	50mm dia	Each	2377.00	2555.00
	65mm dia	Each	2810.00	3022.00
	80mm dia	Each	3331.00	3582.00
	100mm dia	Each	4494.00	4834.00
	125mm dia	Each	4923.00	5204.00
	150mm dia	Each	6631.00	7367.00
	200mm dia	Each	11629.00	12924.00
	250 mm dia	Each	17273.00	17900.00
	300mm dia	Each	21335.00	23175.00
	350mm dia	Each	38097.00	40801.00
	400mm dia	Each	46138.00	49766.00
	450mm dia	Each	54103.00	58341.00
	500mm dia	Each	89289.00	146065.00
	600mm dia	Each	103806.00	169131.00
	700 mm dia.	Each	241255.00	301027.00
	750 mm dia.	Each	260762.00	325355.00
	800 mm dia.	Each	281115.00	350769.00
	900 mm dia.	Each	368941.00	460528.00
	1000 mm dia.	Each	482809.00	602836.00
	1100 mm dia.	Each	779158.00	973231.00
	1200 mm dia.	Each	1013901.00	1266618.00
8.2	Laying, Fixing including Jointing of Cast iron double flanged sluice valves fitted with cast iron cap testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete (only valve to be supplied by the department free of cost). [Conform to IS 2685 : 1971]			
	50mm dia	Each		156.00
	65mm dia	Each		165.00
	80mm dia	Each		175.00
	100mm dia	Each		295.00
	125mm dia	Each		310.00
	150mm dia	Each		335.00
	200mm dia	Each		602.00
	250mm dia	Each		689.00
	300mm dia	Each		796.00
	350 mm dia	Each		1138.00
	400 mm dia	Each		1285.00
	450 mm dia	Each		2249.00
	500 mm dia	Each		2174.00
	600 mm dia	Each		3605.00
	700 mm dia	Each		3982.00
	750 mm dia	Each		4212.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
	800 mm dia	Each	4324.00		
	900 mm dia	Each	4423.00		
	1000 mm dia	Each	4534.00		
	1100 mm dia.	Each	4725.00		
	1200 mm dia.	Each	4903.00		
8.3	Labour for laying and fixing of cast iron double flanged sluice valves (vide item no.2) including jointing and testing but without cost of Jointing materials. (Conforming to I.S.:14846-2000)				
	50mm dia	Each	37.00		
	65mm dia	Each	42.00		
	80mm dia	Each	44.00		
	100mm dia	Each	56.00		
	125mm dia	Each	67.00		
	150mm dia	Each	83.00		
	200mm dia	Each	129.00		
	250mm dia	Each	185.00		
	300mm dia	Each	244.00		
	350mm dia	Each	424.00		
	400mm dia	Each	514.00		
	450mm dia	Each	575.00		
	500mm dia	Each	728.00		
	600mm dia	Each	1128.00		
	700mm dia	Each	1299.00		
	750mm dia	Each	1347.00		
	800mm dia	Each	1538.00		
	900mm dia	Each	1633.00		
	1000mm dia	Each	1728.00		
	1100 mm dia.	Each	1871.00		
	1200 mm dia.	Each	1990.00		
8.4	Extra for providing cast iron hand wheel to following cast iron sluice valves vide item no. 8.1.		PN-0.6	PN-1.0	PN-1.6
	80 mm dia.	Each	88.00	91.00	92.00
	100 mm dia.	Each	94.00	97.00	99.00
	125 mm dia.	Each	117.00	121.00	123.00
	150 mm dia.	Each	135.00	139.00	142.00
	200 mm dia.	Each	235.00	242.00	246.00
	250 mm dia.	Each	352.00	362.00	370.00
	300 mm dia.	Each	381.00	393.00	400.00
	350 mm dia.	Each	587.00	604.00	616.00
	400 mm dia.	Each	880.00	906.00	924.00
	450 mm dia.	Each	933.00	961.00	979.00
	500 mm dia.	Each	1056.00	1087.00	1109.00
	600 mm dia.	Each	1173.00	1208.00	1232.00
	700 mm dia.	Each	1290.00	1329.00	1355.00
	750 mm dia.	Each	1466.00	1510.00	1540.00
	800 mm dia.	Each	1554.00	1601.00	1632.00
	900 mm dia.	Each	1760.00	1812.00	1848.00
	1000 mm dia.	Each	1818.00	1873.00	1909.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
	1100 mm dia.	Each	2053.00	2115.00	2156.00
	1200 mm dia.	Each	2200.00	2266.00	2310.00
8.5	Providing and fixing air valve threaded of following diameter				
	15 mm diameter	Each		403.00	
	25 mm diameter	Each		661.00	
	40 mm diameter	Each		1446.00	
	50 mm diameter	Each		2039.00	
	80 mm diameter	Each		6544.00	
8.6	Labour only for fixing air valve threaded of following diameter				
	15 mm diameter	Each		11.00	
	25 mm diameter	Each		13.00	
	40 mm diameter	Each		21.00	
	50 mm diameter	Each		42.00	
	80 mm diameter	Each		87.00	
8.7	Supply of Single Chamber D.I. Air valve with body and cover in ductile iron of grade SG 50 or equivalent grade as per I.S. 3896-part2-1985 and subsequent revisions. All internal parts such as float shell etc. all cover bolts of stainless steel and gaskets and seals of EPDM. Epoxy powder coating (EP-P) inside and outside colour blue. Drilled as per IS:1538.				
	Dia (in mm)		P.N. 1.0/1.6	P.N. 2.5	
	50	Each	28931.00	36164.00	
	80	Each	42571.00	53214.00	
	100	Each	53844.00	67305.00	
	150	Each	69997.00	87497.00	
	200	Each	79273.00	99092.00	
8.8	Supply of DI D/F Swing Check Valves Slanted/Straight seated with metallic, corrosion proof and wear resistant seat faces, body and disc of ductile cast iron GGG 50/SG Iron 420/12 or equivalent grade as per IS 3896 (part-2) - 1985 and subsequent revisions. Shafts of stainless steel, shaft bearing of zinc free bronze and seat faces with nickel weld over lay, micro finished. All the inside and outside of the body is to be coated with double coating of Epoxy liquid. Drilled as per IS:1538.				
	(Dia in mm)		P.N. 1.0	P.N. 1.6	P.N. 2.5
	100	Each	14424.00	15866.00	18246.00
	150	Each	27279.00	30007.00	34508.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
200		Each	46408.00	51049.00	58706.00
250		Each	65076.00	71583.00	82321.00
300		Each	94142.00	103556.00	119090.00
350		Each	155981.00	171580.00	197317.00
400		Each	181669.00	199836.00	229812.00
500		Each	297385.00	327124.00	376192.00
600		Each	412051.00	419104.00	481969.00
700		Each	729895.00	746521.00	858499.00
800		Each	744104.00	762732.00	877142.00

8.9 Supply of DI D/F Sluice Valves Slanted/Straight seated with metallic, corrosion proof and wear resistant seat faces, body and disc of ductile cast iron GGG 50/SG Iron 420/12 or equivalent grade as per IS 3896 (part-2) - 1985 and subsequent revisions. Shafts of stainless steel, shaft bearing of zinc free bronze and seat faces with nickel weld over lay, micro finished. All the inside and outside of the body is to be coated with double coating of Epoxy liquid. Drilled as per IS:1538.

			PN 1.6
50mm dia	Each	3783.00	
65mm dia	Each	4553.00	
80mm dia	Each	5435.00	
100mm dia	Each	5435.00	
125mm dia	Each	7340.00	
150mm dia	Each	9074.00	
200mm dia	Each	10994.00	
250mm dia	Each	21070.00	
300mm dia	Each	30237.00	
350mm dia	Each	37939.00	
400mm dia	Each	72920.00	
450mm dia	Each	88069.00	
500mm dia	Each	103337.00	
600mm dia	Each	118605.00	

8.10a Providing & fixing cast iron double flanged single door reflux (non return) valves including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS :5312 (Part I)

			PN- 1.0
50mm dia	Each	1202.00	
65mm dia	Each	1561.00	
80mm dia	Each	1895.00	
100mm dia	Each	2657.00	
150mm dia	Each	4366.00	
200mm dia	Each	7819.00	
250mm dia	Each	11080.00	

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	300mm dia	Each	15404.00	
	350mm dia	Each	28172.00	
8.10b	Providing & fixing cast iron double flanged multi door reflux (non return) valves including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS : 5312 (Part II)		PN- 0.6	PN- 1.0
	400mm dia	Each	60653.00	67296.00
	450mm dia	Each	76867.00	83511.00
	500mm dia	Each	107582.00	128037.00
	600mm dia	Each	160418.00	182073.00
	700mm dia	Each	188605.00	252980.00
	750mm dia	Each	292390.00	306463.00
	800mm dia	Each	334910.00	362369.00
	900mm dia	Each	390718.00	418177.00
	1000mm dia	Each	447516.00	474951.00
	1100mm dia	Each	504919.00	532365.00
	1200mm dia	Each	562949.00	590396.00
8.11	Labour for laying and fixing of Cast Iron Double Flanged reflux (non return) valves including jointing & testing but without cost and jointing materials.			
	50mm dia	Each	44.00	
	65mm dia	Each	48.00	
	80mm dia	Each	51.00	
	100mm dia	Each	55.00	
	150mm dia	Each	83.00	
	200mm dia	Each	129.00	
	250mm dia	Each	185.00	
	300mm dia	Each	244.00	
	350mm dia	Each	424.00	
	400mm dia	Each	514.00	
	450mm dia	Each	575.00	
	500mm dia	Each	728.00	
	600mm dia	Each	1128.00	
	700mm dia	Each	1299.00	
	750mm dia	Each	1347.00	
	800mm dia	Each	1490.00	
	900 mm dia	Each	1633.00	
	1000mm dia	Each	1728.00	
	1100mm dia	Each	1871.00	
	1200mm dia	Each	2014.00	
8.12	Providing & fixing cast iron butterfly valves including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS :13095-1991. (Valves above 200 mm dia should be gear operated)		PN- 1.0	PN- 1.6
	50mm dia	Each	2169.00	2499.00
	65mm dia	Each	2453.00	2823.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	80mm dia	Each	2772.00	3190.00
	100mm dia	Each	3427.00	3941.00
	150mm dia	Each	4696.00	5383.00
	200mm dia	Each	8963.00	10280.00
	250mm dia	Each	13827.00	15859.00
	300mm dia	Each	18770.00	21508.00
	350mm dia	Each	30221.00	34639.00
	400mm dia	Each	39993.00	45853.00
	450mm dia	Each	49739.00	57043.00
	500mm dia	Each	99435.00	114157.00
	600mm dia	Each	125566.00	144090.00
	700mm dia	Each	315611.00	362579.00
	750mm dia	Each	411661.00	472966.00
	800mm dia	Each	454172.00	521836.00
	900mm dia	Each	537468.00	617609.00
	1000mm dia	Each	866765.00	807034.00
	1100mm dia	Each	866949.00	996458.00
	1200mm dia	Each	1031681.00	1185873.00
	1400mm dia	Each	1196613.00	1375489.00
8.13	Labour for laying and fixing of Cast Iron butterfly valves including jointing & testing but without cost and jointing materials			
	50mm dia	Each	37.00	
	65mm dia	Each	42.00	
	80mm dia	Each	44.00	
	100mm dia	Each	56.00	
	150mm dia	Each	83.00	
	200mm dia	Each	129.00	
	250mm dia	Each	185.00	
	300mm dia	Each	244.00	
	350mm dia	Each	443.00	
	400mm dia	Each	534.00	
	450mm dia	Each	596.00	
	500mm dia	Each	748.00	
	600mm dia	Each	1148.00	
	700mm dia	Each	1320.00	
	750mm dia	Each	1633.00	
	800mm dia	Each	1728.00	
	900mm dia	Each	1823.00	
	1000mm dia	Each	1966.00	
	1100mm dia	Each	2099.00	
	1200mm dia	Each	2205.00	
	1400mm dia	Each	2468.00	
8.14a	Providing & fixing cast iron single air valves, small orifice with screwed end as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991		PN- 1.0	PN- 1.6
	25mm dia	Each	692.00	771.00
	40mm dia	Each	841.00	907.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
8.14b	Labour for laying and fixing of Cast Iron Air valves small orifice with screwed end .		PN- 1.0	PN- 1.6
	25mm dia	Each	16.00	16.00
	40mm dia	Each	19.00	19.00
8.15	Providing & fixing cast iron single air valves, large orifice with screwed end as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991		PN- 1.0	PN- 1.6
	25mm dia	Each	891.00	1037.00
	40mm dia	Each	907.00	1292.00
	50mm dia	Each	1113.00	1312.00
8.16	Labour for laying and fixing of Cast Iron Air valves large orifice with screwed end.		PN- 1.0	PN- 1.6
	25mm dia	Each	16.00	
	40mm dia	Each	19.00	
	50mm dia	Each	25.00	
8.17	Providing & fixing cast iron double air valves, flanged without in-built isolating valve as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991		PN- 1.0	PN- 1.6
	40mm dia	Each	1806.00	1726.00
	50mm dia	Each	2169.00	2157.00
	65mm dia	Each	2455.00	2843.00
	80mm dia	Each	2772.00	3098.00
	100mm dia	Each	3434.00	3790.00
	150mm dia	Each	4696.00	6424.00
	200mm dia	Each	8885.00	10147.00
8.18	Labour for laying and fixing of Cast Iron double air valves, flanged without in-built isolating valve. (PN- 1.0/ PN-1.6)			
	40mm dia	Each	23.00	
	50mm dia	Each	42.00	
	65mm dia	Each	51.00	
	80mm dia	Each	51.00	
	100mm dia	Each	71.00	
	150mm dia	Each	96.00	
	200mm dia	Each	152.00	
8.19	Providing & fixing cast iron double air valves, flanged with in-built isolating valve as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991		PN- 1.0	PN- 1.6
	40mm dia	Each	1673.00	1872.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	80mm dia	Each	2168.00	2500.00
	100mm dia	Each	2527.00	7512.00
	150mm dia	Each	4630.00	12871.00
	200mm dia	Each	9616.00	20913.00
8.20	Labour for laying and fixing of Cast Iron double air valves, flanged with in-built isolating valve.		PN- 1.0	PN- 1.6
	40mm dia	Each	23.00	
	80mm dia	Each	51.00	
	100mm dia	Each	71.00	
	150mm dia	Each	96.00	
	200mm dia	Each	152.00	
8.21	Providing and fixing of cast iron plain ended sluice valves as per IS : 14846-2000 fitted with cast iron cap including jointing and testing with cost of jointing material C.I. detachable joints Conforming to IS 8794/1988 with bolts, nuts and rubber rings Conforming to IS 5382/85 & IS-10292/88 (Class 10) all complete.		PN- 1.0	
	80mm dia	Each	3694.00	
	100mm dia	Each	4952.00	
	150mm dia	Each	7490.00	
	200mm dia	Each	12885.00	
	300mm dia	Each	23355.00	
8.22	Providing and supply of Cast Iron Sluice Gate Square type Cast Iron Wall Thimble mounted, Manually operated, CL-PL : 5.50 Meter, Class – I, Flush Bottom Closure as per IS-13349 duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site etc, complete.			
8.22.1	300X300 mm.	Each		190487.00
8.22.2	400X400 mm.	Each		212998.00
8.22.3	500X500 mm.	Each		250406.00
8.22.4	600X600 mm.	Each		280204.00
8.22.5	700X700 mm.	Each		285605.00
8.22.6	800X800 mm.	Each		333202.00
8.22.7	900X900 mm.	Each		366373.00
8.22.8	1000X1000 mm.	Each		418617.00
8.22.9	1100X1100 mm.	Each		436641.00
8.22.10	1200X1200 mm	Each		504466.00
8.22.11	1300X1300 mm.	Each		566906.00
8.22.12	1400X1400 mm.	Each		687013.00
8.22.13	1500X1500 mm.	Each		722824.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
8.23	Lowering, laying and fixing in proper alignment and position all types of C.I. D/F angle type spring loaded pressure relief valves including cost of all material, labour, cost of conveyance from stores to site of work and giving satisfactory hydraulic testing, etc. complete. (For all class of valves).		
	25 mm	Each	28.00
	40 mm	Each	34.00
	50 mm	Each	37.00
	80 mm	Each	44.00
	100 mm	Each	56.00
	125 mm	Each	67.00
	150 mm	Each	83.00
	200 mm	Each	129.00
	250 mm	Each	185.00
	300 mm	Each	244.00
	Mechanical Joints / Fittings		
8.24	Providing and Supply of C.I. Mechanical Compression flanged /socket tail piece (Popularly known as 1TM Flanged/ Socket Tailpiece) suitable for making flanged connection with the plain barrel of C.I. Spun Pipes (as per IS- 1536/2001) and D.I. Pipes (as per IS 8329/2000). The Tailpiece to be supplied complete with sealing rubber gasket of S.B.R., C.I. Follower Glands and M.S. Nut Bolts. The whole assembly should be mechanically and hydraulically tested to the provisions as laid down in IS : 1538/1993.		
	80 mm	Each	1091.00
	100 mm	Each	1268.00
	125 mm	Each	1748.00
	150 mm	Each	2135.00
	200 mm	Each	2569.00
	250 mm	Each	4000.00
	300 mm	Each	4927.00
	350 mm	Each	6511.00
	400 mm	Each	7508.00
	450 mm	Each	9268.00
	500 mm	Each	11203.00
	600 mm	Each	17421.00
	700 mm	Each	24518.00
	750 mm	Each	28155.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
8.25	Supply of C. I. Mechanical Compression Collar Coupling (Popularly known as Jiffy TM collar coupling) suitable for C.I.Spun pipe (as per IS 1536/2001) and D.I. pipes (as per IS 8329/2000). complete with sealing rubber gasket of SBR, C.I., Follower Glands and M.S. Nut Bolts. The whole assembly should be mechanically and hydraulically tested to the provisions as laid down in IS : 1538/1993.		
	80 mm	Each	880.00
	100 mm	Each	1009.00
	125 mm	Each	1396.00
	150 mm	Each	1654.00
	200 mm	Each	2217.00
	250 mm	Each	3027.00
	300 mm	Each	3942.00
	350 mm	Each	5572.00
	400 mm	Each	6628.00
	450 mm	Each	8564.00
	500 mm	Each	10030.00
	600 mm	Each	14723.00
	700 mm	Each	20412.00
	750 mm	Each	23932.00
8.26	Supply of C. I. Mechanical Joint Double Socket 90°(1/4) Bends as dimensionally described in Table 14 of IS- 13382/ 1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/ 1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. Pipes.		
	80 mm	Each	2593.00
	100 mm	Each	3167.00
	125 mm	Each	4223.00
	150 mm	Each	5302.00
	200 mm	Each	7872.00
	250 mm	Each	11285.00
	300 mm	Each	15731.00
	350 mm	Each	24577.00
	400 mm	Each	31322.00
	450 mm	Each	39006.00
	500 mm	Each	48332.00
	600 mm	Each	71032.00
	700 mm	Each	108279.00
	750 mm	Each	128104.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
8.27	Supply of CI Mechanical joint Double Socket Socket45° (1/8) Bends as dimensionally described in Table 14 of IS- 13382/ 1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/ 1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. Pipes.		
	80 mm	Each	2346.00
	100 mm	Each	2945.00
	125 mm	Each	3754.00
	150 mm	Each	4704.00
	200 mm	Each	6816.00
	250 mm	Each	9420.00
	300 mm	Each	13162.00
	350 mm	Each	19884.00
	400 mm	Each	25105.00
	450 mm	Each	30208.00
	500 mm	Each	36894.00
	600 mm	Each	52028.00
	700 mm	Each	78716.00
	750 mm	Each	92559.00
8.28	Supply of C. I. Mechanical Joint Double Socket 22.5°(1/16) Bends as dimensionally described in Table 14 of IS- 13382/ 1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/ 1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. Pipes.		
	80 mm	Each	2241.00
	100 mm	Each	2815.00
	125 mm	Each	3543.00
	150 mm	Each	4470.00
	200 mm	Each	6229.00
	250 mm	Each	8446.00
	300 mm	Each	11637.00
	350 mm	Each	17538.00
	400 mm	Each	21292.00
	450 mm	Each	25457.00
	500 mm	Each	31088.00
	600 mm	Each	42056.00
	700 mm	Each	61589.00
	750 mm	Each	72733.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
8.29	Supply of CI Mechanical joint Double Socket 11.25°(1/32) Bends as dimensionally described in Table 14 of IS- 13382/ 1992 complete with sealing rubber gasket of SBR (dimensionally described in IS-12820/ 1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. Pipes.		
	80 mm	Each	2241.00
	100 mm	Each	2815.00
	125 mm	Each	3402.00
	150 mm	Each	4223.00
	200 mm	Each	5877.00
	250 mm	Each	7989.00
	300 mm	Each	10933.00
	350 mm	Each	16130.00
	400 mm	Each	19708.00
	450 mm	Each	23169.00
	500 mm	Each	27979.00
	600 mm	Each	37246.00
	700 mm	Each	53846.00
	750 mm	Each	63231.00
8.30	Supply of CI Mechanical joint All Socket Tees as dimensionally described in Table 18 of IS 13382/1992 complete with sealing rubber gasket of S.B.R. (dimensionally described in IS-12820/1989) with cast iron follower gland and mild steel nut bolts coated or otherwise protected from rusting and suitable for C.I. pipes.		
	80x80x80 mm dia	Each	3296.00
	100x100x80 mm	Each	3977.00
	100x100x100 mm	Each	4211.00
	150x150x80 mm	Each	5666.00
	150x150x100 mm	Each	6018.00
	150x150x150 mm	Each	7039.00
	200x200x80 mm	Each	7625.00
	200x200x100 mm	Each	8083.00
	200x200x150 mm	Each	9936.00
	200x200x200 mm	Each	10230.00
	250x250x80 mm	Each	10341.00
	250x250x100 mm	Each	10452.00
	250x250x150 mm	Each	11813.00
	250x250x200 mm	Each	13186.00
	250x250x250 mm	Each	14429.00
	300x300x80 mm	Each	13397.00
	300x300x100 mm	Each	13854.00
	300x300x150 mm	Each	15344.00
	300x300x200 mm	Each	16811.00
	300x300x250 mm	Each	18512.00
	300x300x300 mm	Each	20788.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
8.31	Supply of CI Mechanical joint Double Socket with Flanged Tees inclusive of all taxes & duties, insurance, loading/unloading & stacking FOR at site complete.		
	80x80x80 mm dia	Each	2780.00
	100x100x80 mm	Each	3472.00
	100x100x100 mm	Each	3578.00
	150x150x80 mm	Each	5244.00
	150x150x100 mm	Each	5373.00
	150x150x150 mm	Each	6124.00
	200x200x80 mm	Each	7144.00
	200x200x100 mm	Each	7250.00
	200x200x150 mm	Each	8224.00
	200x200x200 mm	Each	9045.00
	250x250x80 mm	Each	9397.00
	250x250x100 mm	Each	9608.00
	250x250x150 mm	Each	10722.00
	250x250x200 mm	Each	11825.00
	250x250x250 mm	Each	12939.00
	300x300x80 mm	Each	12388.00
	300x300x100 mm	Each	12494.00
	300x300x150 mm	Each	13831.00
	300x300x200 mm	Each	15168.00
	300x300x250 mm	Each	16529.00
	300x300x300 mm	Each	17761.00
	350x350x80 mm	Each	16306.00
	350x350x100 mm	Each	17362.00
	350x350x150 mm	Each	19004.00
	350x350x200 mm	Each	22289.00
	350x350x300 mm	Each	25691.00
	350x350x350 mm	Each	25691.00
	400x400x80 mm	Each	20764.00
	400x400x100 mm	Each	20764.00
	400x400x150 mm	Each	22289.00
	400x400x200 mm	Each	24635.00
	400x400x300 mm	Each	28448.00
	400x400x400 mm	Each	32554.00
	450x450x80 mm	Each	23814.00
	450x450x100 mm	Each	24753.00
	450x450x200 mm	Each	33727.00
	450x450x300 mm	Each	36073.00
	450x450x350 mm	Each	36073.00
	450x450x450 mm	Each	40648.00
	500x500x100 mm	Each	29035.00
	500x500x250 mm	Each	39182.00
	500x500x300 mm	Each	39182.00
	500x500x400 mm	Each	39827.00
	500x500x500 mm	Each	49740.00
	600x600x100 mm	Each	38713.00
	600x600x300 mm	Each	54902.00
	600x600x400 mm	Each	61882.00
	600x600x500 mm	Each	71971.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	600x600x600 mm	Each	71971.00
	700x700x100 mm	Each	57600.00
	700x700x200 mm	Each	61471.00
	700x700x350 mm	Each	69918.00
	700x700x400 mm	Each	78481.00
	750x750x150 mm	Each	67102.00
	750x750x250 mm	Each	76018.00
	750x750x750 mm	Each	125171.00
8.32	Supply of CI Mechanical joint Double Socket Reducers inclusive of all taxes & duties, insurance, loading/unloading & stacking FOR at site complete.		
	100x80 mm dia	Each	1760.00
	150x80 mm dia	Each	2499.00
	150x100 mm dia	Each	2745.00
	200x100 mm dia	Each	3648.00
	200x150 mm dia	Each	3860.00
	250x150 mm dia	Each	5209.00
	250x200 mm dia	Each	5209.00
	300x150 mm dia	Each	5349.00
	300x200 mm dia	Each	6898.00
	300x250 mm dia	Each	6757.00
	350x200 mm dia	Each	7836.00
	350x250 mm dia	Each	7731.00
	350x300 mm dia	Each	10675.00
	400x250 mm dia	Each	12963.00
	400x300 mm dia	Each	13139.00
	400x350 mm dia	Each	12142.00
	450x400 mm dia	Each	14723.00
	450x350 mm dia	Each	15426.00
	450x300 mm dia	Each	14723.00
	500x350 mm dia	Each	19474.00
	500x400 mm dia	Each	19474.00
	500x450 mm dia	Each	19298.00
	600x400 mm dia	Each	27451.00
	600x450 mm dia	Each	27979.00
	600x500 mm dia	Each	26512.00
	700x500 mm dia	Each	48919.00
	700x600 mm dia	Each	45400.00
	750x600 mm dia	Each	52086.00
	750x700 mm dia	Each	51031.00
	800x450mm dia	Each	62527.00
	800x700mm dia	Each	61119.00
8.33	Supply of DI Dismantling joint with M.S. Nut stud & washers coated for rust prevention & internal rubber rings etc. complete assembly set as per type design inclusive of all taxes & duties, insurance, loading/ unloading & stacking FOR at site complete.		
	80 mm	Each	2534.00
	100 mm	Each	2909.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	150 mm	Each	4927.00
	200 mm	Each	6921.00
	250 mm	Each	9432.00
	300 mm	Each	12236.00
	350 mm	Each	18418.00
	400 mm	Each	22348.00
	450 mm	Each	26806.00
	500 mm	Each	31615.00
	600 mm	Each	45517.00
	700 mm	Each	67689.00
	750 mm	Each	77778.00
	800 mm	Each	86341.00
	900 mm	Each	102061.00
	1000 mm	Each	125406.00
	1100 mm	Each	157784.00
	1200 mm	Each	188402.00

CHAPTER- 9

GALVANISED IRON PIPES, SPECIALS AND GUN METAL OR BRASS FITTINGS

- 1 Work shall be executed in accordance with the specifications in vogue in PHED and all the relevant latest version of I.S. specifications detailed below :-

S.No.	IS Number	Title
1.	IS 1239 (PT-I) : 2004	Mild steel tubes, tubular and other wrought steel fittings, Part-I Steel Tubes.
2.	IS 1239 (PT-II) : 1992	Mild steel tubes, tubular and other wrought steel fittings, Part-II Mild steel tubular and other wrought steel pipes fittings.
3.	IS 1978 : 1982	Line pipes
4.	IS 4736 : 1986	Hot-dip zinc coating on mild steel tubes
5.	IS 778:1984 (Reaffirmed 2005)	Copper alloy gates, globe and check valves for water works purposes.
6.	IS 2692 : 1989	Ferrules for water services - Specifications.

- 2 Galvanizing shall Conform to IS 4736 : The zinc coating shall be uniform, adherent, reasonably smooth and free from such imperfections as flux, ash and dross inclusions, bare patches, black spots, pimples, lumping runs, rust stains, bulky white deposits and blisters. The pipes and sockets shall be cleanly finished, well galvanized in and out and free from cracks, surface flaws, laminations and other defects. All screw threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

3 Marking

(i) Each tube shall be marked with manufacturer's name or trade-mark, IS No. i.e. IS 1239 (Part I) and class of tubes, i.e. is, L, M., and H, for light, medium and heavy class.

(ii) The different classes of tubes shall be distinguished by colour bands, which shall be applied as follows before the tubes leave the manufacturer's works :

- (a) Light tubes : Yellow
- (b) Medium tubes : Blue
- (c) Heavy tubes : Red

- 4 Thickness, dimension & Mass of the tube shall be as per Class 8.1.1 of IS: 1239 - 2004.

5 The Tolerances on thickness and Mass

Nominal bore : in mm	Mass of Screwed & Socketed G.I. Pipes (in Kg per mtr.)		
	Light	Medium	Heavy
6	0.363	0.407	0.49
8	0.519	0.645	0.769
10	0.676	0.845	1.03
15	0.956	1.22	1.45
20	1.39	1.57	1.88
25	2	2.43	2.95
32	2.57	3.13	3.82
40	3.27	3.6	4.41
50	4.15	5.1	6.26

65	5.83	6.54	8.05
80	6.89	8.53	10.1
100	10	12.5	14.8
125		16.4	18.4
150		19.5	21.9

(b)	Tolerance Mass :	
(i)	Single tube (Light series)	+ 10 percent - 8 percent
(ii)	Single tube (medium and heavy series)	± 10 percent
(iii)	For quantities per load of 10 tonnes, Min (light series)	+ 7.5 percent - 5 percent
(iv)	For quantities per load of 10 tonnes, Min (medium and heavy series)	± 7.5 percent

(c)	Tolerance Thickness :	
(i)	Welded tubes :	
	Light tubes	+ not limited - 8 percent
	Medium and heavy	+ not limited - 10 percent
(ii)	Seamless tubes	+ not limited - 12.5 percent

6 Tolerances in length of tubes

(i) Each tubes shall be within $\text{mm} \begin{matrix} + 6 \\ - 0 \end{matrix}$ the specified exact lengths.

(ii) Each tube shall be within ± 150 mm of the specified approximate length, when approximate lengths are required either for screwed and socketed tubes or for plain end tubes.

7 Laying of pipes and fittings/specials includes all precautions to guard against possible damage to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

8 Measurement

All measurements should be of the finished work.

- 9 Rates :
- 9.1 The rates include charges for all tools and plants, other appliances etc. required for lifting and laying the pipes, specials and fittings in position as per approved drawings.
- 9.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials and other causes.
- 9.3 If the material is supplied by department, then it shall be issued from departmental store and no extra charges for carting the same from store to site of work shall be paid.

CHAPTER 9 - GALVANISED IRON PIPES, SPECIALS AND GUN METAL OR BRASS FITTINGS

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
			Light	Medium	Heavy
9.1	Providing, laying and jointing of galvanised Iron (MS) Pipes with specials (such as bends, elbows, tees etc) class light, medium & heavy including testing of joints, cost of pipes, specials and jointing materials all complete. Pipes and sockets Conforming to IS-1239/2004 Part-I & Part-II.				
	15mm dia	RM	98.00	114.00	130.00
	20mm dia	RM	132.00	144.00	166.00
	25mm dia	RM	182.00	211.00	247.00
	32mm dia	RM	231.00	270.00	318.00
	40mm dia	RM	280.00	301.00	356.00
	50mm dia	RM	347.00	406.00	496.00
	65mm dia	RM	480.00	527.00	686.00
	80mm dia	RM	569.00	686.00	814.00
	100mm dia	RM	811.00	981.00	1140.00
	125mm dia	RM	-	1263.00	1450.00
	150mm dia	RM	-	1503.00	1691.00
9.2	Labour for laying and jointing of galvanised Iron (MS) pipes with specials (such as bends, elbows, tees etc) class light, medium & heavy including testing of joints and cost of jointing materials but excluding cost of pipes & specials.		Light	Medium	Heavy
	15mm dia	RM	8.00	9.00	9.00
	20mm dia	RM	9.00	9.00	9.00
	25mm dia	RM	13.00	13.00	13.00
	32mm dia	RM	15.00	15.00	15.00
	40mm dia	RM	18.00	18.00	18.00
	50mm dia	RM	22.00	22.00	31.00
	65mm dia	RM	35.00	35.00	44.00
	80mm dia	RM	37.00	40.00	48.00
	100mm dia	RM	52.00	57.00	61.00
	125mm dia	RM	-	70.00	78.00
	150mm dia	RM	-	95.00	96.00
9.3	Providing and fixing full way gate valves tested to 21.00 kg/sq.cm. Conforming to IS 778/1984 (Reaffirmed 2005) Class-I		Screwed	Flanged	
	15mm dia	Each	145.00	215.00	
	20mm dia	Each	226.00	385.00	
	25mm dia	Each	262.00	447.00	
	32mm dia	Each	400.00	544.00	
	40mm dia	Each	530.00	651.00	
	50mm dia	Each	799.00	1197.00	

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
	65mm dia	Each	1503.00	2698.00
	80mm dia	Each	2361.00	3895.00
	100mm dia	Each	4476.00	5651.00
9.4	Providing and fixing full way gate valves tested to 21.00 kg/sq.cm. Conforming to IS 778/1984 (Reaffirmed 2005) Class-II		Screwed	Flanged
	15mm dia	Each	203.00	215.00
	20mm dia	Each	400.00	407.00
	25mm dia	Each	447.00	451.00
	32mm dia	Each	531.00	542.00
	40mm dia	Each	650.00	650.00
	50mm dia	Each	1176.00	1197.00
	65mm dia	Each	2696.00	2698.00
	80mm dia	Each	3780.00	3902.00
	100mm dia	Each	5651.00	5671.00
	125mm dia	Each		
	150mm dia	Each		
9.5	Providing and fixing class-I Globe wheel valves, Conforming to IS 778/1984 (Reaffirmed 2005), tested to 21.00 kg/sq.cm.		Screwed	Flanged
	15mm dia	Each	195.00	235.00
	20mm dia	Each	206.00	301.00
	25mm dia	Each	223.00	331.00
	32mm dia	Each	309.00	447.00
	40mm dia	Each	417.00	600.00
	50mm dia	Each	702.00	985.00
	65mm dia	Each	1148.00	1615.00
	80mm dia	Each	1353.00	2980.00
	100mm dia	Each	4441.00	4853.00
7.6	Providing and fixing class-II Globe wheel valves, Conforming to IS 778/1984 (Reaffirmed 2005), tested to 21.00 kg/sq.cm.		Screwed	Flanged
	15mm dia	Each	237.00	248.00
	20mm dia	Each	297.00	301.00
	25mm dia	Each	321.00	331.00
	32mm dia	Each	446.00	447.00
	40mm dia	Each	591.00	607.00
	50mm dia	Each	988.00	990.00
	65mm dia	Each	1393.00	1620.00
	80mm dia	Each	2933.00	2978.00
	100mm dia	Each	4851.00	4851.00
	125mm dia	Each		
	150mm dia	Each		

S.No.	Particulars of Items	Unit	Rates (in Rs.)	
9.7	Providing and fixing gun metal/ brass check (non-return) valves Class-I, Conforming to IS-778/1984 (Reaffirmed 2005) female ends, tested to 21.00 kg/sq.cm.		Screwed	Flanged
	15mm dia	Each	107.00	271.00
	20mm dia	Each	148.00	283.00
	25mm dia	Each	225.00	332.00
	32mm dia	Each	317.00	510.00
	40mm dia	Each	413.00	743.00
	50mm dia	Each	530.00	862.00
	65mm dia	Each	706.00	1284.00
	80mm dia	Each	1529.00	2012.00
	100mm dia	Each	2580.00	2546.00
9.8	Providing and fixing gun metal/ brass check (non-return) valves Class-II, Conforming to IS-778/1984 (Reaffirmed 2005) female ends, tested to 21.00 kg/sq.cm.		Screwed	Flanged
	15mm dia	Each	272.00	271.00
	20mm dia	Each	283.00	283.00
	25mm dia	Each	331.00	332.00
	32mm dia	Each	510.00	509.00
	40mm dia	Each	746.00	754.00
	50mm dia	Each	933.00	934.00
	65mm dia	Each	1978.00	1343.00
	80mm dia	Each	2000.00	2012.00
	100mm dia	Each	2546.00	2546.00
	125mm dia	Each		
	150mm dia	Each		
9.9	Providing and fixing GM or brass ferrules Conforming to IS-2692/1984 (Reaffirmed 2005), tested to 21.00 kg/sq.cm. i/c boring and tapping the main		Screwed	
	15mm dia	Each	350.00	
	20mm dia	Each	617.00	
	25mm dia	Each	820.00	
	32mm dia	Each	1200.00	
	40mm dia	Each	1739.00	
	50mm dia	Each	2246.00	
9.10	Labour for laying and fixing full way gate valves, check valves, globe valve (excluding cost of jointing materials) Class-I		Screwed	Flanged
	15mm dia	Each	8.00	9.00
	20mm dia	Each	10.00	12.00
	25mm dia	Each	10.00	15.00

S.No.	Particulars of Items	Unit		Rates (in Rs.)
	32mm dia	Each	12.00	16.00
	40mm dia	Each	15.00	17.00
	50mm dia	Each	25.00	34.00
	65mm dia	Each	50.00	84.00
	80mm dia	Each	76.00	126.00
	100mm dia	Each	134.00	168.00
9.11	Labour for laying and fixing Screwed or flanged full way gate valves check valves, globe valve (excluding cost of jointing materials) Class-II		Screwed	Flanged
	15mm dia	Each	9.00	9.00
	20mm dia	Each	12.00	12.00
	25mm dia	Each	15.00	15.00
	32mm dia	Each	16.00	16.00
	40mm dia	Each	17.00	17.00
	50mm dia	Each	34.00	34.00
	65mm dia	Each	84.00	84.00
	80mm dia	Each	126.00	126.00
	100mm dia	Each	168.00	168.00
	125mm dia	Each		
	150mm dia	Each		
9.12	Labour for laying and fixing Screwed or flanged globe wheel valves Class-I		Screwed	Flanged
	15mm dia	Each	8.00	8.00
	20mm dia	Each	8.00	8.00
	25mm dia	Each	8.00	10.00
	32mm dia	Each	8.00	13.00
	40mm dia	Each	12.00	20.00
	50mm dia	Each	24.00	30.00
	65mm dia	Each	34.00	50.00
	80mm dia	Each	42.00	76.00
	100mm dia	Each	79.00	110.00
9.13	Labour for laying and fixing Screwed or flanged globe wheel valves Class-II		Screwed	Flanged
	15mm dia	Each	8.00	8.00
	20mm dia	Each	8.00	8.00
	25mm dia	Each	10.00	10.00
	32mm dia	Each	13.00	13.00
	40mm dia	Each	20.00	20.00
	50mm dia	Each	30.00	30.00
	65mm dia	Each	50.00	50.00
	80mm dia	Each	76.00	76.00
	100mm dia	Each	101.00	101.00
9.14	Labour for laying and fixing Screwed or flanged check (non-return) valves Class-I,		Screwed	Flanged
	15mm dia	Each	4.00	8.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)		
	20mm dia	Each	4.00	8.00	
	25mm dia	Each	8.00	11.00	
	32mm dia	Each	8.00	15.00	
	40mm dia	Each	12.00	24.00	
	50mm dia	Each	15.00	24.00	
	65mm dia	Each	22.00	37.00	
	80mm dia	Each	44.00	59.00	
	100mm dia	Each	67.00	76.00	
9.15	Labour for laying and fixing Screwed or flanged check (non-return) valves Class-II,		Screwed	Flanged	
	15mm dia	Each	8.00	8.00	
	20mm dia	Each	8.00	8.00	
	25mm dia	Each	11.00	11.00	
	32mm dia	Each	15.00	15.00	
	40mm dia	Each	24.00	24.00	
	50mm dia	Each	24.00	24.00	
	65mm dia	Each	37.00	37.00	
	80mm dia	Each	59.00	59.00	
	100mm dia	Each	76.00	76.00	
9.16	Labour for laying and fixing GM or brass ferrules including boring and tapping the main and jointing materials (i.e. white lead, hemp, oil etc.)		Screwed		
	15mm dia	Each	76.00		
	20mm dia	Each	118.00		
	25mm dia	Each	151.00		
	32mm dia	Each	235.00		
	40mm dia	Each	336.00		
	50mm dia	Each	437.00		
9.17	Providing & fixing water taps		Stainless Steel	CI self closing	Brass Heavy Duty
	15mm dia	Each	621.00	393.00	393.00
	20mm dia	Each	712.00	471.00	455.00
	25mm dia	Each	730.00	501.00	518.00
	40mm dia	Each	901.00	652.00	670.00
9.18	Labour for laying & fixing water taps		Stainless Steel	CI self closing	Brass Heavy Duty
	15mm dia	Each	28.00	28.00	28.00
	20mm dia	Each	49.00	49.00	49.00
	25mm dia	Each	49.00	49.00	49.00
	40mm dia	Each	54.00	54.00	54.00
9.19	Painting G.I. pipes and fittings with synthetic enamel white paint over a ready mixed priming coat, both of approved quality for new work :				

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	15 mm diameter pipe. -	RM	6.00
	20 mm diameter pipe.	RM	7.00
	25 mm diameter pipe	RM	9.00
	32 mm diameter pipe.	RM	11.00
	40 mm diameter pipe.	RM	12.00
	50 mm diameter pipe.	RM	15.00
9.20	Repainting G.I. pipes and fittings with synthetic enamel white paint of approved quality :		
	15 mm diameter pipe.	RM	3.00
	20 mm diameter pipe.	RM	3.00
	25 mm diameter pipe	RM	4.00
	32 mm diameter pipe.	RM	5.00
	40 mm diameter pipe.	RM	6.00
	50 mm diameter pipe.	RM	7.00
9.21	Painting G.I. pipes and fittings with two coats of anti-corrosive bitumastic paint of approved quality :		
	15 mm diameter pipe.	RM	3.00
	20 mm diameter pipe.	RM	4.00
	25 mm diameter pipe	RM	5.00
	32 mm diameter pipe.	RM	6.00
	40 mm diameter pipe.	RM	7.00
	50 mm diameter pipe.	RM	8.00
	65 mm diameter pipe	RM	10.00
	80 mm diameter pipe	RM	12.00
9.22	Providing and fixing G.I. Union in G.I. pipe line including cutting and threading the pipe and making long screws etc complete (new work) :		
	15 mm diameter pipe.	RM	86.00
	20 mm diameter pipe.	RM	100.00
	25 mm diameter pipe	RM	118.00
	32 mm diameter pipe.	RM	153.00
	40 mm diameter pipe.	RM	176.00
	50 mm diameter pipe.	RM	260.00
	65 mm diameter pipe	RM	431.00
	80 mm diameter pipe	RM	573.00
9.23	Providing and fixing G.I. Union in existing G.I. pipe line, cutting and threading the pipe and making long screws including excavation, refilling the earth or cutting of wall and making good the same complete wherever required :		
	15 mm diameter pipe.	Each	180.00
	20 mm diameter pipe.	Each	194.00
	25 mm diameter pipe	Each	212.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	32 mm diameter pipe.	Each	247.00
	40 mm diameter pipe.	Each	269.00
	50 mm diameter pipe.	Each	388.00
	65 mm diameter pipe	Each	559.00
	80 mm diameter pipe	Each	700.00
9.24	Providing and fixing C.I. double acting air valve of approved quality with bolts, nuts, rubber insertions etc. complete (The tail pieces, tapers etc if required will be paid separately) :		
	50 mm diameter	Each	2157.00
	80 mm diameter	Each	3098.00
	100 mm diameter	Each	3790.00
9.25	Providing and Supplying of following G.I. Specials as per relevant IS 1239, ISI marked for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading /unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
9.25.1	GI REDUCER (HEAVY)		
	100 mm x 80 mm	Each	190.00
	100 mm x 65 mm	Each	190.00
	100 mm x 50 mm	Each	182.00
	80 mm x 65 mm	Each	126.00
	80 mm x 50 mm	Each	126.00
	80 mm x 40 mm	Each	126.00
	80 mm x 32 mm	Each	126.00
	65 mm x 50 mm	Each	86.00
	65 mm x 40 mm	Each	86.00
	65 mm x 32 mm	Each	86.00
	65 mm x 20 mm	Each	86.00
	50 mm x 40 mm	Each	50.00
	50 mm x 32 mm	Each	50.00
	50 mm x 20 mm	Each	50.00
	40 mm x 32 mm	Each	32.00
	40 mm x 20 mm	Each	32.00
9.25.2	GI REDUCER (MEDIUM)		
	100 mm x 80 mm	Each	165.00
	100 mm x 65mm	Each	165.00
	100 mm x 50 mm	Each	165.00
	80 mm x 65 mm	Each	109.00
	80 mm x 50 mm	Each	109.00
	80 mm x 40 mm	Each	109.00
	80 mm x 32 mm	Each	109.00
	65 mm x 50 mm	Each	75.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	65 mm x 40 mm	Each	75.00
	65 mm x 32 mm	Each	75.00
	65 mm x 20 mm	Each	75.00
	50 mm x 40 mm	Each	43.00
	50 mm x 32 mm	Each	43.00
	50 mm x 20 mm	Each	43.00
	40 mm x 32 mm	Each	27.00
	40 mm x 20 mm	Each	27.00
9.25.3	G I UNEQUAL TEE (HEAVY)		
	100 mm x 80 mm	Each	194.00
	100 mm x 65mm	Each	194.00
	100 mm x 50 mm	Each	194.00
	80 mm x 65 mm	Each	131.00
	80 mm x 50 mm	Each	131.00
	80 mm x 40 mm	Each	131.00
	80 mm x 32 mm	Each	131.00
	65 mm x 50 mm	Each	87.00
	65 mm x 40 mm	Each	87.00
	65 mm x 32 mm	Each	87.00
	65 mm x 20 mm	Each	87.00
	50 mm x 40 mm	Each	52.00
	50 mm x 32 mm	Each	52.00
	50 mm x 20 mm	Each	52.00
	40 mm x 32 mm	Each	32.00
	40 mm x 20 mm	Each	32.00
	32 mm x 20 mm	Each	16.00
9.25.4	G.I UNEQUAL TEE(MEDIUM)		
	100 mm x 80 mm	Each	168.00
	100 mm x 65mm	Each	168.00
	100 mm x 50 mm	Each	168.00
	80 mm x 65 mm	Each	115.00
	80 mm x 50 mm	Each	115.00
	80 mm x 40 mm	Each	115.00
	80 mm x 32 mm	Each	115.00
	65 mm x 50 mm	Each	76.00
	65 mm x 40 mm	Each	76.00
	65 mm x 32 mm	Each	76.00
	65 mm x 20 mm	Each	76.00
	50 mm x 40 mm	Each	45.00
	50 mm x 32 mm	Each	45.00
	50 mm x 20 mm	Each	45.00
	40 mm x 32 mm	Each	28.00
	40 mm x 20 mm	Each	28.00
	32 mm x 20 mm	Each	14.00
9.25.5	G.I. Equal Elbow plain		
	15mm	Each	13.00
	20mm	Each	21.00
	25mm	Each	31.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	32mm	Each	40.00
	40mm	Each	65.00
	50mm	Each	104.00
	65mm	Each	157.00
	80mm	Each	282.00
	100mm	Each	707.00
	125mm	Each	1134.00
	150mm	Each	1203.00
9.25.6	G.I. Equal Tee plain		
	15mm	Each	12.00
	20mm	Each	18.00
	25mm	Each	25.00
	32mm	Each	35.00
	40mm	Each	55.00
	50mm	Each	92.00
	65mm	Each	160.00
	80mm	Each	221.00
	100mm	Each	368.00
9.25.7	G.I. Coupling		
	15mm	Each	12.00
	20mm	Each	19.00
	25mm	Each	24.00
	32mm	Each	37.00
	40mm	Each	45.00
	50mm	Each	77.00
	65mm	Each	124.00
	80mm	Each	187.00
	100mm	Each	302.00
9.25.8	M.S.Saddle Piece		
	15mm	Each	13.00
	20mm	Each	21.00
	25mm	Each	30.00
	32mm	Each	49.00
	40mm	Each	61.00
	50mm	Each	92.00
	65mm	Each	176.00
	80mm	Each	262.00
	100mm	Each	483.00
9.25.9	Rubber sheet for Flange set		
	15mm	Each	2.00
	20mm	Each	4.00
	25mm	Each	5.00
	32mm	Each	6.00
	40mm	Each	7.00
	50mm	Each	8.00
	65mm	Each	9.00
	80mm	Each	13.00
	100mm	Each	16.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
9.25.10	MS BOLTS AND NUTS		
9.25.10.1	16 mm dia x 65 to 90 mm length fully threaded bolts and nuts with 2 Nos.	Kg.	117.00
9.25.10.2	20mm dia and above x 90mm to 120mm length fully threaded bolts and with nuts 2 Nos.	Kg.	170.00
9.25.11	RUBBER INSERTION SHEET		
	3 Ply R.I. Sheet	Kg.	70.00

CHAPTER- 10

HDPE PIPES & SPECIALS

- 1 High Density polyethylene pipes for Water Supply shall be as per IS : 4984
- 2 Rubber sealing rings for gas mains, water mains and sewers shall be as per IS : 5382.
- 3 Laying & jointing of polyethylene (PE) Pipes shall be as per IS : 7634
- 4 Colour
 - 4.1 The colour of the pipe shall be black for the purpose of identification of the pipes covered in this standard. Each pipe shall contain minimum three equi-spaced longitudinal stripes of width 3 mm (Min) in blue colour. These stripes shall be more than 0.2 mm in depth. The material of the stripes shall be of the same type of resin, as used in the base compound for the pipe.
- 5 Length of straight Pipe & marking on pipe
 - 5.1 The length of straight pipe used shall be more than 6 m or as agreed by Engineer in charge. Short lengths of 3 meter (minimum) up to a Maximum of 10 % of the total supply may be permitted.
 - 5.2 Each straight length of pipe shall be clearly marked in indelible ink/paint on either end and for coil at both ends or hot embossed on white base every meter throughout the length of pipe/coil with the following information:
 - 5.2.1 Manufacturer's name/Trade-mark,
 - 5.2.2 Designation of pipe
 - 5.2.3 Lot No./Batch No.
 - 5.2.4 BIS certification marking on each pipe.
- 6 Appearance

Pipe shall be free from all defect including indentation, delaminating, bubbles, pinholes, cracks, pits, blisters, foreign inclusion that due to their nature degree or extent detrimentally affect the strength and Serviceability of the pipe. The pipe shall be as uniform as commercially practicable in colour opacity, density and other physical properties as per relevant IS code or equivalent International Code. The inside surface of each pipe shall be free of scouring, cavities, bulges, dents, ridges and other defects that result in a variation of inside diameter from that obtained on adjacent unaffected portions of the surface. The pipe ends shall be cut clearly and square to the axis of the pipe within the tolerance as per IS: 4984
- 7 Handling, Transportation storage and Lowering of pipes.
 - If transportation of HDPE pipes from a distance greater than 300km than pipes shall be received only when bare coils of pipe have been wrapped with Hessian cloth.
 - The truck for transportation of the PE pipes shall be exclusively used for PE pipes only with no other material loaded-especially no metallic, glass and wooden items. The truck shall not have sharp edges that can damage the pipe.
 - At the time of opening coils it must be remembered that the coils are under tension and must be open in control manner.
 - Straight length should be stored on horizontal racks giving continuous support.
 - Loss/damages during transit, handling, storage will be to the contractor's account.

8 Fittings and specials :

All HDPE fittings/specials shall be fabricated or injection moulded at factory as per IS: 8360 (Part-I & Part-III) and as per IS: 8008 (Part-I to Part-IX). Fittings will be butt welded on the pipes or other fittings by use of heat fusion.

9 Test to Establish Perfectibility/portability of work

Specimen of pipe shall be tested to establish the suitability for use in carrying potable water

(i) Smell of the extract

(ii) Clarity of the colour of the extract

(iii) Acidity and Alkalinity

(iv) Global migration UV absorbing material Heavy metals

(v) Unreacted monomers (styrenes) and biological tests

10 Hydraulic Test

After laying the pipe hydraulic test shall be done to Conform the quality of work and material. There should not be any signs of localized swelling, leakage or weeping.

11 Laying of pipes and fittings/specials includes all precautions to guard against possible damage to the existing structure/pipe lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

12 Measurement

The net length of fixed pipe shall be measured in running meters correct to 10mm. The portion of the pipe inside the joints shall not be included in the length of pipe work. Specials shall be excluded and measured and paid separately under the relevant item.

13 Rates :

The rate shall include the cost of the material and labour involve in all operations described in the item.

CHAPTER 10 -- HDPE PIPES & SPECIALS

S.No	Particulars of Items	Unit	Rate (in Rs.)		
			6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
10.1	Providing, laying, Jointing & field testing of High Density Polyethylene pipes, (HDPE) Conforming to IS 4984/ 14151/ 12786/ 13488 with necessary jointing material like mechanical connector or jointing pipes by heating to the ends of pipes with the help of Teflon coated electric mirror/ heater to the required temperature and then pressing the ends together against each other, to form a monolithic & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic Jacks/ But fusion machine. (50mm & above fusion jointed & below 50mm mechanical jointed)				
	PE-100				
1	20 mm dia	RM	33.00	34.00	35.00
2	25 mm dia	RM	39.00	41.00	45.00
3	32 mm dia	RM	49.00	50.00	56.00
4	40 mm dia	RM	62.00	70.00	82.00
5	50 mm dia	RM	82.00	100.00	118.00
6	63 mm dia	RM	125.00	156.00	185.00
7	75 mm dia	RM	178.00	219.00	262.00
8	90 mm dia	RM	245.00	307.00	368.00
9	110 mm dia	RM	351.00	452.00	540.00
10	125 mm dia	RM	457.00	580.00	694.00
11	140 mm dia	RM	568.00	721.00	862.00
12	160 mm dia	RM	740.00	942.00	1129.00
13	180 mm dia	RM	926.00	1182.00	1439.00
14	200 mm dia	RM	1145.00	1464.00	1767.00
15	225 mm dia	RM	1448.00	1848.00	2224.00
16	250 mm dia	RM	1775.00	2274.00	2736.00
17	280 mm dia	RM	2217.00	2843.00	3419.00
18	315 mm dia	RM	2798.00	3585.00	4322.00
19	355 mm dia	RM	3570.00	4570.00	5538.00
20	400 mm dia	RM	4607.00	5914.00	7166.00
21	450 mm dia	RM	5834.00	7497.00	9045.00
22	500 mm dia	RM	7210.00	9245.00	11173.00
23	560 mm dia	RM	9020.00	11600.00	13991.00
24	630 mm dia	RM	11399.00	14656.00	17704.00
25	710 mm dia	RM	13782.00	17715.00	21421.00

S.No	Particulars of Items	Unit	Rate (in Rs.)		
			6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
10.2	Providing and laying Bend 90° Conforming to IS specifications.		6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
1	20 mm dia	Each	26.00	28.00	29.00
2	25 mm dia	Each	29.00	32.00	33.00
3	32 mm dia	Each	38.00	39.00	41.00
4	40 mm dia	Each	42.00	45.00	46.00
5	50 mm dia	Each	55.00	60.00	66.00
6	63 mm dia	Each	76.00	81.00	108.00
7	75 mm dia	Each	117.00	122.00	138.00
8	90 mm dia	Each	181.00	194.00	222.00
9	110 mm dia	Each	240.00	281.00	300.00
10	125 mm dia	Each	345.00	329.00	504.00
11	140 mm dia	Each	469.00	584.00	690.00
12	160 mm dia	Each	672.00	844.00	1003.00
13	180 mm dia	Each	927.00	1172.00	1405.00
14	200 mm dia	Each	1242.00	1579.00	1898.00
15	225 mm dia	Each	1747.00	2222.00	2668.00
16	250 mm dia	Each	2359.00	3017.00	3627.00
17	280 mm dia	Each	3286.00	4209.00	5059.00
18	315 mm dia	Each	4651.00	5959.00	7183.00
19	355 mm dia	Each	6601.00	8457.00	10251.00
20	400 mm dia	Each	9591.00	12320.00	14934.00
21	450 mm dia	Each	13603.00	17509.00	21145.00
22	500 mm dia	Each	18671.00	23986.00	29018.00
23	560 mm dia	Each	26102.00	33643.00	40631.00
24	630 mm dia	Each	37125.00	47839.00	57865.00
25	710 mm dia	Each	52919.00	68217.00	82718.00
10.3	Providing and laying Bend 45° Conforming to IS specifications.		6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
1	20 mm dia	Each	26.00	28.00	29.00
2	25 mm dia	Each	28.00	30.00	32.00
3	32 mm dia	Each	29.00	32.00	37.00
4	40 mm dia	Each	35.00	38.00	47.00
5	50 mm dia	Each	49.00	49.00	65.00
6	63 mm dia	Each	87.00	87.00	115.00
7	75 mm dia	Each	133.00	133.00	176.00
8	90 mm dia	Each	192.00	192.00	259.00
9	110 mm dia	Each	283.00	283.00	412.00
10	125 mm dia	Each	395.00	305.00	606.00
11	140 mm dia	Each	576.00	411.00	867.00
12	160 mm dia	Each	831.00	587.00	1244.00
13	180 mm dia	Each	1125.00	807.00	1706.00
14	200 mm dia	Each	1483.00	1079.00	2261.00
15	225 mm dia	Each	2091.00	1509.00	3207.00
16	250 mm dia	Each	2824.00	2040.00	4320.00
17	280 mm dia	Each	3872.00	2838.00	5841.00
18	315 mm dia	Each	5941.00	4007.00	8943.00
19	355 mm dia	Each	8548.00	5404.00	12904.00
20	400 mm dia	Each	11660.00	6994.00	18611.00

S.No	Particulars of Items	Unit	Rate (in Rs.)		
21	450 mm dia	Each	15293.00	8926.00	23906.00
22	500 mm dia	Each	21393.00	11004.00	33614.00
23	560 mm dia	Each	29661.00	13773.00	33855.00
24	630 mm dia	Each	38035.00	17393.00	34340.00
25	710 mm dia	Each	42887.00	17812.00	34763.00
10.4	Providing and laying Equal Tee Conforming to IS specifications.		6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
1	20 mm dia	Each	28.00	30.00	31.00
2	25 mm dia	Each	37.00	39.00	40.00
3	32 mm dia	Each	38.00	41.00	42.00
4	40 mm dia	Each	42.00	46.00	46.00
5	50 mm dia	Each	57.00	63.00	74.00
6	63 mm dia	Each	93.00	103.00	114.00
7	75 mm dia	Each	154.00	160.00	197.00
8	90 mm dia	Each	274.00	278.00	337.00
9	110 mm dia	Each	400.00	413.00	483.00
10	125 mm dia	Each	442.00	552.00	653.00
11	140 mm dia	Each	603.00	756.00	896.00
12	160 mm dia	Each	871.00	1100.00	1311.00
13	180 mm dia	Each	1211.00	1536.00	1844.00
14	200 mm dia	Each	1631.00	2077.00	2500.00
15	225 mm dia	Each	2305.00	2937.00	3528.00
16	250 mm dia	Each	3114.00	3986.00	4793.00
17	280 mm dia	Each	4348.00	5572.00	6697.00
18	315 mm dia	Each	6169.00	7905.00	9526.00
19	355 mm dia	Each	8771.00	11235.00	13611.00
20	400 mm dia	Each	12734.00	16353.00	19808.00
21	450 mm dia	Each	17283.00	22231.00	26824.00
22	500 mm dia	Each	24813.00	31857.00	38508.00
23	560 mm dia	Each	34723.00	44722.00	53962.00
24	630 mm dia	Each	49390.00	63590.00	76844.00
25	710 mm dia	Each	70456.00	90741.00	109918.00
10.5	Providing and laying Pipe end Conforming to IS specifications.		6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
1	20 mm dia	Each	39.00	41.00	43.00
2	25 mm dia	Each	41.00	43.00	46.00
3	32 mm dia	Each	43.00	46.00	48.00
4	40 mm dia	Each	46.00	51.00	52.00
5	50 mm dia	Each	54.00	56.00	58.00
6	63 mm dia	Each	67.00	69.00	71.00
7	75 mm dia	Each	86.00	94.00	94.00
8	90 mm dia	Each	125.00	142.00	142.00
9	110 mm dia	Each	160.00	187.00	187.00
10	125 mm dia	Each	247.00	281.00	281.00
11	140 mm dia	Each	312.00	355.00	355.00
12	160 mm dia	Each	317.00	373.00	373.00
13	180 mm dia	Each	490.00	560.00	560.00
14	200 mm dia	Each	485.00	577.00	572.00

S.No	Particulars of Items	Unit	Rate (in Rs.)		
15	225 mm dia	Each	505.00	615.00	615.00
16	250 mm dia	Each	825.00	843.00	961.00
17	280 mm dia	Each	765.00	935.00	935.00
18	315 mm dia	Each	1148.00	1417.00	1417.00
19	355 mm dia	Each	1582.00	1923.00	1923.00
20	400 mm dia	Each	1968.00	2402.00	2402.00
21	450 mm dia	Each	2327.00	2876.00	2876.00
22	500 mm dia	Each	2933.00	3611.00	3611.00
23	560 mm dia	Each	4171.00	5021.00	5021.00
24	630 mm dia	Each	3576.00	4652.00	4652.00
25	710 mm dia	Each	5492.00	7133.00	7133.00
10.6	Providing and laying Reducer 6 kg/sq.cm : Conforming to IS specifications.		STEP I	STEP II	STEP III
1	20 mm dia	Each	-	-	-
2	25 mm dia	Each	43.00	-	-
3	32 mm dia	Each	49.00	49.00	-
4	40 mm dia	Each	56.00	56.00	61.00
5	50 mm dia	Each	68.00	70.00	72.00
6	63 mm dia	Each	83.00	84.00	85.00
7	75 mm dia	Each	105.00	107.00	113.00
8	90 mm dia	Each	114.00	120.00	126.00
9	110 mm dia	Each	113.00	140.00	137.00
10	125 mm dia	Each	122.00	162.00	155.00
11	140 mm dia	Each	144.00	179.00	183.00
12	160 mm dia	Each	187.00	234.00	224.00
13	180 mm dia	Each	220.00	298.00	277.00
14	200 mm dia	Each	254.00	347.00	338.00
15	225 mm dia	Each	329.00	447.00	426.00
16	250 mm dia	Each	385.00	433.00	518.00
17	280 mm dia	Each	509.00	542.00	545.00
18	315 mm dia	Each	673.00	656.00	710.00
19	355 mm dia	Each	957.00	918.00	1120.00
20	400 mm dia	Each	1010.00	1146.00	1304.00
21	450 mm dia	Each	1333.00	1505.00	4620.00
22	500 mm dia	Each	1625.00	1904.00	5502.00
23	560 mm dia	Each	2331.00	2452.00	10797.00
24	630 mm dia	Each	2764.00	2883.00	11534.00
25	710 mm dia	Each	3609.00	3718.00	23453.00
10.7	Providing and laying Reducer 8 kg/sq.cm : Conforming to IS specifications.		STEP I	STEP II	STEP III
1	20 mm dia	Each	-	-	-
2	25 mm dia	Each	44.00	-	-
3	32 mm dia	Each	50.00	50.00	-
4	40 mm dia	Each	57.00	57.00	62.00
5	50 mm dia	Each	68.00	71.00	74.00
6	63 mm dia	Each	94.00	97.00	100.00
7	75 mm dia	Each	112.00	117.00	122.00
8	90 mm dia	Each	123.00	130.00	137.00

S.No	Particulars of Items	Unit	Rate (in Rs.)		
9	110 mm dia	Each	112.00	132.00	154.00
10	125 mm dia	Each	134.00	174.00	173.00
11	140 mm dia	Each	169.00	214.00	221.00
12	160 mm dia	Each	210.00	277.00	284.00
13	180 mm dia	Each	247.00	338.00	322.00
14	200 mm dia	Each	305.00	418.00	401.00
15	225 mm dia	Each	374.00	460.00	497.00
16	250 mm dia	Each	487.00	516.00	556.00
17	280 mm dia	Each	622.00	681.00	687.00
18	315 mm dia	Each	864.00	893.00	975.00
19	355 mm dia	Each	1026.00	1083.00	1273.00
20	400 mm dia	Each	1288.00	1459.00	1561.00
21	450 mm dia	Each	1616.00	1797.00	1781.00
22	500 mm dia	Each	2109.00	2316.00	2339.00
23	560 mm dia	Each	2699.00	2789.00	2621.00
24	630 mm dia	Each	3005.00	3100.00	3010.00
25	710 mm dia	Each	3048.00	3306.00	3236.00
10.8	Providing and laying Reducer 10 kg/sq.cm : Conforming to IS specifications.		STEP I	STEP II	STEP III
1	20 mm dia	Each	-	-	-
2	25 mm dia	Each	49.00	-	-
3	32 mm dia	Each	55.00	56.00	-
4	40 mm dia	Each	62.00	62.00	68.00
5	50 mm dia	Each	73.00	76.00	78.00
6	63 mm dia	Each	89.00	92.00	98.00
7	75 mm dia	Each	111.00	117.00	123.00
8	90 mm dia	Each	124.00	134.00	137.00
9	110 mm dia	Each	130.00	155.00	143.00
10	125 mm dia	Each	146.00	175.00	167.00
11	140 mm dia	Each	154.00	194.00	198.00
12	160 mm dia	Each	201.00	254.00	243.00
13	180 mm dia	Each	237.00	325.00	302.00
14	200 mm dia	Each	276.00	380.00	370.00
15	225 mm dia	Each	360.00	493.00	469.00
16	250 mm dia	Each	423.00	477.00	572.00
17	280 mm dia	Each	596.00	607.00	610.00
18	315 mm dia	Each	744.00	821.00	837.00
19	355 mm dia	Each	1062.00	1019.00	1246.00
20	400 mm dia	Each	1119.00	1272.00	1450.00
21	450 mm dia	Each	1582.00	1789.00	1834.00
22	500 mm dia	Each	1930.00	2118.00	2192.00
23	560 mm dia	Each	2598.00	2734.00	2773.00
24	630 mm dia	Each	3082.00	3141.00	3271.00
25	710 mm dia	Each	3259.00	3331.00	3420.00

S.No	Particulars of Items	Unit	Rate (in Rs.)		
10.9	Providing butt fusion welded joint/jointing by heating to the ends with the help of Teflon coated electric mirror/heater ends together etc. by thermosetting process to HDPE Pipe and specials. (6kg, 8kg, 10kg) (50mm & above fusion jointed & below 50mm mechanical jointed)	Unit	Rate		
1	20 mm dia	Each	59.00		
2	25 mm dia	Each	59.00		
3	32 mm dia	Each	65.00		
4	40 mm dia	Each	80.00		
5	50 mm dia	Each	73.00		
6	63 mm dia	Each	96.00		
7	75 mm dia	Each	120.00		
8	90 mm dia	Each	133.00		
9	110 mm dia	Each	146.00		
10	125 mm dia	Each	177.00		
11	140 mm dia	Each	187.00		
12	160 mm dia	Each	204.00		
13	180 mm dia	Each	214.00		
14	200 mm dia	Each	228.00		
15	225 mm dia	Each	253.00		
16	250 mm dia	Each	298.00		
17	280 mm dia	Each	319.00		
18	315 mm dia	Each	348.00		
19	355 mm dia	Each	389.00		
20	400 mm dia	Each	455.00		
21	450 mm dia	Each	609.00		
22	500 mm dia	Each	729.00		
23	560 mm dia	Each	897.00		
24	630 mm dia	Each	1015.00		
25	710 mm dia	Each	1166.00		
10.10	Providing and laying End Cap Conforming to IS specifications.		6 Kg/sq.cm	8 Kg/sq.cm	10 Kg/sq.cm
1	20 mm dia	Each	40.00	40.00	40.00
2	25 mm dia	Each	40.00	40.00	42.00
3	32 mm dia	Each	42.00	42.00	44.00
4	40 mm dia	Each	43.00	44.00	47.00
5	50 mm dia	Each	51.00	56.00	58.00
6	63 mm dia	Each	68.00	69.00	73.00
7	75 mm dia	Each	85.00	88.00	93.00
8	90 mm dia	Each	96.00	97.00	103.00
9	110 mm dia	Each	85.00	100.00	105.00
10	125 mm dia	Each	120.00	165.00	169.00
11	140 mm dia	Each	174.00	197.00	202.00
12	160 mm dia	Each	206.00	288.00	299.00
13	180 mm dia	Each	297.00	346.00	359.00
14	200 mm dia	Each	355.00	413.00	430.00

S.No	Particulars of Items	Unit	Rate (in Rs.)		
15	225 mm dia	Each	423.00	422.00	562.00
16	250 mm dia	Each	558.00	647.00	676.00
17	280 mm dia	Each	670.00	745.00	1071.00
18	315 mm dia	Each	849.00	931.00	1349.00
19	355 mm dia	Each	1102.00	1266.00	2311.00
20	400 mm dia	Each	1701.00	1920.00	2967.00
21	450 mm dia	Each	2415.00	2597.00	4907.00
22	500 mm dia	Each	3577.00	3846.00	5754.00
23	560 mm dia	Each	5053.00	5372.00	8408.00
24	630 mm dia	Each	7126.00	7893.00	10298.00
25	710 mm dia	Each	7456.00	8690.00	11885.00
10.11	Providing and Supplying standard lengths Polyethylene pipes with necessary jointing material				
10.11.1	PE-100				
10.11.1.1	6kg/sq,cm				
	63mm	RM		109.00	
	75mm	RM		157.00	
	90mm	RM		221.00	
	110mm	RM		326.00	
	125mm	RM		426.00	
	140mm	RM		536.00	
	160mm	RM		704.00	
	180mm	RM		888.00	
	200mm	RM		1105.00	
	225mm	RM		1403.00	
	250mm	RM		1723.00	
	280mm	RM		2161.00	
	315mm	RM		2736.00	
	355mm	RM		3501.00	
	400mm	RM		4526.00	
	450 mm	RM		5726.00	
	500 mm	RM		7080.00	
	560 mm	RM		8862.00	
	630 mm	RM		11220.00	
	710 mm	RM		13577.00	
10.11.2.1	8kg/sq,cm				
	63mm	RM		139.00	
	75mm	RM		198.00	
	90mm	RM		284.00	
	110mm	RM		426.00	
	125mm	RM		550.00	
	140mm	RM		689.00	
	160mm	RM		906.00	
	180mm	RM		1144.00	
	200mm	RM		1424.00	
	225mm	RM		1804.00	
	250mm	RM		2221.00	

S.No	Particulars of Items	Unit	Rate (in Rs.)
	280mm	RM	2786.00
	315mm	RM	3523.00
	355mm	RM	4502.00
	400mm	RM	5833.00
	450 mm	RM	7389.00
	500 mm	RM	9115.00
	560 mm	RM	11442.00
	630 mm	RM	14476.00
	710 mm	RM	17510.00
10.11.3.1	10kg/sq,cm		
	63mm	RM	169.00
	75mm	RM	241.00
	90mm	RM	345.00
	110mm	RM	515.00
	125mm	RM	663.00
	140mm	RM	830.00
	160mm	RM	1093.00
	180mm	RM	1400.00
	200mm	RM	1727.00
	225mm	RM	2180.00
	250mm	RM	2684.00
	280mm	RM	3363.00
	315mm	RM	4261.00
	355mm	RM	5469.00
	400mm	RM	7085.00
	450 mm	RM	8938.00
	500 mm	RM	11043.00
	560 mm	RM	13833.00
	630 mm	RM	17525.00
	710 mm	RM	21217.00
10.11.4.1	12.5kg/sq,cm		
	63mm	RM	200.00
	75mm	RM	286.00
	90mm	RM	414.00
	110mm	RM	619.00
	125mm	RM	797.00
	140mm	RM	1000.00
	160mm	RM	1317.00
	180mm	RM	1681.00
	200mm	RM	2073.00
	225mm	RM	2625.00
	250mm	RM	3229.00
	280mm	RM	4049.00
	315mm	RM	5126.00
	355mm	RM	6570.00
	400mm	RM	8518.00
	450 mm	RM	10774.00
	500 mm	RM	13282.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
	560 mm	RM	16649.00
	630 mm	RM	21068.00
10.11.5.1	16kg/sq,cm		
	63mm	RM	538.00
	75mm	RM	347.00
	90mm	RM	500.00
	110mm	RM	748.00
	125mm	RM	967.00
	140mm	RM	1209.00
	160mm	RM	1600.00
	180mm	RM	2037.00
	200mm	RM	2515.00
	225mm	RM	3181.00
	250mm	RM	4088.00
	280mm	RM	4919.00
	315mm	RM	6217.00
	355mm	RM	7962.00
	400mm	RM	10322.00
	450 mm	RM	13080.00
	500 mm	RM	16144.00
10.12	Lowering laying Jointing HDPE pipes by heating to the end of pipes with the help of Teflon coated Electric mirror/heater and jointing will be done by semi automatic welding machine as per IS - 7634 Part II. Including all cost of material and labour.		
	63mm	RM	16.00
	75mm	RM	21.00
	90mm	RM	23.00
	110mm	RM	25.00
	125mm	RM	31.00
	140mm	RM	33.00
	160mm	RM	36.00
	180mm	RM	38.00
	200mm	RM	41.00
	225mm	RM	45.00
	250mm	RM	52.00
	280mm	RM	56.00
	315mm	RM	62.00
	355mm	RM	69.00
	400mm	RM	81.00
	450mm	RM	108.00
	500mm	RM	130.00
	560mm	RM	158.00
	630mm	RM	179.00

CHAPTER- 11

MDPE PIPE & SPECIALS AND ZERO VELOCITY VALVES

- 1 Providing and Supplying Blue MDPE pipes shall be Conforming to ISO 4427:1996.
- 2 Providing & Supply of Electro Fusion Tapping Ferrule (Branch Tapping Saddle) female BSP Threaded with SS 304 insert fittings shall be in accordance with BS EN 12201.
- 3 Providing & Supply of PVC Ball Valves in PN16 shall be Conforming to ISO:4422-4.
- 4 Rubber sealing rings for gas mains, water mains and sewers shall be as per IS : 5382.
- 5 Laying & jointing of polyethylene (PE) Pipes shall be as per IS : 7634
- 6 Colour
 - 4.1 The colour of the pipe shall be black for the purpose of identification of the pipes covered in this standard. Each pipe shall contain minimum three equi-spaced longitudinal stripes of width 3 mm (Min) in blue colour. These stripes shall be more than 0.2 mm in depth. The material of the stripes shall be of the same type of resin, as used in the base compound for the pipe.
- 7 Length of straight Pipe & marking on pipe
 - 7.1 The length of straight pipe used shall be more than 6 m or as agreed by Engineer in charge. Short lengths of 3 meter (minimum) up to a Maximum of 10 % of the total supply may be permitted.
 - 7.2 Each straight length of pipe shall be clearly marked in indelible ink/paint on either end and for coil at both ends or hot embossed on white base every meter throughout the length of pipe/coil with the following information:
 - 7.2.1 Manufacturer's name/Trade-mark,
 - 7.2.2 Designation of pipe
 - 7.2.3 Lot No./Batch No.
 - 7.2.4 BIS certification marking on each pipe.
- 8 Appearance

Pipe shall be free from all defect including indentation, delaminating, bubbles, pinholes, cracks, pits, blisters, foreign inclusion that due to their nature degree or extent detrimentally affect the strength and Serviceability of the pipe. The pipe shall be as uniform as commercially practicable in colour opacity, density and other physical properties as per relevant IS code or equivalent International Code. The inside surface of each pipe shall be free of scouring, cavities, bulges, dents, ridges and other defects that result in a variation of inside diameter from that obtained on adjacent unaffected portions of the surface. The pipe ends shall be cut clearly and square to the axis of the pipe within the tolerance as per IS: 4984
- 9 Handling, Transportation storage and Lowering of pipes.
 - If transportation of MDPE pipes from a distance greater than 300km than pipes shall be received only when bare coils of pipe have been wrapped with Hessian cloth.

- The truck for transportation of the PE pipes shall be exclusively used for PE pipes only with no other material loaded-especially no metallic, glass and wooden items. The truck shall not have sharp edges that can damage the pipe.
- At the time of opening coils it must be remembered that the coils are under tension and must be open in control manner
- Straight length should be stored on horizontal racks giving continuous support.
- Loss/damages during transit, handling, storage will be to the contractor's account.

10 Fittings and specials :

All MDPE fittings/specials shall be fabricated or injection moulded at factory as per IS: 8360 (Part-I & Part-III) and as per IS: 8008 (Part-I to Part-IX). Fittings will be butt welded on the pipes or other fittings by use of heat fusion.

11 Test to Establish Perfectibility/portability of work

Specimen of pipe shall be tested to establish the suitability for use in carrying potable water

- (i) Smell of the extract
- (ii) Clarity of the colour of the extract
- (iii) Acidity and Alkalinity
- (iv) Global migration UV absorbing material Heavy metals
- (v) Unreacted monomers (styrens) and biological tests

12 Hydraulic Test

After laying the pipe hydraulic test shall be done to Conform the quality of work and material. There should not be any signs of localized swelling, leakage or weeping.

13 Laying of pipes and fittings/specials includes all precautions to guard against possible damaged to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

14 Providing and supply of MDPE pipes house services connections with necessary Electro Fusion & compression fittings are also given. MDPE pipes Conforming to ISO 4427/1996 with quality assurance certificates from WRC/CIPET etc, are to be used. Electro Fusion & compression fittings are to be used as per ISO norms as given in the relevant items.

15 Measurement

The net length of fixed pipe shall be measured in running meters correct to 10mm. The portion of the pipe inside the joints shall not be included in the length of pipe work. Specials shall be excluded and measured and paid separately under the relevant item.

16 Rates :

The rate shall include the cost of the material and labour involve in all operations described in the item.

CHAPTER 11 -- MDPE PIPE & SPECIALS

S.No	Particulars of Items	Unit	Rate (in Rs.)
	MDPE Pipes House Services Connection with necessary Electro Fusion & Compression fittings.		
11.1	Providing and Supplying Blue MDPE pipes Conforming to ISO 4427:1996 manufactured from virgin resin PE 80 Food grade compounded Raw Material having Blue Colour only with quality assurance certificate from quality agencies like WRC/ CIPET (India)/ DVGW/KIWA/SPGN etc. for usage in Drinking Water System The cost shall include testing of all materials, all taxes Central, State, Municipal, Inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.		
11.1.1	PN 1.6 (SDR 9)		
	20mm dia	RM	33.00
	25mm dia	RM	45.00
	32mm dia	RM	75.00
	40mm dia	RM	97.00
	50mm dia	RM	148.00
	63mm dia	RM	221.00
	75mm dia	RM	294.00
	90mm dia	RM	425.00
	110mm dia	RM	631.00
	125mm dia	RM	881.00
	140mm dia	RM	1104.00
	160mm dia	RM	1439.00
	180mm dia	RM	1819.00
	200mm dia	RM	2249.00
	225mm dia	RM	2841.00
	250mm dia	RM	3508.00
	280mm dia	RM	4399.00
	315mm dia	RM	5564.00
11.1.2	PN 1.25 (SDR 11)		
	25mm dia	RM	45.00
	32mm dia	RM	75.00
	40mm dia	RM	90.00
	50mm dia	RM	130.00
	63mm dia	RM	175.00
	75mm dia	RM	244.00
	90mm dia	RM	354.00
	110mm dia	RM	524.00
	125mm dia	RM	742.00
	140mm dia	RM	933.00
	160mm dia	RM	1217.00
	180mm dia	RM	1540.00
	200mm dia	RM	1900.00
	225mm dia	RM	2404.00
	250mm dia	RM	2959.00
	280mm dia	RM	3714.00
	315mm dia	RM	4697.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
11.1.3	PN 1.0 (SDR 13.6)		
	63mm dia	RM	150.00
	75mm dia	RM	211.00
	90mm dia	RM	304.00
	110mm dia	RM	449.00
	125mm dia	RM	628.00
	140mm dia	RM	790.00
	160mm dia	RM	1029.00
	180mm dia	RM	1300.00
	200mm dia	RM	1610.00
	225mm dia	RM	2029.00
	250mm dia	RM	2507.00
	280mm dia	RM	3151.00
	315mm dia	RM	3972.00
11.1.4	PN 0.8 (SDR 17)		
	63mm dia	RM	136.00
	75mm dia	RM	193.00
	90mm dia	RM	275.00
	110mm dia	RM	408.00
	125mm dia	RM	530.00
	140mm dia	RM	664.00
	160mm dia	RM	866.00
	180mm dia	RM	1094.00
	200mm dia	RM	1348.00
	225mm dia	RM	1706.00
	250mm dia	RM	2106.00
	280mm dia	RM	2639.00
	315mm dia	RM	3338.00
11.1.5	PN 0.6 (SDR 21)		
	63mm dia	RM	107.00
	75mm dia	RM	153.00
	90mm dia	RM	218.00
	110mm dia	RM	324.00
	125mm dia	RM	419.00
	140mm dia	RM	523.00
	160mm dia	RM	683.00
	180mm dia	RM	862.00
	200mm dia	RM	1062.00
	225mm dia	RM	1341.00
	250mm dia	RM	1659.00
	280mm dia	RM	2080.00
	315mm dia	RM	2623.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
11.2	Providing & Supply of Electro Fusion Tapping Ferrule (Branch Tapping Saddle) female BSP Threaded with SS 304 insert fittings in accordance with BS EN 12201 : Part-3 suitable for drinking water with in black/blue colour manufactured from compounded PE80/PE 100 virgin polymer and compatible with PE80/PE100 pipes, in pressure rating SDR 11 with min PN 1.25 rated for water application and shall be inclusive of all cost such as testing, all taxes related to central, state & municipal, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.		
11.2.1	Electro Fusion Tapping Ferrule Saddle		
	63x15mm	Each	996.00
	63x20mm	Each	996.00
	63x25mm	Each	996.00
	75x15mm	Each	996.00
	75x20mm	Each	996.00
	75x25mm	Each	996.00
	90x15mm	Each	996.00
	90x20mm	Each	996.00
	90x25mm	Each	996.00
	90x32mm	Each	1292.00
	90x40mm	Each	1292.00
	90x50mm	Each	1292.00
	110x15mm	Each	996.00
	110x20mm	Each	996.00
	110x25mm	Each	996.00
	110x32mm	Each	1292.00
	110x40mm	Each	1292.00
	110x50mm	Each	1292.00
	160x15mm	Each	996.00
	160x20mm	Each	996.00
	160x25mm	Each	996.00
	160x32mm	Each	1412.00
	160x40mm	Each	1412.00
	160x50mm	Each	1412.00
	200x15mm	Each	1406.00
	200x20mm	Each	1406.00
	200x25mm	Each	1406.00
	200x32mm	Each	2034.00
	200x40mm	Each	2034.00
	200x50mm	Each	2034.00
	250x15mm	Each	1406.00
	250x20mm	Each	1406.00
	250x25mm	Each	1406.00
	250x32mm	Each	2034.00
	250x40mm	Each	2034.00
	250x50mm	Each	2034.00
	315x15mm	Each	1675.00
	315x20mm	Each	1675.00
	315x25mm	Each	1675.00
	315x32mm	Each	2273.00
	315x40mm	Each	2273.00
	315x50mm	Each	2273.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
11.3	Providing & Supply of Compression fittings, PN1.6 rated in Conformation to ISO:14236-2000 and shall be tested as per ISO:3459, ISO : 3501 & ISO: 3503, suitable for drinking water & approved by WRAS, UKI KIWA etc., in food grade polypropylene and shall be inclusive of all cost such as testing, all taxes related to central, state & municipal, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.		
11.3.1	Compression Fittings Metal inserted Compression Female Threaded Adaptor with SS 304 Material		
	20x15mm	Each	170.00
	25x20mm	Each	219.00
	32x25mm	Each	299.00
	40x32mm	Each	509.00
	50x40mm	Each	658.00
	63x50mm	Each	897.00
11.3.2	Metal inserted Compression Male Threaded Adaptor with SS 304 Material		
	20x15mm	Each	170.00
	25x20mm	Each	219.00
	32x25mm	Each	299.00
	40x32mm	Each	509.00
	50x40mm	Each	658.00
	63x50mm	Each	897.00
11.3.3	Compression 90 Deg. Elbow threaded male off take in Metal		
	20x15mm	Each	179.00
	25x20mm	Each	239.00
	32x25mm	Each	329.00
	40x32mm	Each	1147.00
	50x40mm	Each	1496.00
	63x50mm	Each	2194.00
11.3.4	Compression 90 Deg. Elbow threaded Female off take in Metal		
	20x15mm	Each	179.00
	25x20mm	Each	239.00
	32x25mm	Each	329.00
	40x32mm	Each	1147.00
	50x40mm	Each	1496.00
	63x50mm	Each	2194.00
11.3.5	Compression 90 Deg. Elbow		
	20mm	Each	110.00
	25mm	Each	150.00
	32mm	Each	194.00
	40mm	Each	389.00
	50mm	Each	552.00
	63mm	Each	749.00
11.3.6	Coupling 20x20	Each	100.00
	Coupling 25x25	Each	100.00
	Coupling 32x32	Each	100.00
	Coupling 40x40	Each	184.00
	Coupling 50x50	Each	228.00
	Coupling 63x63	Each	246.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
11.3.7	Reducing Coupling 25x20	Each	199.00
	Reducing Coupling 32x20	Each	199.00
	Reducing Coupling 32x25	Each	199.00
	Reducing Coupling 40x25	Each	668.00
	Reducing Coupling 40x32	Each	838.00
	Reducing Coupling 50x32	Each	925.00
	Reducing Coupling 50x40	Each	987.00
	Reducing Coupling 63x50	Each	998.00
11.3.8	Equal Tee 20x20x20	Each	249.00
	Equal Tee 25x25x25	Each	249.00
	Equal Tee 32x32x32	Each	249.00
	Equal Tee 40x40x40	Each	846.00
	Equal Tee 50x50x50	Each	939.00
	Equal Tee 63x63x63	Each	1047.00
11.3.9	End Cap 20	Each	152.00
	End Cap 25	Each	152.00
	End Cap 32	Each	152.00
	End Cap 40	Each	329.00
	End Cap 50	Each	399.00
	End Cap 63	Each	578.00
11.4	Providing & Supply of PVC Ball Valves in PN1.6 rating with one end compression using Blue colour compression nut in polypropylene material & other end with female threads Conforming to ISO:4422-4, certified from WRAS UK/KIWA etc. suitable for food products & drinking water, female threads in accordance with ISO:7/BS:21/ IS: 554 and shall be inclusive of all cost such as testing, all taxes related to central, state & municipal, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.		
	PVC Ball Valve with Compression & Female Threads		
	20x15mm	Each	175.00
	25x20mm	Each	226.00
	32x25mm	Each	255.00
	40x32mm	Each	548.00
	50x40mm	Each	735.00
	63x50mm	Each	1130.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
11.5	Providing & Supply of Clamp Saddle (DI Strap Saddle) for House Service connections from metal pipe Water Distribution mains shall be of fastened strap type with threaded outlet for service connection. Clamp Saddle shall be suitable for nominal size of distribution mains pipe line. The strap shall be elastomeric coated (insulated) type for firm grip on pipe as well as to protect the coating on the pipe and to insulate the unidentical metals. The saddle shall be single strap type up to pipe sizes of NB 600 and service outlet 15mm, 20mm & 25mm. Fasteners shall be of threaded nut-bolt- washer type. The sealing between the saddle and mains shall be obtained by using a profiled elastomeric seal matching to the curvature of the pipe. The seal shall be of elastomeric type, suitable for all potable water application. The material of construction of the body, straps, fasteners etc, shall be of non corrosive material such as engineering plastic (PE/PP) or stainless steel or a combination of both.		
	80 NB x 15mm, 20mm, 25mm	Each	997.00
	100 NB x 15mm, 20mm, 25mm	Each	1097.00
	150 NB x 15mm, 20mm, 25mm	Each	1296.00
	200 NB x 15mm, 20mm, 25mm	Each	1496.00
	250 NB x 15mm, 20mm, 25mm	Each	1695.00
	300 NB x 15mm, 20mm, 25mm	Each	1895.00
11.6	Providing & Supply of Electro Fusion Fittings in accordance with BS EN 12201 : Part-3 suitable for drinking water with in black/blue colour manufactured from compounded PE80/PE100 virgin polymer and compatible with PE80/PE100 pipes, in pressure rated SDR11 with min PN 1.25 rated for water application and shall be inclusive of all cost such as testing, all taxes related to central, state & municipal, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.		
11.6.1	Electro Fusion Coupler		
	20mm	Each	100.00
	25mm	Each	100.00
	32mm	Each	100.00
	40mm	Each	184.00
	50mm	Each	228.00
	63mm	Each	246.00
	75mm	Each	443.00
	90mm	Each	475.00
	110mm	Each	676.00
	125mm	Each	687.00
	140mm	Each	1474.00
	160mm	Each	1615.00
	180mm	Each	2412.00
	200mm	Each	3149.00
	225mm	Each	3738.00
	250mm	Each	4555.00
	280mm	Each	9127.00
	315mm	Each	9160.00
11.6.2	Electro Fusion Equal Tee		
	20mm	Each	249.00
	25mm	Each	249.00
	32mm	Each	249.00
	40mm	Each	846.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
	50mm	Each	939.00
	63mm	Each	1047.00
	75mm	Each	1396.00
	90mm	Each	1735.00
	110mm	Each	2094.00
	125mm	Each	2593.00
	140mm	Each	5875.00
	160mm	Each	5875.00
	180mm	Each	8575.00
	200mm	Each	10969.00
	225mm	Each	12963.00
	250mm	Each	18946.00
	280mm	Each	20940.00
	315mm	Each	22934.00
11.6.3	Electro Fusion Elbow 90 Deg.		
	20mm	Each	189.00
	25mm	Each	189.00
	32mm	Each	189.00
	40mm	Each	499.00
	50mm	Each	499.00
	63mm	Each	499.00
	75mm	Each	1097.00
	90mm	Each	1496.00
	110mm	Each	1994.00
	125mm	Each	2393.00
	140mm	Each	5085.00
	160mm	Each	6581.00
	180mm	Each	8476.00
	200mm	Each	15954.00
	225mm	Each	17949.00
	250mm	Each	19943.00
	280mm	Each	21937.00
	315mm	Each	24929.00
11.6.4	Electro Fusion Reducer		
	25x20mm	Each	199.00
	32x20mm	Each	199.00
	32x25mm	Each	199.00
	40x32mm	Each	668.00
	50x32mm	Each	838.00
	50x40mm	Each	925.00
	63x32mm	Each	987.00
	63x40mm	Each	998.00
	63x50mm	Each	1157.00
	90x63mm	Each	1636.00
	90x75mm	Each	2094.00
	110x75mm	Each	2642.00
	110x90mm	Each	3011.00
	125x90mm	Each	3809.00
	125x110mm	Each	3809.00
	140x90mm	Each	4188.00
	140x110mm	Each	4188.00
	140x125mm	Each	4188.00

S.No	Particulars of Items	Unit	Rate (in Rs.)
	160x110mm	Each	5484.00
	160x125mm	Each	5484.00
	160x140mm	Each	5484.00
	180x125mm	Each	6182.00
	180x140mm	Each	6182.00
	180x160mm	Each	6182.00
	200x160mm	Each	7379.00
	200x180mm	Each	7379.00
	225x160mm	Each	8974.00
	225x180mm	Each	8974.00
	225x200mm	Each	8974.00
	250x160mm	Each	10969.00
	250x200mm	Each	10969.00
	250x225mm	Each	10969.00
11.6.5	Electro Fusion End Cap		
	20mm	Each	152.00
	25mm	Each	152.00
	32mm	Each	152.00
	40mm	Each	329.00
	50mm	Each	399.00
	63mm	Each	578.00
	75mm	Each	868.00
	90mm	Each	1097.00
	110mm	Each	1396.00
	125mm	Each	1695.00
	140mm	Each	2493.00
	160mm	Each	3590.00
	180mm	Each	4387.00
	200mm	Each	5185.00
	225mm	Each	8476.00
	250mm	Each	9971.00
	280mm	Each	10969.00
	315mm	Each	11966.00
11.6.6	Spigot Long Neck Pipe End (Stub End) for Electro Fusion Joint		
	63mm	Each	357.00
	75mm	Each	402.00
	90mm	Each	504.00
	110mm	Each	768.00
	125mm	Each	1210.00
	140mm	Each	1376.00
	160mm	Each	1969.00
	180mm	Each	2655.00
	200mm	Each	3121.00
	225mm	Each	3744.00
	250mm	Each	4301.00
	280mm	Each	4814.00
	315mm	Each	6257.00

CHAPTER- 12

ASBESTOS CEMENT PRESSURE PIPES AND CAST IRON FITTINGS

- 1 Asbestos cement pressure pipes & Asbestos Cement Couplings shall Conform to IS:1592-2003
- 1.1 Asbestos Cement Pipes manufacture by Maza Technology process shall be used.
- 2 Cast Iron detachable Joints for use with asbestos cement pressure pipe shall be as per IS 8794 : 1988
- 3 Cast Iron Specials for ACP Pipe shall Conform to the material and strength requirements of IS: 5531-1988.
- 4 Rubber rings – Rubber rings used in jointing shall comply with the requirements of IS: 10292 -1988.
- 5 Laying of pipe shall be as per IS Code : 6530 : 1972.
- 6 All the pipes, Specials & Joints to be used in the work shall Conform to relevant Indian Standards only, duly inspected and tested and having B.I.S. certification marks.
- 7 Asbestos Cement Pipes & AC Couplings suitable for use in Sewerage & drainage, applications shall be Conforming to IS 6908:1991 with up to date amendments.
- 8 Trenches and Excavation
 - 8.1 The trenches shall be so dug that the pipes may be laid to the required alignment and at required depth.
 - 8.1.1 Width- the width of the trench above pipe level shall be as small as possible but shall provide sufficient space necessary for jointing the pipes. The trench width shall be such as to provide a space of 300 mm on either side of the pipe.
 - 8.1.2 Depth – The pipe shall have a minimum soil cover of 750 mm when laid under foot paths and side walks. 900 mm when laid under roads with light traffic or under cultivated soils and 1.25 m when laid under roads with heavy traffic. When the soil has a poor bearing capacity and is subject to heavy traffic, the pipes shall be laid on a concrete cradle. An extra trench depth of 100 mm shall be provided for each jointing pit.
 - 8.2 The excavation of the trench shall be so carried out that the digging of the trenches does not get far ahead of the laying operations.
 - 8.2.1 The wall of the trench shall be cut generally to a slope of $\frac{1}{4} : 1$ or $\frac{1}{2} : 1$ depending on the nature of the soil.
 - 8.3 To protect person from injury and to avoid damage to property, adequate barricades, construction signs, red lanterns and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for the traffic to use the roadways.

9 Testing

9.1 The pipes shall be tested as specified in IS: 5913-1970 in the factory. Hence the purpose of field testing is to check the quality of workman ship and also to check whether the pipes have been damaged in transits. As such, the test pressure shall be kept as 1.5 times the actual operating pressure, unless a higher test pressure is specified.

9.2 It is recommended to test the portions of the line by subjecting to pressure test as the laying progresses before the entire line is completed. In this way any error of workmanship will be found immediately and can be corrected at a minimum cost.

9.3 Usually the length of the section to be tested shall not exceed 500m.

9.4 Prior to testing enough back fill shall be placed over the pipeline to resist upward thrust. All thrust blocks forming part of the finished line shall be sufficiently cured and no temporary bracing shall be used.

9.5 The open end of the section can be sealed temporarily with an end cap having an outlet which can serve as an air relief or for filling the line, as may be required.

9.6 The blind face of the end cap shall be properly braced during testing by screw jacks and wooden planks or steel plate.

9.7 The section of the line to be tested shall be filled with water manually or by a low pressure pump. Air shall be vented from all high spots in the pipeline before making the pressure strength test because entrapped air gets compressed and causes difficulty in raising the required pressure.

9.8 Asbestos cement pipes always absorb a certain amount of water. Therefore, after the line is filled, it should be allowed to stand for 24 hours, before pressure testing and the line shall be again filled.

9.9 The test pressure shall be gradually raised at the rate of approximately one kg/cm²/min.

9.10 The duration of the test period if not specified shall be sufficient to make a careful check on the pipeline section.

9.11 After the test has been completed, the trench shall be filled back. Care shall be taken to avoid back filling with large stones which might damage the pipe.

10 Items of ACP Pipes shall be used in repair work only. As far as possible ACP Pipes shall be replaced preferably by PVC Pipe using suitable detachable joints.

11 Laying of pipes and fittings/specials includes all precautions to guard against possible damaged to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

12 Measurements :-

All measurement should be of the finished work.

- 13 Rates :-
- 13.1 The rates include charges for all tools and plants, chain, pulley blocks and other appliances etc for lifting and laying the pipes and fittings in position as per approved drawings.
 - 13.2 The rates include provision and use of all covering etc. to protect the work from inclement weather etc. and from damages from fall of materials and other causes.
 - 13.3 The rates include provision of handling and storing under cover as required and returning of empty cases or containers if any to the departmental stores without any extra cost, for such materials as may be supplied by the department.

CHAPTER 12 ASBESTOS CEMENT PRESSURE PIPES AND CAST IRON FITTINGS

S.No.	Particulars of Items	Unit	Rate (in Rs)		
12.1	Providing and laying of Asbestos cement pressure pipe ISI marked and Conforming to IS-1592/03 (Maza technology process only) tested to the required pressure including cost of pipes all complete.		Class 10	Class 15	Class 20
	80mm	RM	155.00	201.00	255.00
	100mm	RM	208.00	263.00	333.00
	125mm	RM	272.00	344.00	429.00
	150mm	RM	379.00	450.00	560.00
	200mm	RM	645.00	761.00	961.00
	250mm	RM	883.00	1020.00	1305.00
	300mm	RM	1151.00	1411.00	1831.00
	350mm	RM	1521.00	1865.00	2432.00
12.2	Providing, laying and jointing of Asbestos cement pressure pipe with A.C. coupler Joint ISI marked and Conforming to IS-1592/03 (Maza technology process only) tested to the required pressure including testing of joints, cost of pipes all complete.		Class 10	Class 15	Class 20
	80mm	RM	269.00	269.00	332.00
	100mm	RM	311.00	311.00	393.00
	125mm	RM	405.00	405.00	504.00
	150mm	RM	585.00	585.00	730.00
	200mm	RM	857.00	963.00	1218.00
	250mm	RM	1091.00	1221.00	1561.00
	300mm	RM	1451.00	1662.00	2147.00
	350mm	RM	3339.00	2050.00	2667.00
12.3	Labour for laying in position Asbestos cement pressure pipes Class 10,15,20		Class 10	Class 15	Class 20
	80mm	RM	4.00	4.00	4.00
	100mm	RM	5.00	5.00	5.00
	125mm	RM	7.00	7.00	7.00
	150mm	RM	9.00	9.00	9.00
	200mm	RM	16.00	16.00	16.00
	250mm	RM	22.00	22.00	22.00
	300mm	RM	30.00	30.00	30.00
	350mm	RM	33.00	33.00	33.00
12.4	Providing & fixing detachable joints to asbestos cement pressure pipes and fittings including C.I. detachable joints Conforming to IS/8794/1988 with bolts, nuts and rubber rings Conforming to IS-5382/85 & IS-10292/88		Class 10	Class 15	Class 20
	80mm	Each	285.00	295.00	317.00

S.No.	Particulars of Items	Unit	Rate (in Rs)		
	100mm	Each	349.00	368.00	405.00
	125mm	Each	465.00	482.00	517.00
	150mm	Each	572.00	592.00	563.00
	200mm	Each	804.00	821.00	1018.00
	250mm	Each	1048.00	1091.00	1272.00
	300mm	Each	1264.00	1294.00	1613.00
	350mm	Each	2583.00	2102.00	2278.00
12.5	Labour for providing detachable joints to asbestos cement pressure pipes and fittings Class 10, 15 & 20 including testing of joints but excluding cost of C.I. Detachable joints.		Class 10	Class 15	Class 20
	80mm	Each	41.00	41.00	41.00
	100mm	Each	57.00	57.00	57.00
	125mm	Each	66.00	66.00	66.00
	150mm	Each	73.00	73.00	73.00
	200mm	Each	82.00	82.00	82.00
	250mm	Each	87.00	87.00	87.00
	300mm	Each	99.00	99.00	99.00
	350mm	Each	110.00	110.00	110.00
12.6	Providing and laying in position Cast Iron plain ended 90 degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	676.00	526.00	602.00
	100mm	Each	1012.00	733.00	899.00
	125mm	Each	1404.00	1025.00	1245.00
	150mm	Each	1988.00	1453.00	1778.00
	200mm	Each	3473.00	2524.00	3092.00
	250mm	Each	4981.00	3690.00	4519.00
	300mm	Each	7289.00	5389.00	6620.00
	350mm	Each	10695.00	7575.00	9225.00
12.7	Labour for laying in position Cast Iron plain ended 90 degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	9.00	9.00	10.00
	100mm	Each	11.00	11.00	15.00
	125mm	Each	16.00	18.00	20.00
	150mm	Each	22.00	24.00	29.00
	200mm	Each	37.00	41.00	51.00
	250mm	Each	54.00	57.00	70.00
	300mm	Each	77.00	82.00	101.00
	350mm	Each	96.00	105.00	119.00
12.8	Providing and laying in position Cast Iron plain ended 45 degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20

S.No.	Particulars of Items	Unit	Rate (in Rs)		
	80mm	Each	535.00	535.00	610.00
	100mm	Each	695.00	722.00	889.00
	125mm	Each	931.00	972.00	1194.00
	150mm	Each	1216.00	1361.00	1660.00
	200mm	Each	1910.00	2265.00	2793.00
	250mm	Each	2848.00	3182.00	3925.00
	300mm	Each	3939.00	4530.00	5607.00
	350mm	Each	5396.00	6133.00	7579.00

12.9 Labour for laying in position Cast Iron plain ended 45 degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)

		Class 10	Class 15	Class 20
80mm	Each	9.00	9.00	9.00
100mm	Each	11.00	11.00	14.00
125mm	Each	15.00	15.00	19.00
150mm	Each	20.00	22.00	27.00
200mm	Each	30.00	37.00	46.00
250mm	Each	46.00	52.00	63.00
300mm	Each	63.00	73.00	91.00
350mm	Each	74.00	87.00	109.00

12.10 Providing and laying in position Cast Iron plain ended 22.5 degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)

		Class 10	Class 15	Class 20
80mm	Each	380.00	380.00	433.00
100mm	Each	493.00	513.00	640.00
125mm	Each	640.00	679.00	846.00
150mm	Each	819.00	960.00	1186.00
200mm	Each	1333.00	1598.00	1999.00
250mm	Each	1866.00	2178.00	2739.00
300mm	Each	2525.00	3091.00	3897.00
350mm	Each	3676.00	4448.00	5620.00

12.11 Labour for laying in position Cast Iron plain ended 22.5 degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)

		Class 10	Class 15	Class 20
80mm	Each	6.00	6.00	8.00
100mm	Each	9.00	9.00	11.00
125mm	Each	11.00	11.00	14.00
150mm	Each	14.00	16.00	20.00
200mm	Each	23.00	27.00	34.00
250mm	Each	32.00	37.00	47.00
300mm	Each	43.00	52.00	66.00
350mm	Each	48.00	61.00	81.00

S.No.	Particulars of Items	Unit	Rate (in Rs)		
12.12	Providing and laying in position Cast Iron plain ended 11¼ degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	325.00	325.00	367.00
	100mm	Each	414.00	436.00	553.00
	125mm	Each	532.00	573.00	719.00
	150mm	Each	678.00	815.00	1016.00
	200mm	Each	1079.00	1363.00	1728.00
	250mm	Each	1479.00	1804.00	2309.00
	300mm	Each	1963.00	2558.00	3284.00
	350mm	Each	2701.00	3474.00	4478.00
12.13	Labour for laying in position Cast Iron plain ended 11¼ degree bends Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	5.00	5.00	6.00
	100mm	Each	6.00	8.00	9.00
	125mm	Each	9.00	9.00	11.00
	150mm	Each	11.00	13.00	16.00
	200mm	Each	18.00	23.00	28.00
	250mm	Each	24.00	29.00	38.00
	300mm	Each	32.00	42.00	53.00
	350mm	Each	39.00	54.00	70.00
12.14	Providing and laying in position Cast Iron plain ended Tees Body & Branch Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80 x 80 mm	Each	654.00	654.00	748.00
	100 x 80 mm	Each	815.00	848.00	977.00
	100 x 100mm	Each	909.00	936.00	1158.00
	125 x 80 mm	Each	1057.00	1077.00	1280.00
	125 x 100mm	Each	1151.00	1192.00	1522.00
	125 x 125mm	Each	1273.00	1341.00	1644.00
	150 x 80mm	Each	1496.00	1630.00	1973.00
	150 x 100mm	Each	1556.00	1703.00	2088.00
	150 x 125 mm	Each	1644.00	1798.00	2202.00
	150 x 150 mm	Each	1751.00	1960.00	2398.00
	200 x 80 mm	Each	2512.00	2788.00	3395.00
	200 x 100mm	Each	2579.00	2869.00	3634.00
	200 x 125 mm	Each	2673.00	2970.00	3835.00
	200 x 150mm	Each	2788.00	3186.00	4303.00
	200 x 200mm	Each	3092.00	3508.00	5012.00
	250 x 80 mm	Each	3798.00	4121.00	5143.00
	250 x 100mm	Each	3872.00	4202.00	5145.00
	250 x 125mm	Each	3981.00	4317.00	5280.00
	250 x 150mm	Each	4095.00	4485.00	5488.00
	250 x 200mm	Each	4418.00	4882.00	5981.00
	250 x 250mm	Each	4768.00	5246.00	6445.00

S.No.	Particulars of Items	Unit	Rate (in Rs)		
	300 x 80mm	Each	5496.00	6068.00	7409.00
	300x 100mm	Each	5569.00	6149.00	7543.00
	300 x 125mm	Each	5678.00	6270.00	7677.00
	300 x 150mm	Each	5732.00	6371.00	7812.00
	300 x 200mm	Each	6155.00	6870.00	8418.00
	300 x 250mm	Each	6519.00	7273.00	8889.00
	300 x 300mm	Each	6937.00	7812.00	9631.00
	350x200mm	Each	8304.00	9129.00	11158.00
	350x250mm	Each	8716.00	9535.00	11632.00
	350x300mm	Each	9194.00	10144.00	12375.00
	350x350mm	Each	9669.00	10685.00	13119.00

12.15 Labour for laying in position Cast Iron plain ended Tees Body & Branch Conforming to IS/5531/1988 (Reaffirmed 2002)

	Unit	Class 10	Class 15	Class 20
80 x 80 mm	Each	11.00	11.00	13.00
100 x 80 mm	Each	14.00	14.00	16.00
100 x 100mm	Each	15.00	15.00	19.00
125 x 80 mm	Each	18.00	18.00	22.00
125 x 100mm	Each	19.00	20.00	25.00
125 x 125mm	Each	21.00	23.00	28.00
150 x 80mm	Each	25.00	28.00	33.00
150 x 100mm	Each	27.00	28.00	35.00
150 x125 mm	Each	28.00	30.00	37.00
150 x 150 mm	Each	29.00	33.00	40.00
200 x 80 mm	Each	42.00	47.00	57.00
200 x100mm	Each	43.00	48.00	58.00
200 x125 mm	Each	44.00	49.00	61.00
200 x 150mm	Each	47.00	53.00	65.00
200 x 200mm	Each	52.00	58.00	72.00
250 x 80 mm	Each	63.00	68.00	84.00
250 x 100mm	Each	65.00	70.00	86.00
250 x 125mm	Each	67.00	72.00	89.00
250 x 150mm	Each	68.00	75.00	91.00
250 x 200mm	Each	73.00	81.00	100.00
250 x250mm	Each	80.00	88.00	108.00
300 x 80mm	Each	92.00	101.00	124.00
300x 100mm	Each	92.00	102.00	126.00
300 x 125mm	Each	95.00	105.00	128.00
300 x 150mm	Each	96.00	106.00	130.00
300 x 200mm	Each	103.00	115.00	141.00
300 x 250mm	Each	109.00	121.00	148.00
300 x 300mm	Each	117.00	130.00	161.00
350x200mm	Each	124.00	151.00	185.00
350x250mm	Each	137.00	158.00	194.00
350x300mm	Each	150.00	168.00	205.00
350x350mm	Each	159.00	177.00	217.00

S.No.	Particulars of Items	Unit	Rate (in Rs)		
			Class 10	Class 15	Class 20
12.16	Providing and laying in position Cast Iron plain ended Crosses Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80 x 80mm	Each	865.00	865.00	978.00
	100 x 100mm	Each	1191.00	1226.00	1524.00
	125 x 125mm	Each	1659.00	1744.00	2141.00
	150x 150mm	Each	2268.00	2560.00	3133.00
	200 x 200mm	Each	3999.00	4587.00	5630.00
	250 x 250mm	Each	6126.00	6800.00	8366.00
	300 x 300mm	Each	8934.00	10140.00	12478.00
	350x350mm	Each	13345.00	14985.00	18305.00
12.17	Labour for laying in position Cast Iron plain ended Crosses Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80 x 80mm	Each	14.00	14.00	15.00
	100 x 100mm	Each	19.00	19.00	24.00
	125 x 125mm	Each	27.00	28.00	34.00
	150x 150mm	Each	35.00	41.00	49.00
	200 x 200mm	Each	63.00	72.00	90.00
	250 x 250mm	Each	97.00	108.00	133.00
	300 x 300mm	Each	142.00	161.00	197.00
	350x350mm	Each	177.00	218.00	266.00
12.18	Providing and laying in position Cast Iron plain ended Reducers Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	100 x80mm	Each	574.00	580.00	692.00
	125 x 80mm	Each	665.00	685.00	816.00
	125 x 100mm	Each	733.00	761.00	934.00
	150 x 80mm	Each	768.00	837.00	1003.00
	150 x 100mm	Each	837.00	913.00	1127.00
	150 x 125 mm	Each	927.00	1017.00	1245.00
	200 x 100mm	Each	1106.00	1259.00	1556.00
	200 x 125mm	Each	1196.00	1355.00	1675.00
	200 x 150mm	Each	1301.00	1514.00	1868.00
	250 x 125mm	Each	1467.00	1646.00	1979.00
	250 x 150mm	Each	1570.00	1805.00	2242.00
	250 x 200mm	Each	1834.00	2145.00	2670.00
	300 x 150mm	Each	1881.00	2248.00	2808.00
	300 x 200mm	Each	2152.00	2594.00	3238.00
	300 x 250mm	Each	2407.00	2871.00	3458.00
	350 x 300mm	Each	4197.00	5418.00	6672.00
12.19	Labour for laying in position Cast Iron plain ended Reducers Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	100 x80mm	Each	9.00	9.00	11.00
	125 x 80mm	Each	11.00	11.00	13.00
	125 x 100mm	Each	11.00	13.00	15.00
	150 x 80mm	Each	13.00	14.00	16.00

S.No.	Particulars of Items	Unit	Rate (in Rs)		
	150 x 100mm	Each	14.00	15.00	18.00
	150 x 125 mm	Each	15.00	16.00	20.00
	200 x 100mm	Each	18.00	20.00	25.00
	200 x 125mm	Each	19.00	22.00	28.00
	200 x 150mm	Each	22.00	24.00	30.00
	250 x 125mm	Each	24.00	27.00	33.00
	250 x 150mm	Each	25.00	29.00	37.00
	250 x 200mm	Each	30.00	35.00	43.00
	300 x 150mm	Each	30.00	37.00	46.00
	300 x 200mm	Each	36.00	42.00	53.00
	300 x 250mm	Each	39.00	47.00	56.00
	350 x 300mm	Each	45.00	82.00	101.00
12.20	Providing and laying in position Cast Iron Flange spigot (Adopter) Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	518.00	518.00	552.00
	100mm	Each	629.00	636.00	713.00
	125mm	Each	790.00	817.00	909.00
	150mm	Each	1000.00	1070.00	1195.00
	200mm	Each	1440.00	1586.00	1803.00
	250mm	Each	2405.00	2572.00	2957.00
	300mm	Each	3042.00	3340.00	3865.00
	350mm	Each	3931.00	4309.00	4983.00
12.21	Labour for laying in position Cast Iron Flange spigot (Adopter) Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	9.00	9.00	9.00
	100mm	Each	10.00	10.00	11.00
	125mm	Each	13.00	13.00	15.00
	150mm	Each	16.00	18.00	19.00
	200mm	Each	23.00	25.00	29.00
	250mm	Each	39.00	42.00	48.00
	300mm	Each	51.00	53.00	62.00
	350mm	Each	53.00	68.00	79.00
12.22	Providing and laying in position Cast Iron end plugs (Dead end cap) Conforming to IS/5531/1988 (Reaffirmed 2002)		Class 10	Class 15	Class 20
	80mm	Each	226.00	226.00	246.00
	100mm	Each	313.00	326.00	367.00
	125mm	Each	427.00	453.00	539.00
	150mm	Each	573.00	679.00	806.00
	200mm	Each	1013.00	1240.00	1492.00
	250mm	Each	1486.00	1758.00	2112.00
	300mm	Each	2099.00	2605.00	3125.00
	350mm	Each	3166.00	3886.00	4653.00

S.No.	Particulars of Items	Unit	Rate (in Rs)		
			Class 10	Class 15	Class 20
12.23	Labour for laying in position Cast Iron end plugs (Dead end cap) Conforming to IS/5531/1988 (Reaffirmed 2002)				
	80mm	Each	4.00	4.00	4.00
	100mm	Each	5.00	5.00	6.00
	125mm	Each	8.00	8.00	9.00
	150mm	Each	10.00	11.00	14.00
	200mm	Each	18.00	22.00	25.00
	250mm	Each	25.00	29.00	35.00
	300mm	Each	35.00	44.00	53.00
	350mm	Each	38.00	57.00	69.00
12.24	Providing A.C. coupler joints to the following A.C. pressure pipe Conforming to IS specification including testing of joints rubber ring complete.				
	80mm diameter	Each		59.00	
	100mm diameter	Each		83.00	
	150mm diameter	Each		114.00	
	200mm diameter	Each		187.00	
	250mm diameter	Each		259.00	
	300mm diameter	Each		402.00	
12.25	Labour for providing A.C. coupler joint for the following asbestos cement pressure pipes and fitting class 5, 10, 15 including testing of joints but excluding cost of A.C. coupler and rubber rings.				
	80mm diameter	Each		6.00	
	100mm diameter	Each		6.00	
	150mm diameter	Each		8.00	
	200mm diameter	Each		9.00	
	250mm diameter	Each		10.00	
	300mm diameter	Each		11.00	
12.26	Providing and laying in position plain cast iron standard specials of any class. Conforming to IS- 5531/1988 which does not appears in this U.S.O.R.				
	80mm to 700mm diameter	Kg		68.00	
12.27	Labour for laying in position cast iron plain ended specials all sizes of any class which does not appears in this U.S.O.R.				
	80mm to 700mm diameter	Kg		1.00	

S.No.	Particulars of Items	Unit	Rate (in Rs)
12.28	Providing and supply of ISI marked Asbestos Cement Pipes Conforming to IS 6908:1991 for Sewerage & Drainage Class-I with suitable A.C. coupling & ISI marked rubber ring, duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site etc, complete of following sizes:-		
	150mm (Length 3mtrs., min.)	RM	316.00
	200mm (Length 3mtrs., min.)	RM	516.00
	250mm (Length 4mtrs., min.)	RM	676.00
	300mm (Length 4mtrs., min.)	RM	873.00
	350mm (Length 4mtrs., min.)	RM	1130.00
	400mm (Length 4mtrs., min.)	RM	1393.00
	450mm (Length 4mtrs., min.)	RM	1644.00
	500mm (Length 4mtrs., min.)	RM	2094.00
	600mm (Length 4mtrs., min.)	RM	2898.00
12.29	Providing and supply of ISI marked Asbestos Cement Pipes Conforming to IS 6908:1991 for Sewerage & Drainage Class-II with suitable A.C. coupling & ISI marked rubber ring, duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site etc, complete of following sizes:-		
	200mm (Length 3mtrs., min.)	RM	675.00
	250mm (Length 4mtrs., min.)	RM	865.00
	300mm (Length 4mtrs., min.)	RM	1194.00
	350mm (Length 4mtrs., min.)	RM	1538.00
	400mm (Length 4mtrs., min.)	RM	1987.00
	450mm (Length 4mtrs., min.)	RM	2323.00
	500mm (Length 4mtrs., min.)	RM	2918.00
	600mm (Length 4mtrs., min.)	RM	4153.00

S.No.	Particulars of Items	Unit	Rate (in Rs)
12.30	Providing and supply of ISI marked Asbestos Cement Pipes Conforming to IS 6908:1991 for Sewerage & Drainage Class-III with suitable A.C. coupling & ISI marked rubber ring, duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site etc, complete of following sizes:-		
	100mm (Length 3mtrs., min.)	RM	283.00
	150mm (Length 3mtrs., min.)	RM	387.00
	200mm (Length 3mtrs., min.)	RM	663.00
	250mm (Length 4mtrs., min.)	RM	1101.00
	300mm (Length 4mtrs., min.)	RM	1540.00
	350mm (Length 4mtrs., min.)	RM	1988.00
	400mm (Length 4mtrs., min.)	RM	2595.00
	450mm (Length 4mtrs., min.)	RM	3077.00
	500mm (Length 4mtrs., min.)	RM	3847.00
	600mm (Length 4mtrs., min.)	RM	5391.00

CHAPTER- 13

SALT GLAZED STONEWARE PIPE

- 1 Salt glazed stone ware pipe shall be as per IS 651 - 2007. SP1 pipe shall be used having crushing strength of 16kN/m duly inspected and tested and having BIS certification mark.

- 2 Laying of glazed stone ware pipe shall be as per IS 4127.
Laying of pipes and fittings/specials includes all precautions to guard against possible damage to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Laying of pipes perfectly true in alignment and to gradient etc.

- 3 Transportation of Pipe
 - (i) While unloading, pipes shall not be thrown from the truck on hard ground.

 - (ii) Unloading of pipes on timber skids without a steadying rope and thus allowing the pipes to bump hard against one another should not be allowed.

 - (iii) In order to avoid damage to the pipes and especially to the spigot end, pipes should not be dragged along concrete and similar pavements with hard surfaces.

- 4 Testing
 - (i) The pipe and fittings shall be inspected for defects and be rung with a light hammer preferably while suspended, to detect cracks.

 - (ii) Hydraulic test, Absorption test, test for resistance to action of acid & test for crushing strength etc. shall be done as per IS 651 and IS 4147.

 - (iii) Necessary tests of the pipe shall be as per IS 651 and test results shall be kept for record.

 - (iv) Each section of sewer shall be tested for water tightness preferably between manhole to man hole.

 - (v) Before commencing the hydraulic test the pipelines shall be filled with water for about a week before commencing the application of pressure to allow for the absorption by pipe wall.

(vi) The sewers are tested by plugging the upper end (with a provision for an air out let) of the pipe with stopcock. The water is filled through a funnel connected at the lower end provided with a plug. After the air has expelled through the air out let, the stop cock is closed and water level in the funnel is noted after 30 minutes and gravity of water required to restore the original water level is determined. The pipe line under pressure is then inspected while the funnel is still in position. There shall be no leaks in the pipe or joints (small sweating on the pipe surface is permitted).

(vii) Any sewer or part there of that does not meet the test shall be emptied and repaired or re-laid as required and tested again.

(viii) The leakage of quantity of water to be supplied to maintain the test pressure during the period of 10 minutes shall not exceed 0.2 litres/mm dia. of pipe per kilometre length per day.

- 5 Stone ware pipe shall be cement jointed.
- 6 Back filling of the trench shall not be commenced until the length of pipes there in has been tested and passed.
- 7 Where pipe are laid under road and pavement subjected to heavy traffic loads the trenches may be covered with R.C.C. slab.
- 8 Providing and laying cement concrete 1:5:10 (1 cement:5 fine sand: 10 graded stone aggregate 40 mm nominal size) up to haunches of SW – pipes including bed concrete i/c curing, testing etc complete for 100mm to 300mm dia SW pipe For Type "Concrete up to Haunches " shall be as per *Drawing No. 8 (1)*
- 9 Providing and laying cement concrete 1:5:10 (1 cement:5 fine sand: 10 graded stone aggregate 40 mm nominal size) around S.W. pipe including bed concrete 15 cm thick i/c curing, testing etc. complete for 100 mm dia. to 300 mm dia pipe. (For type "Concrete Around") shall be as per *Drawing No. 8 (2)*
- 10 Measurement
The length of pipes shall be measured in the running meters nearest to 10mm as laid or fixed, from inside of one manhole to the inside of the other manhole. The length shall be taken, along the centre line of the pipes. Overall fittings, such as bends, junctions, etc., shall not be measured separately. Excavation, refilling, shoring and timbering in trenches and cement concretising where ever required shall be measured separately under relevant item of work.
- 11 Rates
The rate shall include the cost of material and labour involved in all the operation described above excluding the cost of concrete which shall be paid separately.

CHAPTER 13 -- SALT GLAZED STONEWARE PIPE

S.No.	Particulars of Items	Unit	Rate (in Rs.)
13.1	Providing and Laying and Jointing salt glazed stone ware (S.W.) pipes socket and spigot ISI marked as per IS 651-2007 SP1 class with stiff cement mortar 1:1 including testing of joints etc. complete.		
	100 mm	RM	153.00
	150 mm	RM	258.00
	200 mm	RM	468.00
	250 mm	RM	651.00
	300 mm	RM	1062.00
13.2	Laying and Jointing salt glazed stone ware (S.W.) pipes s&s (socket and spigot) with stiff cement mortar 1:1 including testing of joints complete.		
	100mm	RM	51.00
	150 mm	RM	73.00
	200 mm	RM	91.00
	250 mm	RM	109.00
	300 mm	RM	122.00
13.3	Providing and laying Cement concrete grade M-5 (Nominal Mix) with 40 mm nominal size stone aggregate up to haunches of SW – pipes including bed concrete i/c curing, testing etc complete for 100mm to 300mm dia SW pipe For Type "Concrete up to Haunches ") <i>Drawing No. 8 (1)</i>		
	100mm dia pipe	RM	191.00
	150mm dia	RM	310.00
	200mm dia	RM	365.00
	250mm dia	RM	424.00
	300mm dia	RM	490.00
13.4	Providing and laying Cement concrete grade M-5 (Nominal Mix) with 40 mm nominal size stone aggregate around S.W. pipe including bed concrete 15 cm thick i/c curing, testing etc. complete for 100 mm dia. to 300 mm dia pipe. (For type" Concrete Around") <i>Drawing No. 8 (2)</i>		
	100mm dia SW pipe	RM	403.00
	150mm dia	RM	493.00
	200mm dia	RM	574.00
	250mm dia	RM	664.00
	300mm dia	RM	762.00

CHAPTER- 14

UNPLASTICIZED NON-PRESSURE POLYVINYL CHLORIDE (PVC-U) PIPES, DWC PIPES FOR USE IN UNDERGROUND SEWERAGE SYSTEM

- 1 Unplasticized polyvinyl chloride (PVC - U) pipes shall be as per IS 15328. & having BIS Certification mark.
- 2 Laying of Unplasticized polyvinyl chloride (PVC - U) pipe shall be as per IS 7634 (Part-3) : 2003
- 3 The solvent cement shall Conform to the requirements laid down in IS 14182.
- 4 Integral sockets for either solvent-cement welding or for jointing with elastomeric sealing rings pipes made of unplasticized polyvinyl chloride (PVC-U) of nominal outside diameters ranging from 110mm up to and including 630 mm, intended for underground (buried) non-pressure gravity drain and sewer applications for transportation of soil and waste discharge of domestic origin, surface water (storm water).
- 5 Dimensions of Pipes :
 - (i) Mean outside diameter :- The mean outside diameter, outside diameter at any point and tolerances shall be as give in the table 1 of IS 15328 and shall be measured according to the method in IS:12235 (part-1).
 - (ii) Wall thickness :- The nominal wall thickness, e, shall be in accordance with table 2 of IS 15328. Tolerances in outside diameters shall be those given in IS 4985.
- 6 Marking :-

The colour of marking shall be different from the basic colour of the pipe. It shall be as

 - (i) Identification of the source of manufacture.
 - (ii) Outside diameter,
 - (iii) Stiffness class, and
 - (iv) Batch or lot number
- 7 Joints :

Elastomeric Sealing rings :- Elastomeric sealing rings shall be free from substances (for example, plasticizers) that can have a detrimental effect on the polyvinyl chloride of the pipe or fittings used in conjunction with the pipes.
- 8 Laying of pipes includes all precautions to guard against possible damage to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

9 Minimum Cover

9.1 A minimum cover of 0.9 m should be ensured when normal truck traffic is expected and 1.8m should ensured when heavy truck traffic is expected.

9.2 Bedding and backfill material must be free from boulders, sharp stones, flints etc.

9.3 Bedding should be prepared by laying on soft soil duly compacting and watering so that thickness of bedding is 100 mm to 150 mm. Please refer *Drawing No. 3*

10 Providing and supply of DWC HDPE pipes class SN8 for non pressure underground sewerage drainage application as per EN: 13476-3 is also given in the given chapter. Pipes and fittings shall be as per relevant BIS/ISO specifications. Material should be used after obtaining third party quality assurance certificate

11 Measurement

All measurement should be of the finished work only. The net length of pipes as laid or fixed shall be measured in running meters correct to 10mm. The portion of the pipe inside the joints shall not be included in the length of pipe work. Excavation, refilling, masonry and concrete work wherever required shall be measured and paid for separately under relevant items of work.

12 Rates

The rate shall include the cost of material and labour involved in all the operation described above excluding the cost of concrete which shall be paid separately.

CHAPTER 14 - UNPLASTICIZED NON-PRESSURE POLYVINYL CHLORIDE (PVC-U) PIPES, DWC PIPES FOR USE IN UNDERGROUND SEWERAGE SYSTEM

S.No.	Particulars of Items	Unit	Rates (in Rs.)
14.1	Providing, laying and jointing following P.V.C. - U pipes with solvent cement joint for Non-pressure gravity drain and sewer applications including testing of joints, cost of jointing materials etc. complete in all respect. [Conform to IS 15328:2003, solvent cement shall Conform to IS 14182]. SN-8		
	110 mm dia.	RM	255.00
	125 mm dia	RM	293.00
	160 mm dia	RM	546.00
	200 mm dia	RM	848.00
	250 mm dia	RM	1314.00
	315 mm dia	RM	2033.00
	400 mm dia	RM	2976.00
14.2	Providing and supply of DWC HDPE Pipes of renowned duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site/ store etc, complete.		
14.2.1	Internal dia /Outer dia		
14.2.1.1	76 mm / 90 mm	RM	104.00
14.2.1.2	100 mm / 120 mm	RM	160.00
14.2.1.3	135 mm / 160 mm	RM	226.00
14.2.1.4	170 mm / 200 mm	RM	353.00
14.2.1.5	250 mm / 295 mm	RM	908.00
14.2.1.6	400 mm / 480 mm	RM	1804.00
14.2.1.7	600 mm / 715 mm	RM	4314.00
14.2.1.8	800 mm / 950 mm	RM	7112.00
14.2.1.9	1000 mm / 1200 mm	RM	10716.00
	PVC-U non pressure pipes as per IS 15328/2003		
14.3	Providing and Supplying of PVC-U non pressure pipes as per IS 15328/2003 SN8-SDR 34(S 16.5) duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as for direction of Engineer-in-Charge.		
1	110mm	RM	240.00
2	125mm	RM	275.00
3	160mm	RM	512.00
4	200mm	RM	803.00
5	250mm	RM	1248.00
6	315mm	RM	1940.00
7	400mm	RM	2844.00

S.No.	Particulars of Items	Unit	Rates (in Rs.)
14.4	Providing and Supplying of PVC-U non pressure pipes as per IS 15328/2003 SN4-SDR 41 (S 20) duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as for direction of Engineer-in-Charge.		
1	125mm	RM	272.00
2	160mm	RM	454.00
3	200mm	RM	662.00
4	250mm	RM	1044.00
5	315mm	RM	1689.00
6	400mm	RM	2593.00
14.5	Providing and Supplying of PVC-U non pressure pipes as per IS 15328/2003 SN2-SDR 51 (S 25) duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as for direction of Engineer-in-Charge.		
1	160mm	RM	342.00
2	200mm	RM	532.00
3	250mm	RM	812.00
4	315mm	RM	1348.00
5	400mm	RM	2252.00

CHAPTER- 15

NON- PRESSURE REINFORCED CEMENT CONCRETE PIPES

- 1 All the pipes, specials, joints to be used in the work shall be as per Indian Standards 458 - 2003 duly inspected and tested and having BIS certification mark
- 2 Laying and Jointing shall be as per IS 783:1985
- 3 Transportation :-
 - (1) Reasonable care shall be exercised in loading, transporting and unloading concrete pipes. Handling shall be such as to avoid impact. Gradual unloading by inclined plane or by chain block is recommended.
- 4 Tests to be conducted at manufacturing units before taking delivery.
 - 4.1 All samples for testing purpose shall be selected at random.
 - 4.2 Samples of pipes shall be subjected to following test in accordance with IS : 3597
 - 4.2.1 Hydrostatic test
 - 4.2.2 Three edge bearing test
 - 4.2.3 Permeability test
 - 4.3 At the time manufacture of such pipes compressive strength of the concrete cubes shall be tested as per IS : 516.
- 5 Laying of Pipe :-
 - 5.1 Pipes shall be lowered in to the trench carefully by mechanical appliances. Under no circumstances shall the pipes be dropped or dumped in to the trench.
 - 5.2 All pipe sections and connections shall be inspected carefully before being laid. Broken or defective pipes or connections shall not be used.
 - 5.3 All lumps, blisters and excess coating materials shall be removed gently from the ends of each pipe and they should be wiped clean and dry before the pipe is laid.
 - 5.4 In the case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.
 - 5.5 Every precaution shall be taken to prevent foreign materials from entering the pipe when it is being placed in the line
 - 5.6 Pipes shall be laid true to line and grade as specified.
 - 5.7 Sight rails provided at all change of directions or gradients and at distances of about 15 meters. Straight lengths with centre line marked on each horizontal rail which is fixed at true level, shall be used for laying all inverts with the help of proper boning rods.
 - 4.8 Laying of pipes shall always proceed upgrade of a slope. If the pipes have spigot and socket joints, the socket ends shall face upstream. In the case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.

5.9 The pipe shall be secured in place with approved back fill material or concrete tamped under it except at the joint portion.

5.10 Precautions shall be taken to prevent dirt from entering the joint space.

5.11 At times when pipe laying is not in progress the open ends of pipe shall be closed by a water tight plug or canvas or other means approved by the Engineer in charge.

5.12 Trench shall be kept free from water until the material in the joints has hardened.

5.13 When the pipe is closed and the trench liable to be flooded by rain, care shall be taken to prevent the pipe from damage.

5.14 Walking or working on the completed pipe shall not be permitted until the trench has been back filled to a height of at least 30 cm over the pipe, except as may be necessary in tamping or back filling.

5.15 The cutting of pipe for inserting, fittings or closure pieces shall be done in a neat and workmanlike manner without danger to the pipe so as to leave a smooth surface and at right angles to the axis of the pipe.

5.16 The connection to an existing sewer shall be done through manholes.

5.17 Before connecting a pipe to a manhole, a relieving arch or any other similar protection device should be made in the manhole for the safety of the pipe.

5.18 The pipe when laid should not be subjected to super imposed load beyond what the pipe can safely take up.

6 Pipe Bedding: (See Drawing No.- 9)

6.1 In case where the foundation conditions are unsafe such as in the proximity of trees or poles, under existing or proposed tracks, under manholes etc; the pipe shall be encased, in low strength concrete bedding or compacted sand or gravel.

6.2 The following class of pipe beddings are recommended as per CPHEEO manual. The class of bedding depends upon the site condition and loading.

Class A bedding-	It may be either concrete cradle or concrete arch depending upon the design.
Class B bedding-	It is having a shaped bottom or compacted granular bedding with a carefully compacted back fill.
Class C bedding-	It is ordinary bedding having a compacted granular bedding with a lightly compacted back fill.

6.3 The pipe bedding materials must remain firm and not permit displacement of pipes. Where rock or other unyielding foundation material is encountered, bedding shall be according to one of the classes A, B or C but with the following additional requirements.

6.3.1 Class A bedding-The hard unyielding material should be excavated down to the bottom of the concrete cradle.

6.3.2 Class B or C bedding- The hard unyielding material should be excavated below the bottom of the pipe and pipe bell to depth of at least 15cm.

6.3.3 The width of trench should be at least 1.25 times the outside dia of pipe and it should be refilled with granular material.

6.4 When the pipe is laid in a trench in rock, hard clay, shale or other hard material, the space below the pipe shall be excavated and replaced with an equalising bed of concrete, sand or compacted earth. In no place the pipe shall be laid directly on such hard material.

7 Jointing : (See Drawing No.-10)

7.1 The socket and spigot pipes are laid and jointed with rubber gasket.

7.2 In case of collar jointed pipe, the jointing shall be done with hemp yarn soaked in cement slurry tamped with just sufficient quantity of water to have a consistency of semi dry condition, well packed and thoroughly rammed with caulking tools and then filled with cement mortar 1:2. The joint shall be finished off with a fillet slopping at 45 degrees to the surface of the pipe. The finished joint shall be protected and cured for at least 24 hours. For jointing procedure should be followed as per I.S. 783 – 1985.

8 Testing :- Sampling & testing of pipe shall be done as per IS 458.

8.1 Each section of sewer shall be tested for water tightness preferably between manholes.

8.2 In case of cement mortar joints, the sewer line shall be tested three days after the cement mortar joints have been made.

8.3 The pipe line shall be filled with water for about a week before commencing the application of pressure to allow for the absorption by pipe wall.

8.4 The pipe line shall be tested by plugging the upper end with a provision for an air outlet pipe with stop cock. The water shall be filled through a funnel connected at the lower end provided with a plug. After expelling the air through the air outlet, the stop cock shall be closed and water level in the funnel shall be raised to 2.5 m above the invert at the upper end. Water level in the funnel is noted after 30 minutes and the quantity of water required to restore the original water level in the funnel is determined. The pipe line under pressure is then inspected while funnel is still in position. There shall not be any leaks in the pipe or joints (small sweating on the pipe surface is permitted).

8.5 Any sewer or part thereof that doesn't meet the test shall be emptied and repaired or re-laid as required and tested again.

8.6 The leakage or quantity of water to be supplied to maintain the test pressure during the period of 10 minutes should not exceed 0.2 litres / mm diameter of pipe per Km. length per day.

8.7 For non pressure pipes the leakage should be observed for a period of 24 hours if feasible.

8.8 Ex filtration test for detection of leakage shall be carried out at a time when the ground water table is low.

8.9 Air testing shall be done particularly in large diameter pipes when the required quantity of water is not available for testing. It is done as per procedure given in CPHEEO manual.

9 Back filling of trenches:

9.1 The method of backfilling to be used shall vary with the width of trench, the character of material excavated, the method of excavation and degree of compaction required.

9.2 In open country, it shall be sufficient to mound the trench and after natural settlement return to regarded the areas.

9.3 In developed streets, it shall be compacted to minimize the load.

9.4 Soft material screened free from stones or hard substances shall first be used and hand pressed under and around the pipes to half the height. Similar soft material shall then be put up to a height of 30 cm. above the top of pipe and this will be moistened with water and well rammed. The remaining trench can be filled with hard material, in layers each not exceeding 60 cm. At each stage the filling shall be well rammed, consolidated and completely saturated with water and then only further filling shall be continued.

10 Measurements

All RCC pipes should be measured according to the work actually done and no allowance should be made for any waste in cutting to the exact length required. The measurement for pipes should be in running meter nearest to a cm. of length along the centre line of pipe as actually laid at work site.

11 Rates :

The rate for providing, laying and jointing of RCC pipes shall be deemed to include the cost of collars/ rubber rings, jointing material, testing and the extra excavation required for ordinary bedding of pipes and also for collars and pipe sockets if any.

CHAPTER 15 -- NON-PRESSURE REINFORCED CEMENT CONCRETE PIPES

SI NO.	Particulars of Items	Unit	Rate (in Rs.)
15.1	Providing, Laying and jointing non-pressure (NP2) RCC socket & spigot pipes with rubber gasket joint including testing of joints. [Conforming to IS ; 458-1988, ISI marked laying as per IS 783:1985)		
	100 mm dia	RM	259.00
	150 mm dia	RM	355.00
	200 mm dia	RM	412.00
	225 mm dia	RM	396.00
	250 mm dia	RM	555.00
	300 mm dia	RM	790.00
	350 mm dia	RM	964.00
	400 mm dia	RM	1047.00
	450 mm dia	RM	1275.00
	500 mm dia	RM	1435.00
	600 mm dia	RM	1761.00
	700 mm dia	RM	2216.00
	800 mm dia	RM	2682.00
	900 mm dia	RM	3455.00
	1000 mm dia	RM	4105.00
	1100 mm dia	RM	4607.00
	1200 mm dia	RM	5040.00
	1600 mm dia	RM	5545.00
	1800 mm dia	RM	10226.00
15.2	Labour only for Laying and Jointing non-pressure (NP2) RCC socket & spigot pipes with rubber gasket joint including testing of joints. (IS 783:1985)		
	100 mm dia	RM	14.00
	150 mm dia	RM	19.00
	200 mm dia	RM	24.00
	225 mm dia	RM	31.00
	250 mm dia	RM	31.00
	300 mm dia	RM	49.00
	350 mm dia	RM	56.00
	400 mm dia	RM	63.00
	450 mm dia	RM	79.00
	500 mm dia	RM	86.00
	600 mm dia	RM	116.00
	700 mm dia	RM	133.00
	800 mm dia	RM	172.00
	900 mm dia	RM	213.00
	1000 mm dia	RM	215.00
	1100 mm dia	RM	254.00
	1200 mm dia	RM	297.00
	1600 mm dia	RM	387.00
	1800 mm dia	RM	542.00

SI NO.	Particulars of Items	Unit	Rate (in Rs.)
15.3	Providing and Laying non-pressure (NP3) RCC socket & spigot pipes with rubber gasket joint including testing of joints. [Conforming to IS ; 458-1988, ISI marked laying as per IS 783:1985)		
	150 mm dia	RM	386.00
	225 mm dia	RM	491.00
	250 mm dia	RM	636.00
	300 mm dia	RM	994.00
	350 mm dia	RM	1447.00
	400 mm dia	RM	1811.00
	450 mm dia	RM	2177.00
	500 mm dia	RM	2396.00
	600 mm dia	RM	3086.00
	700 mm dia	RM	3519.00
	800 mm dia	RM	4818.00
	900 mm dia	RM	6087.00
	1000 mm dia	RM	6338.00
	1100 mm dia	RM	7174.00
	1200 mm dia	RM	8925.00
	1400 mm dia	RM	11781.00
	1600 mm dia	RM	14013.00
	1800 mm dia	RM	15573.00
15.4	Labour only for Laying and Jointing non-pressure (NP3) RCC socket & spigot pipes with rubber gasket joint including testing of joints. (IS 783:1985)		
	150 mm dia	RM	18.00
	225 mm dia	RM	35.00
	250 mm dia	RM	39.00
	300 mm dia	RM	64.00
	350 mm dia	RM	148.00
	400 mm dia	RM	162.00
	450 mm dia	RM	181.00
	500 mm dia	RM	199.00
	600 mm dia	RM	245.00
	700 mm dia	RM	288.00
	800 mm dia	RM	374.00
	900 mm dia	RM	456.00
	1000 mm dia	RM	482.00
	1100 mm dia	RM	534.00
	1200 mm dia	RM	577.00
	1400 mm dia	RM	603.00
	1600 mm dia	RM	721.00
	1800 mm dia	RM	863.00

SI NO.	Particulars of Items	Unit	Rate (in Rs.)
15.5	Providing, Laying and Jointing non-pressure (NP4) RCC socket & spigot pipes with rubber gasket joint including testing of joints. [Conforming to IS ; 458-1988, ISI marked laying as per IS 783:1985)		
	150 mm dia	RM	509.00
	225 mm dia	RM	497.00
	250 mm dia	RM	755.00
	300 mm dia	RM	852.00
	350 mm dia	RM	1442.00
	400 mm dia	RM	1844.00
	450 mm dia	RM	2147.00
	500 mm dia	RM	2540.00
	600 mm dia	RM	2938.00
	700 mm dia	RM	3618.00
	800 mm dia	RM	4959.00
	900 mm dia	RM	5703.00
	1000 mm dia	RM	6751.00
	1100 mm dia	RM	6968.00
	1200 mm dia	RM	8825.00
	1400 mm dia	RM	12233.00
	1600 mm dia	RM	14868.00
	1800 mm dia	RM	16224.00
15.6	Labour only for Laying and Jointing non-pressure (NP4) RCC socket & spigot pipes with rubber gasket joint including testing of joints. (IS 783:1985)		
	150 mm dia	RM	19.00
	225 mm dia	RM	40.00
	250 mm dia	RM	40.00
	300 mm dia	RM	65.00
	350 mm dia	RM	151.00
	400 mm dia	RM	169.00
	450 mm dia	RM	185.00
	500 mm dia	RM	203.00
	600 mm dia	RM	275.00
	700 mm dia	RM	306.00
	800 mm dia	RM	392.00
	900 mm dia	RM	456.00
	1000 mm dia	RM	490.00
	1100 mm dia	RM	534.00
	1200 mm dia	RM	589.00
	1400 mm dia	RM	613.00
	1600 mm dia	RM	721.00
	1800 mm dia	RM	863.00

CHAPTER- 16

GRP PIPES AND SPECIALS

- 1 GRP Pipes, Joints and Fittings for use for Potable Water Supply shall be as per IS 12709 : 1994
- 2 Glass Fibre reinforced plastics (GRP) Pipes, Joints and fittings for use for sewerage, industrial waste and water (other than Potable) shall be as per IS 14402 : 1996
- 3 Installation of GRP Piping system –code of practice shall be as per IS 13916 : 1994
- 4 Rubber sealing rings for gas mains, water mains and sewers shall be as per IS 5382 : 1985
- 5 For fibre glass pressure pipe shall be as per American Water Works Association (AWWA) 950
- 6 Standard practice for clarifying visual defects in glass reinforced plastic laminated parts shall be as per American Society for Testing & Material (ASTM) 2563
- 7 Specification for fibre Glass Pressure Pipes shall be as per ASTM 3517
- 8 Standard specification for contact moulded “Fibre glass” flanges shall be as per ASTM D 5421.
- 9 Specification for Glass Fibre resin forced Plastic Pressure Pipes, Joints & Fittings shall be as per British Standard (BS) -5480
- 10 Handling of Pipe :-
 - (i) All pipe sections and fittings shall be supported on timber saddles spaced at 4m centre to centre with a maximum overhang of 2 m. Pipes with diameter greater than 1 m may be stored on their delivery cradles at a maximum distance of 6 m c/c. Stock height should not generally exceed 2 m. Pipe shall be strapped to the vehicle over the support points using non-metallic pliable straps or ropes only.
 - (ii) Pipes and fittings with diameters of less than 1 m may be stored directly on sandy soil the ground should be flat and free from sharp projection and stones/rocks bigger than 40 mm in diameter or of other potentially damaging debris. If the surface is not flat or is slopping, then all the pipes shall be checked to prevent rolling.
 - (iii) All rubber rings, gasket and other items shall be stored in a cool, dry and dark place to avoid damage of any kind.

(iv) During delivery, all sections shall be handled by such means and in such a manner that no distortion or damage is done to the protection or to the section as a whole.

(v) Pipes shall be handled and transported to the site carefully as per the general Specifications for laying of Pipes and fittings given in this chapter and as per IS 783.

11 Transportation of pipes :-

(i) Pipes manufactured at factory are to be carried to the site of work directly or stacked suitably and neatly along the alignment/road side/elsewhere near by the work site, as directed by the Engineer.

(ii) All pipes shall be loaded in trucks by mechanical crane/tripod and unloaded carefully using crane/tripod. No unloading using crow bars or on tyres will be allowed in any case. Rubber belt may be used instead of crow bars or chains.

(iii) Extreme care shall be taken while handling the pipes. Damages during transit will be to the Contractor's account and replacement for such pipes has to be made by the contractor without any extra cost.

12 Tolerances for GRP fitting :-

Except for flanged pipe work, which may require closer tolerances, the permissible deviations on the manufacturer's declared length of a fitting, exclusive of the socket where applicable, shall be 25 mm taken from the point of intersection to the end of the fitting.

13 Soundness :-

Each length of pipe of nominal diameter up to 1400 mm shall withstand without leakage or cracking the internal hydrostatic test pressures.

14 Marking :-

Both ends of pipe shall be marked with bold letters not less than 12mm in height and in a colour and type that remains legible under normal handling and installation procedures. The marking shall include the following :

(i) The manufacturer's name or trade-mark.

(ii) The nominal pipe diameter

(iii) Class of pipe (pressure and stiffness), and

(iv) Batch No. or date of manufacture.

15 Laying of pipes and fittings/specials includes all precautions to guard against possible damage to the existing structure/pipes lines, cables etc., taking precautions to prevent dirt from entering the pipe ends, lowering and laying pipes and specials in the trenches with specials arrangement such as cranes, tripods with chain pulley block, use of slings of canvas etc. to fit the ends of pipes and fittings/ specials to lift and lower the same. Inspection of pipes and fittings for defects by striking with a light hammer while suspended. Laying of pipes perfectly true in alignment and to gradient etc.

- 16 GRP Pipes Conforming to iS 14402 : 1996 are also manufactured for Sewerage, Industrial waste and water (other than potable). These pipes may be used for raw water pumping also. While placing order for procurement of pipes relevant code should be clearly mentioned according to the purpose for which pipes are to be used.
- 17 Measurement :-
The net length of pipes as laid or fixed shall be measured in running meter correct to 10mm. Special shall be excluded & measured and paid for separately. The part of the pipe within the joint shall not be included in the length of pipe. Other work like masonry, concrete etc. shall also be measured separately.
- 18 Rates :-
The rate shall include the cost of material and labour involved in all the operation described in the item including the cost of concrete which shall be paid separately.

CHAPTER 16 -- GRP PIPES AND SPECIALS

S.No.	Particulars of Items	Unit	Rate (in Rs.)
16.1	Providing, Supplying, laying, jointing, field testing, commissioning, complete at site of GRP pipes PN-3.0 (3.0kg/sqcm) Conforming to IS 12709 for water application/ IS 14402 for sewerage application, including cost of coupling, pipe material, transportation, loading, unloading, stacking and labour work complete stiffness class 124kpa (2500N/m ²)		
	300 mm dia	RM	1739.00
	350 mm dia	RM	2116.00
	400 mm dia	RM	2529.00
	450 mm dia	RM	2921.00
	500 mm dia	RM	3380.00
	600 mm dia	RM	4361.00
	700 mm dia	RM	5319.00
	800 mm dia	RM	6441.00
	900 mm dia	RM	8025.00
	1000 mm dia	RM	9506.00
	1100 mm dia	RM	11425.00
	1200 mm dia	RM	13210.00
	1400 mm dia	RM	17453.00
	1600 mm dia	RM	25343.00
	1800 mm dia	RM	30074.00
	2000 mm dia	RM	35330.00
	2200 mm dia	RM	41460.00
16.2	Providing, Supplying, laying, jointing, field testing, commissioning, complete at site of GRP pipes PN-6.0 (6.0kg/sqcm) Conforming to IS 12709 for water application/ IS 14402 for sewerage application, including cost of coupling, pipe material, transportation, loading, unloading, stacking and labour work complete stiffness class 124kpa (2500N/m ²)		
	300 mm dia	RM	1764.00
	350 mm dia	RM	2182.00
	400 mm dia	RM	2640.00
	450 mm dia	RM	2988.00
	500 mm dia	RM	3449.00
	600 mm dia	RM	4513.00
	700 mm dia	RM	5506.00
	800 mm dia	RM	7067.00
	900 mm dia	RM	8313.00
	1000 mm dia	RM	10281.00
	1100 mm dia	RM	11822.00
	1200 mm dia	RM	14313.00
	1400 mm dia	RM	21653.00
	1500 mm dia	RM	26380.00
	1600 mm dia	RM	26490.00
	1800 mm dia	RM	31540.00
	2000 mm dia	RM	37359.00
	2200 mm dia	RM	43342.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
16.3	Providing, Supplying, laying, jointing, field testing, commissioning, complete at site of GRP pipes PN-9.0 (9.0kg/sqcm) Conforming to IS 12709 for water application/ IS 14402 for sewerage application, including cost of coupling, pipe material, transportation, loading, unloading and stacking and labour work complete stiffness class 124kpa (2500N/m ²)		
	300 mm dia	RM	1789.00
	350 mm dia	RM	2249.00
	400 mm dia	RM	2751.00
	450 mm dia	RM	3056.00
	500 mm dia	RM	3516.00
	600 mm dia	RM	4666.00
	700 mm dia	RM	5694.00
	800 mm dia	RM	7312.00
	900 mm dia	RM	8600.00
	1000 mm dia	RM	10620.00
	1100 mm dia	RM	12219.00
	1200 mm dia	RM	14762.00
	1400 mm dia	RM	22834.00
	1600 mm dia	RM	27637.00
	1800 mm dia	RM	33005.00
	2000 mm dia	RM	39390.00
	2200 mm dia	RM	45226.00
16.4	Providing, Supplying, laying, jointing, field testing, commissioning, complete of GRP pipes PN-12.0(12.0kg/sqcm) Conforming to IS 12709 for water application/ IS 14402 for sewerage application, including cost of coupling, pipe material, transportation, loading, unloading and stacking and labour work complete stiffness class 124kpa (2500N/m ²)		
	300 mm dia	RM	1855.00
	350 mm dia	RM	2334.00
	400 mm dia	RM	2759.00
	450 mm dia	RM	3174.00
	500 mm dia	RM	3677.00
	600 mm dia	RM	4891.00
	700 mm dia	RM	5981.00
	800 mm dia	RM	7659.00
	900 mm dia	RM	9046.00
	1000 mm dia	RM	11143.00
	1100 mm dia	RM	12861.00
	1200 mm dia	RM	15506.00
	1400 mm dia	RM	23896.00
	1600 mm dia	RM	29248.00
	1800 mm dia	RM	35103.00
	2000 mm dia	RM	41797.00
	2200 mm dia	RM	49846.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
16.5	Providing, Supplying, laying, jointing, field testing, commissioning, complete of GRP pipes PN-15.0(15.0kg/sqcm) Conforming to IS 12709 for water application/ IS 14402 for sewerage application, including cost of coupling, pipe material, transportation, loading, unloading and stacking and labour work complete stiffness class 124kpa (2500N/m ²)		
	300 mm dia	RM	1987.00
	350 mm dia	RM	2506.00
	400 mm dia	RM	2957.00
	450 mm dia	RM	3326.00
	500 mm dia	RM	3862.00
	600 mm dia	RM	5148.00
	700 mm dia	RM	6344.00
	800 mm dia	RM	8106.00
	900 mm dia	RM	9580.00
	1000 mm dia	RM	11812.00
	1100 mm dia	RM	13674.00
	1200 mm dia	RM	16486.00
	1400 mm dia	RM	25103.00
	1600 mm dia	RM	30754.00
	1800 mm dia	RM	37121.00
	2000 mm dia	RM	44193.00
	2200 mm dia	RM	51427.00
16.6	Providing and supplying Glass reinforced plastic pipes Class (SN) 5000 3 Kg/Sq.cm.		
	300 mm	RM	1875.00
	350 mm	RM	2320.00
	400 mm	RM	2970.00
	450 mm	RM	3228.00
	500 mm	RM	3755.00
	600 mm	RM	4909.00
	700 mm	RM	6106.00
	800 mm	RM	7849.00
	900 mm	RM	9374.00
	1000mm	RM	11611.00
	1100mm	RM	13473.00
	1200mm	RM	16278.00
	1400mm	RM	24093.00
	1600mm	RM	29299.00
	1800mm	RM	34685.00
	2000mm	RM	41515.00
	2200mm	RM	48407.00
16.7	Providing and supplying Glass reinforced plastic pipes Class (SN) 5000 6 Kg/Sq.cm.		
	300 mm	RM	1900.00
	350 mm	RM	2374.00
	400 mm	RM	2898.00
	450 mm	RM	3245.00
	500 mm	RM	3772.00
	600 mm	RM	4978.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
	700 mm	RM	6174.00
	800 mm	RM	7942.00
	900 mm	RM	9459.00
	1000mm	RM	11703.00
	1100mm	RM	13573.00
	1200mm	RM	16397.00
	1400mm	RM	24739.00
	1600mm	RM	30236.00
	1800mm	RM	36189.00
	2000mm	RM	43214.00
	2200mm	RM	50270.00
16.8	Providing and supplying Glass reinforced plastic pipes Class (SN) 5000 9 Kg/Sq.cm.		
	300 mm	RM	1926.00
	350 mm	RM	2427.00
	400 mm	RM	2825.00
	450 mm	RM	3262.00
	500 mm	RM	3787.00
	600 mm	RM	5044.00
	700 mm	RM	6241.00
	800 mm	RM	8036.00
	900 mm	RM	9543.00
	1000mm	RM	11794.00
	1100mm	RM	13673.00
	1200mm	RM	16516.00
	1400mm	RM	25385.00
	1600mm	RM	31173.00
	1800mm	RM	37695.00
	2000mm	RM	44914.00
	2200mm	RM	52133.00
16.9	Providing and supplying Glass reinforced plastic pipes Class (SN) 5000 12 Kg/Sq.cm.		
	300 mm	RM	1974.00
	350 mm	RM	2508.00
	400 mm	RM	2876.00
	450 mm	RM	3339.00
	500 mm	RM	3871.00
	600 mm	RM	5196.00
	700 mm	RM	6443.00
	800 mm	RM	8288.00
	900 mm	RM	9846.00
	1000mm	RM	12183.00
	1100mm	RM	14120.00
	1200mm	RM	17028.00
	1400mm	RM	26570.00
	1600mm	RM	32804.00
	1800mm	RM	39526.00
	2000mm	RM	47184.00
	2200mm	RM	54756.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
16.10	Providing and supplying Glass reinforced plastic pipes Class (SN) 5000 15 Kg/Sq.cm.		
	300 mm	RM	2046.00
	350 mm	RM	2597.00
	400 mm	RM	2976.00
	450 mm	RM	3456.00
	500 mm	RM	3456.00
	600 mm	RM	4023.00
	700 mm	RM	5415.00
	800 mm	RM	6729.00
	900 mm	RM	8649.00
	1000mm	RM	10309.00
	1100mm	RM	12739.00
	1200mm	RM	14786.00
	1400mm	RM	17829.00
	1600mm	RM	27735.00
	1800mm	RM	34285.00
	2000mm	RM	41486.00
	2200mm	RM	49666.00
16.11	Supplying, laying, jointing, field testing, commissioning, complete of GRP pipes specials Conforming to IS 12709 for water application, including cost of material, transportation, loading, unloading and stacking and labour complete.		rates in terms of per meter cost of GRP pipe
	90° Bend with one coupling	Each	5.50 times per mtr. Cost of pipe
	60° Bend with one coupling	Each	4.50 times per mtr. Cost of pipe
	45° Bend with one coupling	Each	3.75 times per mtr. Cost of pipe
	30° Bend with one coupling	Each	3.25 times per mtr. Cost of pipe
	22.5° Bend with one coupling	Each	2.25 times per mtr. Cost of pipe
	11.25° Bend with one coupling	Each	1.75 times per mtr. Cost of pipe
	GRP Equal Tee.	Each	1.00 times per mtr. Cost of pipe
	Flanged tailpiece (length 0.65 mtr)	Each	1.00 times per mtr. Cost of pipe
	Lamination (Butt strap joint) joint	Each	2.50 times per mtr. Cost of pipe
	Double belt coupling	Each	6.50 times per mtr. Cost of pipe

CHAPTER 17

M.S. PIPES, SPECIALS, FITTINGS INCLUDING FABRICATION & LAYING

1 Scope

1.1 This Specification covers the requirements for manufacturing, supplying, laying, jointing, testing at works, site of Electrically Welded Steel pipes, internally lined with cement concrete and externally coated with cement mortar, used for water supply mains.

2 Applicable Codes

- IS: 3589 Seamless/Electrically Welded Steel Pipes for Water, Gas, Sewage Specification.
- IS: 5822 Code of Practice for laying of Electrically Welded Steel Pipes for Water Supply.
- IS : 7322 Specification for Specials for Steel Cylinder Reinforced Concrete Pipes
- IS: 432 Mild Steel and Medium Tensile Bars Reinforcement Part I
- IS: 432 Specifications for Mild Steel and Medium Tensile Bars and Hard Part II Drawn Steel Wire (Third Revision)
- IS: 2328 Flattening Test for Seamless Pipes
- IS: 12269 Specification for 53 Grade Ordinary Portland Cement (OPC)
- IS: 6452 Specification for High Alumina Cement for Structural Use (1st Revision)
- IS: 8112 Specification for Curing of High Strength OPC
- IS: 8041 Specifications for Curing of Rapid Hardening Cement
- IS: 269 Specification for Ordinary Portland Cement (OPC)
- IS: 455 Specification for Portland Slag Cement
- IS: 1489 Specification for Portland Pozzolana Cement
- IS: 8043 Specification for Hydrophobic Portland Cement
- IS: 3600 Methods of Testing Fusion Welded Joints and Weld Metal in Part I Steel :

2.1 Other I.S. Codes not Specifically mentioned here but pertaining to the use of Electrically Welded Steel pipes shall form part of these Specifications.

3 Diametation & Mass Per Meter Run of Pipes

3.1 The preferred outside Diameter and thickness of the pipes shall be as per the table -5, of IS : 3589 : 2001.

3.2 Mass per meter run of the pipes can be worked out by the formula as under.

$$M = (D - T) \times T \times 0.0246615$$

M = mass of the pipe kg/metre,

D = nominal outside diameter of the tube in mm, and

T = Nominal thickness of the tube in mm

3.3 Tolerances

The tolerances of mass per cart load of 10 tonnes or above shall be ± 7.5 percent on the nominal theoretical mass of the tubes.

4 Length : The pipes shall be manufactured in lengths of 5m, unless otherwise specified.

5 Welding : For manufacturing of the site pipes, the welding & testing should comply with IS: 816.

6 Fabrication of specials : Specials such as bends, tapers, tees shall Conform to IS: 7322, Specials shall be fabricated by cutting plates of the specified thickness to the required shape obtained by developing the form of specials on ground. Stiffeners shall be provided wherever necessary. Abutting profiles shall be obtained using templates which guide the cutting torches as to obtained a uniform cut. No hand cutting shall be permitted. Specifications for the using and testing of the plates, electrodes, welding, cleaning etc., shall be the same as for the straight pipes.

7 Measurement:

The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and enumerated and paid for separately. The portion of the pipe within the collar at the joints shall not be included in the length of pipe work.

8 Rates

The rates include charges for all tools & plants, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in positions as per approved drawing.

The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials, and other causes.

**CHAPTER 17 - M.S. PIPES, SPECIALS, FITTINGS INCLUDING FABRICATION
& LAYING**

Sr. No.	Short Description	Unit	Rate (in Rs.)
	M.S.PIPES		
17.1	Providing and Supplying of following M.S. pipes as per IS specifications with inside & outside epoxy coating as per relevant IS code, duly tested for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
17.1.1	Dia. of pipe 219.10 mm (O.D) Thickness of pipe :		
	4.80 mm	RM	1664.00
	5.60 mm	RM	1933.00
	6.40 mm	RM	2200.00
	7.00 mm	RM	2399.00
	7.90 mm	RM	2695.00
	8.20 mm	RM	2793.00
	8.70 mm	RM	2956.00
	9.50 mm	RM	3216.00
17.1.2	Dia. of pipe 273.10 mm (O.D) Thickness of pipe :		
	4.80 mm	RM	2086.00
	5.60 mm	RM	2424.00
	6.40 mm	RM	2761.00
	7.20 mm	RM	3096.00
	7.80 mm	RM	3345.00
	8.70 mm	RM	3718.00
	9.30 mm	RM	3964.00
17.1.3	Dia. of pipe 323.9 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	2883.00
	6.40 mm	RM	3285.00
	7.10 mm	RM	3636.00
	7.90 mm	RM	4034.00
	8.40 mm	RM	4282.00
	8.70 mm	RM	4431.00
	9.50 mm	RM	4825.00
17.1.4	Dia. of pipe 355.7 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	3174.00
	6.40 mm	RM	3617.00
	7.10 mm	RM	4004.00
	7.90 mm	RM	4443.00
	8.70 mm	RM	4880.00
	9.50 mm	RM	5316.00
17.1.5	Dia. of pipe 406.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	3633.00
	6.40 mm	RM	4141.00
	7.10 mm	RM	4584.00
	7.90 mm	RM	5088.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	8.70 mm	RM	5590.00
	9.50 mm	RM	6091.00
	10.00 mm	RM	6402.00
17.1.6	Dia. of pipe 457.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	4098.00
	6.40 mm	RM	4672.00
	7.10 mm	RM	5172.00
	7.90 mm	RM	5742.00
	8.70 mm	RM	6310.00
	9.50 mm	RM	6876.00
	10.00 mm	RM	7229.00
17.1.7	Dia. of pipe 508.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	4558.00
	6.40 mm	RM	5198.00
	7.10 mm	RM	5756.00
	7.90 mm	RM	6391.00
	8.70 mm	RM	7026.00
	9.50 mm	RM	7657.00
	10.00 mm	RM	8051.00
17.1.8	Dia. of pipe 559.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	5030.00
	6.40 mm	RM	5735.00
	7.10 mm	RM	6351.00
	7.90 mm	RM	7052.00
	8.70 mm	RM	7752.00
	9.50 mm	RM	8449.00
	10.00 mm	RM	8884.00
17.1.9	Dia. of pipe 610.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	5490.00
	6.40 mm	RM	6261.00
	7.10 mm	RM	6935.00
	7.90 mm	RM	7702.00
	8.70 mm	RM	8467.00
	9.50 mm	RM	9231.00
	10.00 mm	RM	9706.00
	12.00 mm	RM	11602.00
17.1.10	Dia. of pipe 660.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	5942.00
	6.40 mm	RM	6777.00
	7.10 mm	RM	7507.00
	7.90 mm	RM	8339.00
	8.70 mm	RM	9168.00
	9.50 mm	RM	9996.00
	10.00 mm	RM	10512.00
17.1.11	Dia. of pipe 711.0 mm (O.D) Thickness of pipe :		
	5.60 mm	RM	6402.00
	6.40 mm	RM	7303.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	7.10 mm	RM	8091.00
	7.90 mm	RM	8988.00
	8.70 mm	RM	9884.00
	9.50 mm	RM	10777.00
	10.00 mm	RM	11335.00
	12.00 mm	RM	13556.00
17.1.12	Dia. of pipe 762.00. mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	6862.00
	6.40 mm	RM	7830.00
	7.10 mm	RM	8674.00
	7.90 mm	RM	9638.00
	8.70 mm	RM	10599.00
	9.50 mm	RM	11558.00
	10.00 mm	RM	12156.00
17.1.13	Dia. of pipe 813.00. mm (O.D.) Thickness of pipe :		
	5.60 mm	RM	7323.00
	6.40 mm	RM	8356.00
	7.10 mm	RM	9258.00
	7.90 mm	RM	10287.00
	8.70 mm	RM	11315.00
	9.50 mm	RM	12340.00
	10.00 mm	RM	12979.00
	12.00 mm	RM	15530.00
17.1.14	Dia. of pipe 864.00. mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	7800.00
	6.40 mm	RM	8899.00
	7.10 mm	RM	9859.00
	7.90 mm	RM	10954.00
	8.70 mm	RM	12047.00
	9.50 mm	RM	13138.00
	10.00 mm	RM	13818.00
17.1.15	Dia. of pipe 914.00 mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	8251.00
	6.40 mm	RM	9415.00
	7.10 mm	RM	10431.00
	7.90 mm	RM	11590.00
	8.70 mm	RM	12748.00
	9.50 mm	RM	13903.00
	10.00 mm	RM	14624.00
17.1.16	Dia. of pipe 965.00 mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	8729.00
	6.40 mm	RM	9958.00
	7.10 mm	RM	11032.00
	7.90 mm	RM	12257.00
	8.70 mm	RM	13480.00
	9.50 mm	RM	14701.00
	10.00 mm	RM	15463.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
17.1.17	Dia. of pipe 1016.00 mm (O. D.) Thickness of pipe :		
	i) 5.60 mm	RM	9189.00
	ii) 6.40 mm	RM	10484.00
	iii) 7.10 mm	RM	11616.00
	iv) 7.90 mm	RM	12906.00
	v) 8.70 mm	RM	14195.00
	vi) 9.50 mm	RM	15482.00
	vii) 10.00 mm	RM	16285.00
	viii) 12.00 mm	RM	19490.00
17.1.18	Dia. of pipe 1067.00 mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	9649.00
	6.40 mm	RM	11010.00
	7.10 mm	RM	12199.00
	7.90 mm	RM	13556.00
	8.70 mm	RM	14910.00
	9.50 mm	RM	16263.00
	10.00 mm	RM	17107.00
17.1.19	Dia. of pipe 1118.00. mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	10110.00
	6.40 mm	RM	11537.00
	7.10 mm	RM	12783.00
	7.90 mm	RM	14206.00
	8.70 mm	RM	15626.00
	9.50 mm	RM	17044.00
	10.00 mm	RM	17930.00
17.1.20	Dia. of pipe 1168.00. mm (O. D.) Thickness of pipe :		
	5.60 mm	RM	10561.00
	6.40 mm	RM	12052.00
	7.10 mm	RM	13355.00
	7.90 mm	RM	14842.00
	8.70 mm	RM	16327.00
	9.50 mm	RM	17810.00
	10.00 mm	RM	18736.00
17.1.21	Dia. of pipe 1219.00. mm (O. D.) Thickness of pipe :		
	6.40 mm	RM	12579.00
	7.10 mm	RM	13939.00
	7.90 mm	RM	15491.00
	8.70 mm	RM	17043.00
	9.50 mm	RM	18591.00
	10.00 mm	RM	19558.00
	12.00 mm	RM	23417.00
17.1.22	Dia. of pipe 1296.00. mm (O. D.) Thickness of pipe :		
	9.50 mm	RM	19796.00
	9.98 mm	RM	20783.00
	10.00 mm	RM	20825.00
17.1.23	Dia. of pipe 1321.00. mm (O. D.) Thickness of pipe :		
	6.40 mm	RM	13656.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	7.10 mm	RM	15132.00
	7.90 mm	RM	16816.00
	8.70 mm	RM	18498.00
	9.50 mm	RM	20178.00
	10.00 mm	RM	21227.00
17.1.24	Dia. of pipe 1422.00. mm (O. D.) Thickness of pipe :		
	7.10 mm	RM	16287.00
	7.90 mm	RM	18102.00
	8.70 mm	RM	19915.00
	9.50 mm	RM	21725.00
	10.00 mm	RM	22856.00
	12.00 mm	RM	27369.00
17.1.25	Dia. of pipe 1473.00. mm (O. D.) Thickness of pipe :		
	9.50 mm	RM	22506.00
	9.98 mm	RM	23631.00
17.1.26	Dia. of pipe 1524.00. mm (O. D.) Thickness of pipe :		
	7.10 mm	RM	17455.00
	7.90 mm	RM	19401.00
	8.70 mm	RM	21346.00
	9.50 mm	RM	23287.00
	10.00 mm	RM	24500.00
	11.90 mm	RM	29101.00
	12.00 mm	RM	29343.00
17.1.27	Dia. of pipe 1550.00. mm (O. D.) Thickness of pipe :		
	10.00 mm	RM	24919.00
	11.00 mm	RM	27384.00
17.1.28	Dia. of pipe 1576.00. mm (O. D.) Thickness of pipe :		
	9.50 mm	RM	24084.00
	10.00 mm	RM	24677.00
17.1.29	Dia. of pipe 1626.00. mm (O. D.) Thickness of pipe :		
	7.10 mm	RM	18622.00
	7.90 mm	RM	20700.00
	8.70 mm	RM	22776.00
	9.50 mm	RM	24849.00
	10.00 mm	RM	26144.00
	12.00 mm	RM	31316.00
17.1.30	Dia. of pipe 1650.00. mm (O. D.) Thickness of pipe :		
	7.90 mm	RM	21006.00
	8.70 mm	RM	23112.00
	9.50 mm	RM	25217.00
	10.00 mm	RM	26531.00
	12.00 mm	RM	31780.00
17.1.31	Dia. of pipe 1700.00. mm (O. D.) Thickness of pipe :		
	7.90 mm	RM	21642.00
	8.70 mm	RM	23814.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	9.50 mm	RM	25983.00
	10.00 mm	RM	27337.00
	12.00 mm	RM	32747.00
17.1.32	Dia. of pipe 1750.00. mm (O. D.) Thickness of pipe :		
	7.90 mm	RM	22280.00
	8.70 mm	RM	24515.00
	9.50 mm	RM	26748.00
	10.00 mm	RM	28143.00
	12.00 mm	RM	33715.00
17.1.33	Dia. of pipe 1800.00. mm (O. D.) Thickness of pipe :		
	i) 7.90 mm	RM	22916.00
	ii) 8.70 mm	RM	25216.00
	iii) 9.50 mm	RM	27514.00
	iv) 10.00 mm	RM	28949.00
	v) 12.00 mm	RM	34682.00
17.2	Providing and Supplying of following M.S. pipes as per IS specifications with inside & outside epoxy coating as per relevant IS code, duly tested for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.		
17.2.1	Dia. of pipe 200.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	1658.00
	ii) 6.00 mm	RM	1998.00
	iii) 7.00 mm	RM	2341.00
	iv) 8.00 mm	RM	2688.00
	v) 9.00 mm	RM	3038.00
	vi) 10.00 mm	RM	3391.00
17.2.2	Dia. of pipe 250.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	2063.00
	ii) 6.00 mm	RM	2484.00
	iii) 7.00 mm	RM	2908.00
	iv) 8.00 mm	RM	3335.00
	v) 9.00 mm	RM	3766.00
	vi) 10.00 mm	RM	4199.00
17.2.3	Dia. of pipe 300.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	2468.00
	ii) 6.00 mm	RM	2970.00
	iii) 7.00 mm	RM	3474.00
	iv) 8.00 mm	RM	3982.00
	v) 9.00 mm	RM	4493.00
	vi) 10.00 mm	RM	5007.00
17.2.4	Dia. of pipe 350.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	2875.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	ii) 6.00 mm	RM	3457.00
	iii) 7.00 mm	RM	4042.00
	iv) 8.00 mm	RM	4631.00
	v) 9.00 mm	RM	5222.00
	vi) 10.00 mm	RM	5817.00
17.2.5	Dia. of pipe 400.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	3282.00
	ii) 6.00 mm	RM	3945.00
	iii) 7.00 mm	RM	4611.00
	iv) 8.00 mm	RM	5280.00
	v) 9.00 mm	RM	5952.00
	vi) 10.00 mm	RM	6628.00
17.2.6	Dia. of pipe 450.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	3690.00
	ii) 6.00 mm	RM	4433.00
	iii) 7.00 mm	RM	5179.00
	iv) 8.00 mm	RM	5929.00
	v) 9.00 mm	RM	6682.00
	vi) 10.00 mm	RM	7438.00
17.2.7	Dia. of pipe 500.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	4093.00
	ii) 6.00 mm	RM	4917.00
	iii) 7.00 mm	RM	5744.00
	iv) 8.00 mm	RM	6574.00
	v) 9.00 mm	RM	7407.00
	vi) 10.00 mm	RM	8244.00
17.2.8	Dia. of pipe 550.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	4507.00
	ii) 6.00 mm	RM	5412.00
	iii) 7.00 mm	RM	6319.00
	iv) 8.00 mm	RM	7230.00
	v) 9.00 mm	RM	8144.00
	vi) 10.00 mm	RM	9061.00
17.2.9	Dia. of pipe 600.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	4910.00
	ii) 6.00 mm	RM	5895.00
	iii) 7.00 mm	RM	6883.00
	iv) 8.00 mm	RM	7875.00
	v) 9.00 mm	RM	8869.00
	vi) 10.00 mm	RM	9867.00
	vii) 12.00 mm	RM	11873.00
17.2.10	Dia. of pipe 650.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	5313.00
	ii) 6.00 mm	RM	6379.00
	iii) 7.00 mm	RM	7447.00
	iv) 8.00 mm	RM	8519.00
	v) 9.00 mm	RM	9595.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	vi) 10.00 mm	RM	10673.00
	vii) 12.00 mm	RM	12840.00
17.2.11	Dia. of pipe 700.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	5716.00
	ii) 6.00 mm	RM	6862.00
	iii) 7.00 mm	RM	8011.00
	iv) 8.00 mm	RM	9165.00
	v) 9.00 mm	RM	10320.00
	vi) 10.00 mm	RM	11479.00
	vii) 12.00 mm	RM	13807.00
17.2.12	Dia. of pipe 750.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	6119.00
	ii) 6.00 mm	RM	7346.00
	iii) 7.00 mm	RM	8576.00
	iv) 8.00 mm	RM	9809.00
	v) 9.00 mm	RM	11046.00
	vi) 10.00 mm	RM	12272.00
	vii) 12.00 mm	RM	14775.00
17.2.13	Dia. of pipe 800.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	6522.00
	ii) 6.00 mm	RM	7830.00
	iii) 7.00 mm	RM	9140.00
	iv) 8.00 mm	RM	10454.00
	v) 9.00 mm	RM	11771.00
	vi) 10.00 mm	RM	13091.00
	vii) 12.00 mm	RM	15742.00
17.2.14	Dia. of pipe 850.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	6942.00
	ii) 6.00 mm	RM	8330.00
	iii) 7.00 mm	RM	9819.00
	iv) 8.00 mm	RM	11116.00
	v) 9.00 mm	RM	12513.00
	vi) 10.00 mm	RM	13914.00
	vii) 12.00 mm	RM	16726.00
17.2.15	Dia. of pipe 900.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	7345.00
	ii) 6.00 mm	RM	8813.00
	iii) 7.00 mm	RM	10286.00
	iv) 8.00 mm	RM	11761.00
	v) 9.00 mm	RM	13239.00
	vi) 10.00 mm	RM	14720.00
	vii) 12.00 mm	RM	17693.00
17.2.16	Dia. of pipe 950.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	7765.00
	ii) 6.00 mm	RM	9314.00
	iii) 7.00 mm	RM	10867.00
	iv) 8.00 mm	RM	12422.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	v) 9.00 mm	RM	13981.00
	vi) 10.00 mm	RM	15544.00
	vii) 12.00 mm	RM	18677.00
17.2.17	Dia. of pipe 1000.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	8168.00
	ii) 6.00 mm	RM	9798.00
	iii) 7.00 mm	RM	11431.00
	iv) 8.00 mm	RM	13068.00
	v) 9.00 mm	RM	14707.00
	vi) 10.00 mm	RM	16350.00
	vii) 12.00 mm	RM	19644.00
17.2.18	Dia. of pipe 1050.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	8571.00
	ii) 6.00 mm	RM	10281.00
	iii) 7.00 mm	RM	11995.00
	iv) 8.00 mm	RM	13712.00
	v) 9.00 mm	RM	15432.00
	vi) 10.00 mm	RM	17156.00
	vii) 12.00 mm	RM	20612.00
17.2.19	Dia. of pipe 1100.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	8974.00
	ii) 6.00 mm	RM	10765.00
	iii) 7.00 mm	RM	12560.00
	iv) 8.00 mm	RM	14357.00
	v) 9.00 mm	RM	16158.00
	vi) 10.00 mm	RM	17962.00
	vii) 12.00 mm	RM	21579.00
17.2.20	Dia. of pipe 1200.00 mm (I. D.) Thickness of pipe :		
	i) 5.00 mm	RM	9780.00
	ii) 6.00 mm	RM	11733.00
	iii) 7.00 mm	RM	13688.00
	iv) 8.00 mm	RM	15646.00
	v) 9.00 mm	RM	17609.00
	vi) 10.00 mm	RM	19574.00
	vii) 12.00 mm	RM	23514.00
17.2.21	Dia. of pipe 1300.00 mm (I. D.) Thickness of pipe :		
	i) 6.00 mm	RM	12725.00
	ii) 7.00 mm	RM	14841.00
	iii) 8.00 mm	RM	16961.00
	iv) 9.00 mm	RM	19084.00
	v) 10.00 mm	RM	14674.00
	vi) 12.00 mm	RM	25474.00
17.2.22	Dia. of pipe 1400.00 mm (I. D.) Thickness of pipe :		
	i) 7.00 mm	RM	15970.00
	ii) 8.00 mm	RM	18251.00
	iii) 9.00 mm	RM	20536.00
	iv) 10.00 mm	RM	22823.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
v)	12.00 mm	RM	27408.00
17.2.23	Dia. of pipe 1500.00 mm (I. D.) Thickness of pipe :		
i)	7.00 mm	RM	17098.00
ii)	8.00 mm	RM	19541.00
iii)	9.00 mm	RM	21986.00
iv)	10.00 mm	RM	24435.00
v)	12.00 mm	RM	29342.00
17.2.24	Dia. of pipe 1600.00 mm (I. D.) Thickness of pipe :		
i)	7.00 mm	RM	18227.00
ii)	8.00 mm	RM	20830.00
iii)	9.00 mm	RM	23437.00
iv)	10.00 mm	RM	26048.00
v)	12.00 mm	RM	31277.00
17.2.25	Dia. of pipe 1700.00 mm (I. D.) Thickness of pipe :		
i)	8.00 mm	RM	22120.00
ii)	9.00 mm	RM	24888.00
iii)	10.00 mm	RM	27660.00
iv)	12.00 mm	RM	33211.00
17.2.26	Dia. of pipe 1800.00 mm (I. D.) Thickness of pipe :		
i)	8.00 mm	RM	23410.00
ii)	9.00 mm	RM	26339.00
iii)	10.00 mm	RM	29272.00
iv)	12.00 mm	RM	35146.00
<i>Fabrication of M.S. Pipes and Specials</i>			
17.3	Fabrication of M.S. pipes & specials as per IS specifications with inside & outside epoxy coating as per relevant IS code, duly tested for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as for direction of Engineer-in-Charge.		
17.3.1	Fabricating pipes from steel plates (all thickness)		
	5 to 8 mm	MT	9059.00
	8 to 12 mm	MT	6133.00
17.4	Providing and applying primer and one coat of red oxide.	Sqm	35.00
17.5	Providing and applying primer and one coat of red oxide of iron paint, internally	Sqm	75.00
17.6	Providing and applying primer and one coat of red oxide of iron paint, externally, including cleaning the surface of the pipes with steel scrappers, wire brushes and metal cleaning solution etc.	Sqm	41.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
17.7	Providing and applying covering coat of grey graphite of approved quality including dusting the surface etc complete.	Sqm	81.00
Laying of M.S. Pipes and Specials			
17.8	Labour Only for lowering & laying of M.S. Pipes on pedestals or chairs upon prepared formation including all site arrangements complete.		
17.8.1	5 mm to 8 mm thick.		
	Up to 250 mm. dia.	RM	228.00
	Above 250 mm.Upto 500 mm. dia.	RM	269.00
	Above 500 mm.Upto 750 mm. dia.	RM	350.00
	Above 750 mm.Upto 1000 mm. dia	RM	431.00
	Above 1000 mm.Upto 1200 mm. dia.	RM	479.00
17.8.2	8 mm to 12 mm thick.		
	From 750 mm. Upto1000 mm. dia.	RM	563.00
	Above 1000 mm.Upto 1200 mm. dia	RM	642.00
	Above 1200 mm.Upto 1500 mm. Dia	RM	785.00
	Above 1500 mmUpto 1700 mm. dia	RM	811.00
	Above 1700 mm.Upto 1800 mm dia	RM	847.00
17.9	Labour Only lowering & laying of M.S. M.S.specials such as distance pieces, straps etc. including all site arrangements complete.		
17.9.1	5 mm to 8 mm thick.		
	Up to 250 mm. dia.	RM	73.00
	Above 250 mm.Upto 500 mm. dia.	RM	94.00
	Above 500 mm.Upto 750 mm. dia.	RM	123.00
	Above 750 mm.Upto 1000 mm. dia.	RM	151.00
	Above 1000 mm.Upto 1250 mm. dia.	RM	168.00
17.9.2	8 mm to 12 mm thick.		
	From 750 mm. Upto1000 mm. dia.	RM	86.00
	Above 1000 mm.Upto 1200 mm. dia	RM	225.00
	Above 1200 mm.Upto 1500 mm. Dia	RM	275.00
	Above 1500 mmUpto 1700 mm. dia	RM	284.00
	Above 1700 mm.Upto 2000 mm dia	RM	296.00
17.10	Welding in all positions M.S.Pipes,		
17.10.1	Butt Joints : Plate Thickness		
	4 mm.	RM	64.00
	5 mm.	RM	101.00
	6 mm.	RM	130.00
	7 mm.	RM	158.00
	8 mm.	RM	267.00
	10mm.	RM	325.00

CHAPTER 18

BAR WRAPPED STEEL CYLINDER PIPES (BWSC)

- 1 Scope
 - 1.1 This specification covers the requirements for design, manufacturing, testing, supplying, laying, jointing, welding and testing at works and site of Bar Wrapped Steel Cylinder (BWSC) Pipes used for water supply mains.

- 2 Applicable Codes
 - IS : 226 Specifications for structural Steel (Standard Quality)
 - IS: 383 Specifications for coarse and fine aggregates from natural sources for concrete
 - IS: 432 Specifications for mild steel and medium tensile steel bar/wires for concrete reinforcement
 - Part 1 Mild Steel and medium tensile steel bar/wires
 - Part 2 Hard drawn steel wire
 - IS: 783 Code of Practice for laying of concrete pipes
 - IS : 1566 Specifications for Hard Drawn Steel Wire for Concrete Reinforcement
 - IS: 2062 Specifications for Steel for General Structural Purposes
 - IS: 3597 Methods of Test for Concrete Pipes
 - IS: 3658 Code of Practice for liquid penetrant flaw detection
 - IS: 5822 Code of Practice for laying of Electrically Welded Steel Pipes for Water Supply
 - IS : 7322 Specifications for Specials for Steel Cylinder Reinforced Concrete pipes
 - IS: 15155 Specifications for Bar Wrapped steel Cylinder Pipes (including Fittings)
 - AWWA Manual M-9 Concrete pressure pipe
 - EN 641 Reinforced Concrete Pressure Pipe, Cylinder Type, including Joints & fittings.

- 2.1 Other I.S. Codes not Specifically mentioned here but pertaining to the use of BWSC pipes form part of these Specifications.

- 3 Design Criteria
 - 3.1 The reinforcement of the pipe shall consist of a welded steel cylinder and bar/wire is directly wrapped under low tension. The average circumferential stress in the steel cylinder and bar/wire reinforcement of the pipe shall be as given below :
 - 3.1.1 At factory test pressure, stress shall not exceed 187 N/mm^2 nor 75 percent of the minimum yield strength of the steel used in the cylinder.
 - 3.1.2 At site test pressure, stress shall not exceed 165 N/mm^2 nor 66 percent of the minimum yield strength of the steel used in the cylinder.
 - 3.1.3 At working pressure, stress shall not exceed 125 N/mm^2 nor 50 percent of the minimum yield strength of the steel used in the cylinder.

- 4 Preparing Pipe Faces for Welding : Before aligning, assembling and welding, the pipe faces shall be cleaned by scrapping by wire brushes or any other method specified by the authority.
- 5 Welding : Generally the welding of pipe in the field should comply with IS 816 : 1969.
- 5.1 For field welding rates applicable for similar welding in M.S. Pipes, shall be adopted.
- 6 Internal Diameter : The internal diameter shall be measured at each end of the pipe at approximately 50mm from the ends. Two measurements of the internal diameter at 90⁰ to each other shall be made at each end and centre. The internal diameter shall be maintained within the tolerance specified.
- 7 Wall Thickness : Measurement of outside circumference of the pipe shall be made at three positions and average outside diameter of the pipe shall be calculated. The inside diameter shall be measured at three positions and average shall be calculated.
- 8 Specials and Fittings
- 8.1 The steel for fabricated steel plate specials, in cut, shaped and welded so that finished special has the required shape and internal dimensions. Adjacent segments are jointed by butt welding. Before lining and coating the welding of special shall be tested by use of hot oil or dye penetrant according to IS 3658 and defects, if any shall be rectified. The steel plate thickness for specials shall be as given in IS 7322.
- 8.2 All the specials shall be tested for hydrostatic pressure as specified for BWSC pipes and to the pressure specified for pipes in the reaches where the specials are fitted.
- 9 For lowering, laying & pouring of cement mortar in the field on joints (after laying & welding) rate as per P.S.C. pipes Lowering, laying & jointing shall be adopted.
- 10 When ever manufacturer is separate and contractor for lowering, laying, jointing & testing is separate the principal contractor shall enter in to agreement with BWSC pipe manufacturer for satisfactory manufacturing, transporting, lowering, laying, jointing and testing of pipe.

11 **Measurement:**

The net length of pipes as laid or fixed shall be measured in running meters correct to a cm. Specials shall be excluded and measured and paid separately under the relevant item. The portion of the pipe at the joints (inside the joints) shall not be included in the length of pipe work. Excavation, refilling, masonry and concrete work wherever required shall be measured and paid for separately under relevant items of work.

12 **Rates**

The rate shall include the cost of materials and labour involved in all the operations except for the items measured/ enumerated separately under clause 'Measurements', which shall be paid for separately.

CHAPTER 18 - BAR WRAPPED STEEL CYLINDER PIPES (BWSC)

Sr. No.	Short Description	Unit	Rate (in Rs.)
18.1	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 4 kg/Sqcm		
	350 mm	RM	3706.00
	400 mm	RM	4042.00
	450 mm	RM	4596.00
	500 mm	RM	4936.00
	600 mm	RM	6496.00
	700 mm	RM	7413.00
	800 mm	RM	8673.00
	900 mm	RM	11208.00
	1000mm	RM	12757.00
	1100mm	RM	17859.00
	1200mm	RM	20083.00
	1300mm	RM	24298.00
	1400mm	RM	25996.00
	1500mm	RM	27675.00
	1600mm	RM	29119.00
	1700mm	RM	30561.00
	1800mm	RM	32005.00
18.2	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 6 kg/Sqcm		
	350 mm	RM	3712.00
	400 mm	RM	4055.00
	450 mm	RM	4616.00
	500 mm	RM	4958.00
	600 mm	RM	6528.00
	700 mm	RM	7435.00
	800 mm	RM	8696.00
	900 mm	RM	11232.00
	1000mm	RM	12788.00
	1100mm	RM	17872.00
	1200mm	RM	20101.00
	1300mm	RM	24323.00
	1400mm	RM	26015.00
	1500mm	RM	27699.00
	1600mm	RM	29143.00
	1700mm	RM	30587.00
	1800mm	RM	32029.00
18.3	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 8 kg/Sqcm		
	350 mm	RM	3716.00
	400 mm	RM	4080.00
	450 mm	RM	4638.00
	500 mm	RM	4986.00
	600 mm	RM	6559.00
	700 mm	RM	7462.00
	800 mm	RM	8724.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	900 mm	RM	11258.00
	1000mm	RM	12820.00
	1100mm	RM	17891.00
	1200mm	RM	20125.00
	1300mm	RM	24354.00
	1400mm	RM	26038.00
	1500mm	RM	27727.00
	1600mm	RM	29170.00
	1700mm	RM	30613.00
	1800mm	RM	32057.00
18.4	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 10 kg/Sqcm		
	350 mm	RM	3719.00
	400 mm	RM	4110.00
	450 mm	RM	4666.00
	500 mm	RM	5016.00
	600 mm	RM	6593.00
	700 mm	RM	7492.00
	800 mm	RM	8754.00
	900 mm	RM	11286.00
	1000mm	RM	12857.00
	1100mm	RM	17915.00
	1200mm	RM	20157.00
	1300mm	RM	24384.00
	1400mm	RM	26070.00
	1500mm	RM	27757.00
	1600mm	RM	29201.00
	1700mm	RM	30645.00
	1800mm	RM	32087.00
18.5	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 12 kg/Sqcm		
	350 mm	RM	3722.00
	400 mm	RM	4145.00
	450 mm	RM	4698.00
	500 mm	RM	5051.00
	600 mm	RM	6630.00
	700 mm	RM	7528.00
	800 mm	RM	9189.00
	900 mm	RM	11321.00
	1000mm	RM	13440.00
	1100mm	RM	17947.00
	1200mm	RM	20188.00
	1300mm	RM	24417.00
	1400mm	RM	26107.00
	1500mm	RM	28148.00
	1600mm	RM	30824.00
	1700mm	RM	33500.00
	1800mm	RM	36177.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
18.6	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 14 kg/Sqcm		
	350 mm	RM	3726.00
	400 mm	RM	4173.00
	450 mm	RM	4736.00
	500 mm	RM	5088.00
	600 mm	RM	6674.00
	700 mm	RM	8192.00
	800 mm	RM	10183.00
	900 mm	RM	12473.00
	1000mm	RM	14944.00
	1100mm	RM	18021.00
	1200mm	RM	20463.00
	1300mm	RM	25653.00
	1400mm	RM	28462.00
	1500mm	RM	31610.00
	1600mm	RM	34946.00
	1700mm	RM	38282.00
	1800mm	RM	41619.00
18.7	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 16 kg/Sqcm		
	350 mm	RM	3733.00
	400 mm	RM	4203.00
	450 mm	RM	4781.00
	500 mm	RM	5532.00
	600 mm	RM	7257.00
	700 mm	RM	8973.00
	800 mm	RM	11169.00
	900 mm	RM	13733.00
	1000mm	RM	16606.00
	1100mm	RM	19215.00
	1200mm	RM	22653.00
	1300mm	RM	28410.00
	1400mm	RM	31557.00
	1500mm	RM	35236.00
	1600mm	RM	37656.00
	1700mm	RM	40076.00
	1800mm	RM	42496.00
18.8	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 18 kg/Sqcm		
	350 mm	RM	3738.00
	400 mm	RM	4253.00
	450 mm	RM	4860.00
	500 mm	RM	5721.00
	600 mm	RM	7566.00
	700 mm	RM	9362.00
	800 mm	RM	11675.00
	900 mm	RM	14348.00
	1000mm	RM	17426.00
	1100mm	RM	20119.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	1200mm	RM	23754.00
	1300mm	RM	29618.00
	1400mm	RM	33328.00
	1500mm	RM	36862.00
	1600mm	RM	41429.00
	1700mm	RM	45995.00
	1800mm	RM	50562.00
18.9	Providing and supplying Bar Wrapped Steel Cylinder Pipes Test Pressure 20 kg/Sqcm		
	350 mm	RM	3773.00
	400 mm	RM	4402.00
	450 mm	RM	5311.00
	500 mm	RM	6148.00
	600 mm	RM	8129.00
	700 mm	RM	10145.00
	800 mm	RM	12015.00
	900 mm	RM	15694.00
	1000mm	RM	19028.00
	1100mm	RM	22158.00
	1200mm	RM	26071.00
	1300mm	RM	32363.00
	1400mm	RM	36824.00
	1500mm	RM	40880.00
	1600mm	RM	45246.00
	1700mm	RM	49612.00
	1800mm	RM	53978.00

CHAPTER 19

Precast Concrete Pipes (PCCP)

- 1 Scope
- 1.1 The Specification covers the requirements for design, manufacturing, testing, supplying, laying, jointing and testing at works and site of Precast Concrete Pipes (PCCP) pipes used for water supply mains, sewers and storm water drains.

- 2 Applicable Codes
 - IS : 458 Specification for Concrete pipes (with and without reinforcement)
 - IS: 3597 Method of Tests for Concrete pipes.
 - IS: 5382 Specification for Rubber Sealing Rings for Gas Mains, Water Mains and Sewers.
 - IS: 456 Code of Practice for Plain and Reinforced Concrete.
 - IS: 783 Code of Practice for Laying of Concrete Pipes.
- 2.1 Other I.S. Codes not Specifically mentioned here but pertaining to the use of Electrically Welded Steel pipes shall form part of these Specifications.

- 3 Design
- 3.1 Design of PCC pipes shall be in accordance with the relevant clauses of IS : 454.
- 3.2 The ends of pipes shall be in accordance with relevant clauses of IS : 458.

- 4 Laying and Jointing shall be as per IS 783:1985

- 5 Transportation :-
 - (1) Reasonable care shall be exercised in loading, transporting and unloading concrete pipes. Handling shall be such as to avoid impact. Gradual unloading by inclined plane or by chain block is recommended.

- 6 Tests to be conducted at manufacturing units before taking delivery :-
 - 6.1 All samples for testing purpose shall be selected at random.
 - 6.2 Samples of pipes shall be subjected to following test in accordance with IS : 3597
 - 6.2.1 Hydrostatic test
 - 6.2.2 Three edge bearing test
 - 6.2.3 Permeability test
 - 6.3 At the time manufacture of such pipes compressive strength of the concrete cubes

- 7 Laying & Jointing of Pipe Shall be as given in the Chapter 15 (Non Pressure RCC Pipes).

- 8 For lowering, laying & pouring of cement mortar in the field on joints (after laying & welding) rate as per P.S.C. pipes Lowering, laying & jointing shall be adopted.

- 9 For field welding rates applicable for similar welding in M.S. Pipes, shall be adopted.

10 When ever manufacturer is separate and contractor for lowering, laying, jointing & testing is separate the principal contractor shall enter in to agreement with PCC pipe manufacturer for satisfactory manufacturing, transporting, lowering, laying, jointing and testing of pipe.

11 **Measurement:**

The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and measured in running meters and paid for separately under the relevant items. The portion of the pipe at the joints shall not be included in the length of the pipe work.

12 **Rates**

The rate shall include the cost of materials and labour involved in all the operations except for the items measured/ enumerated separately under clause 'Measurements', which shall be paid for separately.

CHAPTER 19 - Precast Concrete Pipes (PCCP)

Sr. No.	Short Description	Unit	Rate (in Rs.)
19.1	Providing & Supplying Precast Concrete Pipe Test Pressure - 4 kg/Sq.cm.		
	350 mm	RM	4685.00
	400 mm	RM	5203.00
	450 mm	RM	5706.00
	500 mm	RM	6274.00
	600 mm	RM	7218.00
	700 mm	RM	8330.00
	800 mm	RM	9258.00
	900 mm	RM	10788.00
	1000 mm	RM	13213.00
	1100 mm	RM	14420.00
	1200 mm	RM	18130.00
	1300 mm	RM	19922.00
	1400 mm	RM	21511.00
	1500 mm	RM	24730.00
19.2	Providing & Supplying Precast Concrete Pipe Test Pressure 5.5 kg/Sq.cm.		
	350 mm	RM	4690.00
	400 mm	RM	5213.00
	450 mm	RM	5714.00
	500 mm	RM	6284.00
	600 mm	RM	7269.00
	700 mm	RM	8452.00
	800 mm	RM	9375.00
	900 mm	RM	10928.00
	1000 mm	RM	13421.00
	1100 mm	RM	14670.00
	1200 mm	RM	18426.00
	1300 mm	RM	20278.00
	1400 mm	RM	21935.00
	1500 mm	RM	25230.00
19.3	Providing & Supplying Precast Concrete Pipe Test Pressure 7.0 kg/Sq.cm.		
	350 mm	RM	4691.00
	400 mm	RM	5214.00
	450 mm	RM	5719.00
	500 mm	RM	6296.00
	600 mm	RM	7319.00
	700 mm	RM	8514.00
	800 mm	RM	9449.00
	900 mm	RM	11040.00
	1000 mm	RM	13546.00
	1100 mm	RM	14812.00
	1200 mm	RM	18612.00
	1300 mm	RM	20489.00
	1400 mm	RM	22182.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	1500 mm	RM	25509.00
19.4	Providing & Supplying Precast Concrete Pipe Test Pressure 8.5 kg/Sq.cm.		
	350 mm	RM	4694.00
	400 mm	RM	5216.00
	450 mm	RM	5724.00
	500 mm	RM	6307.00
	600 mm	RM	7361.00
	700 mm	RM	8574.00
	800 mm	RM	9531.00
	900 mm	RM	11126.00
	1000 mm	RM	13666.00
	1100 mm	RM	14967.00
	1200 mm	RM	18784.00
	1300 mm	RM	20701.00
	1400 mm	RM	22424.00
	1500 mm	RM	25790.00
19.5	Providing & Supplying Precast Concrete Pipe Test Pressure 10 kg/Sq.cm.		
	350 mm	RM	4696.00
	400 mm	RM	5220.00
	450 mm	RM	5753.00
	500 mm	RM	6372.00
	600 mm	RM	7452.00
	700 mm	RM	8695.00
	800 mm	RM	9688.00
	900 mm	RM	11325.00
	1000 mm	RM	14043.00
	1100 mm	RM	15269.00
	1200 mm	RM	19143.00
	1300 mm	RM	21119.00
	1400 mm	RM	22913.00
	1500 mm	RM	26353.00
19.6	Providing & Supplying Precast Concrete Pipe Test Pressure 11.5 kg/Sq.cm.		
	350 mm	RM	4699.00
	400 mm	RM	5252.00
	450 mm	RM	5808.00
	500 mm	RM	6439.00
	600 mm	RM	7544.00
	700 mm	RM	8818.00
	800 mm	RM	9846.00
	900 mm	RM	11526.00
	1000 mm	RM	14295.00
	1100 mm	RM	15574.00
	1200 mm	RM	19504.00
	1300 mm	RM	21547.00
	1400 mm	RM	23405.00
	1500 mm	RM	27410.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
19.7	Providing & Supplying Precast Concrete Pipe Test Pressure 13.0 kg/Sq.cm.		
	350 mm	RM	4712.00
	400 mm	RM	5274.00
	450 mm	RM	5835.00
	500 mm	RM	6472.00
	600 mm	RM	7589.00
	700 mm	RM	8880.00
	800 mm	RM	9926.00
	900 mm	RM	11677.00
	1000 mm	RM	14420.00
	1100 mm	RM	15726.00
	1200 mm	RM	19688.00
	1300 mm	RM	21759.00
	1400 mm	RM	23891.00
	1500 mm	RM	27728.00
19.8	Providing & Supplying Precast Concrete Pipe Test Pressure 14.5 kg/Sq.cm.		
	350 mm	RM	4723.00
	400 mm	RM	5296.00
	450 mm	RM	5861.00
	500 mm	RM	6505.00
	600 mm	RM	7635.00
	700 mm	RM	8941.00
	800 mm	RM	10006.00
	900 mm	RM	11829.00
	1000 mm	RM	14546.00
	1100 mm	RM	15878.00
	1200 mm	RM	19870.00
	1300 mm	RM	21973.00
	1400 mm	RM	24376.00
	1500 mm	RM	28047.00
19.9	Providing & Supplying Precast Concrete Pipe Test Pressure - 17.0 kg/Sq.cm.		
	350 mm	RM	4752.00
	400 mm	RM	5336.00
	450 mm	RM	5909.00
	500 mm	RM	6568.00
	600 mm	RM	7716.00
	700 mm	RM	9046.00
	800 mm	RM	10140.00
	900 mm	RM	11874.00
	1000 mm	RM	14723.00
	1100 mm	RM	16074.00
	1200 mm	RM	20150.00
	1300 mm	RM	22346.00
	1400 mm	RM	24811.00
	1500 mm	RM	28536.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
19.10	Providing & Supplying Precast Concrete Pipe Test Pressure 18.5 kg/Sq.cm.		
	350 mm	RM	4777.00
	400 mm	RM	5362.00
	450 mm	RM	5945.00
	500 mm	RM	6605.00
	600 mm	RM	7774.00
	700 mm	RM	9126.00
	800 mm	RM	10245.00
	900 mm	RM	12032.00
	1000 mm	RM	14799.00
	1100 mm	RM	16338.00
	1200 mm	RM	20419.00
	1300 mm	RM	23095.00
	1400 mm	RM	25205.00
	1500 mm	RM	28993.00
19.11	Providing & Supplying Precast Concrete Pipe Test Pressure 20 kg/Sq.cm.		
	350 mm	RM	4813.00
	400 mm	RM	5408.00
	450 mm	RM	6014.00
	500 mm	RM	6671.00
	600 mm	RM	7867.00
	700 mm	RM	9253.00
	800 mm	RM	10406.00
	900 mm	RM	12237.00
	1000 mm	RM	15054.00
	1100 mm	RM	16648.00
	1200 mm	RM	21229.00
	1300 mm	RM	23569.00
	1400 mm	RM	25482.00
	1500 mm	RM	30223.00
19.12	Providing & Supplying Precast Concrete Pipe Test Pressure 21.5 kg/Sq.cm.		
	350 mm	RM	4849.00
	400 mm	RM	5454.00
	450 mm	RM	6083.00
	500 mm	RM	6738.00
	600 mm	RM	7960.00
	700 mm	RM	9378.00
	800 mm	RM	10566.00
	900 mm	RM	12443.00
	1000 mm	RM	15310.00
	1100 mm	RM	16957.00
	1200 mm	RM	22038.00
	1300 mm	RM	24043.00
	1400 mm	RM	25757.00
	1500 mm	RM	31454.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
19.13	Providing & Supplying Precast Concrete Pipe Test Pressure 23 kg/Sq.cm.		
	350 mm	RM	4885.00
	400 mm	RM	5500.00
	450 mm	RM	6153.00
	500 mm	RM	6805.00
	600 mm	RM	8053.00
	700 mm	RM	9505.00
	800 mm	RM	10728.00
	900 mm	RM	12648.00
	1000 mm	RM	15564.00
	1100 mm	RM	17267.00
	1200 mm	RM	22848.00
	1300 mm	RM	24517.00
	1400 mm	RM	26034.00
	1500 mm	RM	32684.00
19.14	Providing & Supplying Precast Concrete Pipe Test Pressure 24.5 kg/Sq.cm.		
	350 mm	RM	4921.00
	400 mm	RM	5546.00
	450 mm	RM	6221.00
	500 mm	RM	6872.00
	600 mm	RM	8146.00
	700 mm	RM	9631.00
	800 mm	RM	10889.00
	900 mm	RM	12854.00
	1000 mm	RM	15820.00
	1100 mm	RM	17576.00
	1200 mm	RM	23658.00
	1300 mm	RM	24991.00
	1400 mm	RM	26310.00
	1500 mm	RM	33914.00

CHAPTER 20 PRE-STRESSED CEMENT CONCRETE PIPES (PSCP)

- 1 Scope
- 1.1 The Specification covers the requirements for design, manufacturing, testing, supplying, laying, jointing and testing at works and site of Prestressed Concrete (PSC) pipes used for water supply mains, sewers and storm water drains.
- 2 Applicable Codes
 - IS: 784 Specifications for Prestressed Concrete Pipes (Including Fittings)

 - IS : 783 Code of Practice for laying of concrete pipes
 - IS: 1343 Code of Practice for Prestressed Concrete
 - IS: 7322 Specifications for specials for Steel Cylinder Reinforced Concrete Pipes
 - IS: 3597 Methods of Test for Concrete Pipes
 - IS: 5382 Specifications for Rubber Sealing Rings for Gas Mains, Water Mains and Sewers.
 - IS: 226 Specifications for Structural Steel (Standard Quality)
- 2.1 Other I.S. Codes not Specifically mentioned here but pertaining to the use of Electrically Welded Steel pipes shall form part of these Specifications.
- 3 Nominal Diameter
- 3.1 Nominal internal diameter of the pipes and minimum core thickness shall be as given in Table 1 of IS Code IS:784:2001.
- 4 Length : Effective length of pipes shall be 2m to 6m. However, the preferred effective lengths should be 2, 2.5, 4, 5 and 6m. For pipes upto and including 300mm diameter, the effective length shall not be more than 3m.
- 5 Tolerances
- 5.1 Length : Tolerance on Length shall be ± 1 percent of the specified length.
- 5.2 Internal Diameter : For pipes of length less than 4m, the tolerance shall be ± 5 mm for diameter upto and including 350 mm. For diameter above 350 mm, the tolerance shall be ± 10 mm.
- 6 Rubber Gaskets : Rubber gaskets used for joints shall comply with IS: 5382. The pipe manufacturer shall test each gasket by stretching it to 33.3% in excess of its original length and examining it visually for defects, particularly at any joint.

7 **Specicals**

7.1 Fabrication : The steel for fabricated steel plate specials, is cut, shaped and welded so that the finished special has the required shape and internal dimensions. Adjacent segments are jointed by butt welding. Before lining and coating, the welding of specials shall be tested by use of hot oil or dye penetrant according to iS 3658 and defects, if any shall be rectified. The steel plate thickness for specials shall be as given in IS 1916.

7.2 Lining and Coating : Steel plate specials are lined and coated with concrete or cement mortar or other approved materials, as agreed between the manufacturer and the purchaser. The porportion of cement to total aggregate shall not be leaner than 1:3 by mass.

8 Jointing of Pipes : Pipes shall be provided with Flexible Joints unless otherwise specified. Joining shall be done in accordance with the Specifications of IS : 783.

9 When ever manufacturer is separate and contractor for lowering, laying, jointing & testing is separate the principal contractor shall enter in to agreement with PSC pipe manufacturer for satisfactory manufacturing, transporting, lowering, laying, jointing and testing of pipe.

10 **Measurement:**

The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and measured in running meters and paid for separately under the relevant items. The portion of the pipe at the joints shall not be included in the length of the pipe work.

11 **Rates**

The rate shall include the cost of materials and labour involved in all the operations except for the items measured/ enumerated separately under clause 'Measurements', which shall be paid for separately.

CHAPTER 20 - PRE-STRESSED CEMENT CONCRETE PIPES (PSCP)

Sr. No.	Short Description	Unit	Rate (in Rs.)
20.1	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 2kg/Sq.cm		
	350 mm	RM	2763.00
	400 mm	RM	2931.00
	450 mm	RM	3118.00
	500 mm	RM	3224.00
	600 mm	RM	4213.00
	700 mm	RM	4380.00
	800 mm	RM	5250.00
	900 mm	RM	6434.00
	1000 mm	RM	10263.00
	1100 mm	RM	10896.00
	1200 mm	RM	11865.00
	1300 mm	RM	12911.00
	1400 mm	RM	13744.00
	1500 mm	RM	15170.00
	1600 mm	RM	16515.00
20.2	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 4 kg/Sq.cm		
	350 mm	RM	2769.00
	400 mm	RM	2938.00
	450 mm	RM	3138.00
	500 mm	RM	3246.00
	600 mm	RM	4251.00
	700 mm	RM	4489.00
	800 mm	RM	5394.00
	900 mm	RM	6626.00
	1000 mm	RM	10487.00
	1100 mm	RM	11134.00
	1200 mm	RM	12159.00
	1300 mm	RM	13242.00
	1400 mm	RM	14109.00
	1500 mm	RM	15598.00
	1600 mm	RM	17006.00
20.3	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 6 kg/Sq.cm		
	350 mm	RM	2776.00
	400 mm	RM	2945.00
	450 mm	RM	3159.00
	500 mm	RM	3268.00
	600 mm	RM	4290.00
	700 mm	RM	4597.00
	800 mm	RM	5537.00
	900 mm	RM	6818.00
	1000 mm	RM	10713.00
	1100 mm	RM	11371.00
	1200 mm	RM	12454.00
	1300 mm	RM	13574.00
	1400 mm	RM	14474.00
	1500 mm	RM	16024.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	1600 mm	RM	17499.00
20.4	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 8 kg/Sq.cm		
	350 mm	RM	2783.00
	400 mm	RM	2958.00
	450 mm	RM	3181.00
	500 mm	RM	3296.00
	600 mm	RM	4385.00
	700 mm	RM	4727.00
	800 mm	RM	5709.00
	900 mm	RM	7034.00
	1000 mm	RM	10979.00
	1100 mm	RM	11708.00
	1200 mm	RM	12839.00
	1300 mm	RM	14031.00
	1400 mm	RM	15025.00
	1500 mm	RM	16659.00
	1600 mm	RM	18414.00
20.5	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 10 kg/Sq.cm		
	350 mm	RM	2794.00
	400 mm	RM	2974.00
	450 mm	RM	3212.00
	500 mm	RM	3371.00
	600 mm	RM	4489.00
	700 mm	RM	4873.00
	800 mm	RM	5887.00
	900 mm	RM	7253.00
	1000 mm	RM	11246.00
	1100 mm	RM	12036.00
	1200 mm	RM	13224.00
	1300 mm	RM	14483.00
	1400 mm	RM	15773.00
	1500 mm	RM	17521.00
	1600 mm	RM	19206.00
20.6	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 12 kg/Sq.cm		
	350 mm	RM	2815.00
	400 mm	RM	3030.00
	450 mm	RM	3284.00
	500 mm	RM	3455.00
	600 mm	RM	4609.00
	700 mm	RM	5032.00
	800 mm	RM	6094.00
	900 mm	RM	7499.00
	1000 mm	RM	11539.00
	1100 mm	RM	12363.00
	1200 mm	RM	13758.00
	1300 mm	RM	15104.00
	1400 mm	RM	16225.00
	1500 mm	RM	18026.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	1600 mm	RM	19744.00
20.7	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 14 kg/Sq.cm		
	350 mm	RM	2862.00
	400 mm	RM	3087.00
	450 mm	RM	3355.00
	500 mm	RM	3541.00
	600 mm	RM	4733.00
	700 mm	RM	5192.00
	800 mm	RM	6305.00
	900 mm	RM	7771.00
	1000 mm	RM	11986.00
	1100 mm	RM	12895.00
	1200 mm	RM	14227.00
	1300 mm	RM	15611.00
	1400 mm	RM	17145.00
	1500 mm	RM	19089.00
	1600 mm	RM	21009.00
20.8	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 16 kg/Sq.cm		
	350 mm	RM	2906.00
	400 mm	RM	3146.00
	450 mm	RM	3426.00
	500 mm	RM	3627.00
	600 mm	RM	4854.00
	700 mm	RM	5351.00
	800 mm	RM	6513.00
	900 mm	RM	8436.00
	1000 mm	RM	12331.00
	1100 mm	RM	13671.00
	1200 mm	RM	15079.00
	1300 mm	RM	16562.00
	1400 mm	RM	17806.00
	1500 mm	RM	20397.00
	1600 mm	RM	22527.00
20.9	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 18 kg/Sq.cm		
	350 mm	RM	2953.00
	400 mm	RM	3208.00
	450 mm	RM	3495.00
	500 mm	RM	3711.00
	600 mm	RM	4978.00
	700 mm	RM	5727.00
	800 mm	RM	6981.00
	900 mm	RM	8719.00
	1000 mm	RM	12990.00
	1100 mm	RM	14091.00
	1200 mm	RM	15581.00
	1300 mm	RM	17147.00
	1400 mm	RM	19998.00
	1500 mm	RM	22671.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
	1600 mm	RM	24835.00
20.10	Providing ISI standard Pre -stressed Cement concrete pipes Test Pressure 20 kg/Sq.cm		
	350 mm	RM	3002.00
	400 mm	RM	3265.00
	450 mm	RM	3569.00
	500 mm	RM	3801.00
	600 mm	RM	5103.00
	700 mm	RM	6233.00
	800 mm	RM	7544.00
	900 mm	RM	9346.00
	1000 mm	RM	13431.00
	1100 mm	RM	15202.00
	1200 mm	RM	17214.00
	1300 mm	RM	18353.00
	1400 mm	RM	21206.00
	1500 mm	RM	24044.00
	1600 mm	RM	26633.00
20.11	Lowering, laying and jointing in proper grade and alignment Pre-Stressed Cement concrete pipes(For all class of pipes)		
	350 mm	RM	104.00
	400 mm	RM	142.00
	450 mm	RM	179.00
	500 mm	RM	223.00
	600 mm	RM	258.00
	700 mm	RM	309.00
	800 mm	RM	346.00
	900 mm	RM	387.00
	1000 mm	RM	434.00
	1100 mm	RM	558.00
	1200 mm	RM	591.00
	1300 mm	RM	689.00
	1400 mm	RM	749.00
	1500 mm	RM	913.00
	1600 mm	RM	1032.00

CHAPTER 21
ZERO VELOCITY VALVES AND AIR CUSHION VALVES

- 1 Providing and supply of zero velocity valves and air cushion valves shall be Conforming to relevant Indian Standard with third party quality assurance certificate.

Zero Velocity Valve

- 2 The principle behind the design of this valve is to arrest the forward moving water column at zero momentum i.e. when its velocity is zero and before any return velocity is established.
- 3 The valve fitted in the pipeline consists of an outer shell and an inner fixed dome leaving a streamlined annular passage for water. A closing disc is mounted on central and peripheral guide rods and is held in the closed position by one or more springs when there is no flow of water.
- 4 A bypass connects the upstream and downstream sides of the disc. The springs are so designed that the disc remains in fully open position for velocity of water equal to 25% of the designed maximum velocity in the pipeline.
- 5 With sudden stoppage of pumps the forward velocity of water column goes on decreasing due to friction and gravity. When the forward velocity becomes less than 25% of the maximum, the flap starts closing at the same rate as the velocity of water.
- 6 The flap comes to the fully closed position when forward velocity approaches zero magnitude, water column on the upstream side of the valve is thus prevented from acquiring a revised velocity and taking part in creating surge pressures. The bypass valve maintains balanced pressures on the disc and also avoids vacuum on the downstream side of valve if that column experiences.

The main advantages of zero velocity valves are:

- (a) Controlled closing characteristics, and
- (b) Low loss of head due to streamlined design.

Air Cushion Valve

- 7 The principle of this valve is to allow large quantities of air in the pumping main during separation, entrap the air, compress it with the returning air column and expel the air under controlled pressure so as to dissipate the energy of the returning water column. An effective air cushion is thus provided.
- 8 The valve is mounted on TEE-joint on the rising main at locations where water column separation is likely. The valve has a spring loaded air inlet port, an outlet normally closed by a float, a spring loaded outlet poppet valve and an adjustable needle valve control orifice.
- 9 When there is sudden stoppage of pump due to power failure, partial vacuum is created in the main. With differential pressure, the spring loaded port opens and admits outside air into the main.

- 10 When the pressure in the main becomes near atmospheric, the inlet valve closes under spring pressure. The entrapped air is then compressed by the returning water column till the poppet valve opens. With float in dropped position, the air is expelled through poppet valve and controlled orifice under predetermined pressure thus dissipating the energy of the returning water column.
- 11 Measurement
Zero velocity valves and Air cushion valves shall be enumerated.
- 12 Rate
The rate shall include cost of all the materials and labour involved in the all the operation described in the item.

CHAPTER 21 - ZERO VELOCITY VALVES AND AIR CUSHION VALVES

S.No.	Description	Unit	Rate (in Rs.)
21.1	Providing and supply of Zero Velocity Valves of renowned make duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site/ store etc, complete.		
	100mm 10 kg/cm ²	Each	69214.00
	100mm 15 kg/cm ²	Each	74493.00
	100mm 20 kg/cm ²	Each	76252.00
	100mm 25 kg/cm ²	Each	87514.00
	150mm10 kg/cm ²	Each	89039.00
	150mm15 kg/cm ²	Each	95726.00
	150mm20 kg/cm ²	Each	105346.00
	150mm25 kg/cm ²	Each	121065.00
	200mm10 kg/cm ²	Each	93028.00
	200mm15 kg/cm ²	Each	100067.00
	200mm20 kg/cm ²	Each	110038.00
	200mm25 kg/cm ²	Each	126696.00
	250mm10 kg/cm ²	Each	104994.00
	250mm15 kg/cm ²	Each	112971.00
	250mm20 kg/cm ²	Each	124116.00
	250mm25 kg/cm ²	Each	142768.00
	300mm10 kg/cm ²	Each	118250.00
	300mm15 kg/cm ²	Each	127048.00
	300mm20 kg/cm ²	Each	139718.00
	300mm25 kg/cm ²	Each	160482.00
	350mm10 kg/cm ²	Each	122473.00
	350mm15 kg/cm ²	Each	131741.00
	350mm20 kg/cm ²	Each	144762.00
	350mm25 kg/cm ²	Each	166582.00
	400mm10 kg/cm ²	Each	135377.00
	400mm15 kg/cm ²	Each	145466.00
	400mm20 kg/cm ²	Each	160130.00
	400mm25 kg/cm ²	Each	184179.00
	450mm10 kg/cm ²	Each	157432.00
	450mm15 kg/cm ²	Each	169280.00
	450mm20 kg/cm ²	Each	186173.00
	450mm25 kg/cm ²	Each	214211.00
	500mm10 kg/cm ²	Each	181950.00
	500mm15 kg/cm ²	Each	195558.00
	500mm20 kg/cm ²	Each	215267.00

S.No.	Description	Unit	Rate (in Rs.)
	500mm25 kg/cm2	Each	247645.00
	600mm10 kg/cm2	Each	223009.00
	600mm15 kg/cm2	Each	239785.00
	600mm20 kg/cm2	Each	263716.00
	600mm25 kg/cm2	Each	303250.00
	700mm10 kg/cm2	Each	314512.00
	700mm15 kg/cm2	Each	338092.00
	700mm20 kg/cm2	Each	371877.00
	700mm25 kg/cm2	Each	427718.00
	750mm10 kg/cm2	Each	355688.00
	750mm15 kg/cm2	Each	382435.00
	750mm20 kg/cm2	Each	420562.00
	750mm25 kg/cm2	Each	483793.00
	800mm10 kg/cm2	Each	392524.00
	800mm15 kg/cm2	Each	421969.00
	800mm20 kg/cm2	Each	421969.00
	800mm25 kg/cm2	Each	534002.00
	900mm10 kg/cm2	Each	466665.00
	900mm15 kg/cm2	Each	501741.00
	900mm20 kg/cm2	Each	551716.00
	900mm25 kg/cm2	Each	634655.00
	1000mm10 kg/cm2	Each	593362.00
	1000mm15 kg/cm2	Each	637823.00
	1000mm20 kg/cm2	Each	701523.00
	1000mm25 kg/cm2	Each	806986.00
	1100mm10 kg/cm2	Each	727918.00
	1100mm15 kg/cm2	Each	782585.00
	1100mm20 kg/cm2	Each	860832.00
	1100mm25 kg/cm2	Each	989992.00
	1200mm10 kg/cm2	Each	898020.00
	1200mm15 kg/cm2	Each	965474.00
	1200mm20 kg/cm2	Each	1061904.00
	1200mm25 kg/cm2	Each	1221330.00
	1300mm10 kg/cm2	Each	1293242.00
	1300mm15 kg/cm2	Each	1374773.00
	1300mm20 kg/cm2	Each	1463813.00
	1300mm25 kg/cm2	Each	1608458.00
	1400mm10 kg/cm2	Each	1411492.00
	1400mm15 kg/cm2	Each	1517307.00
	1400mm20 kg/cm2	Each	1668991.00
	1400mm25 kg/cm2	Each	1919451.00
	1500mm10 kg/cm2	Each	215876.62

S.No.	Description	Unit	Rate (in Rs.)
	1500mm15 kg/cm2	Each	1933763.00
	1500mm25 kg/cm2	Each	2446297.00
21.2	Providing and supply of Air cushion Valves of renowned make duly tested inclusive of all taxes related to central, state and municipal, inclusive of excise duty, inspection charges, transportation charges, transit insurance, loading/ unloading and stacking at site etc, complete.		
	100 mm TP 10 kg/cm2	Each	77191.00
	100 mm TP 15 kg/cm2	Each	84816.00
	100 mm TP 20 kg/cm2	Each	93263.00
	100 mm TP 25 kg/cm2	Each	107340.00
	150 mm TP 10 kg/cm2	Each	117077.00
	150 mm TP 15 kg/cm2	Each	128691.00
	150 mm TP 20 kg/cm2	Each	141595.00
	150 mm TP 25 kg/cm2	Each	162828.00
	200 mm TP 10 kg/cm2	Each	124937.00
	200 mm TP 15 kg/cm2	Each	137489.00
	200 mm TP 20 kg/cm2	Each	151215.00
	200 mm TP 25 kg/cm2	Each	173738.00
	300 mm TP 10 kg/cm2	Each	175733.00
	300 mm TP 15 kg/cm2	Each	193447.00
	300 mm TP 20 kg/cm2	Each	222423.00
	300 mm TP 25 kg/cm2	Each	255739.00

CHAPTER 22
SMOOTH FLOW PIPES

1 Applicable Codes

IS: 3589	Seamless/Electrically Welded Steel Pipes for Water, Gas, Sewage Specification.
IS: 5822	Code of Practice for laying of Electrically Welded Steel Pipes for Water Supply.
IS : 7322	Specification for Specials for Steel Cylinder Reinforced Concrete Pipes
IS: 432 Part I	Mild Steel and Medium Tensite Bars Reinforcement
IS: 432 Part II	Specifications for Mild Steel and Medium Tensite Bars and Hard Drawn Steel Wire (Third Revision)
IS: 2328	Flattening Test for Seamiess Pipes
IS: 6452	Specification for High Alumina Cement for Structural Use (I Revision)
IS: 4853	Recommended Practice for Radiographic Inspection of Fusion Welded Butt Joints in Steel Pipes (First Revision)
IS: 4260	Recommended Practice for Ultrasonic Butt Welds in Ferritic Steel
IS: 3600 Part I	Methods of Testing Fusion Welded Joints and Weld Metal in Steel :

- 1.1 Other I.S. Codes not Specifically mentioned here but pertaining to the use of Electricially Welded Steel pipes shall form part of these Specifications.
- 2 The Smoothflow pipes shall be 3 Layer Polyethylene (3 LPE) coated & fusion bonded Epoxy lined Steel pipes for drinking water supply Application.
- 3 External 3 LPE coating shall be done as per Canadian Standard CSA Z245.20 & 21
- 4 Internal lining of Fusion Bond Epoxy (FEB) will be as per IS 3589 Annex "C".
- 5 Steel Pipes shall be as per Indian Standard IS 3589.
- 6 External coating shall be 3 layer polyethylene for burried or submerged application and dual layer fusion bonded epoxy for above ground pipe installation.
- 7 Internal lining shall be potable water contact approved fusion bonded epoxy.
- 8 Pipes on both the ends shall have steel ring 50mm long and 2mm extra thickness over and above the pipe thickness on each pipes upto 600mm dia only.
- 9 Pipes can be specially designed upto 6.3 Mpa depending on OD & thickness.
- 10 These pipes should be food grade approved for potable water.

11 Measurement:

The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and enumerated and paid for separately.

12 Rates

- a) The rates include charges for all tools & plants, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in positions as per approved drawing.
- b) The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials, and other causes.

CHAPTER 22 - SMOOTH FLOW PIPES

S.No.	Description	Unit	Rate (in Rs.)
22.1	Providing, laying, Jointing & field testing of SMOOTHFLOW PIPES (3 Layer Polyethylene (3LPE) Coated & fusion bonded Epoxy lined Steel pipes) for drinking water purposes for under ground application with necessary jointing material having working pressure of 10Kg/sq.cm., cost of pipes & jointing material complete as per relevant IS specification complete as directed by the Engineer-in-charge.		
	300mm	RM	5180.00
	350mm	RM	6046.00
	400mm	RM	6911.00
	450mm	RM	7712.00
	500mm	RM	8519.00
	550mm	RM	10646.00
	600mm	RM	11592.00
	700mm	RM	14761.00
	750mm	RM	15799.00
	800mm	RM	16918.00
	900mm	RM	18983.00
	1000mm	RM	23171.00
	1200mm	RM	27796.00
	1400mm	RM	35623.00
	1500mm	RM	38128.00
	1600mm	RM	40660.00
	1800mm	RM	45683.00
	2000mm	RM	59159.00
22.2	Providing, laying, Jointing & field testing of SMOOTHFLOW PIPES (3 Layer Polyethylene (3LPE) Coated & fusion bonded Epoxy lined Steel pipes) for drinking water purposes for under ground application with necessary jointing material having working pressure of 20Kg/sq.cm., cost of pipes & jointing material complete as per relevant IS specification complete as directed by the Engineer-in-charge.		
	300mm	RM	5794.00
	350mm	RM	6722.00
	400mm	RM	7648.00
	450mm	RM	8572.00
	500mm	RM	9502.00
	550mm	RM	11673.00
	600mm	RM	12711.00

S.No.	Description	Unit	Rate (in Rs.)
	700mm	RM	16240.00
	750mm	RM	17386.00
	800mm	RM	18612.00
	900mm	RM	22791.00
	1000mm	RM	25296.00
	1200mm	RM	30340.00
	1400mm	RM	41546.00
	1500mm	RM	44363.00
	1600mm	RM	47441.00
	1800mm	RM	53318.00
	2000mm	RM	67623.00

CHAPTER- 23

SEWER APPURTENANCES

1 SEWER APPURTENANCES

Following are the General Sewer Appurtenances-

- (I) Manholes
- (II) Inverted Siphons
- (III) Storm Water Inlets
- (IV) Sewer Ventilators

Out of the above, manholes are the most essential items in any sewerage system.

2 Manholes

2.1 **Function** :- Manholes is the essential ancillary structure in any sewerage system. They shall be provided for inspection, testing, cleaning, repairing and removal of obstruction from sewer line.

2.2 **Provision**: - Manholes should be built at every change of alignment, gradient or diameter, at the head of all sewer and branches and at every junction of two or more sewers, on sewer, which is to be cleaned manually or which cannot be entered for cleaning or inspection, the maximum distance between manholes should be 30m.

2.3 Spacing: -

The Maximum spacing of manholes in the sewer shall be kept as follows: -

<u>Pipe dia (mm)</u>	<u>Max. Spacing (mt)</u>
Up to 900	30
900 to 1500	90-150
1500 to 2000	150-200
Above 2000	300

A spacing allowance of 100m per 1m dia of sewer is a general rule in case of very large sewers.

2.4 **Types of manholes**: Following is the general classification of manholes-

2.4.1 Straight-through manholes: -

The simplest type of manhole is that built on a straight run of sewer with no side junctions. Where there is a change in the size of sewer, the soffit or crown level of the two sewers should be the same, except where special conditions require otherwise.

2.4.2 Junction Manholes: -

A manhole should be built at every junction of two or more sewers, and the curved portions of the inverts of tributary sewers should be formed within the manhole. To achieve this with the best economy of space, the chamber may be built of a shape other than rectangular. The soffit of the smaller sewer at a junction should be not lower than that of the larger sewer, in order to avoid the surcharging of the former when the latter is running full, and the hydraulic design usually assumes such a condition. The gradient of the smaller sewer may be increased from the previous manhole sufficiently to reduce the difference of invert level at the point of junction to a convenient amount.

2.4.3 Side Entrance Manholes: -

In large sewer or where it is difficult to obtain direct vertical access to the sewer from ground level, owing to existing services, gas, water etc. the access shaft should be constructed in the nearest convenient position off the line of sewer, and connected to the manhole chamber by a lateral passage.

In the tunnelled sewer the shaft and the lateral access heading may be used as a working shaft, the tunnel being broken out from the end of the heading, or alternatively the shaft and heading may be used as a working shaft, the tunnel being broken out from the end of the heading, or alternatively the shaft and heading maybe constructed after the main tunnel is completed, provision having been made for breaking in from the access heading to build the chamber.

The floor of the side-entrance passage, which should fall at about 1 in 30 towards the sewer, should enter the chamber not lower than the soffit level of the sewer. In large sewer where the floor of the side entrance passage is above the soffit either steps or a ladder (which should be protected either by a removable handrail or by safety chains) should be provided to reach the benching.

2.4.4 Drop Manholes; -

When a sewer connects with another sewer, where the difference in level between water lines (peak flow levels) of main line and the invert level of branch line is more than 600 mm or a drop of more than 600 mm is required to be given in the same sewer line and it is uneconomical or impractical to arrange the connection with in 600 mm a drop connection shall be provided for which is manholes maybe built incorporating a vertical or nearly vertical drop pipe from the higher sewer to the lower one. This pipes maybe either outside the shaft and enclosed in concrete or supported on brackets inside the shaft, which should be suitably enlarged. If the drop pipe is outside the shaft, a continuation of the sewer should be built through the shaft wall to from a Roding and inspection eye, which should be provided with a half blank flange. If the drop pipe is inside the shaft. It should be in cast iron and it would be advantageous to provide adequate means for roding and water cushion of 150 mm depth should also be provided. The diameter of the backdrop should be at-least as large as that of the incoming pipe

The drop pipe should terminate at its lower end with a plain or duck-foot bend turned so as to discharge its flow at 45 degree or less then to the direction of the flow in the main sewer and the pipe, unless of cast iron, should be surrounded with 150 mm of concrete.

In the case of sewer over 450 mm in diameter the drop in level may be accomplished by one of the following methods: -

(a) A cascade: - This is a steep ramp composed of steps over which the flow is broken up and retarded. A pipe connecting the two levels is often concreted under the steps to allow small flow to pass without trickling over the steps. The cascade steps maybe made of heavy-duty bricks of class- I quality (IS: 2180-1985) cement concrete with granolithic finish or dressed granite.

(b) A Ramp: - A ramp maybe formed by increasing the grade of the last length of the upper sewer to about 45 degrees or by constructing a steeply graded channel or culvert leading from the high level to the low level sewer. In order to break up the flow down the ramp and minimize the turbulence in the main sewer the floor of culvert ramp should be obstructed by riced transverse ribs of either bricks or concrete at 1.50m intervals and a stilling pool provided at the bottom of the ramp and

(c) By drop in previous successive manholes instead of providing the total drop require at the junction manholes, the same may be achieved by giving smaller deeps in successive manhole preceding the junction manhole. Thus, for example, if a total drop of 2.4m is required to be given, 0.6m drop maybe given in each of the previous three manholes and the last 0.6m-drop maybe given at the junction manhole.

2.4.5 **Scraper (Service) Type Manhole: -**

All sewers above 450mm diameter should have manhole at intervals for 110 to 120 m of scraper type. This manhole should have clear opening of 1200 X 900 mm at top to facilitate lowering of buckets.

2.4.6 **Flushing manholes: -**

Where it is not possible to obtain self-cleaning velocities due to flatness of the gradient specially at the top end of branch sewer which receive very little flow, it is essential that same form of flushing device be incorporated in the system. This can be done by making grooves at intervals of 45 to 50m in the main drains in which wooden planks are inserted & water allow to head up and which will rush on with great velocity when the planks are removed. Alternatively, an overhead water tanks is built, from which connection are made through pipe flushing hydrants to rush water to the sewer. The relevant Indian standard is :IS 4111(part two).Flushing can be very conveniently accomplished by use of fire hydrant or tanker.

Where flushing manhole is provided, they are located generally at the head of a sewer. Sufficient velocity shall be imparted in the sewer to wash away the deposited solid. The flush is usually effective up to a certain distance after which the imparted velocity gets dissipated.

The automatic systems which are operated by mechanical units gets often corroded by the sewer gases and do not generally function satisfactorily and hence are not recommended. In case of hard chockages in sewers, care should be exercised to be ensuring that there is no possibility or back flow of sewer into the water supply mains.

Approximate quantities of water needed for flushing are as follows: -

S.No.	Slope	Quantity of water (litre)		
		200 mm dia	250 mm dia	300 mm dia
1	0.0050	2300	2500	3000
2	0.0075	1500	1800	2300
3	0.0100	1300	1500	2000
4	0.0200	0500	0800	1000
5	0.0300	0400	0500	0700

3 **Constructional Details: -**

Manhole is usually constructed directly over the centre line of the sewer they are usually constructed with brickwork. However in areas where sewers are to be laid in high water condition manhole shall be constructed in R.C.C. They are circular, rectangular or square in shape. Manholes should be of such size as will allow necessary cleaning and inspection of manholes.

a) **Rectangular Manholes** - The minimum internal sizes of rectangular manholes (fig. 10 & 11) between brick face should be as follows:

(i) For depth of manholes less than 0.9m, 900mm x 800mm and

(ii) For depths of manholes from 0.9mm and up to 2.5m, 1200mm x 900mm

b) **Arch type manholes** - For depth of 2.5m and above, arch type manholes can be provided and the internal size of the chambers between brick faces shall be 1400mm x 900mm. The width of manhole chamber on bents and junction of pipes with diameter greater than 450mm should be suitably increased to 900mm or more so that benching width on either side of the channel at-least 200mm.

4 **Circular manholes -**

Circular manholes are longer than rectangular and arch type manhole and thus there are preferred over rectangular as well as arch type manholes. The circular manholes can be provided for all depths starting from 0.9m circular manholes are straight down in lower portion and slanting in top portion so as to narrow down the top opening equal to internal dia.of manhole over. Depending upon the depth of manhole, the diameter of manhole changes. The internal diameter of circular manholes may be kept as following for verifying depths.

(i) For depths 0.9 m and up to 1.65 m, 900 mm diameter.

(ii) For depths above 1.65 m and up to 2.30 m, 1200 mm diameter.

(iii) For depths above 2.30 m and up to 9.0 m, 1500 mm diameter.

(iv) For depths above 9.0 m and up to 14.0 m, 1800 mm diameter.

Typical circular manholes are shown in fig.12

If the sewer is constructed in a tunnel, the manhole should be located at the access or working shaft and the manhole chamber maybe constructed of a size to suit the working shaft or vice-versa.

The width /diameter of the manhole should not be less than internal diameter of the sewer +150mm benching as both sides (150mm+ 150mm) The opening for entry into the manhole (without cover) should be such minimum diameters as to allow a workman with the cleaning equipments into the interior of the manhole without difficulty. A minimum clear opening of 60cm preferably circular is recommended. Suitable steps usually cast iron shall be provided for entry.

Access shaft for large sewers - Access shaft shall be circular in shape and shall have a minimum internal dia of 750mm, where the depth of the shaft exceeds 3m suitable dimensions shall be provided to facilitate cleaning and maintenance.

Access shaft where built of brick work should be carvel led on three sides to reduce it to the size of the opening in the cover frame, and to provide easy access on the fourth side to step iron or ladder .In determining sizes the dimensions of the maintenance equipments likely to be used in sewer, shall be kept in view.

Where the diameter of the sewer is increased, the crown of the entering leaving pipes shall be fixed at the same level and necessary slopes given in the inverted of the manholes chamber .In exceptional cases and where unavoidable the crown of the entering sewer maybe fixed at lower level but in each cases too the peak flow level of the two sewer shall be kept the same.

A slab generally of plain cement concrete at least 150mm thick should be provided at the base to support the walls of the manhole and to prevent the entry of foul water. The thickness of the base also shall be suitably increased up to 300mm, for manholes on large dia sewers, with adequate reinforcement provided to withstand excessive uplift pressures. In the case of larger manholes, the flow in the sewer should be carried in U-Shaped smooth channel constructed integrally with the concrete base of the manhole. The side of the channel should be equal to the dia. of the largest sewer pipe. The adjacent floor should have a slope of 1 in 10 draining to the channel. Where more than one sewer enters the manhole the flow through channel should be curved smoothly and should have sufficient capacity to carry the maximum flow.

It is desirable to place the first pipe joint outside the manhole as close as practicable. The pipe shall be built inside the wall of the manhole flush with the internal periphery protected with an arch of masonry or cement concrete to prevent it from being crushed. The sidewalls of the manhole are usually constructed of cement brickwork 250mm thick and corbelled suitably to accommodate the frame of the manhole cover.

The inside and outside of the brickwork should be plastered with cement mortar 1:3 (1 cement: 3 coarse sand) and inside finished smooth with a coat of neat cement.

Where subsoil water condition exist, a richer mix may be used and it shall further be water proofed with addition of approved water proofing compound in a quantity as per manufacturer's specifications.

5 Covers and frames: -

- 5.1 The size of manhole covers should be such that there should be clear opening of not less than 560mm diameter for manholes exceeding 0.9m depths. When cast iron manhole covers and frames are used they shall conform to IS 1726 (parts 1 to 7).
- 5.2 The frames of manhole shall be firmly embedded to correct alignment and level in plain concrete on the top of masonry. After completion of the work, manhole covers shall be sealed by means of thick grease. Where sewer are to be laid in high subsoil water conditions, manholes maybe constructed in R.C.C. of grade M 20 or 1:1.5:3. The manholes in this type of construction shall be preferably circular.
- 5.3 Heavy reinforced concrete covers with suitable lifting arrangements could also be used instead of C.I manhole covers. However pre-cast cement concrete covers reinforced by materials other than mild steel should be used provided that those are properly tested & certified for use by competent authority.
- 5.4 Fibre reinforcement plastic covers (FRP) conforming to relevant IS: may be used wherever such covers are available.

6 Inverted siphon

6.1 Function and provision

In the course of laying sewers, at times it is found necessary to cross obstructions like nallah etc. Such obstruction shall be crossed by means of "Inverted Syphon" i.e. by laying the sewer under the obstruction and regaining as much elevation as possible after the obstruction is passed .As the siphons are depressed below the hydraulic grade line, maintenance of self cleaning velocity at all flows is very important. Two considerations, which govern the profile of a siphon, are provision for hydraulic losses and case of cleaning.

6.2 Construction

To ensure self-cleaning velocities for the wide variations in flows, generally, two or more pipes not less than 200mm dia are provided in parallel so that up to the average flows, first pipe is used and when the flow exceeds the average, the second and subsequent pipes take the balance flow. Siphons may need cleaning other than gravity sewers and hence should not have any sharp bends either horizontal or vertical. Only smooth curves of adequate radius should be used. The design criteria for inverted syphons are given in IS: 411 part -III. It is necessary to have a self-cleaning velocity of 1.0 mps for the minimum flow to avoid deposition in the line.

Provision should be made for isolating the individual pipes as well as the siphon to facilitate cleaning. It is desirable to provide a coarse screen to prevent the entry of rags etc, into the siphon.

6.3 Inlet and outlet chambers: -

In the multiple pipe siphon, the inlet should be such that the pipes coming to action successively as the flow increases. This may be achieved by providing lateral with heights kept in accordance with the depth of flow at which one or more siphon pipes functions. In the two-pipe siphon, the first should take 1.25 to 1.5 times the average flow and second should take the balance of the flow.

A manhole at each end of the siphon should be provided with clearance for roding. The design of inlet and outlet chambers should allow sufficient room for entry for cleaning and maintenance of siphons. The outlet chambers should be so designed as to prevent the flow of sewage into pipes, which are not being used at the time of minimum flow.

7 Hatch box:

Hatch boxes of adequate size in manholes shall be provided on the pipes so as to give access into the pipes for roding.

8 By pass:

Proper by pass arrangements should be provided from the inlet chamber and if required special arrangements should be made for pumping the sewage to the lower reach of sewer line. Alternatively a vacuum pump maybe provided at the outlet to overcome maintenance problems arising out of dogging and silting of siphons. If it is possible a blow off may be installed at the low point to facilitate emergency maintenance operations.

9 Storm water inlets :-

There are device meant to admit the surface runoff to the sewers and form a very important part of the systems. Their location and design should therefore be given careful considerations.

Storm water inlets maybe categorised under three major groups viz. curb inlets, gutter inlets and combination inlets, each being either depressed or flush depending upon their elevation with reference to the pavement surface.

The actual structure of an inlet is usually made of brickwork. Normally cast-iron gratings conforming to IS : 5961 shall be used . In case there is no vehicular traffic, fabricated steel gratings maybe used. The clear opening shall not be more than 25mm. The connecting pipe from the street inlet to the main street sewer should not be less than 200mm in dia. and should have sufficient slope.

Maximum spacing of inlets would depend upon various conditions of road surface, size and type of inlet and rainfall. A maximum spacing of 30m is recommended.

10 Sewer ventilators :-

In a modern, well designed sewerage system, there is no need to provide ventilation on such elaborate scale considered necessary in the past, especially with the present day policy to omit intercepting traps in house connections. The ventilating columns/shafts are not necessary where intercepting traps are not provided. It is necessary however, to make provision for the escape of air to take care of the exigencies of full flow and also to keep the sewage as fresh as possible especially in outfall sewers. In case of storm sewers providing ventilating manhole covers can do these.

10.1 Provision: -

Ventilating columns/ shafts shall be provided at an interval of 180m in all mains intercepting and outfall sewers, near the manholes. The connections of house drains to the sewer shall be allowed without the use of any intercepting trap and thus permitting ventilation of laterals and branch sewers via. House drains and their ventilating pipes.

10.2 Construction: -

The ventilating shaft shall consist of vertical columns of R.C.C. or cast iron about 6 to 8 metre in height and about 100 to 150mm in diameter (opening) at the top, the diameter increasing uniformly towards the bottom for stability.

The shaft shall be provided with a Crowell or fitted with a wire ground at the top.

11 Measurement :-

Manholes shall be enumerated under relevant items. The depth of the manhole shall be reckoned from the top level of chamber cover to the invert level of channel. The depth shall be measured correct to 10mm. The extra depth shall be measured and paid as extra over the specified depth.

12 Rates :-

The rate shall include the cost of the material and labour involved in all the operation described in the items.

CHAPTER 23 - SEWER APPURTENANCES

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.1	Providing and fixing SW gully trap complete with CI grating, Brick masonry chamber in cement mortar 1:4 (1 cement : 4 fine sand) water tight CI cover with frame of 30x30cm size including necessary Excavation, cement concrete grade M-5 (Nominal Mix) with stone aggregate 40mm nominal size, fixing CI cover with frame in Cement concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size, 12 mm thick cement plaster 1:2 (1 cement:2 coarse sand) finished with a floating coat of neat cement complete.		
23.1.1	100x100mm size "P" Gully Trap Chamber	Each	1179.00
23.1.2	125x100mm size "p", "Q" or "S" type Gully trap chamber	Each	1232.00
23.1.3	180x150mm size "P" or "S" type	Each	1311.00
23.2	Constructing Brick masonry manhole in cement mortar 1:4 (1cement:4 fine sand) RCC top slab Cement Concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size, foundation in cement concrete grade M-7.5 (Nominal Mix) with stone aggregate 40mm nominal size, inside plastering 12 mm thick with cement mortar 1:3 (1 cement:3 coarse sand) finished with a floating coat of neat cement and making channels in Cement Concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size including finishing the channel to shape, curing etc. with CI cover with frame etc.		
23.2.1	Man hole with above specifications having inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg):	Each	6621.00
23.2.2	Man hole with above specifications having inside size 90x80 cm and 60 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg):	Each	7155.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.2.3	Man hole with above specifications having inside size 1200x900 Mm and 900 Mm deep including C.I. cover with frame (medium duty) 500 mm internal diameter, total weight of cover and frame to be not less than 116 kg (weight of cover 58 kg and weight of frame 58 kg):	Each	14572.00
23.2.4	Man hole with above specifications having inside size 1200x900 mm and 900 mm deep including C.I. cover with frame (heavy duty) 560 mm internal diameter, total weight of cover and frame to be not less than 208 kg (weight of cover 108 kg and weight of frame 100 kg)	Each	23112.00
23.2.5	Man hole for property connection (House connection) in narrow lanes.		
23.2.5.1	Man hole with above specifications having inside size 900x450mm and 900mm deep including Pre Cast RCC Man hole Cover (Heavy Duty) 500mm dia having 100mm thickness Conforming to IS : 12592 - 2002 complete. (See Drawing No.-24)	Each	5693.00
23.2.5.2	Man hole with above specifications having inside size 600x450mm and 900mm deep including Pre Cast RCC Man hole Cover (Heavy Duty) 500mm dia having 100mm thickness Conforming to IS : 12592 - 2002 complete. (See Drawing No.-25)	Each	4244.00
23.3	Extra for depth of man holes given at item 23.2		
23.3.1	90x80cm size manhole	RM	3529.00
23.3.2	120x90cm size manhole over item.	RM	4223.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.4	Construction of circular type of manhole 1500 mm internal dia. at bottom, 560 mm dia at top, total depth of manhole 2650mm in brick masonry with 1:5 cement mortar (1 cement : 5 fine sand), 12 mm thick Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement, 30 cm thick foundation in Cement concrete grade M-7.5 (Nominal Mix) with stone aggregate 40 mm nominal size, RCC Cement Concrete grade M-20 (Nominal Mix) with 20mm Nominal size on top slab and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20 mm nominal size neatly finished, curing fixing of ISI marked reinforced concrete heavy duty cover (including transportation of cover) complete. as per standard design (<i>Drawing No. 15</i>)	Each	18879.00
23.4.1	Construction of circular type of manhole 1500 mm internal dia; depth 2650 mm as per item 11.4 but fitted with circular type C.I. manhole cover with frame having 116 kg weight (58 Kg cover + 58 Kg frame) in place of RCC heavy duty cover.	Each	23501.00
23.4.2	Extra for increasing depth of manhole mentioned at Item No. 23.4 from depth 2.65m to 4.25 m	RM	7214.00
23.4.3	Extra for increasing depth of manhole mentioned at Item No. 23.4 from depth 4.25m to 9.75m	RM	12344.00
23.5	Construction of circular type manhole 900 mm internal dia. at bottom, 560 mm dia at top total depth of manhole 900 mm in brick masonry with 1:5 cement mortar (1 cement : 5 fine sand), 12 mm thick Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement. 22.5 cm foundation in cement concrete grade M-10 (Nominal Mix) with stone aggregate 40mm nominal size, RCC top slab cement concrete M-20 (Nominal Mix) with stone aggregate 20mm nominal size and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size neatly finished, curing fixing of ISI marked heavy duty SFRC cover etc. complete as per standard design.	Each	6001.00
23.5.1	Extra for increasing depth of manhole mentioned at Item No. 23.5 from depth of 900mm to 1650mm.	RM	3227.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.6	Providing MS/CI foot rests and fixing in manhole with CC blocks of Cement Concrete grade M-10 (Nominal Mix) with stone aggregate 20 mm nominal size of size 20x20x10cm.		
23.6.1	With 20mm square bar/ casting one foot rest (average weight of 1 foot rest 2.35kg)	Kg.	75.00
		Each	176.00
23.6.2	With 20mm round bar foot rest (average weight of 1 foot rest 1.85kg)	Kg.	79.00
		Each	146.00
23.7	Making connection of drain or sewer line with existing service lines manhole including breaking into and making good the walls, floors etc. with cement concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size plastered with Cement Mortar 1:3 (1 Cement : 3 coarse sand) finished with a floating coat of neat cement and making necessary channels etc. complete.		
23.7.1	For 100 to 150 mm dia pipes	Each	311.00
23.7.2	For 250 to 300 mm dia pipes	Each	348.00
23.7.3	For 350 to 450 mm dia pipes	Each	467.00
23.8	Providing SCI drop connection with SCI drop pipe and bend encased all-round with Cement concrete grade M-5 (Nominal Mix) with stone aggregate 40mm nominal size including cutting holes and making good with brick work in cement mortar 1:5 (1 cement:5 fine sand) plastered with cement mortar 1:3 (1 cement: 3 coarse sand) on inside walls including lead caulked joints and jointing SW pipes & SCI pipes with stiff cement mortar 1:1(1 cement: 1sand) including making required channel etc. complete.		
	(i) For 100 mm drop connection	Each	4630.00
	(ii) For 150mm dia drop connection	Each	6308.00
	(iii) Extra rate for depths of drop more than 60 cm		
	(a) 100mm dia Sand cast iron drop connection	Each	1225.00
	(b) 150mm dia Sand cast iron drop connection	Each	1786.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.9	Road Gully Chambers :- Construction of Brick masonry road gully chambers with brick work in cement mortar 1:5 (1 cement: 5 fine sand) and 12mm plaster 1:3 including foundation in cement concrete 1:5:10 (1 cement : 5 fine sand : 10 stone aggregate 40mm nominal size).		
23.9.1	Chamber 45x45x77.5cm with vertical grating 450x100 mm size	Each	3057.00
23.9.2	Chamber 50x45x60cm with 500x450mm CI Horizontal grating with frame.	Each	2811.00
23.9.3	Chamber 110 x 50 x 77.5cm with 500x450 mm horizontal and 450x100 mm vertical gratings both.	Each	5293.00
23.9.4	Providing & fixing of ISI marked pre cast reinforced cement concrete manhole cover including frame and transporting at site, cost of all material etc.		
	1. 560 mm dia heavy duty	Each	2592.00
	2. 600 mm dia heavy duty	Each	3217.00
	3. 560 mm dia extra heavy duty	Each	3331.00
	4 450x900 mm dia extra heavy duty	Each	5734.00
	5. 600 mm x 900 mm extra heavy duty rectangular	Each	5893.00
23.10	Providing and constructing Brick masonry valve chamber with 15cm thick 1:3:6 proportion PCC bedding excluding excavation, Brick masonry in C.M. 1:6 proportion, cement concrete grade M-15 (Nominal mix) with stone aggregate 20 mm Nominal size for benching, precast RCC as directed by Engineer-in-Charge. (Note :- Wall thickness : 0.23 M for depth of 1.2M and 0.35 M for balance depth exceeding 1.2M. 12 mm plaster 1:3 inside chamber).		
23.10.1	Valve Chamber with precast RCC covers		
23.10.1.1	Size 60cm x45cm, depth 0.9 M with cover	No.	4370.00
23.10.1.1.1	Add 30 cm or part there off	30 cm depth	643.00
23.10.1.2	Size 90cm x45cm , depth 1.2 M with cover	No.	5462.00
23.10.1.2.1	Add 30 cm or part there of	30 cm depth	784.00
23.10.1.3	Size 90cm x60cm , depth 1.2 M with cover	No.	7079.00
23.10.1.3.1	Add 30 cm or part there of	30 cm depth	1145.00
23.10.1.4	Size 90cm x90cm, depth 1.2 M with cover	No.	9866.00
23.10.1.4.1	Add 30 cm or part there of	30 cm depth	1327.00
23.10.1.5	Size 90cm dia, depth 1.2 M with cover	No.	6191.00
23.10.1.5.1	Add 30 cm or part thereof	30 cm	507.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.10.1.6	Size 1.2m x 1.2m, depth 1.2 M with cover	depth No.	12482.00
23.10.1.6.1	Add 30 cm or part thereof	30 cm depth	1694.00
23.10.1.7	Size 1.5m x 1.5m, depth 1.5 M with cover	No.	20209.00
23.10.1.7.1	Add 30 cm or part thereof	30 cm depth	3185.00
23.10.2	Providing and constructing Brick masonry valve chamber with 15cm thick 1:3:6 proportion PCC bedding excluding excavation, Brick masonry in C.M. 1:5 proportion 12mm thick cement plaster in cm 1:4 proportion on both sides with providing and fixing C.I. manhole frame and cover in RCC 1:2:4 coping or RCC 1:2:4 proportion x 15cm thick slab, etc complete as directed by Engineer-in-Charge. (Note :- Wall thickness : 0.23 M for depth of 1.2M and 0.35 M for balance depth exceeding 1.2M).		
	Valve chamber with CI Frame & Cover		
23.10.2.1	Size 60cm x45cm , depth 0.9 M with F&C,40 Kg	No.	6269.00
23.10.2.1.1	Add 30 cm or part there of	30 cm depth	643.00
23.10.2.2	Size 90cm x45cm, depth 1.2 M with F&C,40 Kg	No.	6657.00
23.10.2.2.1	Add 30 cm or part there of	30 cm depth	784.00
23.10.2.3	Size 90cm x60cm,depth 1.2 M with F&C,50 Kg	No.	8608.00
23.10.2.3.1	Add 30 cm or part there of	30 cm depth	1145.00
23.10.2.4	Size 90cm x90cm,depth 1.2 M with 53 cm dia F&C,90 Kg	No.	12398.00
23.10.2.4.1	Add 30 cm or part there of	30 cm depth	1327.00
23.10.2.5	Size 1.2m x1.2m, depth 1.2 M with 53 cm dia F&C,90 Kg	No.	14152.00
23.10.2.5.1	Add 30 cm or part there of	30 cm depth	1694.00
23.10.2.6	Size 1.5m x 1.5m, depth 1.5 M with 53 cm dia F&C,90Kg	No.	20348.00
23.10.2.6.1	Add 30 cm or part there of	30 cm depth	3185.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.10.3	Providing and constructing Brick masonry valve chamber with 15cm thick 1:3:6 proportion PCC bedding excluding excavation, Brick masonry in C.M. 1:5 proportion, 12 mm thick cement plaster in CM 1:4 on both sides with providing and fixing precast S.F.R.C. frame and covers etc. complete as directed by Engineer-in-Charge. (Note :- Wall thickness : 0.23 M for depth of 1.2M and 0.35 M for balance depth exceeding 1.2M). Valve chamber with precast steel fibre reinforced concrete frame and covers (S F R C frame and covers).		
23.10.3.1	Size 60cm x45cm, depth 0.9 M with SFRC, F&C	No.	5400.00
23.10.3.1.1	Add 30 cm or part there of	30 cm depth	778.00
23.10.3.2	Size 90cm x45cm, depth 1.2 M with SFRC, F&C	No.	7048.00
23.10.3.2.1	Add 30 cm or part there of	30 cm depth	978.00
23.10.3.3	Size 90cm x60cm, depth 1.2 M with SFRC,F&C	No.	8394.00
23.10.3.3.1	Add 30 cm or part there of	30 cm depth	1381.00
23.10.3.4	Size 90cm x90cm, depth 1.2 M with SFRC,F&C	No.	10442.00
23.10.3.4.1	Add 30 cm or part there of	30 cm depth	1593.00
23.10.3.5	Size 1.2m x1.2m, depth1.2 M with SFRC,F&C 540mm dia	No.	12938.00
23.10.3.5.1	Add 30 cm or part there of	30 cm depth	2020.00
23.10.3.6	Size 1.5m x1.5m,depth1.5 M with SFRC,F&C 540mm dia	No.	19497.00
23.10.3.6.1	Add 30 cm or part there of	30 cm depth	3659.00
23.11	Providing and fixing in position M.S. Air valve boxes fabricated with 2mm thick M.S. Plate 30x30x3mm size M.S. angle frame, concreting in M-15 for fixing the box in position, applying two coats of oil paint, painting chainage, locking arrangement, etc. complete as directed by Engineer-in-charge.		
	a) For single ball air valve	Each	1987.00
	b) For double ball air valve	Each	2201.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.12	Providing & Fixing C.I. road box including loading, unloading and carting to site of work including all necessary excavation in all types of strata and fixing in murum packing, etc. complete.		
	a) 100 mm x 225 mm (20kg)	Each	1342.00
	b) 225 mm x 300 mm (40kg)	Each	2684.00
23.13	Construction of circular type manhole 1200mm internal dia at bottom, 560mm dia at top in brick masonry class designation 40 with 1:4 cement mortar 1:4 (1 cement : 4 Coarse sand) 1680m depth, 12mm thick cement plaster 1:3 cement plaster (1 cement : 3 Coarse sand) finished with a floating coat of neat cement. 30cm thick foundation in cement concrete grade M-10 (Nominal Mix) with stone aggregate 40mm nominal size, RCC grade M-20 (Nominal Mix) with stone aggregate M-20 nominal size on top slab and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size neatly finished, curing and fixing of SFRC cover and frame (heavy duty HD-20) 560mm internal dia Conforming to IS 12592.	Each	10782.00
23.14	Extra for increasing depth of manhole mentioned at Item No. 23.13 from 1680 mm to 2290 mm with modular brick class designation 40.	RM	3910.00
23.15	Providing and fixing in position steel fibre reinforced concretes (S.F.R.C.) frame and covers of approved make including loading, unloading, transportation, all taxes, etc. complete as directed by Engineer-in-charge (20 tonnes capacity).		
	a) 540 mm dia	Each	1670.00
	b) 560 mm dia	Each	1697.00
	c) 90 x 45 cm	Each	2918.00
	d) 90 x 60 cm	Each	3133.00
	e) 60 x 60 cm	Each	2122.00
	f) 60 x 45 cm	Each	1952.00
23.16	Providing & fixing intercepting sewer trap including concrete bedding, etc. complete		
	a) 150 x 100mm	Each	291.00
	b) 100 x 100mm	Each	194.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)			
23.17	Providing & fixing in position S.W.bends of various size, etc. complete.					
	a)100mm	Each				240.00
	b)150mm	Each				495.00
23.18	Providing & fixing "Y" junction and labour, etc. complete.					
	a) Saddle junction 100 x 100 m	Each				626.00
	b) Y junction 150 x150 x100mm	Each				726.00
	c) Y junction 300 x300 x300mm	Each				1754.09
	d) Y junction 300 x300 x100mm	Each				1864.00
23.19	Providing and fixing in position A.C. soil ventilators/ slotted as necessary and as directed by Engineer-in-charge etc. complete.					
	a)80mm	Each				198.00
	b)100mm	Each				241.00
	c)150mm	Each				478.00
23.20	Providing & fixing A.C.Soil pipe or down take pipe					
	a)80mm	Each				176.00
	b)100mm	Each				211.00
	c)150mm	Each				319.00
23.21	Providing & fixing C.I.Soil pipe 1.80m					
23.21.1	S/S					
	a)80mm	Each				659.00
	b)100mm	Each				738.00
23.21.2	D/S					
	a)80mm	Each				724.00
	b)100mm	Each				798.00
23.21.3	circular manhole					
23.22	Supplying & fixing Manhole Frame and Cover of following sizes circular Composite Resin (FRP/ GRP) Manhole Frame and Cover of approved brand , Conforming to relevant Grand Designation : as per IS: 1726: 1991 etc . Complete.(Inspection shall be as per guidelines of IS Specification)		2.5 T	5T	10T	20T
1	530 mm dia	Each	6670.00	8271.00	9872.00	11474.00
2	600 mm dia	Each	7907.00	9758.00	11609.00	13459.00
23.23	Supplying & fixing following sizes Manhole Frame and Cover of Rectangular composite Resin (FRP/ GRP) Manhole Frame and Cover of approved brand , Conforming to relevant Grade Designation : as per IS: 1726; 1991 , etc. Complete. (Inspection shall be as per guidelines of IS Specifications.)					

S.No.	Particulars of Items	Unit	Rate (in Rs.)			
	225 x 300mm	Each	4556.00	5759.00	6964.00	8167.00
	450 x 600 mm	Each	7352.00	9760.00	12168.00	14576.00
	450 x 900 mm	Each	13530.00	14861.00	15305.00	16192.00
	600 x900 mm	Each	16427.00	18068.00	19709.00	21352.00
	1000x 1000 mm	Each	37507.00	40309.00	43111.00	45913.00
23.24	Supplying & fixing following sizes Square manhole cover of composite Resin (FRP/ GRP) Manhole Frame and Cover of approved brand , Conforming to relevant Grade Designation : as per IS: 1726; 1991 , etc. Complete. (Inspection shall be as per guidelines of IS Specifications.)					
	300 x300 mm	Each	3624.00	4427.00	5230.00	6032.00
	450 x450 mm	Each	5688.00	7653.00	9617.00	11582.00
	600 x 600 mm	Each	11538.00	12599.00	13660.00	14723.00
23.25	Supplying & fixing following sizes Gully Gratings of composite Resin (FRP/ GRP) Manhole Frame and Cover of approved brand , Conforming to relevant Grade Designation : as per IS: 1726; 1991 , etc. Complete. (Inspection shall be as per guidelines of IS Specifications.)					
	450 x 450 mm	Each			2954.00	
	500 x 550 m	Each			3414.00	
	500 x 600 m	Each			3594.00	
23.26	Supplying and fixing C.I. cover without frame for manholes :					
23.26.1	455x610 mm rectangular C.I. cover (light duty) the weight of the cover to be not less than 23 kg.	Each			1491.00	
23.26.2	500 mm diameter C.I. cover (medium duty) the weight of the cover to be not less than 58 kg.	Each			3681.00	
23.26.3	560 mm diameter C.I, cover (heavy duty) the weight of the cover to be not less than 108 kg.	Each			6001.00	
23.27	Replacement of M.S. foot rests in manholes including dismantling concrete blocks and fixing with 20x20x10 cm cement concrete blocks cement concrete grade M-10 (Nominal Mix) with stone aggregate 20mm nominal size.					
23.27.1	With 20x20 mm square bar	Each			221.00	
23.27.2	With 20 mm diameter round bar	Each			187.00	
23.28	Dismantling of manhole including R.C.C. top slab, C.I. cover with frame including stacking of useful materials near the site and disposal of unserviceable materials into municipal dumps/within 50 m lead :					

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.28.1	Rectangular manhole 90x80 cm and 45 cm deep	Each	562.00
23.28.2	Rectangular manhole 120x90 cm and 90 cm deep	Each	986.00
23.28.3	Rectangular arch type manhole 140x90cm and 2.45m deep.	Each	2095.00
23.28.4	Circular manhole 1.22 m diameter and 1.68 m deep.	Each	1192.00
23.29	Extra for depth of manholes dismantled:		
23.29.1	Rectangular manhole 90x80 cm and 45 cm deep	Metre	403.00
23.29.2	Rectangular manhole 120x90 cm and 90 cm deep	Metre	480.00
23.29.3	Rectangular arch type manhole 140x90 cm and 2.45m deep (up to 4.25 m depth).	Metre	389.00
23.29.4	Circular manhole 122 cm diameter and 1.68 m deep (up to 2.29 m depth)	Metre	811.00
23.30	Cleaning of sewers		
23.30.1	Cleaning of sewers by means of manual labour using hand tools like pick axes, manhole guards, tripod stands, danger flags, lanterns, batteries, safety lamps, lead acetate paper, silt drums, ropes, iron hooks, hand carts, plunger rods (cleaning rods), observation rods, shovels etc. Qty of silt, debris etc. to be removed from manholes chambers after cleaning of sewers and manholes.		
23.30.1.1	Not exceeding a total length of 50 metres from manhole or cleaning eyes to the next manhole		
	100 mm	Each	96.00
	150 mm	Each	133.00
	200 mm	Each	206.00
	300 mm	Each	321.00
23.30.2.1	Exceeding 50 metres but not exceeding 100 metres		
	100 mm	Each	191.00
	150 mm	Each	266.00
	200 mm	Each	411.00
	300 mm	Each	649.00
23.31	Pumping out to remove the sewers blockage by using suitable pump sets operated by generators, whole assembly mounted on four wheel trailer/ pickup van.	Per Hour	65.00

S.No.	Particulars of Items	Unit	Rate (in Rs.)
23.32	Cleaning of sewers up to 300mm dia by manila rod and cloth ball/ sewer rod/ Roding machine with flexible sewer rods etc. including removal of blockage of manhole complete.	Each	411.00
23.33	Cleaning of sewers (all sizes) by jetting machine/ sewer cleaning machine equipped with air and water jetting by removal of blockage of manhole and cleaning sewers manhole to manhole by jetting complete.	Day	2149.00
23.34	Removal of debris/malwa collected in manholes by manual means/ mechanical means complete.	Cum	162.00

CHAPTER - 24

INTAKE WELL

- 1 Scope
- 1.1 The Specification covers the requirements for Survey, structural design & Construction of Intake Well.

- 2 An intake is a structure constructed in a surface water / near surface water to obtain water from the source. The intake structures are built to draw water from rivers, streams, lakes, and reservoirs etc.

- 3 Selection for Intake Site : While taking a decision regarding the location of the intake site, the following points should be kept in view:
 - 3.1 The inflow point of the intake drawing water from a stream or a lake should be well below the water surface to prevent hydraulically wasteful air entrainment but sufficiently high enough from the bed to avoid entrapping of suspended solids.
 - 3.2 The location should provide the most suitable quality of water available.
 - 3.3 The site should have firm strata for good foundations.
 - 3.4 The site should avoid the existence of currents that may endanger the safety of the structure or deposit silt against or on it.
 - 3.5 The effect of floods at the proposed point should be studied and all precautions taken for the safety of the structure as well as safe working of the intake during floods.
 - 3.6 The distance from where the power is available should be considered.
 - 3.7 The distance of pumping station from the proposed site of intake also deserves consideration.
 - 3.8 In case of impounding reservoir, the intake should be located at the deepest point in reservoir, which is generally near the dam site, in order to take the optimum utility of the reservoir capacity.

- 4 **Surveys needed for intake well** : Following surveys shall have to be conducted for preparation of detailed drawings & designing of intake well.
 - 4.1 River gauging
 - 4.2 Geological and soil investigation
 - 4.3 Cross sectional survey
 - 4.4 Contour survey of the area.
 - 4.5 Hydrological survey of the source.
 - 4.6 Catchment area survey (the catchment area of the source should be located on the map).
 - 4.7 Fixing of HFL etc.
 - 4.8 Sanitary survey.

4.8.1 Sanitary surveys at regular, intervals at field management levels and inspections at supervisory management level should be conducted. The catchment area of the source should be located on the maps. Potential sources of pollution observed in the catchment should be marked. The type of pollution e.g. industrial/domestic waste discharges, wastes of animal origin and agricultural run-offs should be determined.

4.8.2 The reports of such survey should be promptly sent to the Pollution Control Authorities as well as water works authorities to promote corrective action. Procedure for monitoring of preventive action taken should be laid down and observed. An instant action plan for providing chlorination of raw-water should be available and brought into effect under such circumstances.

4.9 Measurement of flow.

4.9.1 In cases of sources such as springs, rivers, canals, etc., there should be a permanent arrangement for recording daily flows near the intake works. Appropriate records in the form of graphs showing variation of flows in the source for each month in a year and for each year shall be maintained. Rain gauge stations should be established to record daily rainfall in the reservoir catchment and appropriate rainfall records should be built up and compared with discharges/ storages available. In case of reservoirs, the regime tables for filling and emptying of storages should be maintained for each year.

5.0 **Measurement:**

5.1 All the measurement shall be recorded under the relevant item of the work.

5.2 Generally the work of survey, design & construction of intake well is awarded on turnkey basis and payment is made on lumpsum basis as per payment schedule given in the tender.

6 **Rates**

The rate shall include the cost of materials and labour involved in all the operations except for the items measured/ enumerated separately under clause 'Measurements', which shall be paid for separately.

CHAPTER 24 - INTAKE WELL

S.No.	Short Description	Unit	Rate (in Rs.)
24.1	Providing, constructing coffer dam in river basin/dam storages as per type design including excavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious/semipervious materials on both side of B.C. soil (in gunny bags if required) including ramming, compacting to the satisfaction of Engineer-in-Charge, till the completion of work including dismantling coffer dam after completion of works and disposing off the material as directed by the Engineer-in-charge.	Cum	540.00
Note	Pay line maximum - Top width payable shall be 2 mtr. and maximum payable side slopes shall be 1.5 horizontal to 1 vertical, if the constructed top width of the side slopes are less, then the measurement at actual are payable. Extra top width or flatter slopes are not payable. Contractor is free to use ballies, plastic sheets, piles, pipes, CGI sheets for supporting hearting materials instead of impervious/semiimpervious hearting materials for which no extra payments shall be payable. 30% payment shall be withheld for dismantling of coffer dam. This foot note shall appear in tender condition.		
24.2	Providing and fabricating at work shop, carting to site of work, including transport, loading, unloading, hoisting, lowering and setting out at actual site of sinking well, M.S. plate cutting edge for R.C.C. well curb consisting of 350 mm M.S. plate, 10 mm thick, champhering at bottom. Cutting edge should be provided in pieces not less than 2 m in length. Each joint should be plain from outside and jointed by gusset plate 400 x 200 x 12 mm thick M.S. plate with 12 nos. of 20 mm dia. crurshank headed bolts (gusset plates from inside) with unequal angle of 90 x 60 x 10 mm should be welded from top of chamfered portion at 14 mm from bottom so that 15 mm side should be in contact with cutting edge with overlap of 300 mm joints. 16 mm dia bar should be welded to M.S. plate 200 mm below the top surface and length should be 1.8 m above plate with a bend 300 mm from plate surface including 3 coats of anticorrosive paint as directed by Engineer-in-Charge.	Kg.	81.60
24.3	Earth work in excavation of foundation for structures as per drawing and technical specification including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material etc. and as per relevant clause of section 300 & 2100		
	Ordinary soil up to 3 m depth	Per cum	129.00
	3.0 m to 6.0 m depth	Per cum	148.00
	Above 6 m depth	Per cum	180.00
24.4	Providing and filling puddle (selected good impervious clay) in weirs in proper layers of 15 cm including watering, ramming and compaction etc. complete with all leads and lifts.	Cum	228.00

S.No.	Short Description	Unit	Rate (in Rs.)
24.5	Providing and filling around the Intake well, boulders filling of selected variety and size of boulders including cost of all materials, labour, transportation etc. complete with all leads and lifts.	Cum	816.00
24.6	Providing and fixing 80 mm dia A.C./P.V.C. pipe weep holes at 1.5 m c/c staggered in abutment of the approach bridge/ramp including cost of all materials and labour involved with all leads and lifts etc. complete with all leads and lifts.	RM	180.00
24.7	Providing and fixing M.S. chaquered plate flooring of following thickness supported on M.S. angles (25 x25 x 5 mm size) including welding, cutting and fabricating the plate to the required square or round shape, making holes in the plate, including providing and applying 3 coats of anticorrosive paint etc. complete as directed by Engineer-in-charge.		
	a) 6 mm thick	Sqm	3660.00
	b) 8 mm thick	Sqm	4680.00
24.8	Providing at site of works ISI standard RCC slotted pipes for collection of water into Intake well with R.C.C. collar of NP-3 class including cost of all central and local taxes , octroi, inspection, transportation etc. complete.		
	a) 450 mm dia	RM	3660.00
	b) 600 mm dia	RM	5676.00
24.9	Labour for lowering, laying and jointing RCC slotted pipes of following diameters including all leads and lifts, cost of jointing material, complete as directed by Engineer-in-charge.		
	a) 450 mm dia	RM	180.00
	b) 600 mm dia	RM	240.00
24.10	Labour for lowering, laying and jointing CI 'B' class / MS (cement mortar lined inside & epoxy coated on out side) pipe connecting mains with rubber gaskets including transportation of pipes from stores to site of works, cost of jointing materials, cost of rubber gasket with all leads and lifts etc. complete.		
24.10.1	CI Class "B"		
	200 mm dia	RM	232.00
	300 mm dia	RM	396.00
	350 mm dia	RM	498.00
	400 mm dia	RM	611.00
	450 mm dia	RM	733.00
	500 mm dia	RM	858.00
	600 mm dia	RM	1138.00
	700 mm dia	RM	1470.00
	750 mm dia	RM	1659.00
	800 mm dia	RM	1848.00
	900 mm dia	RM	2231.00
	1000 mm dia	RM	2686.00
24.10.2	MS (cement mortar lined inside & epoxy coated on out side) pipe		
	350 mm dia	RM	104.00
	400 mm dia	RM	142.00
	450 mm dia	RM	179.00

S.No.	Short Description	Unit	Rate (in Rs.)
	500 mm dia	RM	223.00
	600 mm dia	RM	258.00
	700 mm dia	RM	309.00
	750 mm dia	RM	346.00
	800 mm dia	RM	387.00
	900 mm dia	RM	434.00
	1000 mm dia	RM	558.00
24.11	Providing, lowering, laying and placing in position, shrouding (covering) material for porous pipe gallery/slotted pipe gallery/trench gallery with all leads and lifts involved including transportation of materials to site of works, screening and washing of materials and placing in position with given section, etc. complete as directed by Engineer-in-charge.		
	a) 40 mm gauge pebbles	Cum	1140.00
	b) 12 mm to 20 mm gauge pebbles	Cum	1380.00
	c) 6 mm to 12 mm gauge pebbles	Cum	1573.20
	d) Coarse sand (from river sand at site)	Cum	780.00
	e) Fine sand (from river sand at site)	Cum	838.50
24.12	Providing and fixing in position C.I./ M.S. steps or 22 mm dia M.S. bar step with proper anchorage etc. and providing and applying 3 coats of anti-corrosive paint etc. complete as directed by Engineer-in-charge.	Each	360.00
24.13	Providing and fixing M.S. sluice gates PN 1.0 in position as per detailed drawing and specification including cost of all materials, labour, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint etc. complete as directed by Engineer-in-charge.	Kg.	91.20
24.13.1	Providing and fixing cast iron double flanged sluice valves PN 1.0 as per IS 14846 - 2000 fitted with cast iron cap including jointing & testing with cost of jointing material complete. (as per Chapter -8 Item No.- 8.1)		
	200mm dia	Each	11629.00
	250 mm dia	Each	17273.00
	300mm dia	Each	21335.00
	350mm dia	Each	38097.00
	400mm dia	Each	46138.00
	450mm dia	Each	54103.00
	500mm dia	Each	89289.00
	600mm dia	Each	103806.00
	700 mm dia.	Each	241255.00
	750 mm dia.	Each	260762.00
	800 mm dia.	Each	281115.00
	900 mm dia.	Each	368941.00
	1000 mm dia.	Each	482809.00
24.14	Providing and fixing in position C.I./M.S. rose pieces in intake wells including cost of all materials and labour, painting with three coats of anti-corrosive oil paint, etc. complete as directed by Engineer-in-charge.	Kg.	88.80

S.No.	Short Description	Unit	Rate (in Rs.)
24.15	Providing and spreading around the well 1 mm thick polyethylene sheet complete as directed by Engineer-in-charge.	Sqm	22.80
24.16	Dewatering charges for estimation purpose for head works in river basin or dam :		
	1) Approach channel	RM	5256.00
	2) Intake well of 3 m dia.	Each	70092.00
	3) Inspection well of 2 m dia.	Each	45132.00
	4) Connecting main	RM	4212.00
	5) Intake well of 6 m dia.	Each	210264.00
	6) Approach Bridge	RM	708.00
Note	<p>i) The contractor at his request may be allowed to start construction of masonry steining so as not to allow silting of well in on coming monsoon and while paying masonry 25% amount shall be withheld and released only when excavation to the full depth is completed.</p> <p>ii) Dewatering : Total dewatering charges are to be proposed in the tender as lump sum amount and 75% is payable for excavation and 25% is payable for construction of well/gallery. Out of 75% excavation, break-up shall be as under</p> <p>25% for last 1 m depth 20% for 2 m depth which just above last 1 m depth 15% for 2 m depth which just above last 3 m depth 15% for the rest of depth from water table level.</p> <p>iii) The provisions made for dewatering in the tender being on lump sum basis, the same shall have to be reduced/increased proportionately as the length of approach channel, connecting main or approach bridge reduces/increase during actual execution.</p> <p>Condition No. (i) and (ii) shall appear in tender document.</p>		
24.17	Carrying out recuperation/yield test for asserting the discharge of constructed well/excavated profile as directed by Engineer-in-charge. The test carried out by drawing down water from the well/profile below normal/subsoil water level up to full depth rise is water level is recorded. The normal water level/subsoil water level in the well/profile as well as strainer/suction level at pump as per design of W.S. scheme shall be recorded prior to the test including cost of all materials. overhead, labouers etc. completed as directed. (The test shall be carried out for 7 days.)		
	Lps more than 25,000	Day	3264.00
	Lps less than 25,000	Day	3246.00
24.18	Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:-	Job	5% of estimated cost.

S.No.	Short Description	Unit	Rate (in Rs.)
(i)	Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.		
(ii)	Architectural/ Structural drawing having following items :-		
(a)	Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell.		
(b)	Preparation of estimate on prevailing schedule of rates, architectural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.		

Chapter No. 25

WATER TREATMENT PLANT & SEWAGE TREATMENT PLANT

25.1 Designing (structurally, hydraulically & aesthetically), providing and constructing and commissioning Conventional Water Treatment Plant consisting of Civil Works, including cost of providing and applying Epoxy paint to inside surface of water retaining structures in contact with Chlorine and providing anti-termites treatment to entire structure below ground level, Mechanical and Electrical components of various sub-works as given below : including necessary hydraulic testing, structural testing, equipment testing and trial run for 3 months, etc. complete as directed by Engineer-in-charge . (turn-key job).

- 1) **Aeration Fountain** : Plan area not less than 0.625 square metre per MLD
- 2) **Parshall Flume** : With necessary devices, consisting of simple mechanical indicator (Pedestal type gauge)
- 3) **Flash Mixer** Rapid mixing device, detention time 60 seconds to give velocity gradient 300 to 400 sec⁻¹ vane mixer type Conforming to IS 7090 of 1985
- 4) **Flocculator** : Conforming to I.S. 7208 of 1974 (Type-C) with detention period of 30 minutes
- 5) **Clarifier** : Vertical flow / Horizontal flow circular tank, weir loading with mechanical sludge scraper conforming to I.S. 10313/1982, detention period, overflow rate for average design flow for different types of sedimentation tanks shall be as follows.

Tank type	Surface loading m ³ /m ² /d*		Detention period, hr*		Particles normally removed
	Range	Typical value for design	Range	Typical value for design	
Plain Sedimentation	Up to 6000	15-30	0.01-15	3-4	Sand, silt and clay
Horizontal flow, Circular	25-75	30-40	2-8	2-2.5	Alum and iron floc
Vertical Flow (Upflow) Clarifiers	-	40-50	-	1-1.5	Flocculent

* at average design flow

5.1 Wire length relative to surface area determines the strength of the outlet current. Normal wire loadings are upto 300 m³/d/m. But when settling tanks are properly designed, well clarified waters can be obtained at weir loadings of even upto 1500 m³/d/m.

6) **Rapid Sand Filters and Filter House** Filter designed for filtration rate of 4,800 litres per square metre per hour, minimum 2 beds for plant up to 10MLD for larger plants as specified , filters house with roof slab, pipe gallery and plat form minimum 5.5 metre in width

a) **Filter Sand** : Effective size 0.45 to 0.70mm, uniformity coefficient not more than 1.7, nor less than 1.3 , depth of water over sand 0.75M , free board 50 cm , gravel 0.45 M depth, sand and gravel Conforming to I.S. 849 (I)-77 back wash by air wash, Standard appurtenances (to be specified), rate of flow controller, filler gauge, sand expansion gauge etc.

b) **Wash Water Tank** : Capacity to be specified and suitable to supply water to wash 2 filter units at a time where the units are 4 or more.

c) **Wash Water Pumps** : Capacity to fill water tank in 1 hours with 100% standby

d) **Air Blowers** : Capable of delivering 600 LMP per square metre of free air, of filter area at 0.4 Kg/square cm at the under drains (100% stand by)

7) Chemical House in Two Storeys

a) **Ground floor** to accommodate 7 days alum requirement and sundry storage.

b) **First floor** to accommodate alum and lime tanks etc.

c) **Solution tanks** : Minimum 3 tanks (One for preparation, Second for dosing and third as standby), each tank capable of giving 8 hours maximum dose without interruption, minimum free board 0.30M trays for dissolving, level indicator tor mechanical agitation devices, solution feed and drain lines, solution feed device(Constant head device strength of solution upto 10% only) Conforming to I.S.9222 part-I/1979.

8) Clear water Sump and Pump House

a) **Capacity of sump** : One hour of designed flow.

b) **Pump House** : Pump house of required size over the sump or by the side

9) Store House : Suitable for alum storage of three months requirement in monsoon with 10% extra capacity for other sundry articles.

10) Vacuum feed type chlorinators : make approved by PHED, CG.

a) Conforming to I.S. 10553 (Part-2) 1983 Reaffirmed 2001

b) **Chlorine Requirement**

1 Rate of withdrawal of chlorine from container depends upon the size of container and the surrounding temperature. For guidance, Table given below may be followed.

Temperature °C	Chlorine discharge per day in Kg.		
	Cylinders		Tonne Container
	45 kg	67 kg	
4	2.72	4.08	45
10	6.35	9.50	110
15	10.75	16.10	130
20	14.50	21.54	254
27 & above	18.70	28.12	315

2 When the gas discharge rate from a single container does not meet the requirements, two or more containers can be connected to a manifold and discharge simultaneously. It is advisable not to couple more than four containers to a manifold.

c) Chlorinator equipment and container room, Handling, Storage & Safety shall Conform to I.S. 10553 Part-I 1983 Reaffirmed 2007

d) **100% standby** shall be provided

11) **By pass arrangement** - C.I. Or M.S. pipes with inside and out side epoxy coating.

12) **Drainage arrangement** : RCC pipes up to plot boundary.

13) **Electrical installation** : Both internal and external including entire plant area.

14) **Laboratory equipment** : As per requirement (to be specified during tendering)

15) **Sanitary blocks** : Carpet area-15 square metre minimum up to 25 Mld. And 25 square metre above 25 Mld. (min 2 units well separated for Ladies & Gents).

16) **Administrative block** :

To accommodate office room, chlorine room, laboratory room, panel board room, blower room etc. (appropriate sizes should be provided at time of estimation)

17) Rates given below are **inclusive of uplift pressure if any and dewatering** during entire work.

18) These rates are **applicable for seismic zones- 2 & 3.**

19) All RCC water retaining structure shall be constructed in M-30.

NOTE: Condition from Sr. No.1 to 19 shall form a part and parcel of the tender and must be incorporated in draft tender papers of conventional treatment plants.

25.2 Designing (structurally & aesthetically), providing and constructing high rate Unconventional Water Treatment Plant i.e. Simplified Water Treatment Plants consisting of Civil Works, including cost of providing and applying Epoxy paint to inside surface of water retaining structures in contact with Chlorine and providing anti-termite treatment to entire structure below ground level, Mechanical and Electrical components of various sub-works as given below : including necessary hydraulic testing, structural testing and trial run for 3 months, etc. complete as directed by Engineer-in-charge .

1) **Aeration fountain**

2) **Inlet arrangements**

3) **Mixing channel** with venturi flume and flow measuring arrangement.

4) **Inlet channel**

5) **Flocculator-** **Conforming to I.S. 7208-1974 (Type-C) with detention period of 30 minutes.**

6) **Tube Settlers** - " Designing, fabricating and construct Tube Settlers with square or any other shaped tube like Circular, Chevron, Hexagonal diamond shaped, triangular, rectangular etc. having proven performance." A widely used material for their construction is thin plastic sheet (1.5 mm) black in colour, though plastic and asbestos cement pipes have also been used.

7) **Rapid sand gravity filters.**

8) **Filter house**

9) **Chemical house**

10) **Alum tanks** 2 Nos. with mixing, carrying and dosing arrangement with piping.

11) **Gravity feed gas chlorinator** with 100% standby.

12) **TCL solution tank** with mixing, carrying and dosing arrangement with piping.

- 13) **Bye-pass arrangement**
- 14) **External and internal electrification**
- 15) **Laboratory equipments**
- 16) **Wash water tanks** of capacity equal to 2% of designed quantity of filtered water in a day (+) 10%
- 17) **Wash water pumps** with 100%standby
- 18) **Pure water sump** capacity equal to 1 hour pumping capacity
- 19) **Pure water pump house** over the sump / by the side of sump
- 20) **Drainage arrangements**
- 21) **Alum store**
- 22) **Sanitary block** with necessary water supply and drainage arrangement.
- 23) These rates are **applicable for seismic zones 2 & 3.**
- 24) Rates given below are inclusive of uplift pressure if any and dewatering during the entire work
- 25) All RCC structures shall be constructed in M-30.
- 26) Unconventional Treatment Plants less than 1 MLD capacity shall not be constructed

Note:- Conditions from Sr.No. 1 to 26 shall form a part and parcel of the tender and must be included in draft tender documents for the work of unconventional treatment plants.

25.3 Designing (structurally & aesthetically), providing, fabricating, **Package Water Treatment Plant**. At the shop, transporting to site, installing, testing and commissioning at the site, giving necessary one month's free test and trial run with guarantee for one year, etc. complete.

Prefabricated Package Water Treatment Plant comprising following

1. **Rapid mixing Channel** in M.s.Sheets and M.S. baffle.
2. **Flocculator** not less than 10 minutes detention, in M.S. prefabricated box, flocculation being achieved either by glass pebbles of graded size or PVC tetra pod or equivalent arrangement to ensure good flock formation.
3. **Plate or tube settlers** of not less than 30 minutes detention, in M.S. prefabricated box, plates/ tubes mounted in the settler basin with inclination of not less than 60 degree to horizontal
4. **Rapid sand gravity filter in M.S. prefabricated box with filter sand** not less than 500mm thick, supported on false floor below with polypropylene nozzles spaced at not more than 500mm centres in either direction.
5. **Backwashing, inlet facilities** shall be provided.
 - 5.1 Air Blowers : Capacity of delivering 600 LMP per sq.mtr. Of free air of filter area 0.4 Kg./Cm² at under drain (100% stand by)
 - 5.2 Wash water tank of capacity equal to 2 % of designed quantity of filtered water in a day (+) 10%.
 - 5.3 Wash water pumps with 100% stand by (Minimum 3Hp with all accessories)
- 6 Laboratory equipments
 - 6.1 External & internal Electrification.

- 6.2 TCL solution tank with mixing , carrying & dosing arrangement with piping.
- 6.3 Gravity feed gas chlorinator with 100 % standby.
- 6.4 Alum storage unit.
- 6.5 Drainage arrangement.
- 6.6 Office and Lab. Space with necessary water supply & drainage arrangement and internal roads.
- 6.7 Sump well and pump house
- 6.8 Wire fencing with gate for W.T.P. Premises.

7. **All civil works** for foundation, consisting of raised RCC platform above G.L. or walls in B.B. Masonry or UCR masonry shall be provided as per needs at site.

8. **Bye pass in the form of pipes or M.S. channels** included in the design, effecting bye pass or such new tank and filter individually or both (Limit up to 5.0 M from W.T.P. face).

9. The entire M.S. **Fabricated tank provided with FRP lining (5 mm thick)** to inside face in contact with water epoxy painting-two coats with one coat of primer on outside. The thickness of plates employed shall be not less than 6mm.

10. **Alum dosing and mixing arrangement** to be provided in twin tanks, each of 8 hours capacity, capable of importing dose of 20 ppm with 5% solution. The alum tanks provided with a dose in steps 5 ppm and entire unit mounted on the top of flocculator/ settler box, in the form of prefabricated structure., with access platform and ladder. Alum boxes with FRP lining (5mm thick) inside and epoxy paint two coats with one coat of primer on outside.

11. Both **flocculator and settling basins** provided with hopper bottom with slope not less than 45 degrees to the horizontal Drain pipes and valves provided to both flocculator and settling basin.

12. Flow rating to Conform following parameters:

a) Velocities in channels not to exceed 0.6 M/Second.

b) Velocities in filter outlet pipes and valves not to excess
1 M/Seconds

c) Velocities interconnecting pipe and control not to exceed
1 M/ Seconds.

d) Backwash with air : Not required

e) Backwash with water : Not less than 0.6 Cu.M/ Sq.m. of filter bed area in filter box.

13. **Free board for all units** not less than 300mm

14. Rates as above **include all** taxes, octopi and duties which would be specific to the site location.

25.4.1 Designing (structurally & aesthetically), providing, and constructing and giving satisfactory trials of modernised Sewage Treatment Plant consisting of receiving chamber, screen chamber, grit chamber, measuring flume, distribution chamber with primary and secondary treatment, etc. as detailed below, administration block of suitable size including allied units for waste disposal with all civil and mechanical works involved, etc. complete turn key job.

25.4.2 Designing (structurally & aesthetically), providing, and constructing, hydraulic testing, commissioning and giving satisfactory trials of modernised Sewage Treatment Plant consisting of inlet chamber, screen chamber, Detritus Tanks, Partial flume, primary settling tanks, Aeration tanks, Secondary tanks, Sludge sump and pump house, Sludge thickener, Primary digester, SST sump and pump house, chlorine contact tank Chlorinators, Chlorinator room, sump cum blending tank (SCBT) PST sludge sump cum blending tank, Pump House Sludge Centrifuge gas holder, necessary piping work with required valves, gates, drains, pathways, Administrative Building cum Laboratory, Laboratory equipments, tools and plants, Spare parts etc. complete as turn-key job with all involved civil electrical and mechanical works inclusive of following items units as per detailed specification for civil, electrical and mechanical components with all duties and taxes etc complete.

Inlet Chamber:

Designing, providing and constructing RCC (M-30) Inlet chamber designed for the peak flow 2 DWF including necessary excavation in all types strata including walkway around the periphery. Each compartment will have phosphor bronze, steel gate with extension rod, head stock, operating wheel, G.I. pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications.

Screen Chambers:

Designing, Providing and constructing and testing commissioning screen chamber, designed for average 1 DWF and maximum 2 DWF in RCC (M-30), including inlet pipe/Channel from inlet chamber outlet pipe/Channel to detritus tank, free board of 0.50 M minimum RCC walkway 1.2 M wide with G.I. pipe railing. RCC stair case of 1.2m width from G.L. to screen chamber.

Detritus Tank:

Designing, Providing and constructing continuously grit removal type of Detritus Tank, mechanically operated in RCC (M-30) capable of removing 100% 0.20mm size particle and above, having specific gravity 2.30 designed for one peak 2 DWF with suitable arrangement of separation of grit from putrescible solids including providing and making necessary arrangement of JB-1 inlet and outlet channels of required sizes as may be required to connect the flow to parshall flume etc. complete. including hydraulic testing for water tightness of the structure having minimum free board of 0.30m washout arrangement to grit chamber and platform 1.20m wide RCC walkway with G.I. pipe hand railing shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as per detailed specifications and as directed by the Engineer-in-Charge.

Designing, Providing and constructing Parshall, Flume Channel in RCC (M-30) for measuring quantity of sewage received at the treatment works, max flow of 2 DWF and minimum flow of 1/2 DWF including providing and making necessary arrangement of approach channel as may be required to connect the flow having minimum velocity of 0.3 m per second to Distribution Box (DB-1) The unit shall be provided with walkway & RCC staircase having width of 1.20m each etc. complete, including hydraulic testing for water tightness of the civil structure having free board of 0.6 m including electrically operated, flow indicating and flow integrating devices having standby of float operated ROF meter. All arrangement as per specifications.

Primary Settling Tanks With Equipments:

Designing, Providing, constructing and hydraulic testing in RCC (M-30) water tight Primary Settling Tanks of 1 DWF capacity with feed chamber sludge and effluent chamber, base adequately supported providing 1.20 m wide clear peripheral and approach walkway inter connecting C.I. double flanged pipes from feed chamber of the clarifier distribution well grouting wherever necessary, including foundation etc. as per specification water depth at outer side shall be minimum 3.0 meter weir loading shall not be greater than 125cum DMF for average flow Bottom slope shall be 1:12

The floor of clarifier shall have 40mm thick (min) screed course of cement grout of mix C.M.1:2 Detention period shall be 2.25 hrs. dispersion box and stiffened weir plate made of mild steel plate not less than 8mm thick, anticorrosive epoxy paint on both faces shall be provided Minimum free board of 0.50 m be provided it includes inlet pipe from distribution chamber, central shaft inlet baffle outlet chamber Scum remover, skimming devices scum chamber, connecting channel from PST outlet chamber, to db-2 as per detailed specifications.

Aeration Tank (AT)

Designing, Providing and constructing in RCC mix (M-30) Aeration Tank in compartments to handle combined flow of 1 DWF incoming flow and recirculation flow including construction of inlet, outlet and distribution chamber DB-3 and providing 1.20 M wide clear peripheral and approach walkways, expansion joints wherever necessary, including foundation etc. as per specification. Peak factor shall be 2, F/M ration shall be 0.40 low speed aerator speed between 20 to 100 RPM recirculation flow @ 50% and free board 0.60m, Depth (SWD) 3.50m ,minimum D.O. level at A.T. 2 Mg/Lit MLVSS concentration shall be 2500mg/Lit and MLVSS concentration shall be 2000 Mg/Lit, HRT shall be 4 to 6 hours and STR 6-8 days. It should have compartments for washing oxygen transfer capacity of mechanical aerator shall not be less than 1.5 Kg/KWH, BOD of effluent 20mg/lit with input to aerator 0.15, to 0.30 Kwh/ 1000 cum of Aeration tank. All related works shall be as per detailed specification.

Secondary Settling Tanks with equipments

Designing, Providing and constructing in RCC (M-30) water tight Secondary settling tank having detention period 2 hours and SWD shall be 4.20 meter. The effluent BOD and SS from the secondary clarifier shall not be more then 20 Mg/lit and 30mg/lit. respectively. It should be hydraulically tested, bottom floor slope of 1:12 and free board of 0.60m minimum Dispersion box shall be made of Mild Steel plate not less then 8mm thick with anticorrosive epoxy paint from both faces and well stiffened. The sewage admitted at the centre flowing upward and outwards towards periphery be slowly and continuously collected towards a convenient discharge point near centre by a rotating wheel arm.

The Clarifier will be complete. with end drive half rotating bridge structural steel rake, over flow weir, walkway diffuser, over load alarms, having push bottoms, starters for the clarifier, walkway and the suitable sludge withdrawing arrangement with flush valve capable of withdrawing moisture content not more than 97% to 98% sloping floor shall have 40mm thickness (Minimum), screed course of cement grout of mix 1 cement :2 sand, rotating sludge scrapper mechanism filled with squeezes including providing and making necessary arrangements to connect the flow to outlet chamber (DB-4) then the gravity main for final disposal and as per detailed specification and obligatory provision. All other arrangements shall be as per detailed specification.

Sludge Thickener with equipments:

Designing providing and constructing water tight of Sludge Thickener (Gravity type) including foundation in RCC (M-30) with inlet and outlet chamber, influent well, inlet and outlet pipes, with sludge pit and sludge removal arrangement, grouting wherever necessary with walkway all around of 1.20m width, G.I. pipe railing interconnecting CI pipes all complete as per specification Detention time 24 hours. SWD shall be 4.25 metre with necessary fixed bridge scraper arrangement as per detailed specification and necessary inlet and outlet arrangement. All other arrangement as per detailed specification.

Primary Digester with mixer equipment(Fixed Cover)

Designing, Providing and constructing unit of water tight and gas tight Primary Digester suitable for 1 DWF plant and complete with pipe gallery, building staircase for access from dome of digester into inside staircase, walkways at springing levels etc. walls and base slab being in RCC M-30 domes in structural concrete including providing burners and civil works for gas collection, grouting wherever necessary etc. complete as per specification. It should be designed from min 90 C and max. 450 C and minimum detention time of 30 days, water depth shall not be more than 8.5 m free board shall be 0.6m with inlet and outlet arrangement of C.I. flanged pipes including giving hydraulic testing and air tightness testing. The item includes works for collecting Gas and Gas burner as per specification.

Secondary Digester with equipment(Fixed cover)

Designing ,Providing and constructing including foundation unit of water tight and gas tight Secondary Digester to deal with 1 DWF complete with pipe gallery, building, staircase for access from dome of digester into inside, staircase to walkways at springing levels etc. Walls and base slab and domes being in RCC M-30, providing arrangement for digested sludge from digesters to centrifuge, providing burners and civil works for gas collection grouting wherever necessary etc. complete. as per specification and obligatory provision All other arrangements as per detailed specifications.

S.S.T.Sump and Pump House with recirculation Pumps and Sludge Pumps to Digester:

Designing, Providing and constructing sump & Pump house of requisite capacity with ceiling height not less than 6 M Sludge stream for recirculation to aeration tank and excess sludge to SCBT including C.I. Piping to carry this flow to sump as per detailed specification and as directed by Engineer-in-charge.

Chlorine Contact Tank:

Designing, Providing and Constructing Chlorine Contact chamber of adequate capacity to deal with 1 DWF. Average flow. The chlorine contact tank should be of 30 minutes capacity during average flow to achieve 99.99% coli form reduction. Chlorine dose shall be maintained as per standard provision including provisions including designing, providing and constructing water supply arrangement for chlorination, including providing dewatering and bypass arrangements jointing to final effluent main and outlet weir etc. complete The effluent quality should match with the standard laid down by the department, as per the obligatory provision, detailed specification and as directed by Engineer-in charge.

Chlorinator and chlorinator Room/ Tonner Room

Designing, Providing and constructing chlorinators vacume type 2 Nos. each having capacity of 10 Kg/Hr. as per obligatory provision and detailed specification with necessary provision of chlorinator room having floor area not less than 30 Sq.m including automatic residual chlorine controller with actuator and residual chlorine analyser including cost of chlorine cylinder, piping valves measuring and controlling equipments, safety devices, lifting equipments, etc. complete. as per I.S.-10553 (Part/II) 1982 The tonner room should have 3 MT capacity crane for loading and unloading facility. Tonner storage should distinctly isolated and should be for minimum 10 Tonners space and arrangement as per gas laws 1981 and factory act shall be provided, and all other matching amenities be provided, 5 MT gantry shall be provided for full length of Tonner room at 6 m height from floor level, with/ outlet chamber and treated effluent outlet channel etc. complete. as per detailed specification.

Sump Cum Blending Tank (SCBT)

Designing providing and constructing sump cum blending tank of appropriate size and detention time with free board of 0.60 m The slope of floor 1:4 with suction pit at the centre as per detailed specification and obligatory requirements

P.S.T. Sump cum Blending Tank, Pump House with recirculation pumps

Designing, providing and constructing pump house of appropriate size with pumps ,ceiling height minimum 6m over the circular sump for discharging the sludge to thickener and recycling of flow for blending, with C.I. Piping etc. complete. As per detailed specification

Sludge Centrifuge Room with Centrifuges:-

Designing, providing and constructing and installing including foundation etc. Sludge Centrifuge to handle the sludge flow of one day in one hour per unit with sludge dewatering unit drain etc. complete as per specification. Sludge centrifuge with all necessary arrangement as per detailed specifications mentioned in Volume-II and Volume-III of tender and obligatory provisions, be provided with satisfactory functioning.

Gas Holder:

Designing, Providing and constructing gas holder having gas collection system gas flow meter and gas burner with floating dome arrangement and storage time 6 hrs. to be constructed in M-30 having appropriate diameter as per detailed specification and obligatory provisions. The flatting dome shall be of 8mm thick M.S. plate minimum and shall be provided with two coats of anticorrosive epoxy coating from both faces.

Outfall Sewer :

Designing providing and constructing appropriate Outfall Sewer of RCC NP-2 pipe to discharge treated effluent, untreated effluent from outlet chamber (after secondary clarifier) to the local nalla at a point shown on the drawing including necessary chambers for inspection/ cleaning including necessary excavation dewatering refilling, concrete encasing/ bedding ,concrete steps to reach the nalla bed level. pitching and energy dissipation chamber in the nalla portion etc. complete up to 50 m length RCC NP-2 pipe line and including all above items

Piping work in C.I. class -LA including Sluice valves, Reflux valves M.S.Gate.

Providing laying and jointing pipe other than those already included in the above items for interconnection by-pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavation, refilling and hydraulic testing of pipes, valves, gates, accessories and cost of jointing material. The item includes required channels with gates for interconnection of units by pass drains etc. for all units and as directed etc. complete. as per detailed specification.

Administrative Building Cum Laboratory (G+ 1)

Designing, providing and constructing Administrative Building office cum Laboratory including stores. This shall be a building having appropriate Carpet area at ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M-200 framed structure, B.B. Masonry (II-Class in C.M. 1:6) 20mm cement plaster in C.M. 1:3, inside and outside painting, Aluminium door and window with glass panels mosaic tile flooring and skirting and all other allied items, fixtures fastening electrification arrangement water supply arrangement etc. complete. The building will have laboratory on upper floor of administrative building and should be so centralised that it should not be attached with any units but should have complete control of every unit as per Laboratory Equipment, beautification, telephone and intercom arrangement and wireless system etc. complete.

B) Primary and secondary treatment - with digesters, sludge drying beds etc. complete.

25.5 Sewage Treatment Plant (STP)

25.5.1 Designing, providing, constructing, hydraulic testing, commissioning and giving satisfactorily trials of C Tech STP consisting of Inlet Chamber, Screen Chamber, Detritus Tanks, Distribution Chamber and Biological C Tech Basins, Sludge Sump, Chlorine Contact Tank, Chlorinator Room/Shed, Sludge Centrifuge, necessary piping work with required valves, gates, drains, pathways, Administration Block cum Laboratory, Laboratory Equipments, Tools and Plants, Spare Parts, etc. complete as turnkey job with all involved civil, electrical and mechanical works inclusive of following items, units as per detailed specifications for civil, electrical and mechanical components with all duties and taxes etc. complete. to achieve BOD < 5ppm, COD < 75ppm, TSS < 10ppm, to get recyclable quality of water for industrial / agricultural purposes.

UNITS INCLUDED:

- 1 Inlet Chamber : Designing, providing, and constructing RCC (M-25) inlet chamber for the peak flow of 2 DWF including necessary excavation in all types of strata including walkway all around the periphery. Each compartment will have phosphor bronze, steel gates with extension rod, head stock, operating wheels, GI pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications.
- 2 Screen Chamber : Designing, providing, constructing, testing and commissioning of screen chamber, designed for average 1 DWF and maximum peak flow of 2 DWF in RCC (M -25), including walkway 1.2 m wide, inlet pipe/ channel from inlet chamber, outlet pipe / channel to detritus tank, free board of 0.5 m minimum, RCC walkway 1.2 m wide with GI pipe railing. RCC stair case of 1.2 m width from GL to screen chamber.

- 3 Detritus Tank : Designing, providing and constructing continuously grit removal type of Detritus Tank, mechanically operated in RCC (M-25) capable of removing 100% 0.2 mm size particle and above, having specific gravity 2.30 designed for one peak 2 DWF with suitable arrangement of separation of grit from putrescible solids including providing, and making necessary arrangements of JB- 1. Inlet and outlet channels of required sizes as make be required to connect the flow to connecting unit etc. Complete including hydraulic testing for water tightness of structure having minimum FB of 0.3 m, wash out arrangement to Grit chamber and platform 1.2 m wide RCC walkway with GI pipe handling shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as detailed specifications and as directed.
- 4 C Tech Basins: Designing, providing and constructing in RCC mixed (M-25), C tech basins for biological removal of BOD along with nitrification, denitrification, Bio- P removal in compartments to handle combine flow of 1 DWF, incoming flow and recirculation flow including construction of selector compartments and providing 1.2 m wide clear approach walkways, expansion joints wherever necessary, including foundations etc as per specifications. Peak factor shall be 2, F/M ration shall be : 0.15, complete with air blowers, fine diffused aeration grid/ equipment and FB 0.6 m depth, SWD as required. DO level in C tech basin to be minimum 2 mg/l complete with "Oxygen Uptake Rate " control system and all related instruments, Stainless steel decanters and automation works. MLSS concentrations shall be 2000 - 5500 mg/l or more,MLVSS to MLSS ratio to be 0.8. HRT shall be between 12 to 16 hrs and SRT suitable for fully digested sludge.It should have all other related works as per detailed specification.
- 5 Chlorine Contact Tank: Designing providing and constructing chlorine contact chamber of adequate capacity to deal with 1DWF average flow. The chlorine contact tank should be of 30 min capacity, during average flow to achieve 99.99 % coli form reduction. Chlorine dose shall be maintained as per standard provisions , including designing, providing and constructing water supply provision for chlorination , including providing dewatering and by pass arrangement jointing to final effluent mains and outlet weir etc complete. The effluent quality should match with the standards laid down by the department, as per obligatory provision, as detailed specification and as directed by engineer in - charge.
- 6 Chlorinator and Chlorinator Room/Tonner Room: Designing, providing and constructing chlorinators vacuum type 2 Nos, with auto switchover facility and having capacity for dosage of adequate chlorine to ensure 99.99 % coliform reduction as per per obligatory provisions and detailed specifications with necessary provision of having chlorinator room of adequate size. The chlorinator equipment shall include cost of chlorine cylinders/tonner, piping, valves, measuring and controlling equipments, safety devices , lifting equipments, etc. complete as per IS -10553 (part II) 1982. The tonner room should have minimum 3 MT capacity crane for loading and unloading facility. Tonner storage should be distinctly isolated and should be for minimum storage space as directed in the design specification and as per gas laws 1981 and factory act shall be provided. All other matching amenities shall be provided, 5 MT gantry rail shall be provided for full length of tonner room at 6 m height from level of tonner room, with outlet chamber and treated effluent outlet channel etc complete as per detailed specification.
- 7 Sludge Sump: Designing, providing and constructing of sludge sump and pump house of appropriate size with pumps, ceiling height minimum 6 m over sump for discharging sludge to centrifuge and recycling of flow for blending of sludge using CI pipe complete as per detailed specification.

- 8 Sludge Centrifuge Platform with Centrifuges: Designing, providing, constructing and installing including foundation etc, sludge centrifuge to handle the sludge flow of 1 day in 20 hours per unit with sludge dewatering unit drain etc complete as per specification. sludge centrifuges with the necessary arrangement as per detailed specification mentioned in tender and obligatory provisions to be provided with satisfactory functioning.
- 9 Outfall Sewer: Designing, providing and constructing appropriate outfall sewer of RCC NP2 pipe, to discharge treated effluent, untreated effluent from outlet chamber (after C Tech basin/ chlorination tank) to the local Nallah at the point shown on the drawing including necessary chambers for inspection and cleaning including necessary excavation, dewatering, refilling, concrete encasing/bedding concrete steps to reach the nallah bed level. pitching and energy dissipation chamber in nallah portion etc. complete upto 50 m length RCC NP2 pipe line and including all above items.
- 10 Piping work in CI Class-LA including Sluice valves, Reflux Valves, MS Gates: Providing laying and jointing pipes other than those already included in the above items for interconnection by - pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavations, refilling and hydraulic testing of pipes, valves, gates, accessories and cost of jointing materials. The items includes required channels with gates for interconnection of units by pass drains etc for all units as directed etc complete as per detailed specifications.
- 11 Administrative Bulding cum Laboratory (G+1): Designing, providing and constructing administrative building, office cum Laboratory including stores. This shall be a building having appropriate carpet area and ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M-20 framed structure B. B masonry (11- class in C.M. 1:6) 20 mm cement plaster in C.M 1:3 inside and outside painiting. Aluminium door and window with glass pannels, mosaic tile flooring and skirting and all other allied items, fixtures fastening electrification arrangement water supply arrangement etc complete. The building will have laboratory on upper floor of administrative building and should be so centralized that it should not be attached with any unit but should have complete control of every unit as per laboratory equipment, beautification, telephone and intercom arrangement and wireless system.

Note **The rates computed in the analysis of water treatment plant and sewage treatment plant do not include the cost of out sourceing for consultancy, technology and detailed survey, soil investigation, detailed hydraulic & structural designing, operation and maintenance, cost of energy / chemical etc during trial run, lab articals and equipments, glass ware, other specifically required articals to construct the plants. Cost does not include provision of SCADA, disposal of sludge, external development like external electrification & electrical connection from electricity board , boundary wall, horticulture, approcah road.**

CHAPTER 25 - WATER TREATMENT PLANT & SEWAGE TREATMENT PLANT

Sr. No.	Short Description	Unit	Rate (Rs. in Lakh)
25.1	Water Treatment Plants Conventional W.T.P.		
1	Cost of 1 MLD Treatment Plant	Per MLD	51.64
2	Cost of 2 MLD Treatment Plant	Per MLD	64.61
3	Add per MLD Upto 5 MLD	Per MLD	29.16
4	Cost of 5 MLD Treatment Plant		152.09
5	Add per MLD above 5 MLD upto10 MLD	Per MLD	25.27
6	Cost of 10 MLD Treatment Plant		278.46
7	Add per MLD above 10 MLD upto20 MLD	Per MLD	17.69
8	Cost of 20 MLD Treatment Plant		455.38
9	Add per MLD above 20 MLD upto50 MLD	Per MLD	15.04
10	Cost of 50 MLD Treatment Plant		906.51
11	Add per MLD above 50 MLD upto100 MLD	Per MLD	12.78
12	Cost of 100 MLD Treatment Plant		1545.62
13	Add per MLD above 100 MLD	Per MLD	8.95
25.2	Water Treatment Plants Unconventional W.T.P.		
i)	Fixed cost for 1MLD	--	55.47
ii)	Cost of 2 MLD treatment plant	--	80.43
iii)	Add per MLD above 2MLD upto 5 MLD	Per MLD	21.22
iv)	Cost of 5 MLD treatment plant	--	144.08
v)	Add per MLD above 5 MLD upto 10 MLD	Per MLD	18.03
vi)	Cost of 10 MLD treatment plant	--	234.25
vii)	Add per MLD above 10MLD	Per MLD	15.33
25.3	Package Water Treatment Plant		
i)	21 Cu.m/Hr. (0.5MLD)	each	26.56
ii)	34 Cu.m/Hr. (0.80MLD)	each	32.60
iii)	42 Cu.m/Hr. (1.00MLD)	each	36.60
iv)	63 Cu.m/Hr. (1.50MLD)	each	46.00
v)	83 Cu.m/Hr. (2.00MLD)	each	54.40
vi)	125 Cu.m/Hr. (3.00MLD)	each	70.15
25.4	Sewage Treatment Plant		
25.4.1	a) Primary treatment - with extended sludge drying beds		
i)	Rate upto 10 MLD	per mld	52.80
ii)	Cost of 10 MLD plant		528.00
iii)	Add per MLD above 10 MLD upto20 MLD	per mld	46.20
iv)	Cost of 20 MLD plant		990.00
v)	Add per MLD above 20 MLD	per mld	39.60
25.4.2	b) Primary & Secondary Treatment - with digesters, sludge drying beds		
i)	Rate upto 10 MLD	per mld	63.36
ii)	Cost of 10 MLD plant		633.60
iii)	Add per MLD above 10 MLD upto20 MLD	per mld	55.44
iv)	Cost of 20 MLD plant		1188.00

Sr. No.	Short Description	Unit	Rate (Rs. in Lakh)
v)	Add per MLD above 20 MLD	per mld	47.52

SECTION - I : (XIX) MOVING MEDIA BIO REACTOR TECHNOLOGY

**25.5 PROCESS DESCRIPTION - MOVING MEDIA BIO REACT TECHNOLOGY
PRICE SCHEDULE**

25.5.1 MOVING MEDIA BIO REACTOR TECHNOLOGY

	Cost of plant with capacity / Area required in Sqm.	Unit	Rate (in Rs Lakhs)
25.5.1.1	Cost of 1 MLD / Area Required 600Sqm.		122.87
25.5.1.2	Add per MLD above 1 MLD upto 3 MLD	Per MLD	25.26
25.5.1.3	Cost of 3 MLD / Area Required 900Sqm		72.35
25.5.1.4	Add per MLD above 3 MLD upto 5 MLD	Per MLD	4.99
25.5.1.5	Cost of 5 MLD / Area Required 1200 Sqm		62.37
25.5.1.6	Add per MLD above 5 MLD upto 8 MLD	Per MLD	2.87
25.5.1.7	Cost of 8 MLD / Area Required 2000Sqm		56.64
25.5.1.8	Add per MLD above 8 MLD upto 10. MLD	Per MLD	0.63
25.5.1.9	Cost of 10 MLD / Area Required 2300Sqm		55.38
25.5.1.10	Add per MLD above 10 MLD upto 13 MLD	Per MLD	1.50
25.5.1.11	Cost of 13 MLD / Area Required 2700Sqm		52.39
25.5.1.12	Add per MLD above 13 MLD upto 15 MLD	Per MLD	2.37
25.5.1.13	Cost of 15 MLD / Area Required 3200Sqm		47.65
25.5.1.14	Add per MLD above 15 MLD upto 3 MLD	Per MLD	0.31
25.5.1.15	Cost of 18 MLD / Area Required 3600Sqm		47.02
25.5.1.16	Add per MLD above 18 MLD upto 20 MLD	Per MLD	0.81
25.5.1.17	Cost of 20 MLD / Area Required 3900Sqm		45.40
25.5.1.18	Add per MLD above 20 MLD upto 25 MLD	Per MLD	0.87
25.5.1.19	Cost of 25 MLD / Area Required 4750Sqm		43.66

25.5.2 Cyclic Activated Sludge Process

Capacity in MLD	Cost of plant with capacity / Area required in Ha. (No of bays)		Rate (in Rs Lakhs)
25.5.2.1	Cost of 1 MLD / Area required 0.5 Ha. (No. of bays -2)		385.00
25.5.2.2	Add per MLD above 1 MLD upto 2 MLD	Per MLD	55.00
25.5.2.3	Cost of 2 MLD / Area required 0.6 Ha. (No. of bays - 2)		440.00
25.5.2.4	Add per MLD above 2 MLD upto 5 MLD	Per MLD	55.00
25.5.2.5	Cost of 5 MLD / Area required 0.65 Ha. (No. of bays - 2)		605.00
25.5.2.6	Add per MLD above 5 MLD upto 10 MLD	Per MLD	68.20
25.5.2.7	Cost of 10 MLD / Area required 0.7 Ha. (No. of bays - 2)		946.00
25.5.2.8	Add per MLD above 10 MLD upto 15 MLD	Per MLD	74.80
25.5.2.9	Cost of 15 MLD / Area required 0.75 Ha. (No. of bays - 2)		1320.00
25.5.2.10	Add per MLD above 15 MLD upto 20 MLD	Per MLD	66.00
25.5.2.11	Cost of 20 MLD / Area required 0.8 Ha. (No. of bays - 4)		1650.00
25.5.2.12	Add per MLD above 20 MLD upto 25 MLD	Per MLD	77.00
25.5.2.13	Cost of 25 MLD / Area required 1 Ha. (No. of bays - 4)		2035.00
25.5.2.14	Add per MLD above 25 MLD upto 30 MLD	Per MLD	67.00
25.5.2.15	Cost of 30 MLD / Area required 1.2 Ha. (No. of bays - 4)		2370.00
25.5.2.16	Add per MLD above 30 MLD upto 40 MLD	Per MLD	68.00
25.5.2.17	Cost of 40 MLD / Area required 1.6 Ha. (No. of bays - 4)		3050.00
25.5.2.18	Add per MLD above 40 MLD upto 50 MLD	Per MLD	80.00
25.5.2.19	Cost of 50 MLD / Area required 1.75 Ha. (No. of bays - 4)		3850.00
25.5.2.20	Add per MLD above 50 MLD upto 60 MLD	Per MLD	68.00

Sr. No.	Short Description	Unit	Rate (Rs. in Lakh)
25.5.2.21	Cost of 60 MLD / Area required 1.9 Ha. (No. of bays - 4)		4530.00
25.5.2.22	Add per MLD above 60 MLD upto 75 MLD	Per MLD	166.40
25.5.2.23	Cost of 75 MLD / Area required 2.25 Ha. (No. of bays - 4)		5362.00
25.5.2.24	Add per MLD above 75 MLD upto 100 MLD	Per MLD	59.60
25.5.2.25	Cost of 100 MLD / Area required 2.4 Ha. (No. of bays - 6)		6852.00
25.5.2.26	Add per MLD above 100 MLD upto 125 MLD	Per MLD	60.00
25.5.2.27	Cost of 125 MLD / Area required 3 Ha. (No. of bays - 6)		8352.00
25.5.2.28	Add per MLD above 125 MLD upto 150 MLD	Per MLD	50.00
25.5.2.29	Cost of 150 MLD / Area required 3.5 Ha. (No. of bays- 6)		9602.00

CHAPTER 26 OUTDOOR TRANSFORMERS

- 1 Scope
- 1.1 The specification covers oil immersed, naturally oil cooled (type ONAN), outdoor type, three phase, 50 Hz, 11/433 KV step down distribution transformers of capacities 25, 63, 100, 200, 315 and 500 KVA.
- 2 Applicable Codes

IS: 2026, 1962	Transformer
IS : 3639 - 1966	Transformer Accessories
IS: 355, 1972	Transformer Oil
IS: 6600 : 1972	Loading of Transformer
IS: 2099 - 1973, 3347	Transformer Bushing
IS: 3043-1987	Earthing
IS: 5613	Over Head Power Lines
IS: 1678 - 1960	P.C.C. Poles
IS: 2141-1968	Stay Wire
IS: 1445, 731-1971	Insulators
IS: 398-1961	ACSR Conductors
IS: 3070-1965	Lightning Arrestors
IS: 2551-1963	Danger Board
IS : 1554	Cables
IS: 1255 - 1967	Installation / laying of Cables
IS: 9921-1981	Isolator Switch
IS: 5613 Part I & II	Code of practice for design installation and maintenance
Section I & II 1969/1970	of over head power lines
- 3 Types :
 - 3.1 The transformers shall be double copper wound, three phase oil immersed, oil naturally oil cooled (type ONAN), core type suitable for outdoor installation tropical climate and shall be insulated with DPC insulation on HV & LV windings. Insulation should be of temperature class as per the temperature rise stipulated in this specification.
 - 3.2 The neutral point of the secondary (LV winding) is intended for solidly earthed system and should be brought out to a separate insulated terminal, enabling external insertion of a current transformer in the earth lead to be connected wherever required.
- 4 Ratings :

Primary Voltage	11 KV
Secondary Voltage	0.433 KV

The windings of the transformers shall be connected in delta on primary side and star on the secondary side. The neutral of the L.T. winding shall be brought out to a separate terminal. The vector group shall be Dyn-11.
- 5 Transformer oil :- The transformer shall be supplied completed with first filling of oil and the same shall comply with IS : 335-1983 with latest version thereof and ageing Annexure - VI. Type tests certificate of oil being used shall be produced at the time of inspection.

- 6 Quality Assurance : To ensure about the quality of transformers, the third party inspection shall be carried out by the Engineer-in-charge or his representative at either or both of the following two stages :-
- 6.1 When raw material is received, and the assembly is in process on the shop floor.
- 6.2 At finished stage i.e. transformers are fully assemble and are ready for testing.
- 7 Approvals :
The rates include all the necessary formalities to be performed for -
(i) Inspection Report from electrical safety department of Chhattisgarh.
(ii) Approval of Electrical drawing from electrical safety department of Chhattisgarh.
- 8 The contractor shall provide one year gaurantee for satisfactory working of the transformer and entire sub-station and other accessories.
- 9 As per I.E. rules the fencing, spreading of metal & paving are to be provided.
- 10 All transformer should be with standard accessories i.e. oil gauge, earthing terminal, unidirectional rollar, rating plate, lifting lugs, oil drawing valve with plug, air release plug, explosion vent, filter valve, bucholz relay, neutral bushing.
- 11 The transformer preferably shall be of following makes only : Kirloskar, Crompton greaves, BEL, Star Delta, BHEL, GEC, voltemp & NGEF and other makes approved by the departments.
- 12 **Measurement:**
The work includes supply and installation of the outdoor type transformer ONAN type complete in respect, on double pole structure or Brick/CC/RCC platform with all fittings, accessories, earthing etc. including testing and commissioning complete as required.
- 13 **Rates**
The rate shall include the cost of materials and labour involved in all the operations except for the items measured/ enumerated separately under clause 'Measurements', which shall be paid separately.

CHAPTER 26 - OUTDOOR TRANSFORMERS

Sr. No.	Short Description	Unit	Rate (in Rs.)
26.1	Supplying and installation of outdoor type transformer ONAN type with copper winding having following continuous KVA rating, 11 KV/415 Volt 3 Phase 50 Hz. Vector group Dyn-11, tapings in steps of $\pm 2.5\%$, $\pm 5\%$, -7.5% with oil conservator, silica gel breather having connecting terminals on HV side suitable for bare conductor connection, cable end box on medium voltage side suitable for 1.1 KV 3 1/2 core UG cable, on double pole structure or Brick/CC/RCC platform with all fittings, accessories, filled with filtered transformer oil including testing and commissioning & supervision charges payable to chhattisgarh electricity board, fees payable to electrical inspector, etc. complete as required.		
1.1	100 KVA	Each	337696.00
1.2	160 KVA	Each	414496.00
1.3	200 KVA	Each	455183.00
1.4	250 KVA	Each	512353.00
1.5	315 KVA	Each	602189.00
1.6	400 KVA	Each	721690.00
1.7	500 KVA	Each	830864.00
1.8	630 KVA	Each	977869.00
1.9	750 KVA	Each	1108540.00
26.2	Supplying and installation of outdoor type transformer ONAN type with copper winding having a continuous rating of 500 KVA, 33 KV/415 Volts, 3 Phase, 50 Hz Vector group Dyn-11, tapings in steps of $\pm 2.5\%$, $\pm 5\%$, -7.5% with oil conservator silica gel breather having connecting terminals on HV side suitable for bare conductor connection, cable end box on medium voltage side suitable for 1.1 KV 3 1/2 core UG cable, on double pole structure or Brick/CC/RCC platform with all fittings, accessories, filled with filtered transformer oil including testing and commissioning & supervision charges payable to chhattisgarh electricity board, fees payable to electrical inspector, etc. complete as required.	Each	1139817.00

Sr. No.	Short Description	Unit	Rate (in Rs.)
26.3	Supplying and installation of outdoor type transformer ONAN type with copper winding having a continuous rating of 750 KVA, 33 KV/415 Volts, 3 Phase, 50 Hz Vector group Dyn-11, tapings in steps of $\pm 2.5\%$, $\pm 5\%$, -7.5% with oil conservator silica gel breather having connecting terminals on HV side suitable for bare conductor connection, cable end box on medium voltage side suitable for 1.1 KV 3 1/2 core UG cable, on double pole structure or Brick/CC/RCC platform with all fittings, accessories, filled with filtered transformer oil including testing and commissioning & supervision charges payable to chhattisgarh electricity board, fees payable to electrical inspector, etc. complete as required.	Each	1412879.00

CHAPTER 27

GROUND SERVICE RESERVOIR & SUMP TANKS

1 Applicable Codes :-

IS 15472-2004	Guidelines for planning and design of low level outlets for evacuating storage reservoirs.
IS 5477 (Part 1-4)	Fixing the capacities of reservoirs
IS 6939 - 1992	Methods for determination of evaporation from reservoirs
IS 7323 - 1994	Operation of reservoirs - Guidelines
IS 3370 Part-I, II & IV	Code of practice for the Reinforced Concrete structure for the storage of liquids.
IS 456	Code of practice for the plain and Reinforced Concrete.
IS 269	Code of practice for portland cement
IS 383	Code of practice for aggregates
IS 432 (Part-I)	Code of practice for Mild Steel and Medium tensile steel bars.
IS 1786	Code of practice for Cold twisted steel bars
IS 226	Code of practice for Structural steel sections

2 Earth work shall be done as per IS 1200 (Part-1) : 1992

3 Excavation shall be done as per safety codes IS 3764 : 1992

4 Concrete work shall be done as per IS 456 : 2000

5 Cement shall be used as IS standard given below :-

5.1 When the strength of concrete required is upto M-20, then O.P.C. Conforming to IS 269-1989 or PSC (Portland Slag Cement) may be used.

5.2 When the strength of concrete required is more than M-20 but upto M-30, then O.P.C. Conforming to IS : 8112 - 1989 shall be used.

5.3 Pozzolona cement is now being widely produced all over country. This may be used in structures in contact with water as per I.S. code. In specific cases requiring higher grade of strength, use of Ordinary Portland Cement (OPC) should invariably be ensured.

6 Sand

Sand shall not contain dust, lumps, soft or flaky materials. Fine aggregate having positive alkali silica reaction shall not be used. All fine aggregate shall conform to IS : 383. The fineness modular of fine aggregate shall neither be less than 2.0 nor greater than 3.5. Sand to be used in work shall conform to IS 1542-1960 for plaster and IS 166-1965 for masonry work.

7 Coarse aggregate

7.1 Coarse aggregate consist of clear, hard, strong, dense, nonporous and durable pieces of crushed stone. They shall not consist pieces of elongated particles salt, alkali, vegetable matter or other deleterious material.

7.2 All coarse aggregate shall conform to IS : 383 & tests for conformity shall be carried out as per IS: 2386 Part I to VIII. The maximum value of flakiness index for coarse aggregate shall not exceed 35%.

- 8 Mortar
 - 8.1 The mortar mixing shall preferably be done in mechanical mixer operated manually or by power. Hand mixing can be restored to as long as uniform density of the mix and its strength are assured subject to prior approval of Engineer-in-charge.
- 9 Curing shall be commenced as soon as mortar used for finishing has hardened sufficiently and not to be damaged during curing. It shall be kept wet for a period of at least 7 days.
- 10 Service Reservoirs are structures which are built at any convenient point in the distribution between the original source and the consumer's end. The capacity of reservoirs depends upon the type of supply, the necessity of catering for peak demand periods and the provision of reserve to cover normal break down or maintenance interruptions.
- 11 Location of Reservoirs : It is decided on following considerations :-
 - 11.1 Location of reservoir in central point with respect to distribution area.
 - 11.2 Location near the beginning of the system.
 - 11.3 Location the reservoir site depends on the availability of land at suitable altitudes.
- 12 Measurements :-

All Measurements shall be of the finished work.
- 13 Rates :-
 - 13.1 The rates includes charges for all tools & plants, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in positions as per approved drawing.
 - 13.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from falling materials and other causes.
 - 13.3 The rates include provision of handling, storing under cover as required and returning of empty cases or containers or bags to the Public Health Engineering Department Stores without any extra cost for such materials as may be supplied by the department.

CHAPTER 27 - GROUND SERVICE RESERVOIR & SUMP TANKS

Sr. No.	Short Description	Unit	Rate (in Rs.)
27.1	R.C.C. Ground Service Reservoirs & Sumps		
i)	Upto 25,000 Litres	Per lit	12.39
ii)	Cost of 25,000 Litres Capacity		309709.00
iii)	Add for capacity 25,000 to 50,000 Litres	per lit	6.50
iv)	Cost of 50,000 Litres Capacity		472209.00
v)	Add for capacity 50,000 to 75,000 Litres	per lit	5.75
vi)	Cost of 75,000 Litres Capacity		615959.00
vii)	Add for capacity 75,000 to 1,00,000 Litres	per lit	5.50
viii)	Cost of 1,00,000 Litres Capacity		753459.00
ix)	Add for capacity 1,00,000 to 1,50,000 Litres	per lit	5.10
x)	Cost of 1,50,000 Litres Capacity		1008795.00
xi)	Add for capacity 1,50,000 to 2,00,000 Litres	per lit	4.15
xii)	Cost of 2,00,000 Litres Capacity		1216295.00
xiii)	Add for capacity 2,00,000 to 2,50,000 Litres	per lit	3.60
xiv)	Cost of 3,00,000 Litres Capacity		1396295.00
xv)	Add for capacity 3,00,000 to 5,00,000 Litres	per lit	3.09
xvi)	Cost of 5,00,000 Litres Capacity		2014472.00
xvii)	Add for capacity 5,00,000 to 10,00,000 Litres	per lit	2.62
xviii)	Cost of 10,00,000 Litres Capacity		3325512.00
xix)	Add for capacity 10,00,000 to 15,00,000 Litres	per lit	2.30
xx)	Cost of 15,00,000 Litres Capacity		4475512.00
xxi)	Add for capacity above 15,00,000 Litres	per lit.	1.75

CHAPTER 28

REINFORCED CEMENT CONCRETE ELEVATED SERVICE RESERVOIRS

- 1 Scope
- 1.1 The Specification covers guidelines for layout for overhead water tanks and Criteria for analysis for RCC staging both for steel and concrete tanks.
- 2 Applicable Codes
 - IS: 11682-1985 Specifications for Criteria for Design of RCC Staging for overhead Water Tanks.
Reaffirmed 1991, 98
 - IS 3370 Part-I, II & IV Code of practice for the Reinforced Concrete structure for the storage of liquids.
 - IS 456 Code of practice for the plain and Reinforced Concrete.
 - IS 269 Code of practice for portland cement
 - IS 383 Code of practice for aggregates
 - IS 432 (Part-I) Code of practice for Mild Steel and Medium tensile steel bars.
 - IS 1786 Code of practice for Cold twisted steel bars
 - IS 226 Code of practice for Structural steel sections
- 3 Earth work shall be done as per IS 1200 (Part-1) : 1992
- 4 Excavation shall be done as per safety codes IS 3764 : 1992
- 5 Concrete work shall be done as per IS 456 : 2000
- 6 Cement shall be used as IS standard given below :-
 - 6.1 When the strength of concrete required is upto M-20, then O.P.C. Conforming to IS 269-1989 or P.P.C. Conforming to IS : 1498-1976 may be used.
 - 6.2 When the strength of concrete required is more than M-20 but upto M-30, then O.P.C. Conforming to IS : 8112 - 1989 shall be used.
 - 6.3 Pozzolona cement is now being widely produced all over country. This may be used in structures in contact with water as per I.S. code. In specific cases requiring higher grade of strength, use of Ordinary Portland Cement (OPC) should invariably be ensured.
- 7 Sand
 - 7.1 Sand is the fine aggregate which is obtained either from natural source like river bank or from pits etc. Sand can also be produce by crushing stone are gravels. It should pass through 4.75 mm IS sieve.
 - 7.2 Sand should be free from clay, dust or silt. The permissible limit for the same is 5% by weight.
 - 7.3 Sand should be free from organic impurities as determined is in accordance with IS : 2386 (Part-II)
 - 7.4 For plaster sand used should Conform to IS : 1542/1960

7.5 For masonry work sand used should Conform to is : 166/1965

- 8 Other I.S. Codes not Specifically mentioned here but pertaining to the use of Electricially Welded Steel pipes shall form part of these Specifications.
- 9 Capacity : Capacity of the tank shall be the volume of water it can store between the designed full supply level and lowest supply level (that is, the level of the lip of the outlet pipe). Due allowance shall be made for plastering the tank from inside if any when calculating the capacity of tank.
- 10 Height of Staging : Height of staging is the difference between the lowest supply level of tank and the average ground level at the tank site.
- 11 Water Depth :- Water depth in tank shall be difference of level between lowest supply level and full supply level of the tank.
- 12 Seismic Forces :- When seismic loading is considered, following two cases may be considered :
 - 12.1 Tank empty :
 - 12.2 Tank full
The seismic force acting on the support for the tank and its analysis shall be in accordance with IS : 1893 - 1975.
- 13 Staging and other reinforced concrete members including foundation shall be designed in accordance with the requirements of IS : 456-1978. Increase in permissible stresses for column staging shall be as per IS : 456-1978.
 - 13.1 The staging height of 10mtr. has been considered for the computation of the rates of ESR.
- 14 Generally the shape and size of elevated concrete tanks for economical design depends upon the functional requirements such as :
 - 14.1 Maximum depth for water ;
 - 14.2 Height of staging :
 - 14.3 Allowable bearing capacity of foundation strata and type of foundation suitable :
 - 14.4 Capacity of tank;
 - 14.5 Other site conditions.
- 15 **Measurement:**
 - 15.1 All the measurement shall be recorded under the relevant item of the work.
- 16 **Rates**
The rate shall include the cost of materials and labour involved in all the operations except for the items measured/ enumerated separately under clause 'Measurements', which shall be paid for separately.

CHAPTER 28 - REINFORCED CEMENT CONCRETE ELEVATED SERVICE RESERVOIRS

Sr. No.	Short Description	Unit	Rate (in Rs.)
	<p>Designing (structurally & aesthetically), and constructing RCC elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically as per staging of the ESR. including excavation in all types of strata, foundation concrete, cement plaster with water proofing compound to the inside face of the container including refilling & disposing off the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, scour, overflow and bypass arrangements as per departmental design, providing and fixing accessories such as M.S. Ladder, C.I. manhole frame and covers water level indicators, lightening conductor, G.I. pipe railing around walk way and top slab, providing spiral staircase from ground level to roof level, M.S. grill gate of 2 mtr. height with locking arrangement of approved design B.B. masonry chambers for all valves, ventilating shafts, providing and applying three coats of cement paint to the structure including roof slab epoxy painting to internal surface & anti termite treatment for underground parts of the structure and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the directions of Engineer-in-Charge.</p>		
Note	The cost may change as per site condition looking to the uplift and type of strata .		
1	The design of the structure be in accordance with relevant (I.S. 3370 - 1965 or revised)		
2	The design shall satisfy the stipulations as per IS 1893-1984 and I.S. 13920/1993 for seismic force and I.S. 11682/1985 for R.C.C. staging of overhead tanks.		
3	For design having more than 6 columns, provision of internal bracing is obligatory. External bracing is also obligatory.		
4	The entire structure shall be in stage M-25, container M-30 mix only.		
5	Round mild steel bars grade - 1 Conforming to I.S. 432 part-I or high yield strength deformed bars Conforming to I.S. 1786 shall be used, grade-II mild steel bars will not be allowed.		
6	Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the ground leve.		
7	These rates includes providing M.S. ladder for E.S.R.'s upto 2 lakh litres capacity and providing spiral staircase for E.S.R. above 2 lakh litres capacity.		
9	Staging shall have to be designed with stresses of M-25 for E.S.R. However all RCC construction should be done in M-25.		

Sr. No.	Short Description	Unit	Rate (in Rs.)
10	These rates are including the cost of uplift pressure if any and entire dewatering during execution. In case of water logging area where water is struck at shallow depth extra provision of dewatering shall be made as per site conditions.		
11	75% part rate shall be payable for reinforcement concrete and plastering items of containers of E.S.R. till satisfactory hydraulic testing for water tightness is given; and till that work shall be treated as incomplete.		
12	The rates indicated in the table are including the cost of pipes, specials and valves required for inlet, outlet, washout, overflow and by-pass arrangement. The scope of work, however and includes cost of erecting, laying and jointing of pipes and valves including cost of jointing materials upto 5 m beyond outer face of outermost column.		
13	For ESR upto 500 Cum capacity C.I. (Horizontal cast spun) pipes with class A, M.S. with epoxy or DI with c.m. lining double flanged pipes upto 300 mm dia shall be provided and C.I. specials shall be used. For ESR above 500 Cum capacity C.I. (Horizontal cast spun) pipes with class A, M.S. with epoxy or DI with c.m. lining pipe assembly with minimum 8 m.m. thickness up to 500 mm dia and minimum 10 mm thickness above 500 mm dia can be used with proper anticorrosive epoxy treatment from inside and outside.		
14	Below mentioned rates are for foundations, with individual footing with bearing capacity of 20 t/sqm. For raft foundations, these rates shall be increased by 7.5% Where safe bearing capacity (SBC) is 5 t./sqm and by 5% where SBC is more that 5 t/sqm and up 10 t/sqm. This percentage of 5% or 7.5% is applicable for estimation of amount of L.S. items ESR for extra item due to change from individual footing foundation to raft, actual increase in concrete and steel be paid as per relevant Item.		
15	The rates shall be increased by 30% for bearing piles upto depth of 10 m & for further increased in depth by 5 m each, it shall be increased by another 10%. These rates are applicable where raft is not feasible for pile foundations sulphate resistant cement shall only be used. Single pile for the column is not permitted group of piles shall be designed with pile cap for each column of ESR.		
16	The rates are applicable for staging height of 10 m. These rates shall be increased or decreased for per metre variation in this staging height as below. 10 to 16 m staging - 2% per metre. 16 to 20 m staging - 3% per metre 20 m and above - 4% per metre i.e. for 17 m staging height Percentage calculation will be like below. 10 to 16 m = 6 x 2 = 12% 16 to 17 m = 1 x 3 = 3% Total = 15% For 21 m staging height		

Sr. No.	Short Description	Unit	Rate (in Rs.)
	Percentage calculation will be like below.		
	10 to 16 m = 6 x 2 = 12%		
	16 to 20 m = 4 x 3 = 12%		
	20 to 21 m = 1 x 4 = 4%		
	Total = 28%		
17	Following rates are for seismic Zone - III For Zone IV, these rates shall be increased by 5%. Concerned Executive Engineer shall Conform the seismic zone for the scheme from seismic zones plan before estimation and adopt appropriate rates as per actual seismic zones. (Seismic maps attached in this C.S.R.)		
Note	1) Conditions from Sr. No. 1 to 9 or part and parcel of the tender and shall be included in the tender documents. 2) Conditions from Sr. No. 10 to 17 are for estimation purpose only and shall not appear in the tender document. 3) Short description along with conditions from Sr. No.- 1 to 17 should be mentioned in all estimates of different capacities of E.S.R.		
28.1	upto 25,000 litres	Per Litre	23.04
28.2	Cost of 25,000 Litres capacity E.S.R.		576000.00
28.3	Add for capacity above 25,000 upto 50,000 litres	Per Litre	8.80
28.4	Cost of 50,000 Litres capacity E.S.R.		796000.00
28.5	Add for capacity above 50,000 upto 75,000 litres	Per Litre	8.27
28.6	Cost of 75,000 Litres capacity E.S.R.		1003000.00
28.7	Add for capacity above 75,000 upto 1,00,000 litres	Per Litre	7.78
28.8	Cost of 1,00,000 Litres capacity E.S.R.		1197000.00
28.9	Add for capacity above 1,00,000 upto 1,50,000 litres	Per Litre	7.19
28.10	Cost of 1,50,000 Litres capacity E.S.R.		1556000.00
28.11	Add for capacity above 1,50,000 upto 2,00,000 litres	Per Litre	6.76
28.12	Cost of 2,00,000 Litres capacity E.S.R.		1894000.00
28.13	Add for capacity above 2,00,000 upto 2,50,000 litres	Per Litre	6.25
28.14	Cost of 2,50,000 Litres capacity E.S.R.		2206000.00
28.15	Add for capacity above 2,50,000 upto 3,00,000 litres	Per Litre	5.78
28.16	Cost of 3,00,000 Litres capacity E.S.R.		2495000.00
28.17	Add for capacity above 3,00,000 upto 4,00,000 litres	Per Litre	5.35
28.18	Cost of 4,00,000 Litres capacity E.S.R.		3030000.00
28.19	Add for capacity above 4,00,000 upto 5,00,000 litres	Per Litre	4.28
28.20	Cost of 5,00,000 Litres capacity E.S.R.		3458000.00
28.21	Add for capacity above 5,00,000 upto 7,50,000 litres	Per Litre	3.94
28.22	Cost of 7,50,000 Litres capacity E.S.R.		4734000.00
28.23	Add for capacity above 7,50,000 upto 10,00,000 Litres	Per Litre	3.61
28.24	Cost of 10,00,000 Litres capacity E.S.R.		5799000.00
28.25	Add for capacity above 10,50,000 upto 15,00,000 Litres	Per Litre	3.31
28.26	Cost of 15,00,000 Litres capacity E.S.R.		6854000.00
28.27	Add for capacity above 15,00,000 upto 20,00,000 ltrs	Per Litre	3.01
28.28	Cost of 20,00,000 Litres capacity E.S.R.		7898000.00
28.29	Add for capacity above 20,00,000 upto 25,00,000 Litres	Per Litre	2.71
28.30	Cost of 25,00,000 Litres capacity E.S.R.		8932000.00

CHAPTER 29

ANCILLARY ITEMS

- 1 The works to be executed in accordance with the General specifications of the Public Health Engineering Department, relevant IS codes for pipes/specials, jointing materials and laying works.
- 2 All materials shall Conform to relevant ISS.
- 3 Protection against lightning - The principal components of a lightning protective system are :-
 - (a) Air terminations
 - (b) Down conductors
 - (c) Joints and bonds
 - (d) Testing joints
 - (e) Earth terminations, and
 - (f) Earth electrodes
- 4 Material requirement of the lightning conductor shall be as under :-
 - 4.1 Copper - Solid or flat copper strip of at least 98% conductivity conforming to relevant IS : specifications shall be used.
 - 4.2 Aluminium - Aluminium 99% pure, and with sufficient mechanical strength, and protected against corrosion shall be used.
 - 4.3 Aluminium should not be used underground, or in direct contact with walls.
- 5 General requirement of Installation :-
 - 5.1 The entire lightning protective system should be mechanically strong to withstand the mechanical forces produced in the event of a lightning strike.
 - 5.2 Conductors shall be securely attached to the building, other object to be protected by fasteners, which shall be substantial in construction, not subject to breakage, and shall be of galvanized steel or other suitable materials, with suitable precautions to avoid corrosion.
 - 5.3 The lightning conductors shall be secured not more than 1.2m apart for horizontal run, and 1m for vertical run.
- 6 Joints
 - (i) A lightning protective system should have as few joints as possible.
 - (ii) Joints should be mechanically and electrically effective, for example, clamped, screwed, bolted, crimped, riveted or welded.
 - (iii) With overlapping joints, the length of the overlap should not be less than 20mm for all types of conductors.
 - (iv) Contact surfaces should first be cleaned then inhibited from oxidation with a suitable non-corrosive compound.
 - (v) Joints of dissimilar metals should be protected against corrosion or erosion from the elements or the environment and should present an adequate contact area.
- 7 Bonds
 - (i) Bonds have to join a variety of metallic part of different shape and composition and cannot therefore be of a standard form.

- (ii) There is a constant problem of corrosion and careful attention must be given to the metals involved, i.e. the metal from which the bond is made, and those of the items being bonded.
- (iii) The bond must be mechanically and electrically effective, and protected from corrosion in, and erosion by the operating environment.
- (iv) Structures supporting overhead electric supply, telephone and other lines must not be bonded to a lightning protective system without the permission of the appropriate authority.

8 Measurements

Measurement shall be made according to the work actually done and pavement shall be made accordingly.

9 Rates :

The rate shall include the cost of the material and labour involved in all the operation described in the items. The rates include all plants, chain, pulley blocks, other appliances etc. required for execution of the works.

CHAPTER 29 - ANCILLARY ITEMS

Sr.No.	Short Description	Unit	Rate (in Rs.)
29.1	Providing and fixing in position copper lightening conductor as per IS 3070 - 1965 (with up to date amendment) including copper rod of 20mm dia as per upper terminal 1.5M long with a knob at end and with conical spike at top, copper tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in I.S. codes 3070.		
29.1.1	For Tape of 10M length	Each	9109.00
29.1.2	Rebate / Extra rate per metre length or part there of over and above initial length of 10M	Mtr.	311.00
29.2	Providing and fixing in position copper lightening conductor as per IS 3070 - 1965 (with up to date amendment) including copper rod of 20mm dia as per upper terminal 1.5M long with a knob at end and with conical spike at top, aluminium tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in I.S. codes 3070.		
29.2.1	For tape of 10 M length	Each	7120.00
29.2.2	Rebate / Extra rate per metre length or part thereof over and above initial length of 10M	Mtr.	112.00
29.3	Providing, hoisting and fixing in position inverted 'J' type 100 mm dia. C.I. Cowl type ventilators with mosquitoproof aluminium mesh at top including applying 2 coats of anti-corrosive paint, etc. complete as directed by Engineer-in-charge, weighing not less than 35 Kg.	Each	1182.00
29.4	Providing, hoisting and fixing in position C.I. manohole, frame and cover of best quality and of required size and shape with locking arrangements including applying 2 coats and nti-corrosive paint, etc. complete.		
a)	90 x 60 cm size and weight 35 kg	Each	2630.00
29.5	Providing and fixing in position M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge.	RM	2933.00

Sr.No.	Short Description	Unit	Rate (in Rs.)
29.6	Providing and applying epoxy paint of approved make (Shalimar, Ciba or Mahindra & Mahindra) to concrete surface of RCC ESR & GSR or any other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc. complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. codes.		
a)	For new surfaces -Two coats.	sq.m	50.00
b)	For old surfaces -Two coats.	sq.m	55.00
29.7	Providing and constructing RCC spiral staircase in M-15 mix concrete at site of work and consisting of central vertical column of 400mm dia and steps in RCC M-15, tie members at each brace level, RCC parapet wall 80cm high including cost of all labour and material involved, cost of scaffolding, centering, shuttering, curing finishing in CM 1:3 proportion including RCC M-15 footing foundation, its excavation, refilling and cleaning the site, the complete as per type design, with 3 coats of cement paint.	Rmt.	6050.00
29.8	Providing and constructing RCC ventilating shaft of diameters and height mentioned below with required number of RCC 15x15cm size columns and RCC circular slab or dome over the pillars in M-15 including cost of all material and labour, providing and fixing steel or wooden frame & providing & fixing G.I. flyproof mesh of 26 gauge and providing and applying in 3 coats of oil paint to wooden or steel frame and cement paint to concrete structure. etc complete as directed by Engineer-in-charge.		
a)	0.9 M dia x 1.35 M height	Each	6490.00
b)	1.2 M dia x 1.80 M height	Each	8250.00
c)	1.5 M dia x 2.25 M height	Each	13200.00

Electro Chlorination System

- 29.9 Providing, erecting, commissioning and giving test & trial for a period of one month including one year free maintenance after commissioning of Electro chlorinator capable of generating chlorine from common salt by electrolysis using electrodes in form of sodium hypo chlorite solution containing 6-8 gms/lit of available chlorine in batch or continuous processes and capable of providing 8 hrs storage of hypochlorite in case of power failure. The electro chlorinator shall comprise of following.
- Electrolytic cell consisting dimensionally stable electrodes made from Gr I Titanium sheet with multi metal oxide coating.
- Electrolyzer tank made from PVC-FRP or Acrylic.
- Power pack consisting of transformer rectifier for generating suitable DC current from AC supply along with the control switch for dosing pumps etc. through MCB's contacts, relays and wiring.

Sr.No.	Short Description	Unit	Rate (in Rs.)
	Control panel for the electro chlorinator consisting of DC voltage and current display income phase status unit on-off switches fuses etc.		
	Dosing tank of suitable capacity made from PVC/FRP.		
	Dosing pumps of specials quality (1W + 1S) suitable to handle hypo chlorite solution.		
	Entire chlorine solution pipeline shall be of PVC Chlorine test kit suitable to measure residual chlorine up to 5 ppm.		
	25 gms/hr	Each	251486.00
	50 gms/hr	Each	306836.00
	100 gms/hr	Each	406763.00
	150 gms/hr	Each	447023.00
	250 gms/hr	Each	628716.00
	350 gms/hr	Each	758204.00
	500 gms/hr	Each	1015041.00
	750 gms/hr	Each	1301576.00
	1000 gms/hr	Each	1636668.00
	1500 gms/hr	Each	2152348.00
	2000 gms/hr	Each	2528241.00
	3000 gms/hr	Each	3492717.00
29.10	Providing, erecting, installing & commissioning Barometric Chlorination system for water treatment plant upto 5 MLD capacity as per manufacturers specification with all required materials viz 15 Kg. Pressure yellow P.V.C. pipe, Specially prepared chamber, mixing chamber, Scrubber unit, Gas pressure flexible pipe, brass nozzle nipple, electronic alarm unit, PPM dose, indicator of 25mm dia 4mm thick glass tube Borosil, gas unit opening spanner 3 hole type. Instructin board, aluminium pipe upto sump (maximum length 15M) etc. including civil works wherever required for above materials fittings, including satisfactory test & trial at work site etc. complete (Item do not include construction of chlorine gas room of 3.0x3.0M or adequate size.) as per drawing attached.		
a)	For WTP upto 5 MLD	Each	107373.00
b)	Add / deduct per MLD or part	MLD	5369.00
29.11	Providing and fixing water level indicator upto 5 mtr ht. MS enable gauge plate 300mm wide 3 mm thick, coper float, providing and fixing required accessories such as pointer, pulleys, nylon thread including cost of all material, labour etc. complete.	Each	6186.00
29.12	Providing and fixing water level indicator upto 5 mtr height including MS enable gauge plate 150mm wide 3 mm thick, copper float, providing and fixing required accessories such as pointer, pulleys, nylon thread including cost of all material, labour etc. complete.	Each	4658.00

Sr.No.	Short Description	Unit	Rate (in Rs.)
29.13	Providing pressure grouting at a pressure of 0.56 kg./sqcm in required row/zigzag fashion as specified at 1.5 M interval as per site conditions to stop leakages through water retaining structures to the entire satisfaction of the Engineer-in-charge including compound / hardening materials, compressor equipment, scaffolding, smooth finishing, etc. complete. For concrete / Masonry structure	Bag	575.00
29.14	Providing and applying epoxy paint of approved make to concrete surface of RCC ESR or GSR including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc. complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per relevant I.S. codes. For new surfaces - Two coats. For old surfaces - Two coats	Sqm Sqm	221.00 236.00
29.15	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete. On steel work On concrete work	Sqm Sqm	104.00 106.00
29.16	Removing dry or oil bound distemper, water proofing cement paint and the like by scrapping, sand papering and preparing the surface smooth including necessary repairs to scratches etc. complete.	Sqm	6.00
29.17	Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade : One or more coats on old work.	Sqm	48.00

CHAPTER 30

WATER METER - (MECHANICAL / ELECTROMAGNETIC)

- 1 Scope
- 1.1 The specification covers the design, manufacture installation & testing of water meters.
- 2 Applicable Codes
 - IS 779 - 1994 Specification of Water Meter
 - ISO 4064 - 1993 Standard with EEC/MID certification mark.
- 3 A water meter is a device used to measure the volume of water usage.
- 4 Multi - jet dry dial meters are used, where the water can be charged with particles.
- 4.1 It should have following performance characteristics
 - (a) rugged, light and intelligently conceived
 - (b) Extra dry dial counter
 - (c) Model with pulse output ex factory with pulse values 1/10/100/1000 l/Imp.
 - (d) Approx 25% less weight than WVG brass bodies.
 - (e) Comprehensive manipulation protection by standard
 - (f) Operating temperature 30 dia C, with security up to 50dia C
- 5 Electromagnetic flow meters are designed for water and waste water application and are available in size 50mm to 3000mm. Salient features shall be as under:
 - (a) Modular Design.
 - (b) Flange connections to PN, DIN, ANSI, AWWA
 - (c) Liner - Hard rubber/ Polyurethane
 - (d) Precise calibration
 - (e) Fully welded sensor housing complying to IP 67/ IP 68.
 - (f) Microprocessor base signal converter with self diagnostic features, self prompting Menur Driven configuration from front fascia.
 - (g) High speed signal processing system.
 - (h) Communication protocol like HART.
- 6 Requirement of flow sensor for Electromagnetic flow meters :
 - (a) Type Pulsed DC excitation
 - (b) System Seprate with cable output
 - (c) Power supply 230 V AC, 50 Hz
 - (d) End connections Flanges of Carbon steel
 - PN 40 - from Size 25mm to size 80 mm
 - PN 16 - from Size 100mm to size 150 mm

- (e) Flange Rating PN 10 - from Size 200 mm to size 1000 mm
 PN 6 - from Size 1200mm to size 2000 mm
- (f) Earthing Grounding Rigns in SS 304 (Gr Electrodes are not
 Acceptable)
- (g) Marking Direction of flow with arrow, size, Sr. No. make

6 **Measurement:**

Measurement of the work includes supply and fixing of water/flow meters complete in all respect as per specifications and to the satisfaction of the

7 **Rates**

The rate shall include the cost of materials and labour involved in all the operations.

CHAPTER 30 - WATER METER - (MECHANICAL / ELECTROMAGNETIC)

Item No.	Description	Unit	Rate (in Rs.)
30.1	Supply and Installation of Multi Jet, dry dial, inferential type, horizontal, Magnetically coupled , class 'B' water meters Conforming to IS- 779 : 1994 and ISO 4064: 1993 standard with EEC/ MID certification mark , with IP 68 protection class copper can register with 5 mm tempered mineral glass cover, successful Life Cycle Test Certificate from FCRI and AMR compatibility with 5 years warranty complete with brass nuts and nipples.		
	15 mm	Each	1203.00
	20 mm	Each	1975.00
	25 mm	Each	3827.00
	40mm	Each	6948.00
30.2	Supply and Installation of Woltman Type, dry dial, inferential type, Magnetically coupled, Class 'B' accuracy water meters in any position with interchangeable mechanism Conforming to ISO 4064: 1993 standard with EEC certification mark, with IP68 protection class copper can register with 5 mm tempered mineral glass cover, AMR compatibility with 5 years warranty complete and successful accuracy test certificate from FCRI, Palakkad with C.I. Body 'T' Type strainer.		
	50mm	Each	9656.00
	65mm	Each	10249.00
	80mm	Each	12487.00
	100 mm	Each	16017.00
	125 mm	Each	21083.00
	150mm	Each	26148.00
	200 mm	Each	29443.00
	250 mm	Each	73197.00
	300 mm	Each	153119.00
	400mm	Each	229667.00
	500 mm	Each	270893.00
30.3	Supply and Installation of Electromagnetic Type, Internal battery-operated with 10 years battery life, MID approved and OIML Compliant, having IP68 protected sensor and converter Converter, to measure flow velocity and volume flow, having minimum straight inlet and outlet flow of 0 DN, having maximum measuring error of +/- 0.2% of measured value, having 8 digit LCD display with GSM based datalogger measuring between every 2 pulses and having a 10 year battery life.		

Item No.	Description	Unit	Rate (in Rs.)
	25 mm	Each	198596.00
	40 mm	Each	199735.00
	50 mm	Each	200494.00
	65mm	Each	204216.00
	80mm	Each	204671.00
	100 mm	Each	216443.00
	125 mm	Each	219481.00
	150mm	Each	228594.00
	200mm	Each	247201.00
	250mm	Each	284033.00
	300mm	Each	358080.00
30.4	Supply of Dirt Box with S.S. Strainer as per specifications (Dia in mm)		
	50 mm	Each	3200.00
	65 mm	Each	3631.00
	80 mm	Each	4643.00
	100 mm	Each	5801.00
	125 mm	Each	9600.00
	150 mm	Each	13399.00
	200 mm	Each	18372.00
	250 mm	Each	30389.00
	300 mm	Each	44341.00
	400 mm	Each	74199.00
30.5	Electromagnetic Bulk Flow Meters		
	Supply of Electromagnetic full bore meter complete as per specification including transportation to site, storage, safety, installation, testing, commissioning, making connections with existing pipe line, including excavation at site, cuts in the existing pipe system, dewatering and reinstating the same after completion of installation as per specification and drawings including all taxes. Accuracy of meter + 0.3% of measured value, Flange connection as per AWWA & IS, Liner:		
	Hard Rubber, Fully welded sensor housing complying to IP 68 standard, Electrodes SS 316, Sensor housing SS 304, Cable gland 1/2" NPT, Sensor housing fully welded SS 304 housing with protective Polyurethane paint, Flow Transmitter/ Converter : Microprocessor based, modular design display 2 line back lit LCD for indication of actual flow rate, forward, reverse, sumtotalizer, Perfection category : IP 65		
	Output : One current output (4-20 mA) one scalable pulse output		
	Dia in mm		
	50mm	Each	104111.00

Item No.	Description	Unit	Rate (in Rs.)
	65mm	Each	106202.00
	80mm	Each	110558.00
	100 mm	Each	122842.00
	150mm	Each	134255.00
	200 mm	Each	171631.00
	250 mm	Each	201165.00
	300 mm	Each	222597.00
	400 mm	Each	377936.00
	450 mm	Each	432649.00
	500 mm	Each	522646.00
	600 mm	Each	850139.00
	700 mm	Each	1114567.00
	900 mm	Each	1666574.00
	1000 mm	Each	1823892.00
	1200 mm	Each	2375899.00
	1400 mm	Each	2927905.00
	2000 mm	Each	4453665.00

CHAPTER - 31
SUBMERSIBLE MOTOR PUMPS

1 Applicable Codes

- IS : 8034 : 2002 Submersible Pumpsets for Clear, Cold, Fresh Water
- IS : 8110 : 1976 Well Screens and Slotted Pipes
- IS : 2800 (part II) : 1979 Construction and Testing of Tubewells
- IS 9283 : 1995 Submersible motors wet type to work on; 3 phases, 50 C/s., 415 Voltage, A.C. supply.

2 Scope - Specifies the technical requirements for submersible pumpsets commonly used in bore holes for handling clear, cold, fresh water.

3 Units, Terminology and Classification - Units, terminology and classification relating to pumps for clear, cold, fresh water shall be as specified in IS : 5120 - 1968 Technical requirements for roto dynamic special purpose pumps.

4 Submersible Motor

4.1 The submersible motor shall be squirrel cage induction motor.

4.2 The motor shall have a name plate giving the following information:

- (a) Induction motor :
- (b) Name of manufacturer;
- (c) Pump type,
- (d) Number of stages,
- (e) Total head, and
- (f) Capacity

5 Information to be furnished by the Purchaser - When enquiring or ordering pumps to this standard, the user shall furnish following information to the suppliers:

- 5.1 Name of purchaser;
- 5.2 Address;
- 5.3 Installation site;
- 5.4 Number of pumps required;
- 5.5 Spare parts required;
- 5.6 Pump operating conditons :
- 5.6.1 Capacity 1/min, l/s or mc/h:
- 5.6.2 Speed Rev/min;
- 5.6.3 Total head below ground level at rated capacity m ;
- 5.6.4 Total head above groud level at rated capacity m ; and
- 5.6.5 Details of delivery conditions.

Sketch of pipe line giving information such as delivery pipe diameter and length, method of connection, distance between point of discharge, ground level, total head, etc may be given.

6 Characteristics of Clear, Cold, Fresh water – Clear, cold, fresh water shell mean water having the characteristics specified below:

Table No - 31.1

(a)	Turbidity		50 ppm (silica scale), Max
(b)	Chlorides		500 ppm, Max
(c)	Total solids		3 000 ppm, Max
(d)	pH		6.5 to 8.5
(e)	Temperature		33°C, Max
(f)	Specific gravity		1.004, Max

7 Material of Construction

- 7.1 It is recognized that a number of materials of construction is available to meet the needs for submersible pumpsets handling clear, cold, fresh water. Typical materials for a few parts are indicated below:-

Table No. 31.2

S.No.	Name of Part	Relevant Specification
i)	Bearing sleeve	Grade 3,4, or 5 of IS : 318 – 1962 Leaded tin bronze ingots and casting (revised)' or 12 percent chromium steel (Grades 07Cr13, 15Cr13 and 22Cr13) conforming to IS : 1570 (Part V) – 1972 'Schedules for wrought steels: Part V Stainless and heat-resisting steels (first revision)
ii)	Casing wear ring	Grade 3,4 or 5 of IS : 318-1962 or Grade 20 of IS : 210-1970 'Grey iron casting (second reivision)'
iii)	Discharge casing	Grade 20 of IS : 210-1970
iv)	Impeller	Grade 3,4 or 5 of IS : 318-1962 or Grade 20 of IS : 210-1970 or 12 percent chromium steel (Grades 07Cr13, 15Cr13 and 22Cr13) conforming to IS : 1570 (Part V) – 1972
v)	Pump bowl	Grade 20 of IS : 210-1970
vi)	Pump Shaft	12 percent chromium steel (Grades 07Cr13, 15Cr13 and 22Cr13) conforming to IS : 1570 (Part V) – 1970 or Grades C40 or c45 of IS : 1570-1961 'Schedules for wrought steels for general engineering purposes'.
vii)	Suction casing	Grade 20 of IS : 210-1970

- 7.2 Gaskets and Seals – Gaskets and seals used for clear, cold, fresh water pumps shall conform to those specified in IS : 5120-1968.

8 General Requirements

- 8.1 Since the motor and the pump are directly coupled or close coupled, the manufacturer shall indicate the minimum size of the borehole in which the submersible pump set can be erected and suspended freely.
- 8.2 The pump shall be installed generally in accordance with the manufacturer's recommendations. A typical sketch of submersible pumpset installation shall be as per IS 8034-1976.
- 8.3 For smooth and efficient working of the submersible pumpset, the manufacturer shall recommend the minimum submergence.

9 Measurements :-

Measurements shall be taken for complete finished item as per details given in specification & description of items.

10 Rates :-

Rates include labour, material equipment and machineries required for completion of items.

CHAPTER 31 - SUBMERSIBLE MOTOR PUMPS

Item No.	Description	Unit	Rate (in Rs.)
31.1	Providing, erecting and giving test of submersible pump set Conforming to IS 8034-2002 with Amdt. No. - 1, (With Up to date amendments) and motor Conforming to IS 9283-1995, with amdt.1 & 2, (With Up to date amendments) with water proof winding. Pump shall be suitable for various delivery head and discharge with stainless steel shaft. Motor suitable for working on 415 V + 10%, 3 Ph. 50 Hz A.C. Supply, with cableguard, thrust carbon/fiber bearing to withstand entire hudraulic thrust. The pump set shall be suitable for direct coupling with suitable suction strainer. Pump should have suitable discharge outlet as per manufacturer's design. Antithrust stream lined non return valve shall be provided with the pump. 3 m submersible copper conductor cable in single/double run and 2 pairs of suitable size erection clamp 10 mm thick shall be provided with each pump.		
31.1.1	Submersible pumpset 100 mm dia (with Polypropelene/Noryl Impeller) up to 20 stages.		
31.1.1.1	1.5 HP	Each	14109.00
31.1.1.2	2 HP	Each	18420.00
31.1.1.3	2.5 HP	Each	19915.00
31.1.1.4	3.0 HP	Each	21409.00
31.1.1.5	4.0 HP	Each	24115.00
31.1.1.6	5.0 HP	Each	26689.00
Note -	Supply rate should be increased by Rs. 200/- per stage for pump with more than 20 stages.		
31.2	Submersible pump 150 mm dia (with Bronze Impeller) up to 8 stages		
31.2.1	1.5 HP	Each	15619.00
31.2.2	2.00 HP	Each	21694.00
31.2.3	3.00 HP	Each	28391.00
31.2.4	4.0 HP	Each	30696.00
31.2.5	5.0 HP	Each	31112.00
31.2.6	6.0 HP	Each	36035.00
31.2.7	7.5 HP	Each	34145.00
Note -	Supply rate should be increased by Rs. 600/- per stage for pump with more than 8 stages.		
31.3	Submersible pump 150 mm dia (with Bronze Impeller) up to 12 stages		
31.3.1	8.0 HP	Each	34145.00
31.3.2	9.0 HP	Each	36456.00
31.3.3	10.0 HP	Each	38768.00
31.3.4	11.0 HP	Each	42273.00

Item No.	Description	Unit	Rate (in Rs.)
31.3.5	12.5 HP	Each	45588.00
31.3.6	15.0 HP	Each	50148.00
Note -	Supply rate should be increased by Rs. 600/- per stage for pump with more than 12 stages.		
31.4	Submersible pump 150 mm dia (with Bronze Impeller) up to 15 stages		
31.4.1	17.5 HP	Each	64177.00
31.4.2	20.0 HP	Each	67149.00
31.4.3	22.5 HP	Each	70123.00
Note -	Supply rate should be increased by Rs. 600/- per stage for pump with more than 15 stages for borewell only.		
	For other use 200 mm dia pump shall be preferred over 150 mm dia with more than 15 stage pump.		
31.5	Submersible pump 200 mm dia (with Bronze Impeller) up to 5 stages of category A & B		
31.5.1	7.5 HP	Each	40344.00
31.5.2	10.0 HP	Each	45056.00
31.5.3	12.5 HP	Each	48858.00
Note -	Supply rate should be increased by Rs. 1900/- per stage for pump with more than 5 stages.		
31.6	Submersible pump 200 mm dia (with Bronze Impeller) up to 8 stages of category A & B		
31.6.1	15.0 HP	Each	50787.00
31.6.2	17.5 HP	Each	54673.00
31.6.3	20.0 HP	Each	58561.00
31.6.4	22.5 HP	Each	63039.00
31.6.5	25.0 HP	Each	67520.00
31.6.6	27.5 HP	Each	72934.00
Note -	Supply rate should be increased by Rs. 1900/- per stage for pump with more than 8 stages.		
31.7	Submersible pump 250 mm dia (with Bronze Impeller) up to 8 stages of category A & B		
31.7.1	15.0 HP	Each	53005.00
31.7.2	20.0 HP	Each	101296.00
31.7.3	22.5 HP	Each	104330.00
31.7.4	25.0 HP	Each	107363.00
31.7.5	30.0 HP	Each	146796.00
31.8	Submersible monoblock pumpset (with Bronze Impeller) Horizontal/Vertical up to 3 stages. (Motor with water lubricated bearing to accept entire hydraulic thrust)		
31.8.1	3.0 HP	Each	18897.00
31.8.2	5.0 HP	Each	20056.00
31.8.3	7.5 HP	Each	26955.00
31.8.4	10.0 HP	Each	29498.00

Item No.	Description	Unit	Rate (in Rs.)
Note -	For turbid water use of submersible pump shall be avoided, however for emergency situation mechanical seal of TCTC construction shall be provided with the motor and adequate screen to prevent floating material shall also be provided for which Rs. 7500/- shall be added in additional to supply rate.		
31.9	Centrifugal Monoblock Pumpset Providing, erecting and giving test of centrifugal monoblock pump set Conforming to IS 9079 operating at 2900 RPM with CI Impeller, priming funnel, cock, suitable flanges at suction and delivery side. Pump shall have common shaft for pump and motor. Motor shall be suitable for working on 415 V + 10%, 3 Ph, 50 Hz A.C. Supply. Motor shall be TEFC type. Pump set shall be suitable for working at various discharge and head requirements. Pump shall be erected on Provided C.C. foundation block with suitable foundation bolts grouted in C.C. foundation block.		
31.9.1	Centrifugal Monoblock Pumpset (Single Stage)		
31.9.1.1	2.0 HP	Each	13864.00
31.9.1.2	3.0 HP	Each	17126.00
31.9.1.3	5.0 HP	Each	22796.00
31.9.1.4	7.5 HP	Each	28127.00
31.9.1.5	10.0 HP	Each	33704.00
31.9.1.6	12.5 HP	Each	33896.00
31.9.1.7	15.0 HP	Each	39850.00
31.9.1.8	20.0 HP	Each	42024.00
31.9.1.9	25.0 HP	Each	45001.00
31.9.1.10	30.0 HP	Each	79878.00
31.10	Centrifugal Monoblock Pumpset (Two Stage)		
31.10.1	5.0 HP	Each	93543.00
31.10.2	7.5 HP	Each	30821.00
31.10.3	10.0 HP	Each	34271.00
31.10.4	12.5 HP	Each	37676.00
31.10.5	15.0 HP	Each	45852.00
31.10.6	20.0 HP	Each	55634.00
	Valve Actuator		

Item No.	Description	Unit	Rate (in Rs.)
31.11	Providing, erecting electric valve actuators totally enclosed, weather proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically dis-engage on restoration of power to motor and with 10 watt single phase space heater and contineous local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp., AC/DC, torque switch dial and with TEFC squirell cage induction motor working on 440 Volts +/- 10%, 3 phase, 50 Hz AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP-67 protection class suitable for DOL starting and with three thermostat and 30% over load margin. The torque rating of reduction gear box shall be chamber and treated effluent outlet channel etc complete as per detailed		
31.11.1	Electric Valve Actuator for non rising spindle type sluice valve, PN1 & PN 1.6 rating for Valve size (Without integral starter)		
31.11.1	350 mm diameter	Each	222106.00
31.11.2	400 mm diameter	Each	298197.00
31.11.3	450 mm diameter	Each	298197.00
31.11.4	500 mm diameter	Each	298197.00
31.11.5	600 mm diameter	Each	298197.00
31.11.6	700 mm diameter	Each	322104.00
31.11.7	750 mm diameter	Each	322104.00
31.11.8	800 mm diameter	Each	322104.00
31.11.9	900 mm diameter	Each	462719.00
31.11.1	1000 mm diameter	Each	462719.00
31.12	Rewinding, Supplying and fitting of submersible pump of following H.P. including transportation from tube well site to work shop and from work shop to tube well site including cost of winding materials insulation , drying and all reacted work of motor winding Job.		
31.12.1	1 to 3 HP capacity	Each	1500.00
31.12.2	4 to 6 HP capacity	Each	2167.00
31.12.3	7 to 10 HP capacity	Each	2950.00
31.12.4	10 to 15 HP capacity	Each	3750.00
31.12.5	15 to 20 HP capacity	Each	5550.00

Item No. Description Unit Rate (in Rs.)

31.13 Providing and Supplying of following Openwell submersible Pumpset with ISI mark IS 14220 (horizontal) without panel board, duly tested from certified agencies for usage in Drinking water inclusive of all materials, Central, State and Municipal taxes and duties inspection charges, transit insurance, loading/unloading FOR site unloading & stacking etc. complete as per direction of Engineer-in-Charge.

Sl. No.	Duty lpm x m	H.P. of Pumpset	Unit	Rate (in Rs.)
1	2	3	4	
1	50x25	1	Each	11019.00
2	50x40	1	Each	12141.00
3	50x50	1.5	Each	16577.00
4	50x60	2	Each	13281.00
5	50x75	4	Each	16573.00
6	50x100	5	Each	17251.00
7	50x125	6	Each	16201.00
8	75x25	1	Each	11667.00
9	75x40	1.5	Each	18497.00
10	75x50	2	Each	18653.00
11	75x60	2	Each	19095.00
12	75x75	4	Each	17450.00
13	75x100	5	Each	28120.00
14	75x125	6	Each	16905.00
15	75x150	7.5	Each	18248.00
16	100x25	1	Each	15057.00
17	100x40	2	Each	15082.00
18	100x50	3	Each	17450.00
19	100x60	4	Each	17949.00
20	100x75	4	Each	18197.00
21	100x100	5	Each	28917.00
22	100x125	6	Each	17831.00
23	125x25	3	Each	18197.00
24	125x40	3	Each	18647.00
25	125x50	3	Each	19444.00
26	125x75	4	Each	19195.00
27	125x100	5	Each	29216.00
28	125x125	6	Each	18183.00
29	150x25	3	Each	22436.00
30	150x40	3	Each	22934.00
31	150x50	3	Each	23433.00

Item No.	Description	Unit	Rate (in Rs.)
32	150x60	4	Each 20043.00
33	150x75	4	Each 20741.00
34	150x100	5	Each 29715.00
35	150x125	7.5	Each 25328.00
36	175x25	3	Each 22236.00
37	175x40	3	Each 22735.00
38	175x50	3	Each 23234.00
39	175x60	4	Each 20391.00
40	175x75	5	Each 30163.00
41	175x100	6	Each 19814.00
42	200x25	3	Each 24231.00
43	200x40	4	Each 20690.00
44	200x50	4	Each 20989.00
45	200x60	4	Each 21289.00
46	200x75	6	Each 20530.00
47	200x100	7.5	Each 29615.00
48	200x125	10	Each 35847.00
49	250x25	3	Each 24430.00
50	250x40	4	Each 21638.00
51	250x50	5	Each 30612.00
52	250x60	5	Each 31061.00
53	250x75	7.5	Each 31984.00
54	250x100	7.5	Each 33055.00
55	250x125	10	Each 36844.00
56	300x25	3	Each 24729.00
57	300x40	5	Each 31510.00
58	300x50	5	Each 31709.00
59	300x60	6	Each 27222.00
60	300x75	10	Each 37243.00
61	300x100	10	Each 37642.00
62	350x25	3	Each 24929.00
63	350x40	5	Each 31909.00
64	350x50	7.5	Each 33454.00
65	350x60	7.5	Each 33853.00
66	350x75	10	Each 37991.00
67	350x100	10	Each 38340.00
68	400x25	3	Each 25427.00
69	400x40	5	Each 32208.00
70	400x50	7.5	Each 34302.00
71	400x60	10	Each 38838.00
72	400x75	10	Each 39337.00
73	500x25	5	Each 32607.00

Item No.	Description	Unit	Rate (in Rs.)
74	500x40	5	Each 33006.00
75	500x50	7.5	Each 34800.00
76	500x75	10	Each 40085.00
77	600x25	5	Each 33205.00
78	600x40	7.5	Each 35299.00
79	600x50	7.5	Each 35798.00
80	600x75	12.5	Each 30513.00
81	700x40	10	Each 40833.00
82	700x60	15	Each 41581.00
83	700x80	20	Each 44054.00
84	700x100	20	Each 65354.00
85	800x40	10	Each 41581.00
86	800x60	20	Each 48906.00
87	800x80	20	Each 52075.00
88	800x100	30	Each 55242.00
89	900x40	10	Each 42328.00
90	900x60	20	Each 60117.00
91	900x80	30	Each 62122.00
92	900x100	30	Each 62621.00
93	1000x40	15	Each 41581.00
94	1000x60	20	Each 62929.00
95	1000x80	25	Each 74391.00
96	1000x100	35	Each 87699.00
97	1250x40	20	Each 64406.00
98	1250x60	25	Each 74391.00
99	1250x80	35	Each 83548.00
100	1250x100	40	Each 128433.00
101	1500x40	20	Each 66002.00
102	1500x60	30	Each 66310.00
103	1500x80	40	Each 128433.00
104	1500x100	50	Each 140099.00
105	2000x40	30	Each 67208.00
106	2000x60	45	Each 105357.00
107	2000x80	50	Each 140099.00
108	2000x100	60	Each 113684.00
109	2500x40	35	Each 93260.00
110	2500x60	60	Each 110873.00
111	2500x80	75	Each 162915.00
112	2500x100	90	Each 201497.00

CHAPTER- 32 MISCELLANEOUS

- 1 The works to be executed in accordance with the General specifications of the Public Health Engineering Department, relevant IS codes for pipes/specials, jointing materials and laying works.
- 2 All materials shall Conform to relevant IS specification.
- 3 Where cracked pipe or cut piece is required to be used on line to take a tyton ring joint, it is necessary to cut the cracked portion and chamfer the pipe. In a cut piece, only chamfering would be required. These rates have been introduced separately for cutting and chamfering. The rates include requirement of tools and plants, lead and lift etc.
- 4 During the course of execution, it sometimes becomes necessary to provide a non-standard special to fit into the pipeline. This can be conveniently made out of steel plates. An item to cover such emergency is also provided for in the schedule. Similarly, item to provide a mild steel flange has also been introduced to over the specific requirement during execution.
- 5 An item for laying and jointing steel pipes, incorporating field welding has also been introduced to cover the special requirements during execution.
- 6 All pavements, paved foot paths, curbing, gutters, shrubbery, fences, poles, rod or other property and surface structures removed or disturbed as a part of the work shall be restored to a condition equal to that before the work began, furnishing all labour and material incidental thereto. In restoring the pavement sound materials may be reuse. No Permanent pavement shall be restored unless and until, in the opinion of the Engineer in charge the condition of the backfill is such as to properly support the pavement.
- 7 Pavement and road surface may be removed as a part of the trench excavation and the amount removed shall depend upon the width of trench specified for the installation of the pipe and the width and length of the pavement area required to be removed for laying pipes. The width of pavement removal along the normal trench for the installation of the pipe shall not exceed the width of the trench specified by more then 15 cm on each side of the trench. Wherever in the opinion of the Engineer in charge existing conditions make it necessary or advisable to remove additional pavement, it shall be removed as directed by the Engineer in charge.
- 8 All construction material, and all tools and temporary structures shall be removed form the site as directed by the Engineer in charge. All dirt, rubbish and excess earth form the excavation shall be taken off to a specified dumping site as directed by Engineer in Charge and the construction site shall be kept clean to the satisfaction of the Engineer-in-charge.
- 9 Where any pavement, shrubbery, fence, poles or other property and surface structures have been damaged, removed or disturbed during the course of the work, such property and surface structures shall be replaced or repaired after completion of work.
- 10 **Measurements**
Measurement shall be made according to the work actually done and pavement shall be made accordingly.

11 Rates :

The rate shall include the cost of the material and labour involved in all the operation described in the items. The rates include all plants, chain, pulley blocks, other appliances etc. required for execution of the works. Rates for items and making good roads etc. include lead for the materials.

PE-AL-PE PIPES & FITTINGS FOR HOT & COLD WATER SUPPLIES

12 PE-AL-PE Pipes shall Conform to IS: 15450 duly inspected and tested and having BIS certification mark.

12.1 SCOPE

This standard covers coextruded polyethylene composite pressure pipes ranging from 12 mm to 50 mm in diameter. These pipes are used for conveyance of hot and cold water supply for domestic and industrial purposes including internal and external plumbing, air conditioning and heating installations within buildings. This standard includes a system of nomenclature for PE-AL-PE pipes, the requirements and test methods for material, the dimensions and strength of finished pipe, adhesion test and the burst and sustained pressure performance test along with requirements and methods for marking.

12.2 Polyethylene compounds shall Conform to IS 7328 as follows:

- 12.2.1 PEEWA 45 T006 for black pipes
- 12.2.2 PEELA 45 T006 for coloured pipes

12.3 NOMINAL DIAMETERS

The nominal outside diameter of pipes are 12, 14, 16, 20, 25, 32, 40 and 50 mm. Respective nominal inside diameters are 9, 10, 12, 16, 20, 25, 32 and 40 mm.

12.4 The PE-AL-PE pipes are bonded, multilayer pipes consisting of metal aluminum and polyethylene i.e. metallic pipe bonded with adhesive both internally and externally by polyethylene coating. The layers of PE-AL-PE pipes are :-

- 12.4.1 The interior layer of polyethylene
- 12.4.2 The adhesive layer
- 12.4.3 Aluminium tube
- 12.4.4 The adhesive layer
- 12.4.5 The external layer of polyethylene

Table -1 Aluminium Thickness and Tolerances for PE-AL-PE

<u>S No</u>	Nominal Pipe Size mm	Nominal <u>Aluminium Thickness</u> mm
1	2	3
i)	912	0.2
ii)	1014	0.2
iii)	1216	0.2
iv)	1620	0.25
v)	2025	0.25
vi)	2532	0.3
vii)	3240	0.3
viii)	4050	0.3

12.5 MARKING

12.5.1 The marking shall be repeated at intervals of 1 m and shall consist of the following information:

a) Manufacturer's name and trade-mark,

12.5.2 Two labels of suitable dimensions should be carefully attached to each coil indicating:

a) suppliers name;

12.5.3 BIS Certification Marking

12.5.3.1 Each pipe may also be marked with the Standard Mark.

12.6 The jointing of the pipe to ensure a leak proof joint :

12.6.1 Cut the pipe square by cutter to the required and proper length.

12.6.2 Select the fitting to be used and dismantle its nuts and split rings.

12.6.3 Place the nut and split ring over the pipe. Ensure that "O" rings are in proper position of insert.

12.6.4 Prepare the end of pipe to be jointed for roundness and chamfer by using beveling tool. Push the pipe over the insert and inside the support groove fully.

12.6.5 Push the split ring and nut towards connector till split ring touches the support groove.

12.6.6 Tighten the nut over connector with spanner.

12.7 The specially manufactured compression joints fittings should be used for PE-AL-PE pipes which are available in 3 types i.e. brass, composite and composite external sealing. Either of these fittings should be used. The external sealing fittings should be used only for cold water applications.

12.8 **Measurement:**

12.8.1 The net length of pipes as laid or fixed should be measured in running meters correct to a cm. Specials should be excluded and enumerated and paid for separately.

12.8.2 The outside diameter of pipe shall be taken as the average of two measurements taken at right angles. The wall thickness shall be measured by a dial vernier or ball ended micrometer. The resulting dimension shall be expressed to the nearest 0.1 mm.

12.8.3 Ovality shall be measured as the difference between maximum outside diameter and minimum outside diameter measured at the same cross section of the pipe. For pipes to be coiled, the ovality shall be measured prior to coiling. For coiled pipes, however, re-rounding the pipes shall be carried out prior to the measurement of ovality.

12.9 **Rates**

12.9.1 The rates include charges for all tools & plants, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in positions as per approved drawing.

12.9.2 The rates include provision and use of all coverings etc. to protect the works from inclement weather etc. and from damages from fall of materials, and other causes.

CHAPTER 32 - MISCELLANEOUS

S. No.	Particulars of Items	Unit	Rates (in Rs.)
32.1	Dismantling dead pipe line of M.S. /R.C.C. /D.I. /P.S.C. and G.I./ A.C./ P.V.C./ S.W./ H.D.P.E. pipe including cost of necessary excavation and refilling of trenches, breaking the joints, lifting the pipes and stacking to the place as directed by Engineer-in-charge with all leads and lifts including cleaning the surface etc. complete.		
32.1.1	For M.S./R.C.C./ D.I./ P.S.C.		
	i) 80 mm	Each	8.00
	ii) 100 mm	Each	9.00
	iii) 125 mm	Each	12.00
	iv) 150 mm	Each	15.00
	v) 200 mm	Each	22.00
	vi) 250 mm	Each	29.00
	vii) 300 mm	Each	38.00
	viii) 350 mm	Each	47.00
	ix) 400 mm	Each	57.00
	x) 450 mm	Each	70.00
	xi) 500 mm	Each	80.00
	xii) 600 mm	Each	107.00
	xiii) 700 mm	Each	140.00
	xiv) 750 mm	Each	156.00
32.1.2	G.I./ A.C./P.V.C./ S.W./H.D.P.E.pipe.		
	i) 80 mm	Each	5.00
	ii) 100 mm	Each	5.00
	iii) 125 mm	Each	7.00
	iv) 150 mm	Each	9.00
	v) 200 mm	Each	13.00
	vi) 250 mm	Each	17.00
	vii) 300 mm	Each	23.00
	viii) 350 mm	Each	28.00
	ix) 400 mm	Each	34.00
	x) 450 mm	Each	42.00
	xi) 500 mm	Each	48.00
	xii) 600 mm	Each	64.00
	xiii) 700 mm	Each	84.00
	xiv) 750 mm	Each	94.00
32.2	Labour for cutting following cast iron pipes of any type and class.		
	80 mm dia.	Per Cut	25.00
	100 mm dia.	Per Cut	32.00
	150 mm dia.	Per Cut	58.00
	200 mm dia.	Per Cut	78.00
	250 mm dia.	Per Cut	98.00
	300 mm dia.	Per Cut	138.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)
	350 mm dia.	Per Cut	155.00
	400 mm dia.	Per Cut	177.00
	450 mm dia.	Per Cut	195.00
	500 mm dia.	Per Cut	238.00
	600 mm dia.	Per Cut	273.00
	700 mm dia.	Per Cut	297.00
	750 mm dia.	Per Cut	314.00
	800 mm dia.	Per Cut	362.00
	900 mm dia.	Per Cut	390.00
	1000mm dia	Per Cut	416.00
32.3	Labour for cutting following Asbestos Cement Pressure Pipes of any type and class.		
	80 mm dia.	Per Cut	13.00
	100 mm dia.	Per Cut	17.00
	150 mm dia.	Per Cut	32.00
	200 mm dia.	Per Cut	43.00
	250mm dia	Per Cut	51.00
	300mm dia	Per Cut	70.00
	350mm dia	Per Cut	80.00
32.4	Labour for cutting following Ductile iron pipes of any type and class.		
	80 mm dia.	Per Cut	23.00
	100 mm dia.	Per Cut	30.00
	150 mm dia.	Per Cut	54.00
	200 mm dia.	Per Cut	72.00
	250 mm dia.	Per Cut	89.00
	300 mm dia.	Per Cut	128.00
	350 mm dia.	Per Cut	141.00
	400 mm dia.	Per Cut	158.00
	450 mm dia.	Per Cut	176.00
	500 mm dia.	Per Cut	211.00
	600 mm dia.	Per Cut	249.00
	700 mm dia.	Per Cut	264.00
	750 mm dia.	Per Cut	282.00
	800 mm dia.	Per Cut	316.00
	900 mm dia.	Per Cut	351.00
	1000mm dia	Per Cut	373.00
32.5	Labour for cutting following Galvanised iron (MS) pipes of any type and class.		
	15 mm dia.	Per Cut	4.00
	20 mm dia.	Per Cut	7.00
	25 mm dia.	Per Cut	10.00
	32 mm dia.	Per Cut	11.00
	40 mm dia.	Per Cut	14.00
	50 mm dia.	Per Cut	17.00
	65 mm dia.	Per Cut	19.00
	80 mm dia.	Per Cut	20.00
	100 mm dia.	Per Cut	25.00
	125 mm dia.	Per Cut	29.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)
	150 mm dia.	Per Cut	32.00
32.6	Labour for cutting following P.V.C pipes of any type and class.		
	90mm dia	Per Cut	5.00
	110mm dia	Per Cut	8.00
	140mm dia	Per Cut	14.00
	160mm dia	Per Cut	15.00
	180mm dia	Per Cut	18.00
	200mm dia	Per Cut	20.00
32.7	Chamfering cast iron pipes of all types and classes to make suitable for tyton joints.		
	80mm to150 mm dia.	Per End	430.00
	200 mm dia.	Per End	531.00
	250 mm dia.	Per End	590.00
	300 mm dia.	Per End	658.00
	400 mm dia.	Per End	763.00
	450 mm dia.	Per End	869.00
	500 mm dia.	Per End	930.00
	600 mm dia.	Per End	1030.00
	700 mm dia.	Per End	1181.00
	750 mm dia.	Per End	1266.00
	800 mm dia.	Per End	1434.00
	900 mm dia.	Per End	1510.00
	1000 mm dia.	Per End	1662.00
	1100 mm dia.	Per End	1815.00
	1200 mm dia.	Per End	1966.00
	1400 mm dia.	Per End	2118.00
32.8	Chamfering ductile iron pipes of all types and classes to make suitable for tyton joints.		
	80mm to150 mm dia.	Per End	301.00
	200 mm dia.	Per End	378.00
	250 mm dia.	Per End	414.00
	300 mm dia.	Per End	461.00
	400 mm dia.	Per End	535.00
	450 mm dia.	Per End	609.00
	500 mm dia.	Per End	651.00
	600 mm dia.	Per End	722.00
	700 mm dia.	Per End	828.00
	750 mm dia.	Per End	888.00
	800 mm dia.	Per End	1006.00
	900 mm dia.	Per End	1059.00
	1000 mm dia.	Per End	1166.00
	1100mm dia	Per End	1273.00
	1200mm dia	Per End	1379.00
	1400mm dia	Per End	1486.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)		
32.9	Dismantling following old cast iron socket and spigot pipes class 'L.A.' 'A' & 'B' including breaking lead caulked joints, melting of lead and making it in to blocks including stacking of pipes at site lead upto 50 meters.		LA	A	B
	80 mm dia.	RM	7.00	7.00	8.00
	100 mm dia.	RM	8.00	9.00	9.00
	125 mm dia.	RM	11.00	12.00	12.00
	150 mm dia.	RM	13.00	14.00	15.00
	200 mm dia.	RM	18.00	20.00	22.00
	250 mm dia.	RM	26.00	27.00	29.00
	300 mm dia.	RM	34.00	35.00	38.00
	350 mm dia.	RM	40.00	44.00	47.00
	400 mm dia.	RM	48.00	53.00	57.00
	450 mm dia.	RM	58.00	64.00	70.00
	500 mm dia.	RM	68.00	74.00	80.00
	600 mm dia.	RM	92.00	100.00	107.00
	700 mm dia.	RM	118.00	124.00	140.00
	750 mm dia.	RM	134.00	145.00	156.00
	800 mm dia	RM	152.00	160.00	174.00
	900 mm dia	RM	179.00	194.00	213.00
	1000 mm dia.	RM	218.00	235.00	254.00
32.10	Providing & fixing in position Cast Iron Manhole Covers and frame Conforming to IS-1726. All the exposed edges rounded end finished in cement mortar 1:3 etc. complete.	Per Kg		73.00	
32.11	Labour only for fixing in position Cast Iron Manhole Covers & frame Conforming to IS-1726.	Per Kg		4.00	
32.12	Provision of public stand posts for urban poor				
32.12.1	Providing and constructing two stand post as per type design with excavation 15 cm thick PCC 1:3:6 bedding 20 mm thick PCC 1:2:4 convert for platform of 1.5 M dia. with side curb and bucket rest, 80 mm dia , heavy duty GI pipe central post duly filled therein with C.C. 1:2:4, 2.2 M long, 20mm dia medium G.I. pipe from point of tapping to stand post additional 20mm dia G.I. pipe 5.8 m long fixed up to 15 mm dia self closing water taps, one brass ferule etc. complete together with all labour and material charges as per drawing and as directed by Engineer-in-charge when good foundation in available. Rate includes draining arrangement by excavating open gutters complete. (Drawing No.- 22)	Each		4468.00	

S. No.	Particulars of Items	Unit	Rates (in Rs.)
32.12.2	Providing and constructing two taps stand post as per type design with excavation 30 cm thick boulder filling 15 cm thick PCC in 1:3:6 , 20 mm thick RCC 1:2:4 platform of 1.5 M dia. with side curb and bucket rest, 80 mm dia, heavy duty GI pipe central post duly filled therein with C.C. 1:2:4, 2.2 M long, 20mm dia medium G.I. pipe 5.8 m long fixed up to two 15 mm dia self closing water taps, one brass ferule etc. complete together with all labour and material charges as per directed by Engineer-in-charge when B.C. soil is available. Rate includes draining arrangement by excavating open gutters complete. (<i>Drawing No.-23</i>)	Each	4578.00
32.13	Disinfecting C.I. water mains by flushing with water containing bleaching powder at 0.5 gms per liter of water and cleaning the same with fresh water, operation to be repeated three times including getting the sample of water from the disinfected main tested in the Govt. / Municipal/ Authorised laboratory :		
	80mm diameter	Per 100RM	362.00
	100mm diameter	Per 100RM	474.00
	125mm diameter	Per 100RM	593.00
	150mm diameter	Per 100RM	715.00
	200mm diameter	Per 100RM	964.00
	250mm diameter	Per 100RM	1224.00
	300mm diameter	Per 100RM	1386.00
	350mm diameter	Per 100RM	1558.00
	400mm diameter	Per 100RM	1745.00
	450mm diameter	Per 100RM	1939.00
	500mm diameter	Per 100RM	2146.00
	600mm diameter	Per 100RM	2583.00
32.14	Extra for every operation of disinfecting the C.I. main by flushing with water containing bleaching powder at 0.5 gms per liter of water and cleaning the same with fresh water, including getting the samples of water tested in the Govt. / Municipal/ Authorised laboratory :		
	80mm diameter	Per 100RM	133.00
	100mm diameter	Per 100RM	162.00
	125mm diameter	Per 100RM	198.00
	150mm diameter	Per 100RM	232.00
	200mm diameter	Per 100RM	345.00
	250mm diameter	Per 100RM	407.00
	300mm diameter	Per 100RM	468.00
	350mm diameter	Per 100RM	556.00
	400mm diameter	Per 100RM	646.00
	450mm diameter	Per 100RM	741.00
	500mm diameter	Per 100RM	796.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)	
	600mm diameter	Per 100RM	1040.00	
32.15	Carriage of Material by Mechanical transport including loading unloading & stacking etc.			
32.15.1	Lime, Alum, Bleaching powder, murum, building rubbish (Malba)	Distance	Per	Rate in Rs.
	1. Distance	1 Km	Cum	49.00
	2. Distance	2 Km	Cum	57.00
	3. Distance	3 Km	Cum	65.00
	4. Distance	4 Km	Cum	72.00
	5. Distance	5 Km	Cum	80.00
	6. Beyond 5 km upto 10km. Add per km		Cum	7.00
	7. Beyond 10 km, upto 20km add per km		Cum	6.00
	8. Beyond 20 km, add per km		Cum	5.00
32.15.2	Earth			
	1. Distance	1 Km	Cum	61.00
	2. Distance	2 Km	Cum	71.00
	3. Distance	3 Km	Cum	81.00
	4. Distance	4 Km	Cum	91.00
	5. Distance	5 Km	Cum	100.00
	6. Beyond 5 km upto 10km. Add per km		Cum	8.00
	7. Beyond 10 km, upto 20km add per km		Cum	7.00
	8. Beyond 20 km, add per km		Cum	6.00
32.15.3	G.I, C.I., D.I., CC, ACP pipes below 100mm dia and other heavy material and machinery Cement, Stone blocks.			
	1. Distance	1 Km	Per Tonne	44.00
	2. Distance	2 Km	Per Tonne	51.00
	3. Distance	3 Km	Per Tonne	58.00
	4. Distance	4 Km	Per Tonne	64.00
	5. Distance	5 Km	Per Tonne	71.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	6.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	5.00
	8. Beyond 20 km, add per km		Per Tonne	4.00
32.15.4	Steel			
	1. Distance	1 Km	Per Tonne	44.00
	2. Distance	2 Km	Per Tonne	51.00
	3. Distance	3 Km	Per Tonne	58.00
	4. Distance	4 Km	Per Tonne	64.00
	5. Distance	5 Km	Per Tonne	71.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	6.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	5.00
	8. Beyond 20 km, add per km		Per Tonne	4.00
32.15.5	R.C.C., Pipes, Steel Pipes, ACP pipes, CI & DI Pipes			
32.15.5.1	100mm dia			
	1. Distance	1 Km	Per Tonne	107.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)	
	2. Distance	2 Km	Per Tonne	125.00
	3. Distance	3 Km	Per Tonne	142.00
	4. Distance	4 Km	Per Tonne	158.00
	5. Distance	5 Km	Per Tonne	174.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	15.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	13.00
	8. Beyond 20 km, add per additional km		Per Tonne	11.00
32.15.5.2	150mm dia			
	1. Distance	1 Km	Per Tonne	179.00
	2. Distance	2 Km	Per Tonne	208.00
	3. Distance	3 Km	Per Tonne	236.00
	4. Distance	4 Km	Per Tonne	264.00
	5. Distance	5 Km	Per Tonne	291.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	25.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	21.00
	8. Beyond 20 km, add per additional km		Per Tonne	18.00
32.15.5.3	200mm dia			
	1. Distance	1 Km	Per Tonne	291.00
	2. Distance	2 Km	Per Tonne	338.00
	3. Distance	3 Km	Per Tonne	384.00
	4. Distance	4 Km	Per Tonne	429.00
	5. Distance	5 Km	Per Tonne	473.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	40.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	35.00
	8. Beyond 20 km, add per additional km		Per Tonne	30.00
32.15.5.4	250mm dia			
	1. Distance	1 Km	Per Tonne	414.00
	2. Distance	2 Km	Per Tonne	481.00
	3. Distance	3 Km	Per Tonne	546.00
	4. Distance	4 Km	Per Tonne	610.00
	5. Distance	5 Km	Per Tonne	672.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	57.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	49.00
	8. Beyond 20 km, add per additional km		Per Tonne	43.00
32.15.5.5	300mm dia			
	1. Distance	1 Km	Per Tonne	511.00
	2. Distance	2 Km	Per Tonne	594.00
	3. Distance	3 Km	Per Tonne	675.00
	4. Distance	4 Km	Per Tonne	754.00
	5. Distance	5 Km	Per Tonne	831.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	71.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	61.00
	8. Beyond 20 km, add per additional km		Per Tonne	53.00
32.15.5.6	350mm dia			
	1. Distance	1 Km	Per Tonne	716.00
	2. Distance	2 Km	Per Tonne	831.00
	3. Distance	3 Km	Per Tonne	945.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)	
	4. Distance	4 Km	Per Tonne	1056.00
	5. Distance	5 Km	Per Tonne	1163.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	99.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	85.00
	8. Beyond 20 km, add per additional km		Per Tonne	74.00
32.15.5.7	400mm dia			
	1. Distance	1 Km	Per Tonne	976.00
	2. Distance	2 Km	Per Tonne	1134.00
	3. Distance	3 Km	Per Tonne	1289.00
	4. Distance	4 Km	Per Tonne	1440.00
	5. Distance	5 Km	Per Tonne	1586.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	135.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	116.00
	8. Beyond 20 km, add per additional km		Per Tonne	101.00
32.15.5.8	450mm & 500mm dia			
	1. Distance	1 Km	Per Tonne	1193.00
	2. Distance	2 Km	Per Tonne	1386.00
	3. Distance	3 Km	Per Tonne	1576.00
	4. Distance	4 Km	Per Tonne	1760.00
	5. Distance	5 Km	Per Tonne	1938.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	165.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	142.00
	8. Beyond 20 km, add per additional km		Per Tonne	123.00
32.15.5.9	600, 700, 750mm & 800mm dia			
	1. Distance	1 Km	Per Tonne	1790.00
	2. Distance	2 Km	Per Tonne	2079.00
	3. Distance	3 Km	Per Tonne	2363.00
	4. Distance	4 Km	Per Tonne	2639.00
	5. Distance	5 Km	Per Tonne	2907.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	247.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	212.00
	8. Beyond 20 km, add per additional km		Per Tonne	184.00
32.15.5.10	900mm dia			
	1. Distance	1 Km	Per Tonne	2685.00
	2. Distance	2 Km	Per Tonne	3118.00
	3. Distance	3 Km	Per Tonne	3545.00
	4. Distance	4 Km	Per Tonne	3959.00
	5. Distance	5 Km	Per Tonne	4361.00
	6. Beyond 5 km upto 10km. Add per km		Per Tonne	371.00
	7. Beyond 10 km, upto 20km add per km		Per Tonne	318.00
	8. Beyond 20 km, add per additional km		Per Tonne	277.00
32.15.5.11	1000, 1100 and 1200mm dia			
	1. Distance	1 Km	Per Tonne	3580.00
	2. Distance	2 Km	Per Tonne	4157.00
	3. Distance	3 Km	Per Tonne	4727.00
	4. Distance	4 Km	Per Tonne	5279.00
	5. Distance	5 Km	Per Tonne	5814.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)
	6. Beyond 5 km upto 10km. Add per km	Per Tonne	495.00
	7. Beyond 10 km, upto 20km add per km	Per Tonne	425.00
	8. Beyond 20 km, add per additional km	Per Tonne	369.00
32.16	Hire Charges of Plants & Machinery inclusive of operator and cleaner but excluding Diesel and oil.		
	1. Truck	Per Day	1150.00
	2. Water Tanker	Per Day	1275.00
	3. Dumper	Per Day	1300.00
	4. Tractor with Trolley	Per Day	800.00
	5. Road Roller	Per Day	1200.00
	6. Concrete Mixer	Per Day	700.00
32.17	Supply & Installation of Lightening Arrester Unit	Each	5769.00
32.18	Supply & Installation of MS Panel with Transmitter, Totalizer, etc as per specifications	Each	12678.00
32.19	Supply & Installation of Uninterruptible Power Supply [6hr Battery Backup (500 VA)]	Each	25356.00
32.20	Providing and Installation of C.I. Fire Hydrant 80x65mm dia on gravity mains as per IS 908, constitution of GM coupling, C.I. post, C.I.D./F riser, C.I.D/G Duckfoot Bend, C.I. D/F sluice valve, PN-1.6, C.I. surface Box, IS-3950 (33 Kg), C.I. Flange socket T.P., Flange Gaskets for above, G.I. Nut Bolt washer for above complete.	Each	21782.00
32.21	Providing and Installation of C.I. Fire Hydrant underground complete set 80x65mm dia consisting of as per IS 909, constitution of GM coupling, C.I. post, C.I.D./F riser, C.I.D/G Duckfoot Bend, C.I. D/F sluice valve, PN-1.6, C.I. surface Box, IS-3950 (33 Kg), C.I. Flange socket T.P., Flange Gaskets for above, G.I. Nut Bolt washer for above complete.	Each	27273.00
32.22	Providing and Installation of C.I. Fire Hydrant underground Type complete set 80x65mm dia (compact single unit) complete.	Each	11715.00
32.23	Providing and Installation of landing valve complete set 80x65mm dia (IS 5290)		
32.23.1	GM body	Each	9567.00
32.23.2	Aluminium body	Each	6773.00
32.23.3	C.I. Body with G.M. fittings	Each	3844.00
32.24	CONSTRUCTION OF STOP DAM		

S. No.	Particulars of Items	Unit	Rates (in Rs.)
32.24.1	Labour only for fixing in position single steel shutter for stop dam including all handling, cleaning of grooves i.e. removal of foreign materials such as dust, sand, silt etc. including greasing, oiling where ever required , excluding cost of all materials & staking at site. (Over all dimension of shutters to be considered.)	Sqm	55.00
32.24.2	Labour only for removing single steel shutter for stop dam including all handling, unscrewing, oiling where ever required ,excluding cost of all materials & staking at site. (Over all dimension of shutters to be considered.)	Sqm	55.00
32.24.3	Labour only for fixing in position the steel/wooden karri shutters for stop dam excluding filling the puddle earth but including all handling ,cleaning of grooves of foreign materials such as dust, sand, silt etc. including greasing, oiling where ever required ,excluding cost of all materials. (Over all dimension of karri shutters to be considered.)	Sqm	53.00
32.24.4	Labour only for removing the steel/wooden karri shutters for stop dam without removal of puddle earth but including handling, unscrewing, oiling where ever necessary excluding cost of all materials & stacking at site. (Over all dimension of karri shutters to be considered.)	Sqm	53.00

PE-AL-PE PIPES & FITTINGS FOR HOT & COLD WATER SUPPLIES

32.25	Providing and fixing Polyethylene-Aluminum-Polyethylene (PE-AL-PE) Composite Pressure pipes Conforming to IS – 15450-2004 U.V. Stablished with carbon black having thermal stability for hot & cold water supply, capable to withstand temperature up to 80 ⁰ C including jointing & testing of joints as per direction of engineer- in-charge. (Exposed on wall)		
	1216 (16 mm OD) Pipe	RM	133.00
	1620 (20 mm OD) Pipe	RM	161.00
	2025 (25 mm OD) Pipe	RM	210.00
	2532 (32 mm OD) Pipe	RM	309.00
	3240 (40 mm OD) Pipe	RM	404.00
	4050 (50 mm OD) Pipe	RM	588.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)
32.26	Providing and fixing Polyethelene-Aluminium-Polyethelene (PE-AL-PE) Composite Pressure Pipes conforming to IS - 15450 U.V.stabilized with carbon black having thermal stability for hot & cold water supply, capable to withstand temperature up to 80°C with clamps at 1.00 meter spacing. This includes the costs of cutting chases and making good the walls, including testing of joints complete as per direction of the engineer in charge. (Concealed work including cutting chases & making good the wall etc.)		
	1216 (16 mm OD) Pipe	RM	188.00
	1620 (20 mm OD) Pipe	RM	233.00
	2025 (25 mm OD) Pipe	RM	300.00
	2532 (32 mm OD) Pipe	RM	418.00
	3240 (40 mm OD) Pipe	RM	537.00
	4050 (50 mm OD) Pipe	RM	777.00
32.27	Providing & fixing Polyethelene – Aluminium - Polyethelene (PE-AL-PE) Composite Pressure Pipes conforming to IS – 15450 - 2004 U.V. stabilized with carbon black having thermal stability for hot & cold water supply, capable to withstand temperature up to 80°C with pipe in trenches, refilling and testing of joints complete as per direction of the engineer in charge. (External work)		
	1216 (16 mm OD) Pipe	RM	123.00
	1620 (20 mm OD) Pipe	RM	157.00
	2025 (25 mm OD) Pipe	RM	195.00
	2532 (32 mm OD) Pipe	RM	283.00
	3240 (40 mm OD) Pipe	RM	365.00
	4050 (50 mm OD) Pipe	RM	536.00
32.28	Providing and fixing Polyethelene-Aluminium-Polyethelene (PE-AL-PE) Composite Pressure Pipes conforming to ASTM F - 1282 U.V. stabilized with carbon black having thermal stability for hot & cold water supply, capable to withstand temperature up to 80 degree. (Pipe in trenches excluding excavation & refilling etc.)		
	5063 (63 mm OD) Pipe	Metre	552.00
	6375 (75 mm OD) Pipe	Metre	720.00
	7590 (90 mm OD) Pipe	Metre	955.00
	90110 (110 mm OD) Pipe	Metre	998.00

S. No.	Particulars of Items	Unit	Rates (in Rs.)
32.29	Providing and fixing composite internal seal compression fitting as per ASTM F: 1282-1995 annexure for water supply e.g. tees. elbows, reducers, connectors , couplers and clamps with jointing, testing complete (including cutting and making good etc. if required).		
32.29.1	Equal Tee		
	5063	Each	1260.00
	6375	Each	1449.00
	7590	Each	1685.00
	90110	Each	1768.00
32.29.2	Reducing Tee		
	6375 x with all branches	Each	1414.00
	7590 x with all branches	Each	1994.00
32.29.4	Equal Elbow		
	5063	Each	559.00
	6375	Each	1213.00
	7590	Each	1574.00
	90110	Each	1840.00
32.29.6	Male Thread Connector		
	5063 x 63 mm thread	Each	156.00
	6375 x 75 mm thread	Each	362.00
	7590 x 90 mm thread	Each	469.00
	90110 x 110 mm thread	Each	655.00
32.29.8	Straight Couplers		
	5063	Each	573.00
	6375	Each	689.00
	7590	Each	1031.00
	90110	Each	1252.00
32.29.9	Reducers		
	7590 x with all sizes	Each	1006.00
	90110 x with all sizes	Each	1348.00

33. Carriage of Materials

1.2 By Manual Labour including loading, unloading and stacking for lead less than 0.5 KM

Data Sheet for Analysis of Rates

Code	Name	Unit	Rate
L08	Beldar	Day	173.00
L09	Coolie	Day	173.00

The following labour work for 8 hours a day will carry following material upto 1st 50 m as given below :

0114/0115 Beldars (Male/ Female) 7 .67 Nos @ Rs 173.00 1326.91 (X)

- 1 Lime, murum, earth, building rubbish etc. 35 cum
- 2 Sand, ballast and boulders 28 cum
- 3 Bricks 15000 nos
- 4 Brick Tiles, Allahabad roofing tiles (Flat or round) 24000 nos
- 5 Steam coal 30 tonnes

NOTE : 1.67 extra coolie (Female coolie) will be required for every additional lead of 50 M

0115 Coolie 1.67 Nos @	Rs	173.00	288.91 (Y)
Lead in Metres	Cost per 8 hours day	Increase in cost for every additional 50 metre or part thereof	
50 metres	(X)	(Y)	
	1326.91	288.91	

S. No	Material	Capacity per Trip	Net Qty to be paid after deduction for looseness	Unit of Rates	Over head @ 15%	Cost per 8 hours/ day	Cost per unit cost for 1st 50 metres	cost for addl. 50m or part there of beyond 1st 50 m upto 0.5 km
1	2	3	4	5	6.00	7.00	8.00	9.00
1.2.1	Lime, murum building rubbish	35 cum	35	1 cum	199.04	1525.95	43.60	8.25
1.2.2	Earth	35 cum	28	1 cum	199.04	1525.95	54.50	10.32
1.2.3	Manure or sludge	35 cum	32.2	1 cum	199.04	1525.95	47.39	8.97
1.2.4	Excavated rock	35 cum	17.5	1 cum	199.04	1525.95	87.20	16.51
1.2.5	Sand, stone aggregate below 40 mm nominal size	28 cum	28	1 cum	199.04	1525.95	54.50	10.32
1.2.6	Stone aggregate 40 mm 28 cum nominal size and above	28 cum	25.9	1 cum	199.04	1525.95	58.92	11.15
1.2.7	Soling stone	28 cum	23.8	1 cum	199.04	1525.95	64.12	12.14
1.2.8	Bricks	15000 Nos	15000	1000 Nos	199.04	1525.95	101.73	19.26
1.2.9	Brick Tiles, Allahabad roofing tiles (Flat or round)	24000 Nos	24000	1000 Nos	199.04	1525.95	63.58	12.04
1.2.10	Steam coal	30 tonne	30	1 tonne	199.04	1525.95	50.86	9.63

1.2 Carriage of material by Manual Labour including loading, unloading and stacking for lead less than 0.5 KM.

Data Sheet for Analysis of Rates

Code	Material Name	Unit	Rate
L08	Beldar	Day	173.00
L09	Coolie	Day	173.00

The following labour works for 8 hours a day and will carry following material as given below:

0114 Beldars 9.2 Nos @ 173.00 1591.6 (x)

Quantity of material as per column 3 of table below will be carried in 50 metres lead including loading and unloading

Notes: 1.35 extra Beldar will be required for every additional lead of 50 m 1.35 Beldar @ 173.00

233.55 (y)

S. No	Material	Capacity per Trip	Net Qty to be paid after deduction for looseness	Unit of Rates	Over head @ 15%	Cost per 8 hours day	Cost per unit cost for 1st 50 metres	cost for addl. 50m or part there of beynd 1st 50 m upto 0.5 km
1	2	3	4	5	6.00	7.00	8.00	9.00
1.2.11	Stone blocks, G.I., C.I., D.I. pipes below 100 mm dia and other heavy materials	46 t	46	1 tonne	238.74	1830.34	39.79	5.08
1.2.12	Cement	57.99 t	57.99	1 cum	238.74	1830.34	31.56	4.03
1.2.13	Steel	27 t	27	1 tonne	238.74	1830.34	67.79	8.65
1.2.14	Timber	42 cum	42	1 cum	238.74	1830.34	43.58	5.56
1.2.15	Tar bitumen etc	46 t	46	1 tonne	238.74	1830.34	39.79	5.08
1.2.16	S.W. pipe				238.74	1830.34		
1.2.16.1	100 mm dia	2298 m	2298	100 m	238.74	1830.34	79.65	10.16
1.2.16.2	150 mm dia	1398 m	1398	100 m	238.74	1830.34	130.93	16.71
1.2.16.3	200 mm dia	999 m	999	100 m	238.74	1830.34	183.22	23.38
1.2.16.4	230 mm dia	780 m	780	100 m	238.74	1830.34	234.66	29.94
1.2.16.5	250 mm dia	600 m	600	100 m	238.74	1830.34	305.06	38.93
1.2.16.6	300 mm dia	420 m	420	100 m	238.74	1830.34	435.80	55.61
1.2.16.7	350 mm dia	300 m	300	100 m	238.74	1830.34	610.11	77.85
1.2.16.8	400 mm dia	240 m	240	100 m	238.74	1830.34	762.64	97.31
1.2.16.9	450 mm dia	198 m	198	100 m	238.74	1830.34	924.41	117.95
1.2.16.10	500 mm dia	162 m	162	100 m	238.74	1830.34	1129.84	144.17
1.2.16.11	600 mm dia	132 m	132	100 m	238.74	1830.34	1386.62	176.93

1.2.17	R.C.C. pipes, steel cylinder, R.C. pipes, BWSC, PSC, PCCP, C.I., D.I. pipes, and unrein-forced cement pipes				238.74	1830.34		
1.2.17.1	100 mm dia	1702 m	1702	100 m	238.74	1830.34	107.54	13.72
1.2.17.2	125 mm dia	1391 m	1391	100 m	238.74	1830.34	131.58	16.79
1.2.17.3	150 mm dia	1208 m	1208	100 m	238.74	1830.34	151.52	19.33
1.2.17.4	200 mm dia	805 m	805	100 m	238.74	1830.34	227.37	29.01
1.2.17.5	250 mm dia	458 m	458	100 m	238.74	1830.34	399.64	50.99
1.2.17.6	300 mm dia	366 m	366	100 m	238.74	1830.34	500.09	63.81
1.2.17.7	350 mm dia	256 m	256	100 m	238.74	1830.34	714.98	91.23
1.2.17.8	400 mm dia	220 m	220	100 m	238.74	1830.34	831.97	106.16
1.2.17.9	450 mm dia & 500 mm dia	165 m	165	100 m	238.74	1830.34	1109.30	141.55
1.2.17.10	600, 700, 750 & 800 mm dia	150 m	150	100 m	238.74	1830.34	1220.23	155.70
1.2.18	Asbestos cement pipes				238.74	1830.34		
1.2.18.1	50 mm dia	10064 m	10064	100 m	238.74	1830.34	18.19	2.32
1.2.18.2	80 mm dia	3660 m	3660	100 m	238.74	1830.34	50.01	6.38
1.2.18.3	100 mm dia	2562 m	2562	100 m	238.74	1830.34	71.44	9.12
1.2.18.4	150 mm dia	1830 m	1830	100 m	238.74	1830.34	100.02	12.76

1.0 Carriage of Materials
1.1 By Mechanical Transport

341.80 42.72 6.41 49.13

S.No	Material	capacity per Trip	Net Qty Payable after dedu- ction for loose- ness	Unit of rates	C.P. & Over heads @ 15%	Cost per Trip per unit					Beyond 5 km upto 10 km per km	Beyond 10 km upto 20 km per km	Beyond 20 km per addl. km	Remarks
						1km	2km	3km	4km	5km	As per Col. 14 of Data Sheet			
						Cost per Trip as per Col. 12 of Data sheet					As per Col. 14 of Data Sheet			
						Net Qty Payable					A	B	C	
1	2	3	4	5	6	7.00	8	9	10	11	Net Qty Payable			15
											12	13	14	
1.1.1	Lime, murum, building, rubbish	8	8	cum	51.27	49.13	57.06	64.88	72.45	79.80	6.79	5.83	5.06	3.53
1.1.2	Earth	8	6.4	cum	59.54	61.42	71.33	81.10	90.56	99.75	8.49	7.29	6.33	3.53
1.1.3	Manure or sludge	8	7.36	cum	67.70	53.41	62.02	70.52	78.75	86.74	7.38	6.34	5.50	3.53
1.1.4	Excavated rock	8	4	cum	75.60	98.27	114.12	129.75	144.90	159.60	13.59	11.66	10.12	3.53
1.1.5	Sand, stone aggregate below 40 mm nominal size	8	8	cum	83.27	49.13	57.06	64.88	72.45	79.80	6.79	5.83	5.06	3.53
1.1.6	Stone aggregate 40 mm nominal size and above	8	7.36	cum		53.41	62.02	70.52	78.75	86.74	7.38	6.34	5.50	3.53
1.1.7	Soling stone	8	6.8	cum		57.80	67.13	76.33	85.24	93.88	7.99	6.86	5.95	3.53
1.1.8	Bricks	3000	3000	1000		131.02	152.16	173.00	193.20	212.80	18.12	15.54	13.49	9.13
1.1.9	Brick Tiles	5000	5000	1000		78.61	91.30	103.80	115.92	127.68	10.87	9.33	8.10	5.48
1.1.10	Cement, stone blocks, G.I., C.I., D.I., A.C., & C.C., pipes below 100 mm dia and other heavy materials	9	9	tonne		43.67	50.72	57.67	64.40	70.93	6.04	5.18	4.50	3.14
1.1.11	Steel	9	9	tonne		43.67	50.72	57.67	64.40	70.93	6.04	5.18	4.50	3.14
1.1.12	Timber	7	7	cum		56.15	65.21	74.14	82.80	91.20	7.76	6.66	5.78	4.04
1.1.13	Tar bitumen	8	8	tonne		49.13	57.06	64.88	72.45	79.80	6.79	5.83	5.06	3.53
1.1.14	Solvent	80	80	qtl		4.91	5.71	6.49	7.25	7.98	0.68	0.58	0.51	0.35
1.1.15	Steam coal	7	7	tonne		56.15	65.21	74.14	82.80	91.20	7.76	6.66	5.78	4.04
1.1.16	S.W. pipe										0.00	0.00	0.00	
1.1.16.1	100 mm dia	600	600	100 m		65.51	76.08	86.50	96.60	106.40	9.06	7.77	6.75	4.71
1.1.16.2	150 mm dia	300	300	100 m		131.02	152.16	173.00	193.20	212.80	18.12	15.54	13.49	9.42
1.1.16.3	200 mm dia	180	180	100 m		218.37	253.60	288.34	322.00	354.67	30.19	25.90	22.49	15.70
1.1.16.4	230 mm dia	126	126	100 m		311.96	362.29	411.92	460.00	506.67	43.13	37.01	32.13	22.42
1.1.16.5	250 mm dia	105	105	100 m		374.35	434.75	494.30	552.00	608.01	51.76	44.41	38.56	26.91
1.1.16.6	300 mm dia	84	84	100 m		467.94	543.43	617.87	690.00	760.01	64.70	55.51	48.20	33.63
1.1.16.7	350 mm dia	60	60	100 m		655.11	760.81	865.02	966.01	1064.02	90.58	77.71	67.47	47.09
1.1.16.8	400 mm dia	42	42	100 m		935.87	1086.87	1235.75	1380.01	1520.02	129.39	14.48	96.39	67.26
1.1.16.9	450 mm dia	33	33	100 m		1191.11	1383.28	1572.77	1756.38	1934.58	164.68	141.29	122.68	85.61
1.1.16.10	500 mm dia	30	30	100 m		1310.22	1521.61	1730.05	1932.01	2128.03	181.15	155.42	134.95	94.17
1.1.16.11	600 mm dia	24	24	100 m		1637.77	1902.02	2162.56	2415.02	2660.04	226.44	194.28	168.69	117.71
1.1.17	R.C.C. pipes, A.C. pipes, steel cylinder, R.C. pipes, BWSC, PSC, PCCP, C.I. pipes, D.I. pipes and unreinforced cement pipes					0.00					0.00	0.00	0.00	
1.1.17.1	100 mm dia	366	366	100 m		107.39	124.72	141.81	158.36	174.43	14.85	12.74	11.06	7.72

1.1.17.2	125 mm dia	274	274	100 m		143.45	166.60	189.42	211.53	233.00	19.83	17.02	14.78	10.31
1.1.17.3	150 mm dia	219.6	219.6	100 m		178.99	207.87	236.35	263.94	290.71	24.82	21.29	18.49	12.86
1.1.17.4	200 mm dia	135	135	100 m		291.16	338.14	384.46	429.34	472.90	40.26	34.54	29.99	20.93
1.1.17.5	250 mm dia	95	95	100 m		413.75	480.51	546.33	610.11	672.01	57.21	49.08	42.62	29.74
1.1.17.6	300 mm dia	76.86	76.86	100 m		511.40	593.92	675.27	754.10	830.61	70.71	60.66	52.67	36.76
1.1.17.7	350 mm dia	54.9	54.9	100 m		715.97	831.48	945.38	1055.75	1162.86	98.99	84.93	73.74	51.46
1.1.17.8	400 mm dia	40.26	40.26	100 m		976.32	1133.84	1289.16	1439.65	1585.72	134.99	115.81	100.56	70.17
1.1.17.9	450 mm & 500 mm dia	32.94	32.94	100 m		1193.28	1385.80	1575.64	1759.58	1938.10	164.98	141.55	122.91	85.77
1.1.17.10	600, 700, 750 & 800 mm	21.96	21.96	100 m		1789.92	2078.71	2363.45	2639.36	2907.15	247.48	212.33	184.36	128.65
1.1.17.11	900 mm dia	14.64	14.64	100 m		2684.87	3118.06	3545.18	3959.05	4360.72	371.21	318.49	276.54	192.97
1.1.17.12	1000, 1100 & 1200 mm	10.98	10.98	100 m		3579.83	4157.41	4726.91	5278.73	5814.30	494.95	424.65	368.72	257.30
1.1.17.13	1400 to 1800 mm	8.78	8.78	100 m		4476.83	5199.13	5911.33	7245.05	7980.12	679.32	582.84	506.06	321.77

33. Carriage of Materials
Data Sheet No 1 for Analysis of Rates

1.1 By Mechanical Transport including loading, unloading and stacking:

Lead in km	Average speed	Nos of Trips N=8/(2L/S)+1	Nos of km Done in one Day (2NL+6)	Litres of Diesel consumed @ 5 km per Litre	Code	Material Name	Unit	Rate	Hire charges of truck (0005) @ Rs per Day	Total Cost= 6+8+9+10	Cost per Trip = col. 11/ col. 3	Increase in cost per km over previous km	Average cost per additional km after first 5,10 and 20 km
					W0086	High Speed Diesel	Litre	51.90					
					W0085	Mobil Oil	Litre	226.00					
					0027	Hire Charges of truck	Day	1150.00					
					L08	Beldar	Day	173.00					
					L09	Coolie	Day	173.00					
					Cost of Diesel (1235) @ Rs per Litre	Litres of Mobil oil consumed @ 140 km per Litre	Cost of Mobil oil (5001) @ Rs per Litre	Cost of 6 Beldars (0114) @ Rs per Day					
1	2	3	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
1 Km	16.00 Km	7.11	20.22	4.04	209.91	0.14	32.64	1038.00	1150.00	2430.55	341.80		
2 Km	17.00 Km	6.48	31.90	6.38	331.17	0.23	51.50	1038.00	1150.00	2570.67	396.94		
3 Km	17.50 Km	5.96	41.74	8.35	433.31	0.30	67.39	1038.00	1150.00	2688.70	451.32		53.34
4 Km	18.00 Km	5.54	50.31	10.06	522.19	0.36	81.21	1038.00	1150.00	2791.40	504.00		
5 Km	18.50 Km	5.19	57.93	11.59	601.31	0.41	93.52	1038.00	1150.00	2882.83	555.14		
6 Km	19.00 Km	4.90	64.84	12.97	673.03	0.46	104.67	1038.00	1150.00	2965.69	604.85	49.71	
7 Km	19.50 Km	4.66	71.19	14.24	738.99	0.51	114.93	1038.00	1150.00	3041.92	653.23	48.39	
8 Km	20.00 Km	4.44	77.11	15.42	800.41	0.55	124.48	1038.00	1150.00	3112.89	700.40	47.17	47.26
9 Km	20.50 Km	4.26	82.68	16.54	858.17	0.59	133.46	1038.00	1150.00	3179.63	746.44	46.04	
10Km	21.00 Km	4.10	87.95	17.59	912.93	0.63	141.98	1038.00	1150.00	3242.91	791.42	44.99	
11Km	21.50 Km	3.95	92.99	18.60	965.22	0.66	150.11	1038.00	1150.00	3303.33	835.44	44.01	
12Km	22.00 Km	3.83	97.83	19.57	1015.43	0.70	157.92	1038.00	1150.00	3361.35	878.54	43.10	
13Km	22.50 Km	3.71	102.49	20.50	1063.90	0.73	165.46	1038.00	1150.00	3417.35	920.79	42.25	
14Km	23.00 Km	3.61	107.02	21.40	1110.86	0.76	172.76	1038.00	1150.00	3471.62	962.24	41.46	
15Km	23.50 Km	3.51	111.42	22.28	1156.55	0.80	179.86	1038.00	1150.00	3524.41	1002.96	40.71	
16Km	24.00 Km	3.43	115.71	23.14	1201.11	0.83	186.80	1038.00	1150.00	3575.91	1042.97	40.02	
17Km	24.50 Km	3.35	119.91	23.98	1244.71	0.86	193.58	1038.00	1150.00	3626.29	1082.34	39.36	40.55
18Km	25.00 Km	3.28	124.03	24.81	1287.46	0.89	200.22	1038.00	1150.00	3675.68	1121.08	38.75	
19Km	25.50 Km	3.21	128.08	25.62	1329.46	0.91	206.76	1038.00	1150.00	3724.21	1159.25	38.17	
20Km	26.00 Km	3.15	132.06	26.41	1370.79	0.94	213.18	1038.00	1150.00	3771.97	1196.88	37.62	
21 km	26.5 Km	3.09	135.99	27.20	1411.53	0.97	219.52	1038.00	1150.00	3819.05	1233.98	37.11	

22 Km	27.00 Km	3.04	139.86	27.97	1451.74	1.00	225.77	1038.00	1150.00	3865.51	1270.61	36.62
23 Km	27.50 Km	2.99	143.69	28.74	1491.47	1.03	231.95	1038.00	1150.00	3911.42	1306.77	36.16
24 Km	28.00 Km	2.95	147.47	29.49	1530.78	1.05	238.06	1038.00	1150.00	3956.84	1342.50	35.73
25 Km	28.50 Km	2.90	151.22	30.24	1569.69	1.08	244.12	1038.00	1150.00	4001.81	1377.82	35.32
26 km	29.00 Km	2.86	154.94	30.99	1608.26	1.11	250.11	1038.00	1150.00	4046.37	1412.74	34.93
27 km	29.50 Km	2.83	158.62	31.72	1646.50	1.13	256.06	1038.00	1150.00	4090.57	1447.30	34.56
28 Km	30.00 Km	2.79	162.28	32.46	1684.46	1.16	261.96	1038.00	1150.00	4134.42	1481.50	34.20
29 Km	30.50 Km	2.76	165.91	33.18	1722.14	1.19	267.83	1038.00	1150.00	4177.97	1515.37	33.87
30 Km	31.00 Km	2.73	169.52	33.90	1759.58	1.21	273.65	1038.00	1150.00	4221.23	1548.92	33.55
		2.70	173.10	34.62	1796.79	1.24	279.44	1038.00	1150.00	4264.23	1582.16	33.25
		2.67	176.67	35.33	1833.80	1.26	285.19	1038.00	1150.00	4306.99	1615.12	32.96
		2.64	180.21	36.04	1870.61	1.29	290.92	1038.00	1150.00	4349.53	1647.80	32.68
		2.61	183.74	36.75	1907.25	1.31	296.61	1038.00	1150.00	4391.86	1680.22	32.42
		2.59	187.26	37.45	1943.72	1.34	302.28	1038.00	1150.00	4434.00	1712.39	32.17
		2.57	190.75	38.15	1980.03	1.36	307.93	1038.00	1150.00	4475.97	1744.31	31.93
		2.54	194.24	38.85	2016.21	1.39	313.56	1038.00	1150.00	4517.77	1776.01	31.70
		2.52	197.71	39.54	2052.25	1.41	319.16	1038.00	1150.00	4559.41	1807.48	31.48
		2.50	201.17	40.23	2088.16	1.44	324.75	1038.00	1150.00	4600.91	1838.74	31.26
		2.48	204.62	40.92	2123.96	1.46	330.32	1038.00	1150.00	4642.28	1869.81	31.06
		2.46	208.06	41.61	2159.65	1.49	335.87	1038.00	1150.00	4683.52	1900.68	30.87
		2.45	211.49	42.30	2195.24	1.51	341.40	1038.00	1150.00	4724.64	1931.36	30.68
		2.43	214.91	42.98	2230.73	1.54	346.92	1038.00	1150.00	4765.65	1961.86	30.50
		2.41	218.32	43.66	2266.14	1.56	352.43	1038.00	1150.00	4806.56	1992.19	30.33
		2.40	221.72	44.34	2301.45	1.58	357.92	1038.00	1150.00	4847.37	2022.36	30.17
		2.38	225.11	45.02	2336.69	1.61	363.40	1038.00	1150.00	4888.09	2052.37	30.01
		2.37	228.50	45.70	2371.85	1.63	368.87	1038.00	1150.00	4928.72	2082.23	29.86
		2.35	231.88	46.38	2406.94	1.66	374.32	1038.00	1150.00	4969.26	2111.94	29.71
		2.34	235.26	47.05	2441.96	1.68	379.77	1038.00	1150.00	5009.73	2141.51	29.57
		2.33	238.62	47.72	2476.92	1.70	385.21	1038.00	1150.00	5050.13	2170.94	29.43
		2.31	241.99	48.40	2511.82	1.73	390.63	1038.00	1150.00	5090.45	2200.24	29.30
		2.30	245.34	49.07	2546.65	1.75	396.05	1038.00	1150.00	5130.71	2229.41	29.17
		2.29	248.69	49.74	2581.44	1.78	401.46	1038.00	1150.00	5170.90	2258.47	29.05
		2.28	252.04	50.41	2616.17	1.80	406.86	1038.00	1150.00	5211.04	2287.40	28.94
		2.27	255.38	51.08	2650.86	1.82	412.26	1038.00	1150.00	5251.11	2316.22	28.82
		2.26	258.72	51.74	2685.49	1.85	417.64	1038.00	1150.00	5291.14	2344.94	28.71
		2.25	262.05	52.41	2720.08	1.87	423.02	1038.00	1150.00	5331.11	2373.54	28.61

35.20

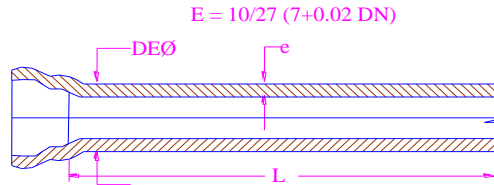
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2.21	275.34	55.07	2858.04	1.97	444.48	1038.00	1150.00	5490.52	2486.97	28.21
2.20	278.65	55.73	2892.44	1.99	449.83	1038.00	1150.00	5530.27	2515.09	28.12
2.19	281.97	56.39	2926.80	2.01	455.17	1038.00	1150.00	5569.97	2543.13	28.04
2.18	285.27	57.05	2961.13	2.04	460.51	1038.00	1150.00	5609.64	2571.09	27.95
2.17	288.58	57.72	2995.43	2.06	465.85	1038.00	1150.00	5649.28	2598.96	27.87
2.17	291.88	58.38	3029.70	2.08	471.18	1038.00	1150.00	5688.87	2626.75	27.79
2.16	295.18	59.04	3063.94	2.11	476.50	1038.00	1150.00	5728.44	2654.47	27.72
2.15	298.47	59.69	3098.15	2.13	481.82	1038.00	1150.00	5767.97	2682.11	27.64
2.14	301.77	60.35	3132.34	2.16	487.14	1038.00	1150.00	5807.47	2709.68	27.57
2.14	305.06	61.01	3166.50	2.18	492.45	1038.00	1150.00	5846.95	2737.17	27.50
2.13	308.35	61.67	3200.63	2.20	497.76	1038.00	1150.00	5886.39	2764.60	27.43
2.12	311.63	62.33	3234.75	2.23	503.06	1038.00	1150.00	5925.81	2791.97	27.36
2.12	314.92	62.98	3268.84	2.25	508.37	1038.00	1150.00	5965.20	2819.27	27.30
2.11	318.20	63.64	3302.91	2.27	513.66	1038.00	1150.00	6004.57	2846.51	27.24
2.10	321.48	64.30	3336.95	2.30	518.96	1038.00	1150.00	6043.91	2873.68	27.18
2.10	324.76	64.95	3370.98	2.32	524.25	1038.00	1150.00	6083.23	2900.80	27.12
2.09	328.03	65.61	3404.99	2.34	529.54	1038.00	1150.00	6122.53	2927.86	27.06
2.09	331.31	66.26	3438.98	2.37	534.83	1038.00	1150.00	6161.80	2954.86	27.00
2.08	334.58	66.92	3472.95	2.39	540.11	1038.00	1150.00	6201.06	2981.81	26.95
2.07	337.85	67.57	3506.90	2.41	545.39	1038.00	1150.00	6240.29	3008.71	26.90
2.07	341.12	68.22	3540.84	2.44	550.67	1038.00	1150.00	6279.51	3035.56	26.85
2.06	344.39	68.88	3574.76	2.46	555.94	1038.00	1150.00	6318.70	3062.35	26.80
2.06	347.66	69.53	3608.66	2.48	561.22	1038.00	1150.00	6357.88	3089.10	26.75
2.05	350.92	70.18	3642.55	2.51	566.49	1038.00	1150.00	6397.04	3115.80	26.70
2.05	354.18	70.84	3676.43	2.53	571.75	1038.00	1150.00	6436.18	3142.45	26.65
2.04	357.45	71.49	3710.29	2.55	577.02	1038.00	1150.00	6475.31	3169.06	26.61
2.04	360.71	72.14	3744.13	2.58	582.28	1038.00	1150.00	6514.42	3195.62	26.56
2.03	363.97	72.79	3777.97	2.60	587.55	1038.00	1150.00	6553.51	3222.14	26.52
2.03	367.22	73.44	3811.79	2.62	592.80	1038.00	1150.00	6592.59	3248.62	26.48
2.02	370.48	74.10	3845.60	2.65	598.06	1038.00	1150.00	6631.66	3275.06	26.44
2.02	373.74	74.75	3879.39	2.67	603.32	1038.00	1150.00	6670.71	3301.46	26.40
2.02	376.99	75.40	3913.18	2.69	608.57	1038.00	1150.00	6709.75	3327.82	26.36
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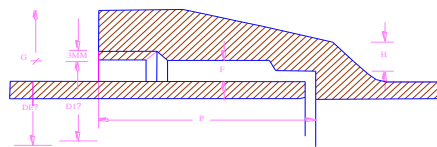
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2.00	390.00	78.00	4048.20	2.79	629.57	1038.00	1150.00	6865.77	3432.89	26.21
2.00	393.25	78.65	4081.93	2.81	634.82	1038.00	1150.00	6904.75	3459.06	26.18
1.99	396.50	79.30	4115.65	2.83	640.06	1038.00	1150.00	6943.71	3485.21	26.14
1.99	399.75	79.95	4149.36	2.86	645.30	1038.00	1150.00	6982.66	3511.32	26.11
1.98	402.99	80.60	4183.06	2.88	650.55	1038.00	1150.00	7021.61	3537.40	26.08

Drawings for Water Supply & Sewerage.

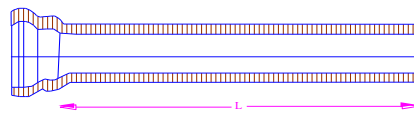
Pipes



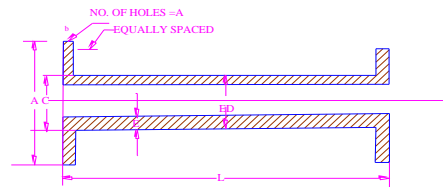
CANTRIFUGALLY CAST SOCKET & SPIGOT PIPE



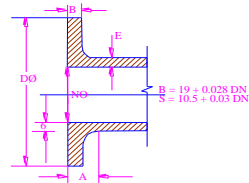
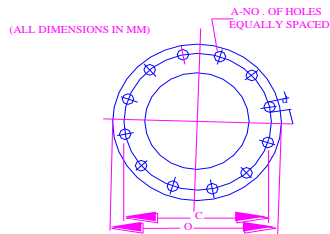
Dimensions of socket and spigot pipes (IS - 1536)



SOCKET & SPIGOT VERTICAL CAST PIPE



Flanged pipes - Vertically Cast

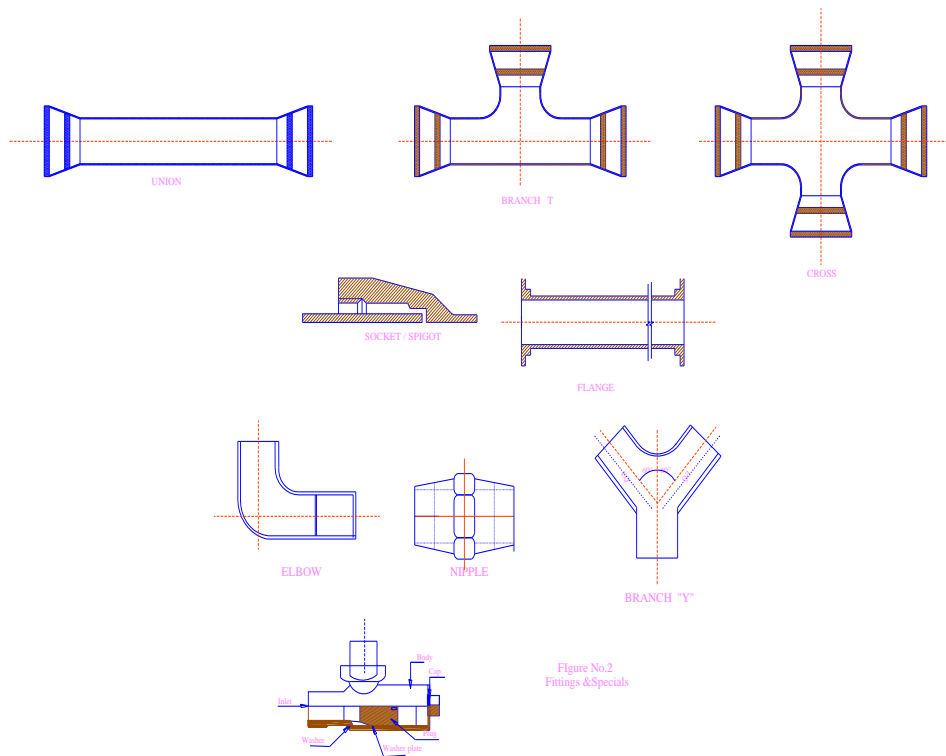


Dim of Flanges & fittings

Standard Flange Drilling of Flanged pipes

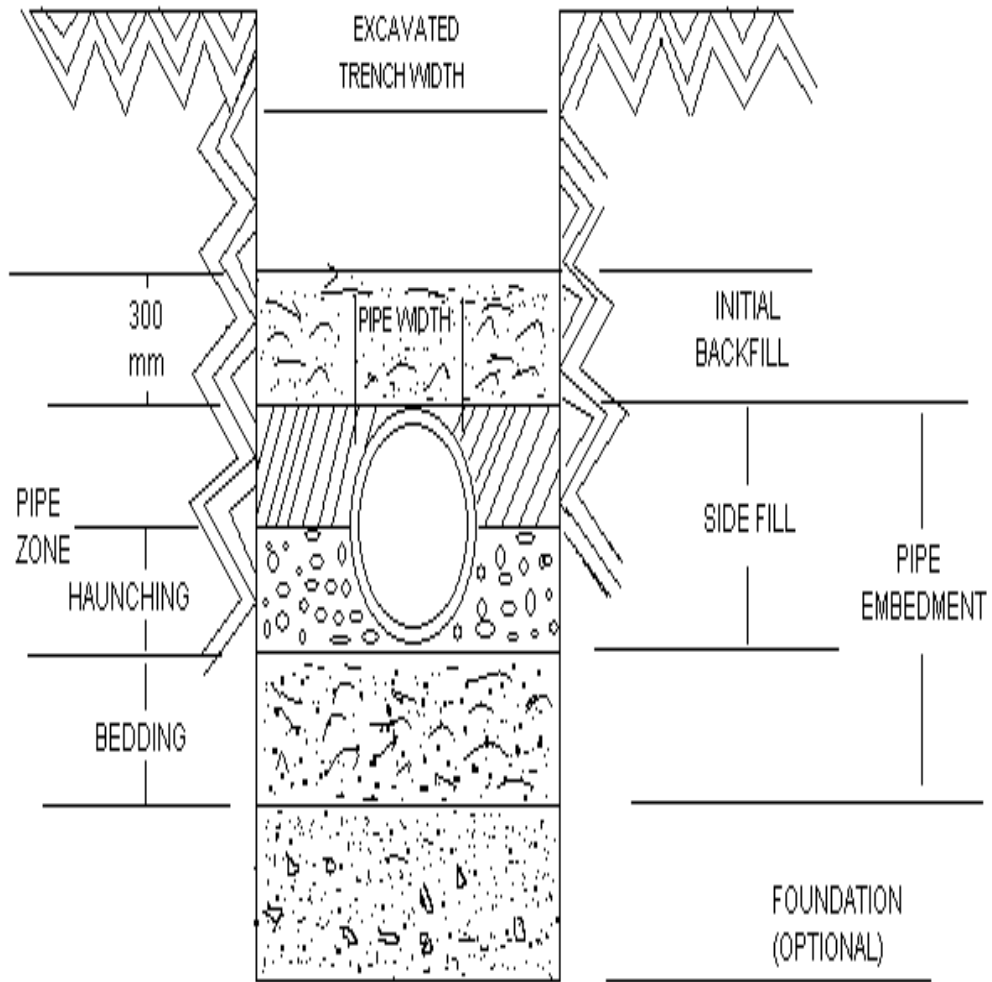
Drawing No.-1

Fitting & Specials



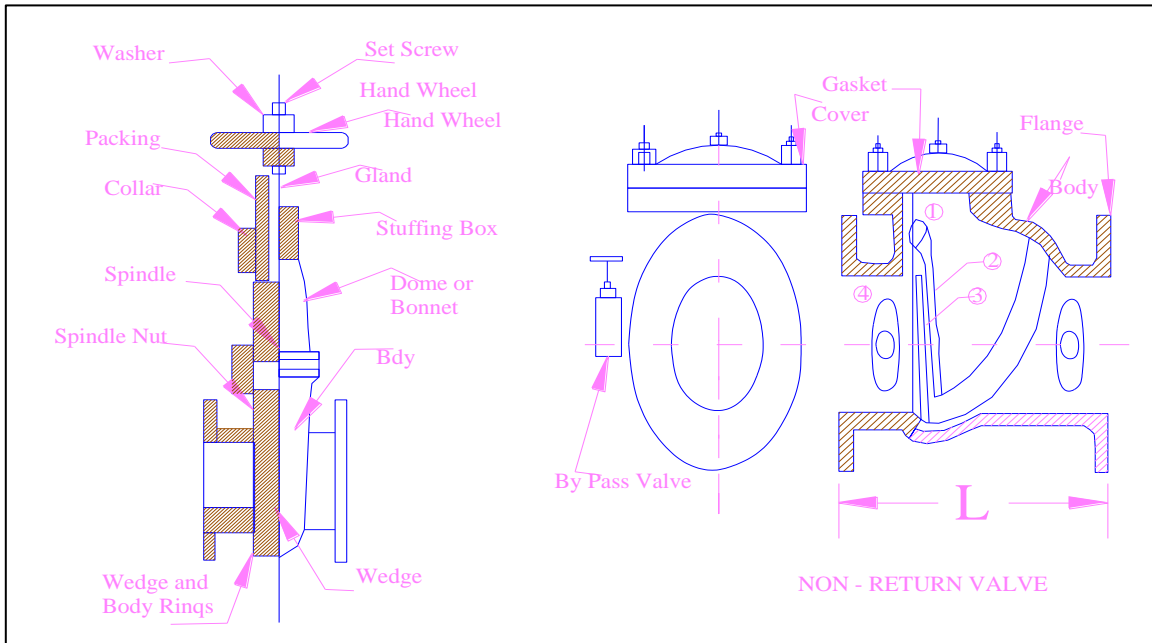
Drawing No.-2

Terminology of Trench Cross-Sections for UPVC & PVC - U Pipes



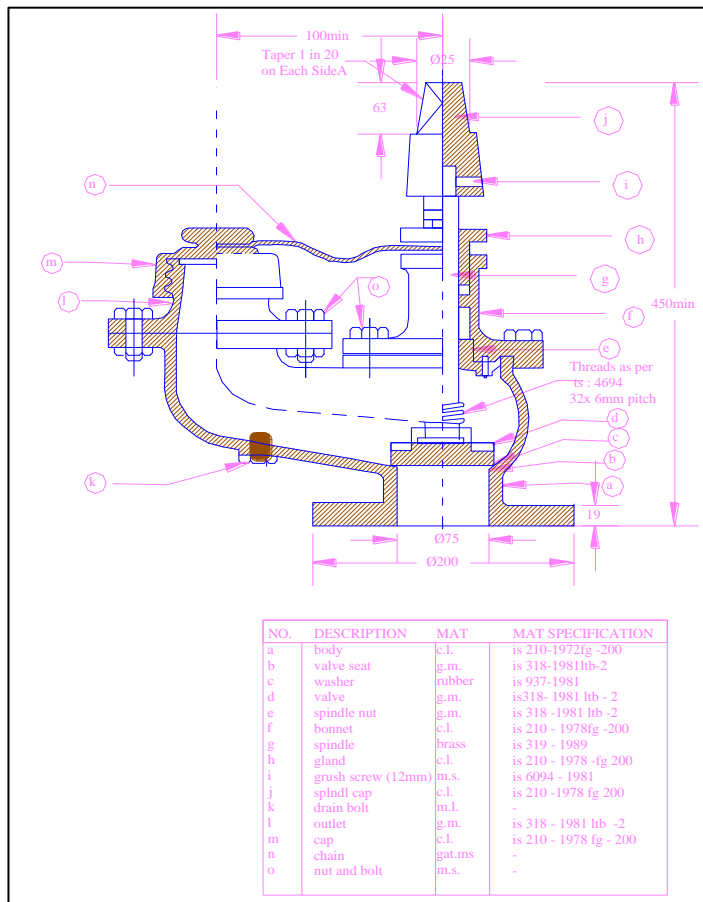
Drawing No. 3

Sluice Valve & Non Return Valve



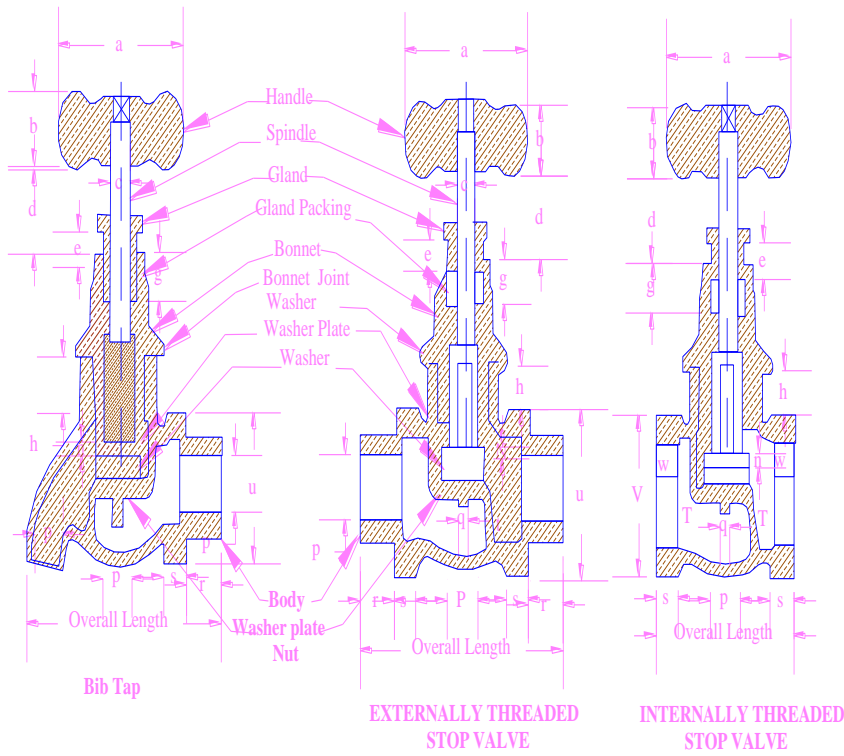
Drawing No. 4

Sluice Valve Gate, Under Ground Fire Hydrant



Drawing No. 5

Stop Valves & Bib Taps



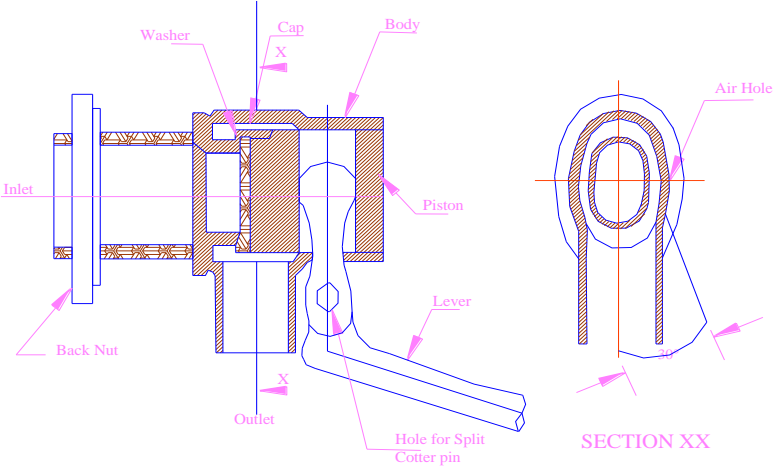
ALL DIMENSIONS IN MILLIMETRES

Nominal sizes	Dimensions																				Lift of washer plate x (with Washer in position min.)	
	a	b	c	d	e	f	g	h	i	k	l	m	n	p	q	r	s	t	u	v		w
8	47.8	13.3	7.8	16.5	6.3	2.0	7.9	7.0	3.8	10.0	m20x1.5	14.3	2.8	6.5	2.4	11.0	4.7	1.6	15.2	19.5	7	3.5
10	54.0	14.0	9.4	18.7	7.5	2.0	9.5	9.5	4.7	11.5	m20x1.5	15.9	3.2	9.0	3.2	11.4	7.9	2.0	20.8	23.3	7	4
15	54.0	14.0	9.4	19.0	7.5	2.0	9.5	11.0	5.6	11.5	m24x1.5	19.0	3.2	13.0	4.1	15.0	9.5	2.0	25.6	28.3	9	4.6
20	60.4	15.7	10.9	20.1	8.9	2.5	11.1	12.5	6.4	13.5	m30x1.5	25.4	4.0	18.0	4.9	16.3	10.3	2.0	30.5	33.0	10.5	6
25	66.8	18.0	12.5	23.0	10.1	2.5	12.7	13.0	7.1	17.0	m39x1.5	33.3	4.0	23.0	4.9	19.1	11.0	2.8	37.6	42.4	11.5	7
32	74.6	20.5	14.1	30.9	11.4	2.5	14.3	16.0	7.8	19.0	m48x1.5	40.1	4.3	30	5.9	21.4	12.7	3.2	47.2	52.1	13.5	9.5
40	82.5	22.0	15.7	33.3	12.7	2.5	15.9	17.5	8.6	20.5	m56x1.5	47.7	5.5	36	6.6	21.4	14.3	3.2	56.4	58.5	13.5	11
50	95.0	25.3	17.3	35.9	14.0	2.5	17.4	17.5	12.5	26.0	m72x1.5	63.5	6.3	46	8.3	25.1	15.9	4.0	70.1	71.5	16.5	14.5

X means :Lift of washer plate
(with Washer in position min.)

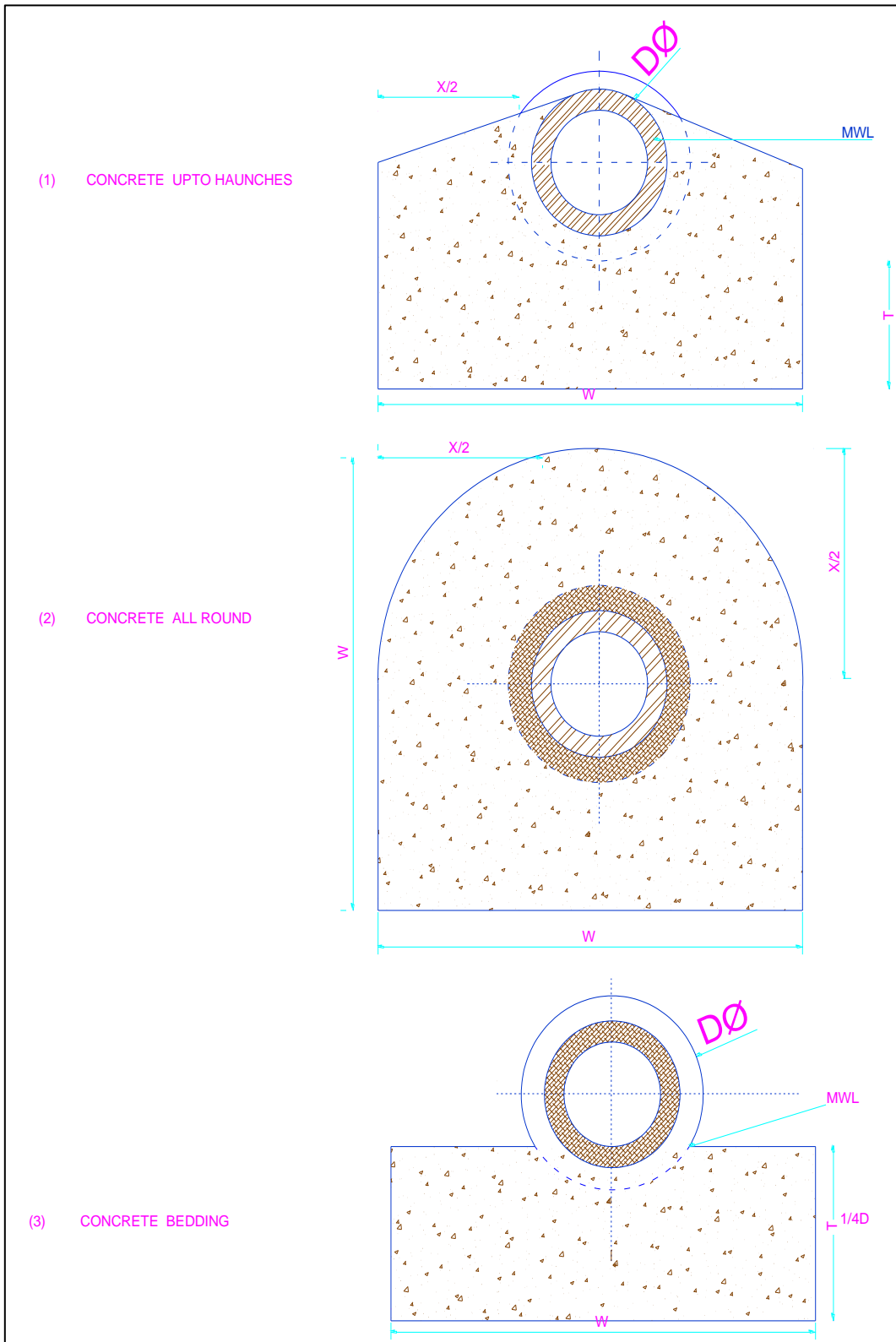
Drawing No. 6

Bal valves



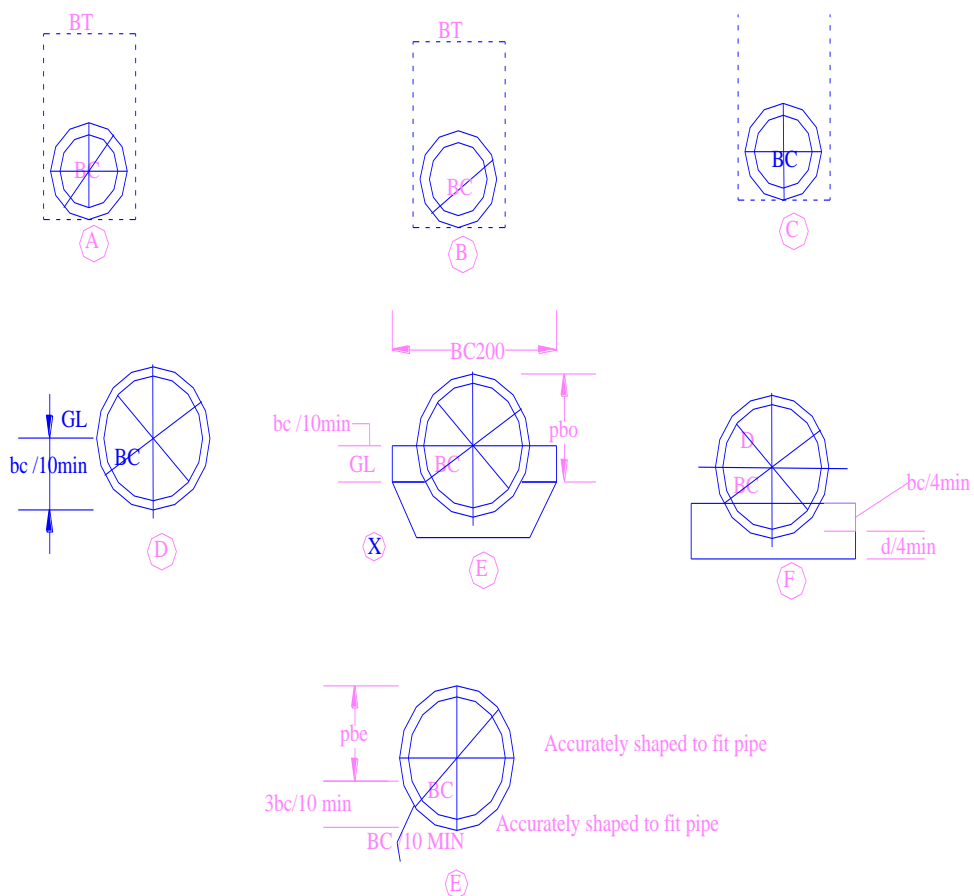
Drawing No. 7

Bedding/Encasing Stoneware Pipes



Drawing No. 8

Bedding of Pipes

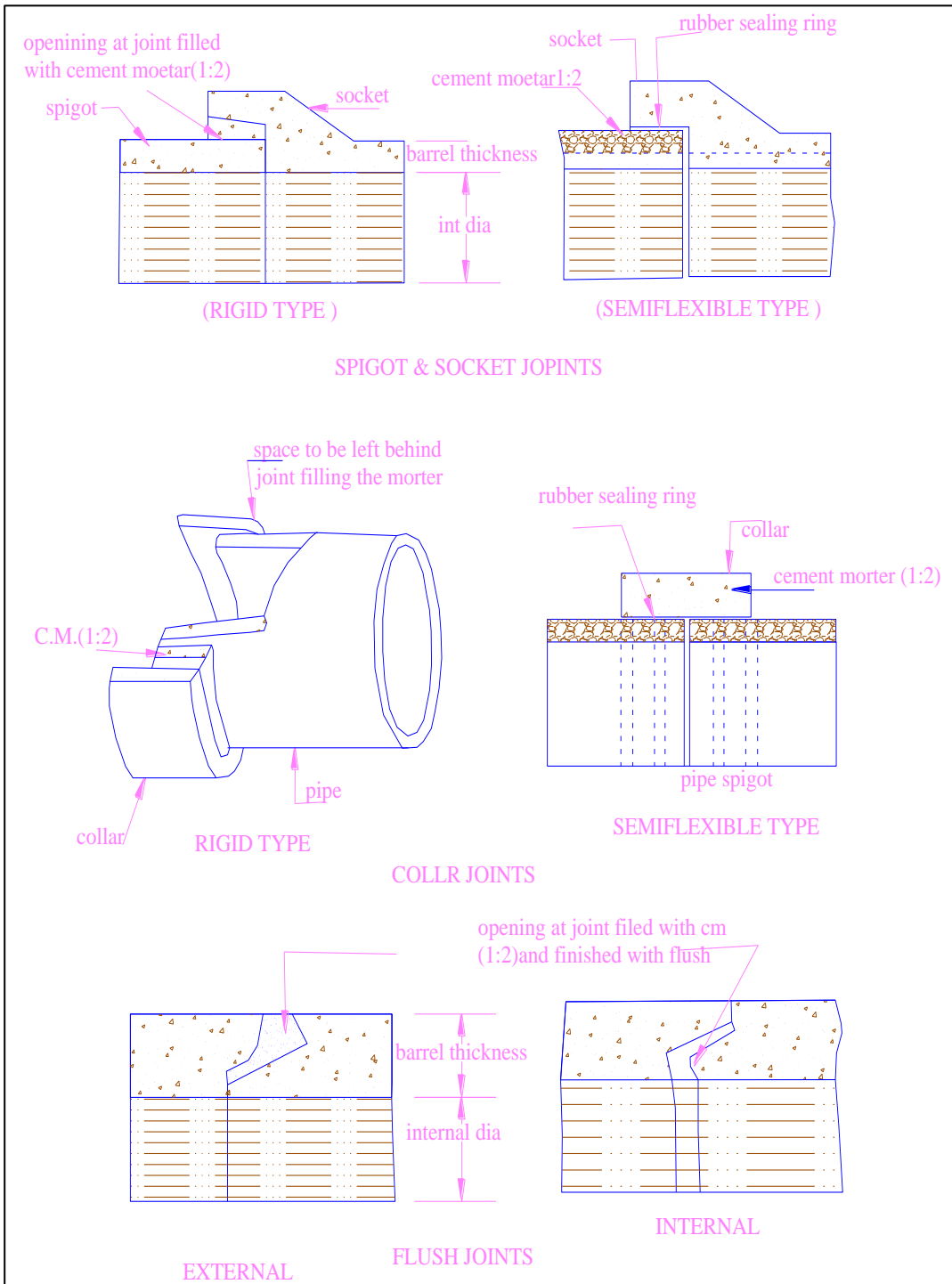


- d = internal diameter
- bc = horizontal breadth outside of the pipes in metres
(i.e. external diameter in case of a circular pipe)
- bt = horizontal width of trench immediately below
the top of the pipe in metres
- h = height of fill above top of pipe in metres
- x = min 200 for 'h' < 5000, 10 for every 250 of 'h'

FIG	BEDDING	LOAD FACTOR
A	ORDINARY	1.5
B	---DO---	---
C	FIRST CLASS	1.9
D	---DO---	---
E	---DO---	---
C	ONCRETE CRADDLE	2.25 TO 3.4
G	---DO---	---

Drawing No. 9

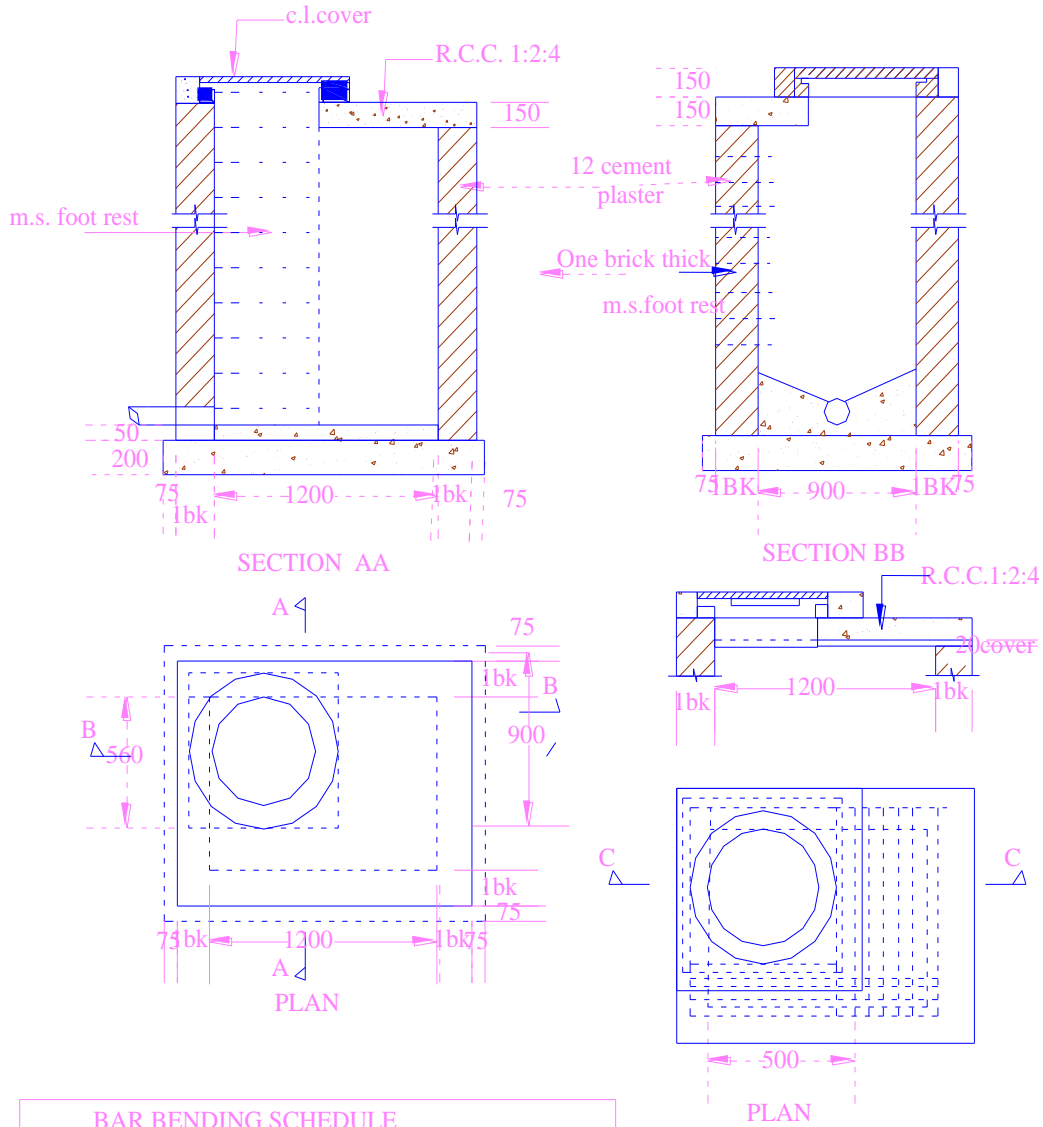
Joints of Concrete Pipes



Drawing No. 10

Size 1200x900 mm Heavy Duty Cover

SIZE 1200X 900 HEAVY DUTY COVER

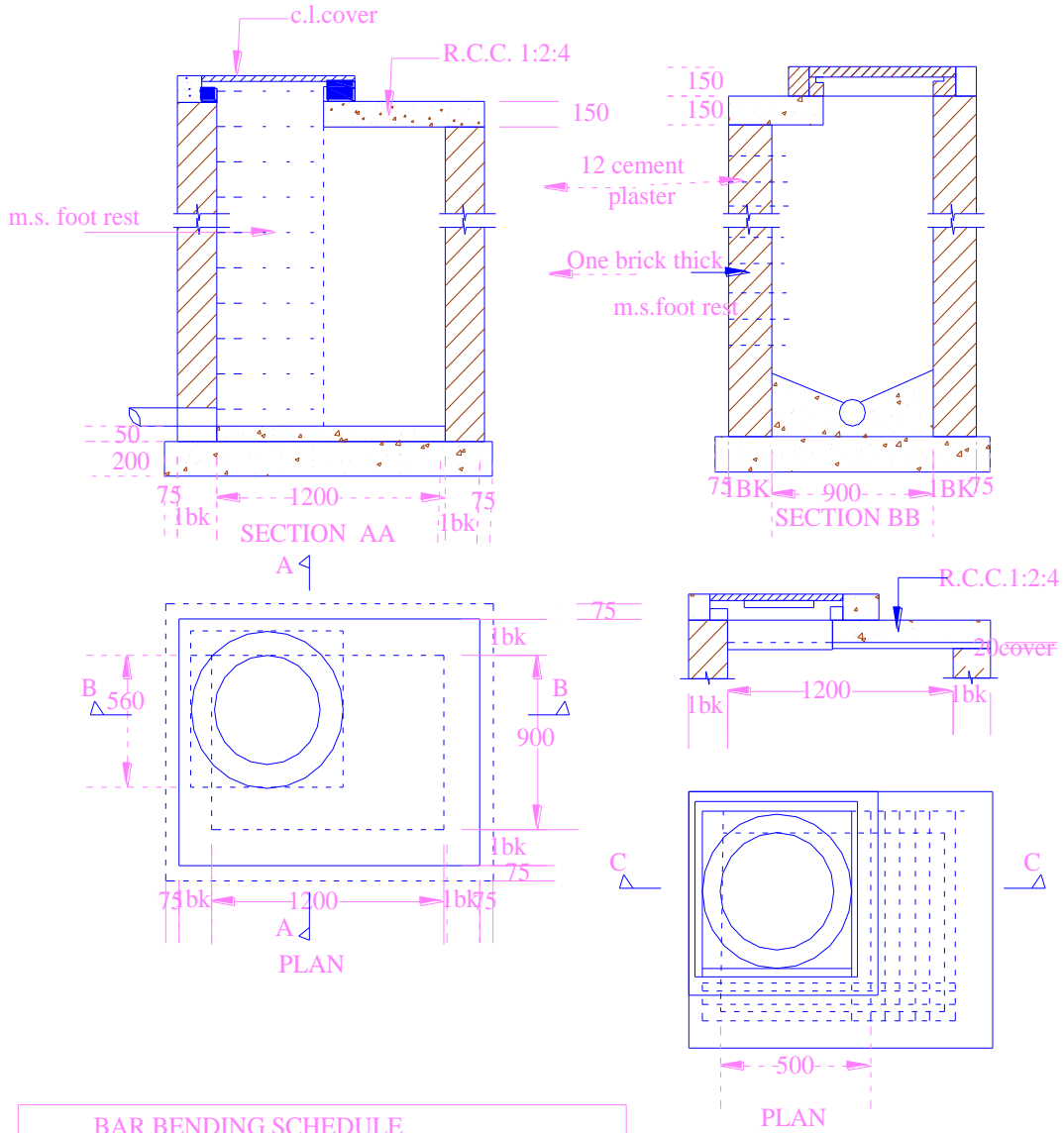


BAR BENDING SCHEDULE				
Mark	diamm	no	length	Bending
a	12	4	1200	100—100 1000
b	12	4	1300	100—100 1100
c	12	1	580	100—100 380
d	12	1	625	100—100 425

Drawing No. 11

Size 1200x900 mm with Medium Duty Cover

SIZE OF 1200X 900 WITH MEDIUM DUTY COVER



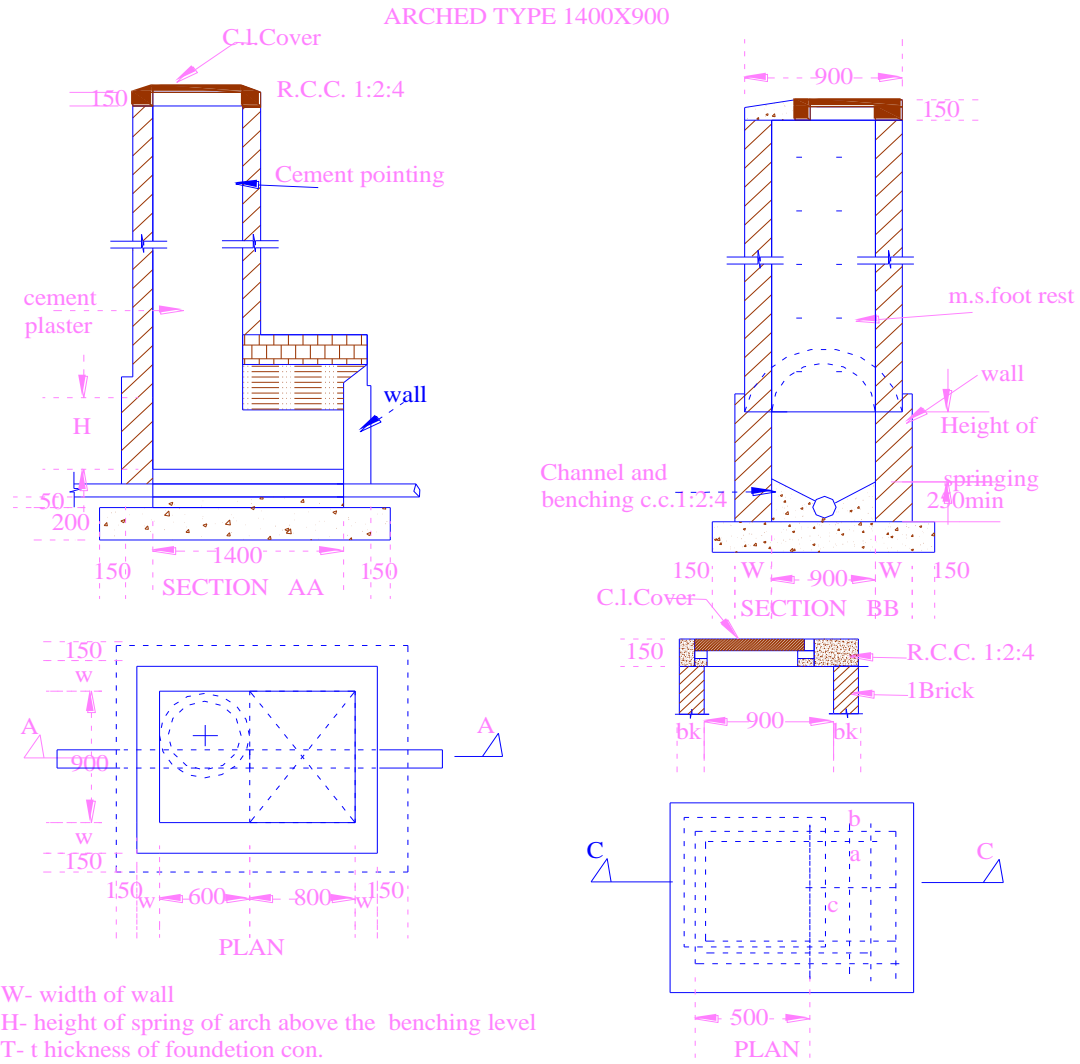
BAR BENDING SCHEDULE				
Mark	diamm	no	length	Bending
a	12	4	1200	100—100 1000
b	12	4	1300	100—100 1100
c	12	1	580	100—100 380
d	12	1	625	100—100 425

Drawing No. 12

Size 9000x800 mm Light Duty Cover

Drawing No. 13

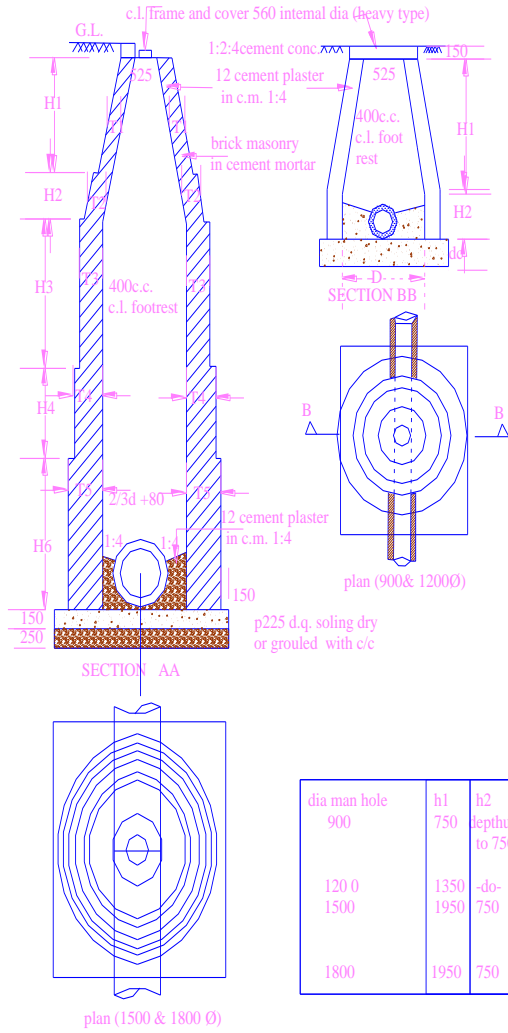
Size 1400x900 mm Arched Type



BAR BENDING SCHEDULE				
Mark	diamm	no	length	Bending
a	12	5	1000	100—100 800
b	12	3	1300	100—100 1100
c	12	1	680	100—100 480
a	12	5	1000	100—100 800
b	12	2	1300	100—100 1100
c	12	1	620	100—100 420

Drawing No. 14

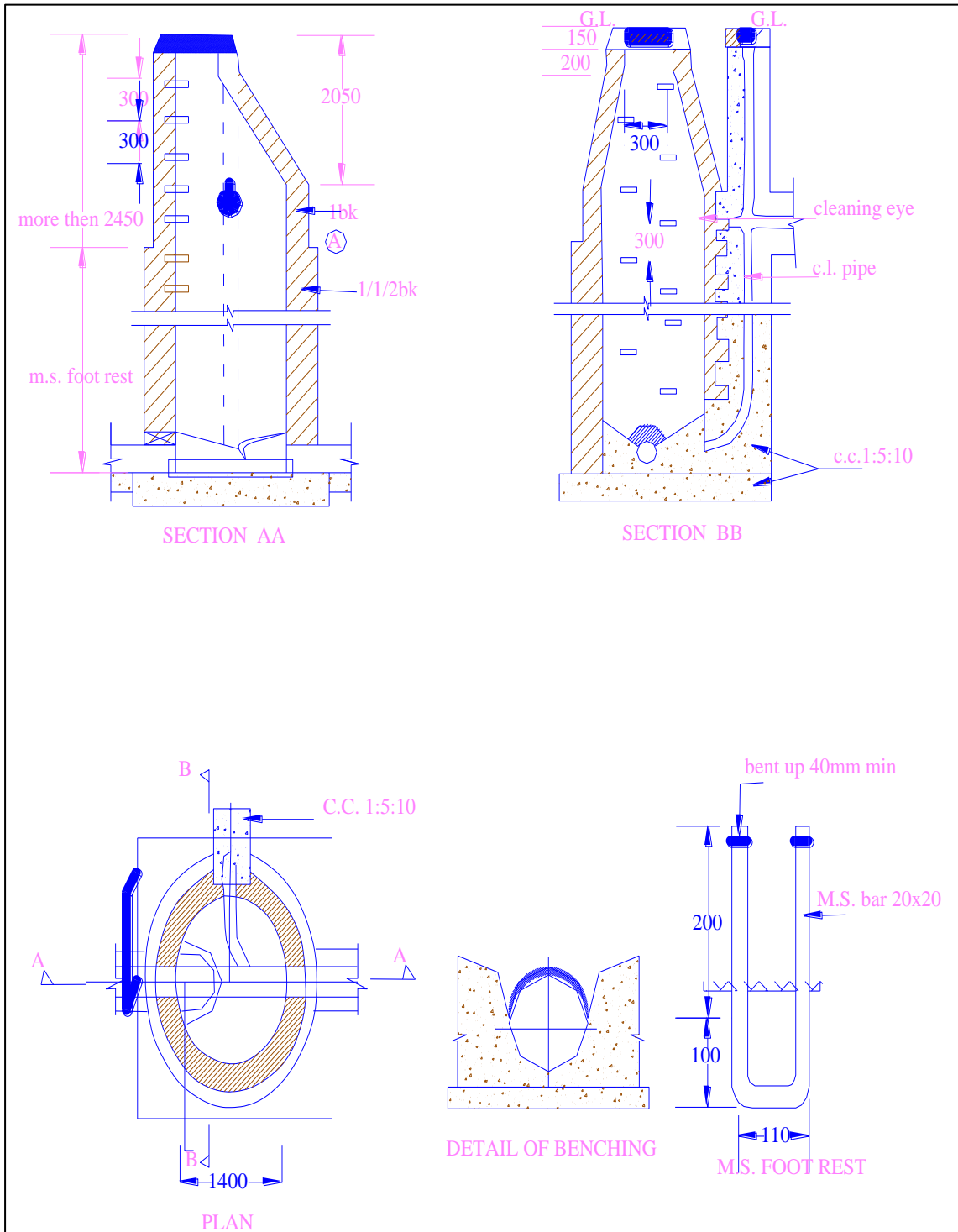
Manhole Design



dia man hole	h1	h2	h3	h4	h5	t1	t2	t3	t4	t5	bed conc dc	remarks
900	750	depth to 750	-	-	-	1bk	1bk	-	-	-	228	
1200	1350	-do-	-	-	-	1bk	1bk	-	-	-	300	thesoling will be provided where the site engineer will feel necessary
1500	1950	750	2100	4050	depth variable up to 4000	1/1/2bk	1bk	2bk	2/1/2bk	3bk	300	
1800	1950	750	2250	4050	-do-	1/1/2bk	1bk	2bk	2/1/2bk	3bk	300	

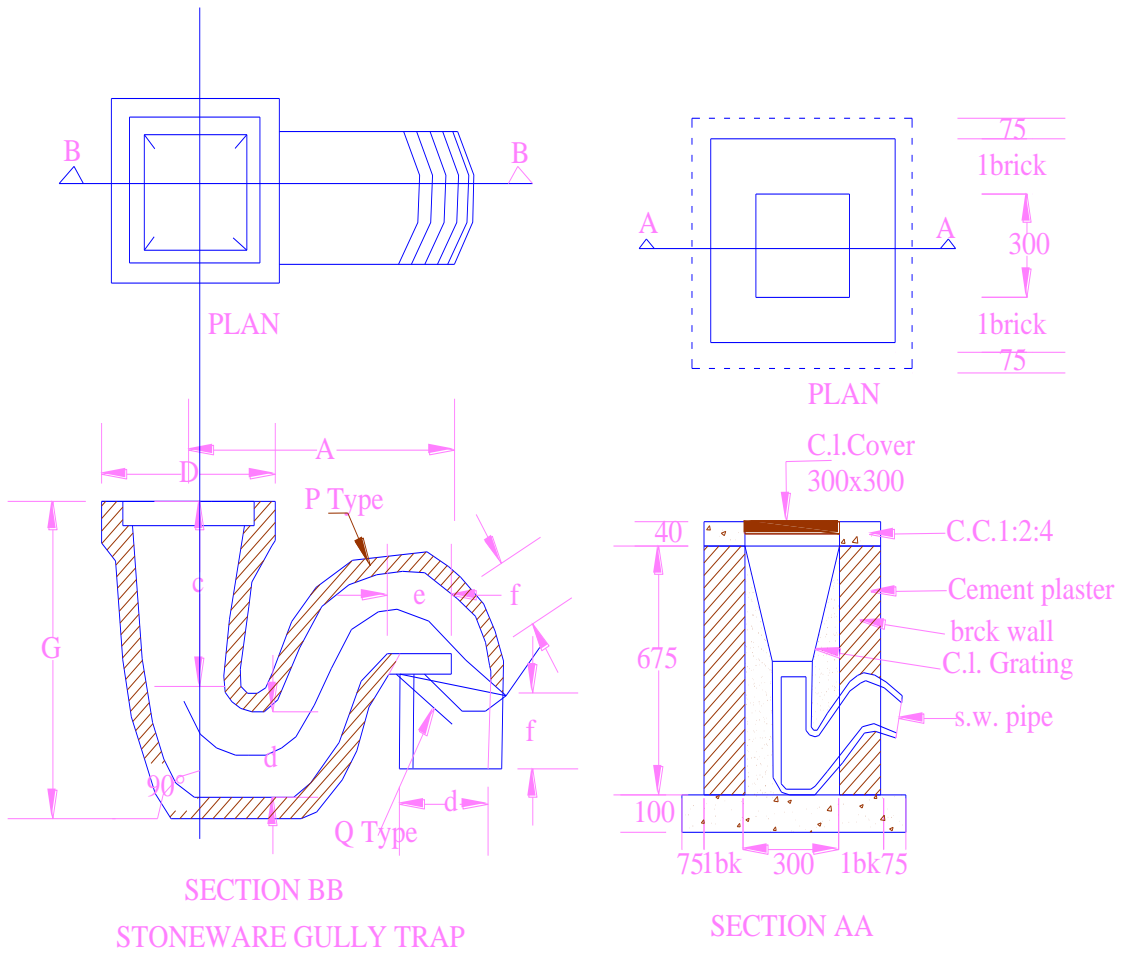
Drawing No. 15

Drop Manhole with Benching



Drawing No. 16

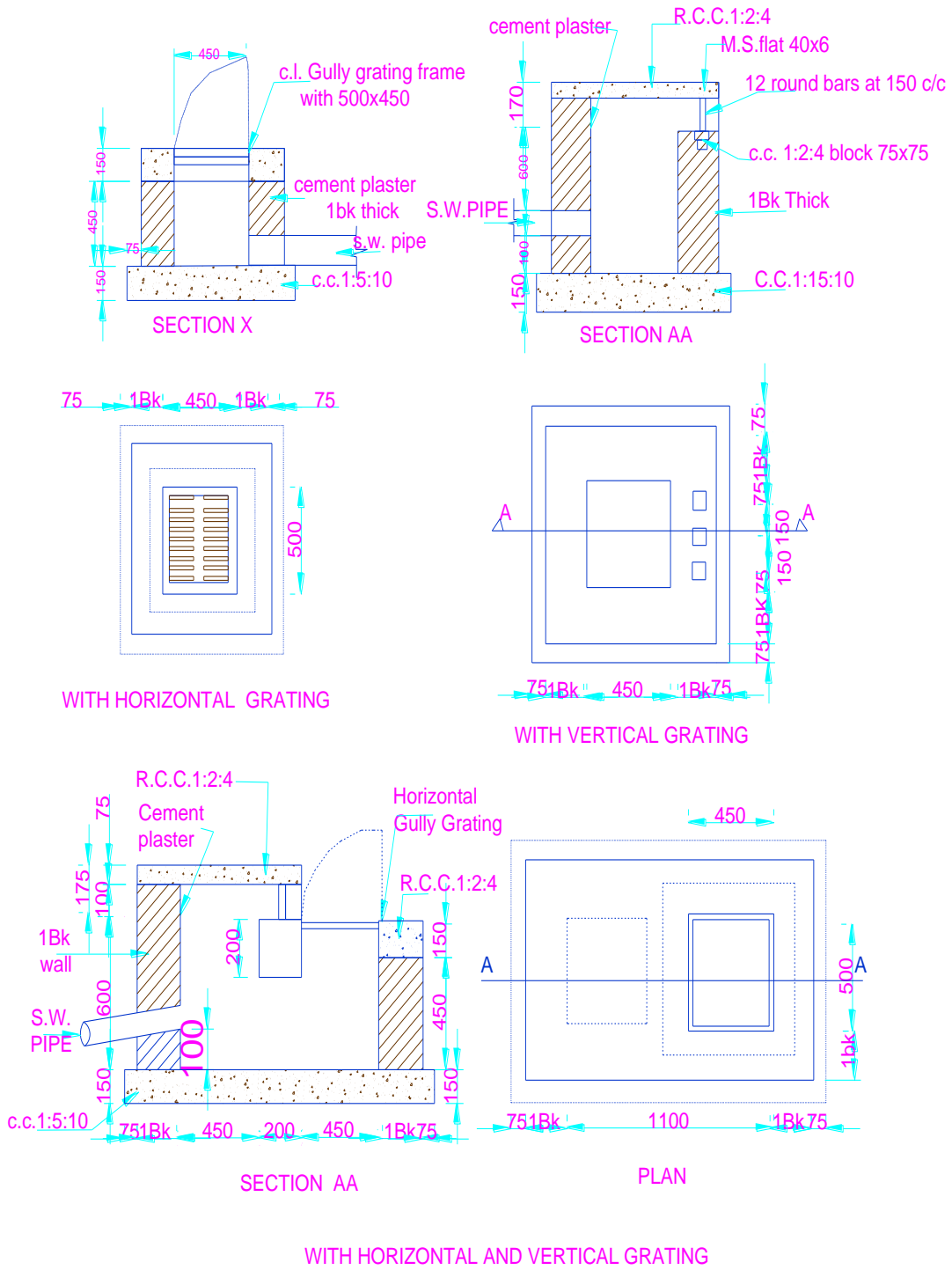
Gully Trap



TYPE	SIZE	A	C	d	D	D	E	F	F	G
P	100X100	305	175	100	100	100	65	-	-	330
	125X100	265	165	100	125	100	60	-	-	345
	150X100	330	165	100	150	100	75	-	-	346
Q	180X100	320	200	100	100	100	65	-	-	380
	180X150	405	270	150	180	150	75	-	-	520
S	125X100	330	165	100	125	100	-	80	-	345
	125X100	290	185	100	125	100	-	-	115	346
	180X150	445	275	150	180	150	-	-	125	520

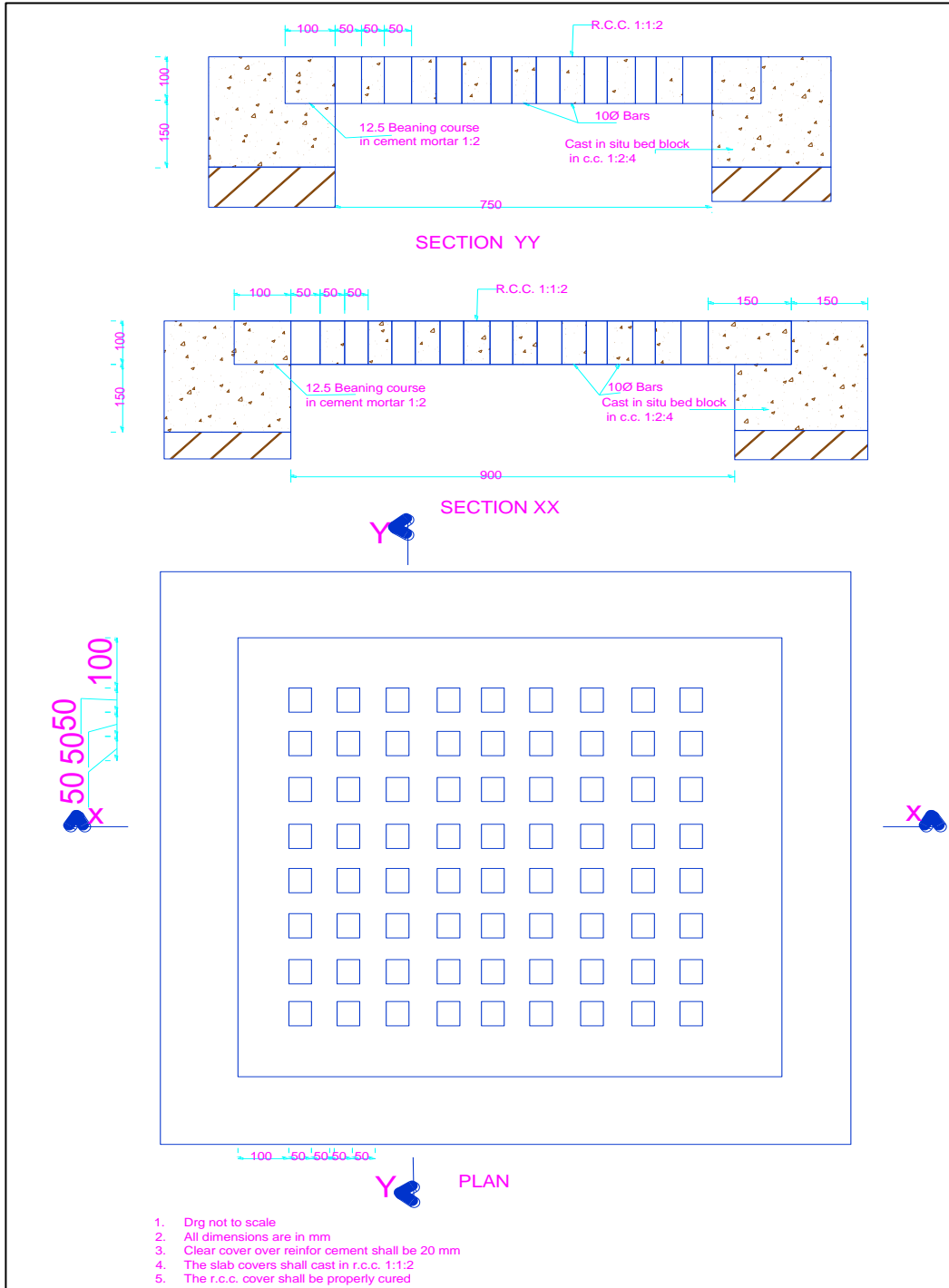
Drawing No. 17

Road Gully Chamber



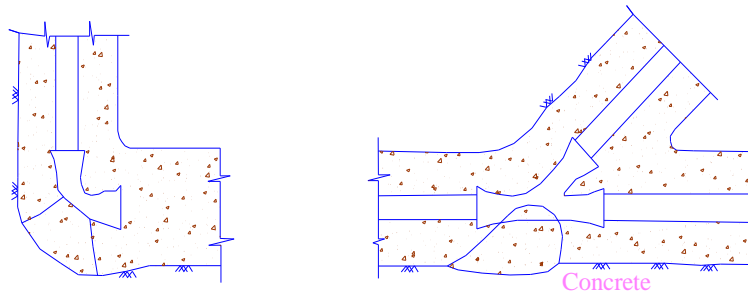
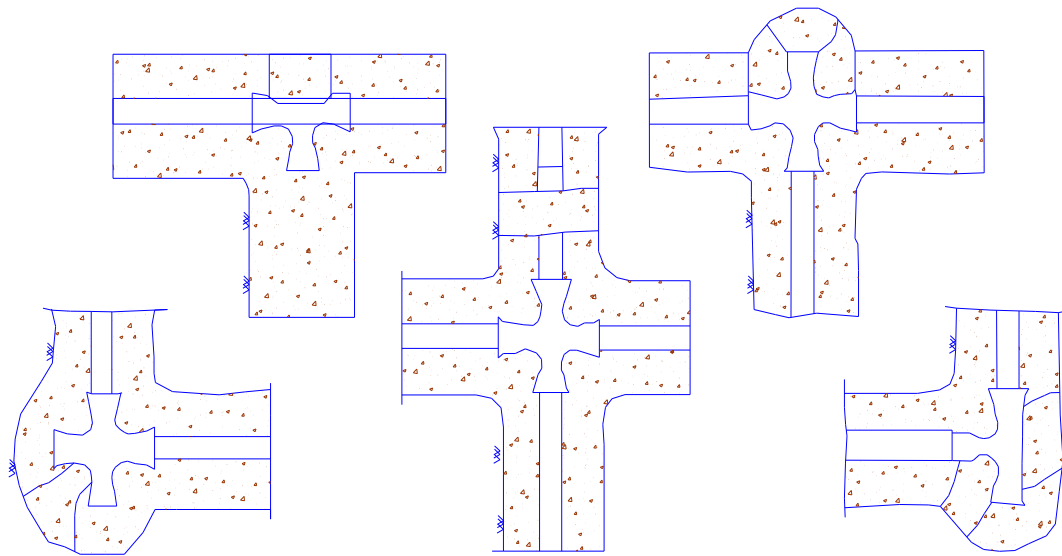
Drawing No. 18

Road Gully Grating

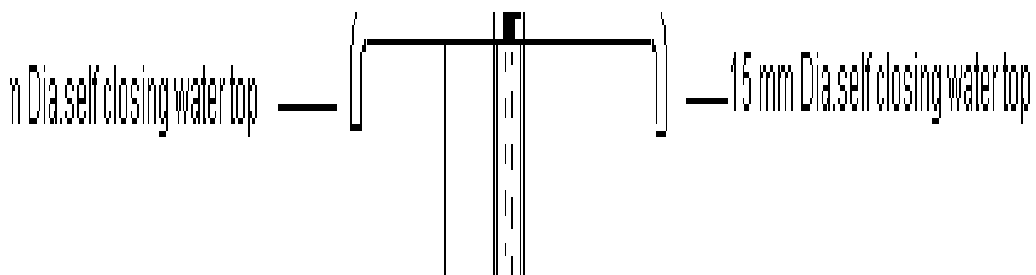
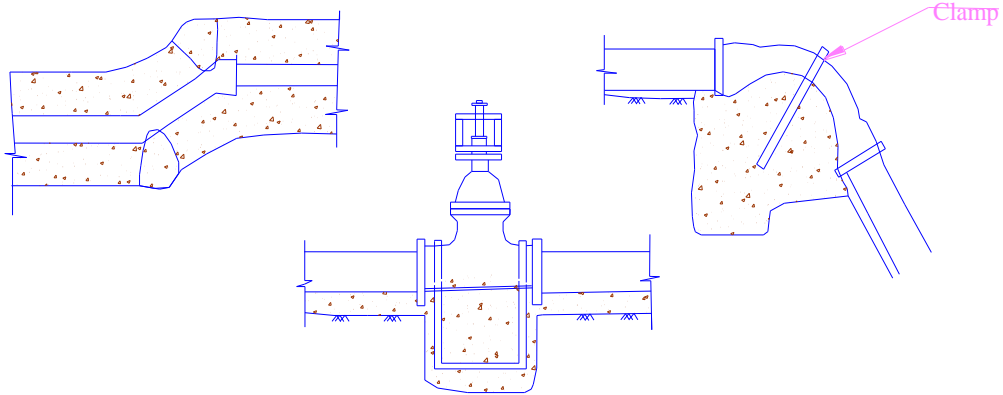


Drawing No. 19

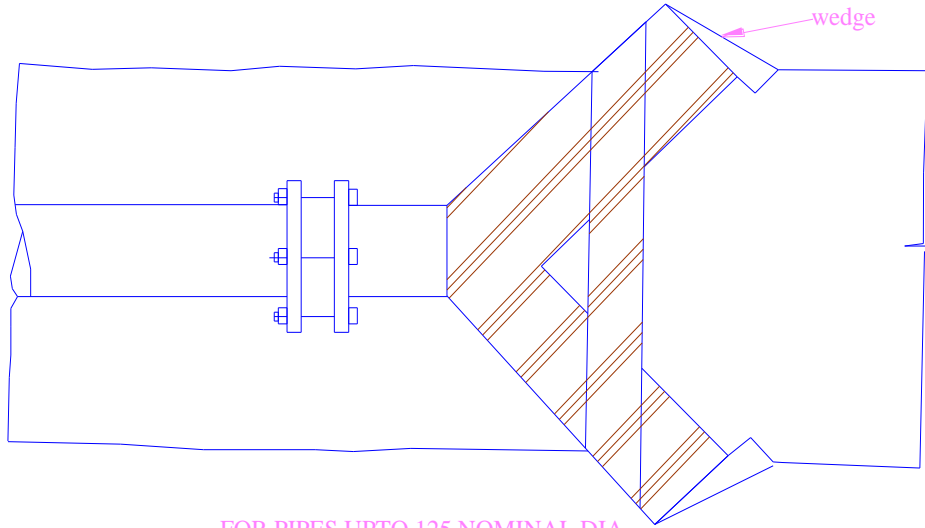
Thrust Blocks



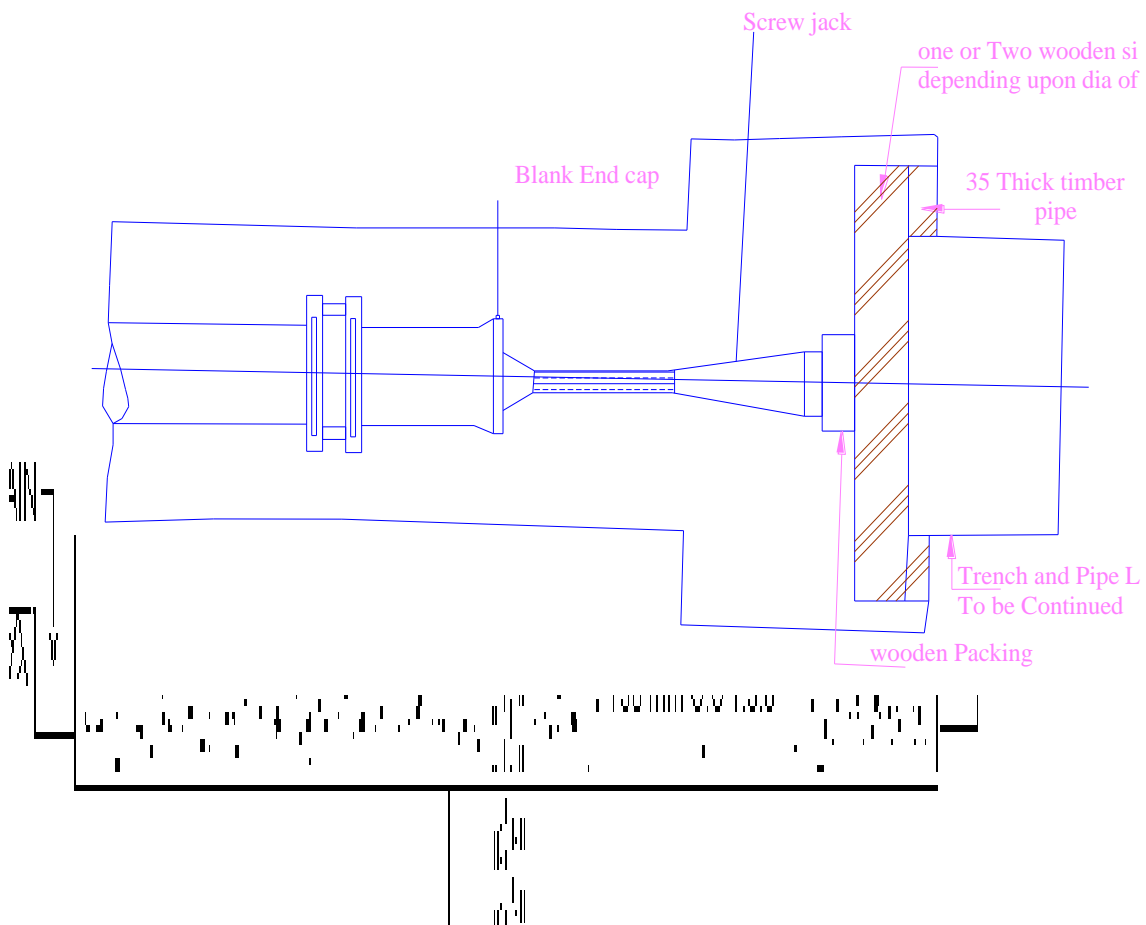
Concrete

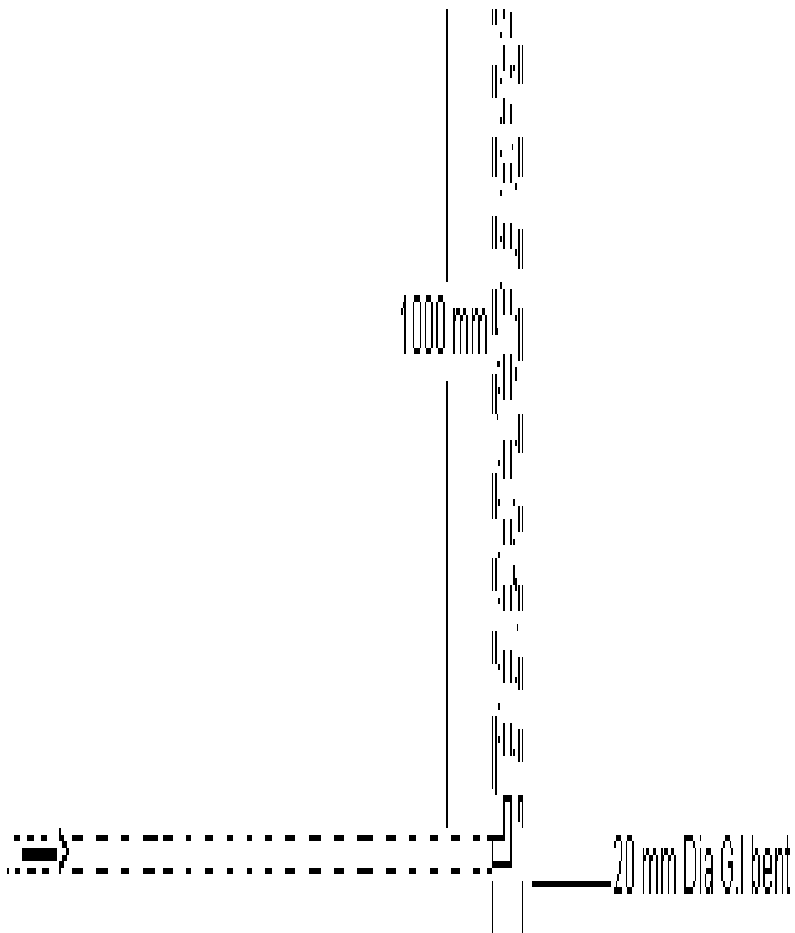


- 80 mm Dia. G.I. pipe
- C.C 1:2:4 Around 20 mm Dia. G.I. pipe

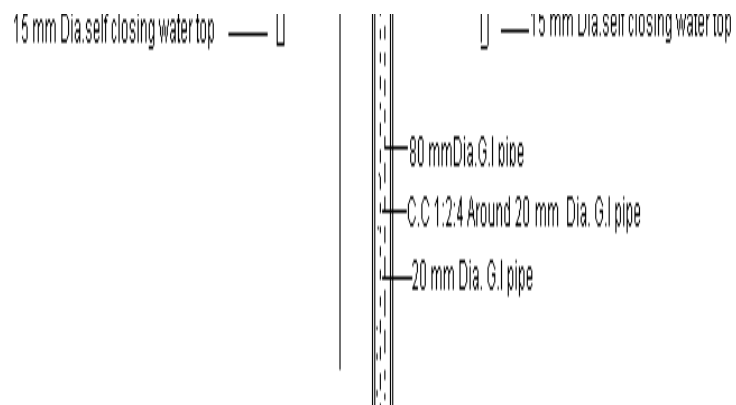


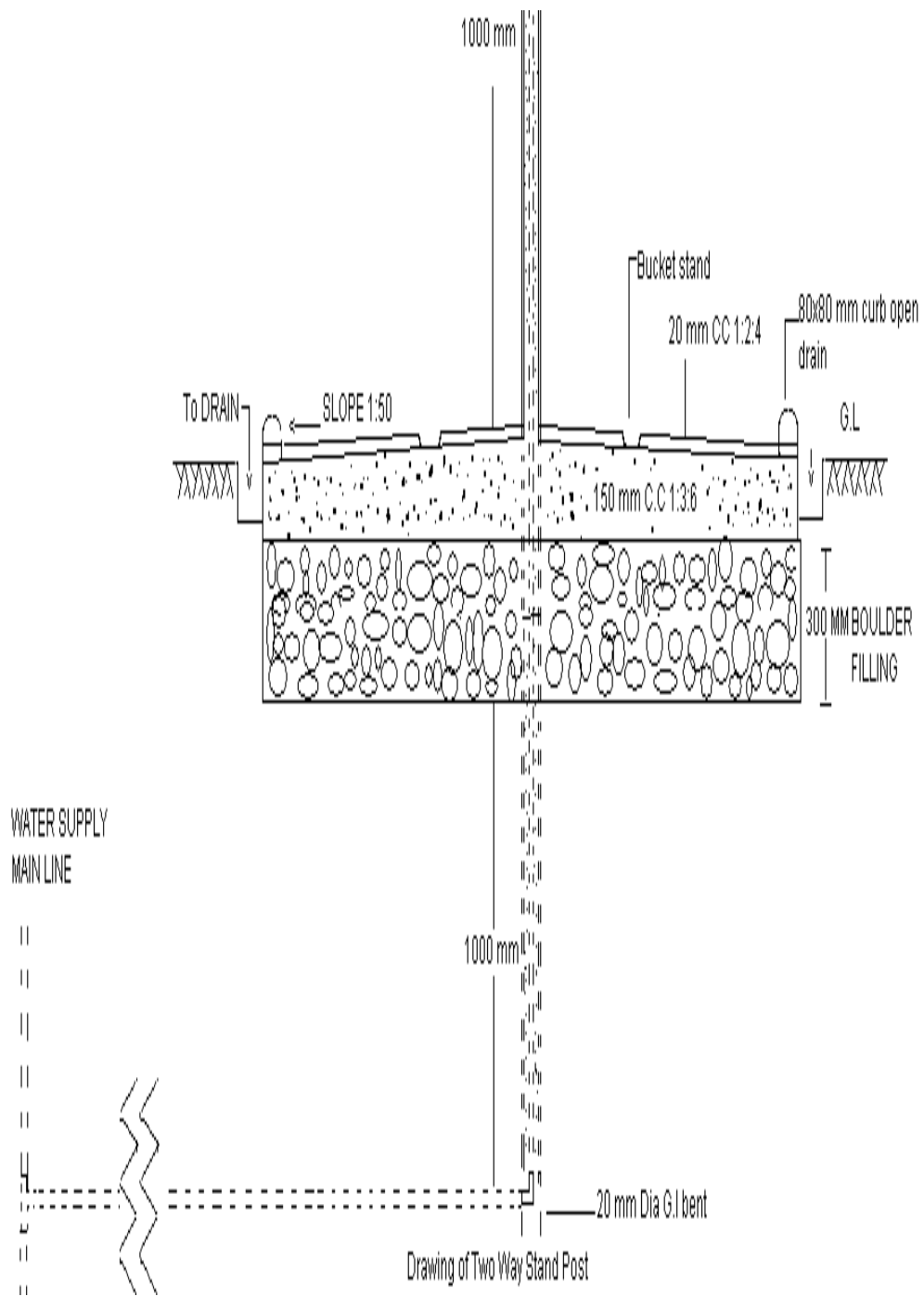
FOR PIPES UPTO 125 NOMINAL DIA





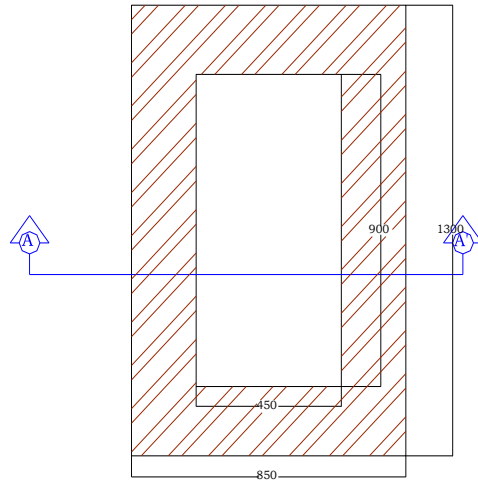
Drawing of Two Way Stand Post



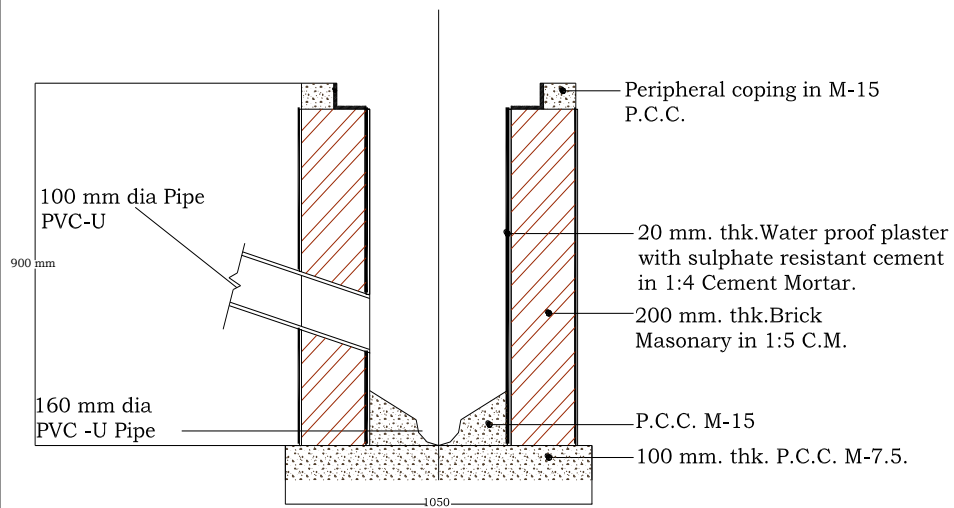


Drawing No. 23

MANHOLE CHAMBER 900MM X 450 MM



PLAN MAIN SEWER CHAMBER

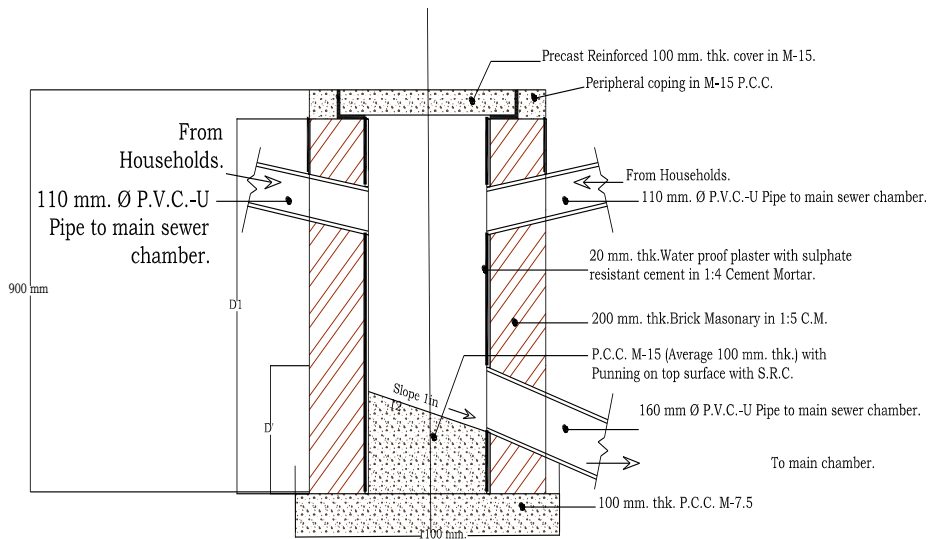


SECTION AT AA OF MAIN SEWER CHAMBER

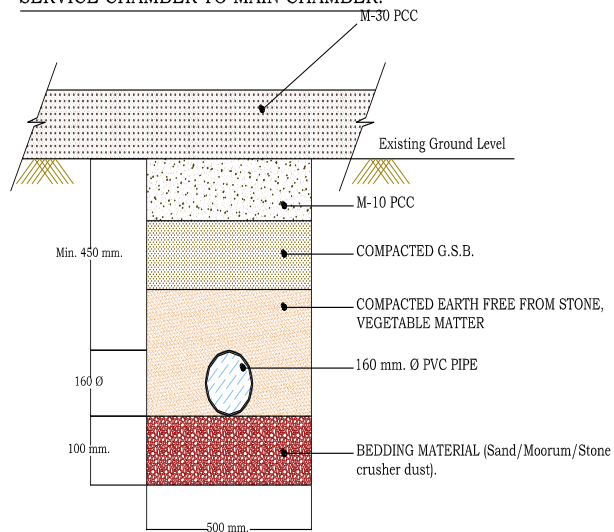
- * Note :- 1. D' depends as per site conditions.
2. D varies from 0.60 m. to 3.00 m.

Drawing No. 24

HOUSE CHAMBER 450MM X 600 MM



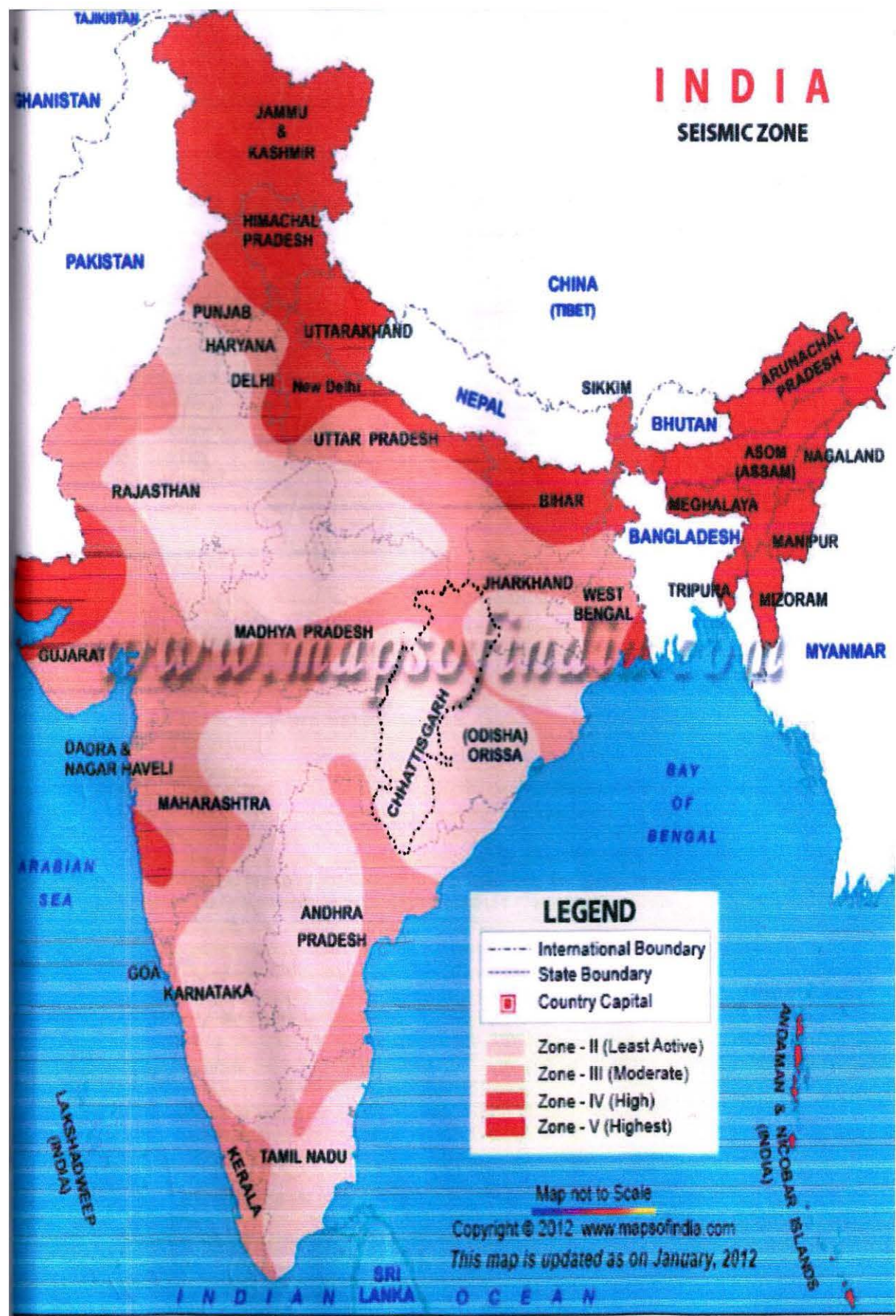
SECTION OF SEWER PIPE TRENCH TO CONNECT SERVICE CHAMBER TO MAIN CHAMBER.



Drawing No. 25

INDIA

SEISMIC ZONE



LEGEND

- International Boundary
- State Boundary
- Country Capital
- Zone - II (Least Active)
- Zone - III (Moderate)
- Zone - IV (High)
- Zone - V (Highest)

Map not to Scale
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 This map is updated as on January, 2012

LIST OF INDIAN STANDARD CODES

IS Codes	Title
273 - 1990	Picks and beaters (Third revision) reaffirmed 2006
1492 - 1970	Metric surveying chains (first revision) (with 2 amendments) (Reaffirmed 1998)
1759 - 1986	Powrahs (Second revision) reaffirmed 2002
1779 - 1961	4 - Metre leveling staff, folding type (reaffirmed 2006)
1842 - 1961	Surveying chain pins (arrows) (reaffirmed 2006)
1955 - 1961	Prismatic compass, liquid, (Reaffirmed 2006)
1957 - 1961	Prismatic compass, non-liquid (reaffirmed 2006)
2286 - 1963	Ranging rods (reaffirmed 2006)
2976 - 1964	Optical theodolite (reaffirmed 2000)
2988 - 1995	Venire theodolite (with 3 amendments) (reaffirmed 2007)
4080 - 1994	Specification for Vertical staff gauges. (reaffirmed 2000)
4590 - 1980	Secondary level (First revision) (reaffirmed 2006)
5497 - 1983	Guide for topographical surveys for river valley projects (reaffirmed 2005)
5510 - 1969	Guide for soil survey for river valley projects (reaffirmed 2005)
8330 - 2004	Telescopic tripod for surveying instruments.
1200 (Pt.1) : 1992 Reaffirmed 1997	Method of measurement of earth work
1200 (Pt.27)	Method of measurement of earth work (by Mechanical Appliances)
3764 : 1992	Safety code for excavation work.
269	Code of practice for Ordinary Portland cement
1077 : 1992 Reaffirmed 2002	Code of practice for Common burnt clay building Bricks
13757 - 1993	Code of practice for burnt clay fly-ash bricks.
2185 (Part-I) 2003	Specification for Hollow concrete blocks.
4081	Safety code for Blasting & related drilling operations
3764 : 1992 Reaffirmed 1996	Excavation work – Code of safety
2062 : 1999 Reaffirmed 2004	Steel for General Structural Purposes
1786	Code of practice for Steel
1542 : 1992 Reaffirmed 2003	Sand for plaster
383 : 1970 reaffirmed 2002	Coarse and Fine aggregates from natural sources for concrete
3114 : 1994	Code for laying of cast iron pipes
12288	Code for laying of ductile iron pipes
6530	Code for laying of asbestos cement pressure pipes
4127	Code for laying of glazed stone ware pipe
783	Code for laying of concrete of pipes
5822	Code for practice for laying of welded steel pipes
1536:2001 with amendment No. 3 July 2008	Specification for Centrifugally Cast (Spun) iron Pressure Pipes for Water, Gas and Sewage
1538:1993 reaffirmed 1999	Specification for Cast iron Fittings.
11606 : 1986	Methods for Sampling of Cast Iron Pipes and Fittings.

782: 1978	Caulking lead (3 rd revision)
5382 - 1985	Tyton rubber sealing ring/Tyton rubber gasket.
7181-1986 (reaffirmed 2005)	The Horizontal Cast C.I. double flanged pipes.
1638	Specification for rubber and insertions.
800	Code of structural steel in general building construction (for nuts and bolts).
1536-2001	Flanged pipes centrifugally cast with screwed/welded flanges.
8329 - 2000	(i) Centrifugally cast (spun) Ductile Iron pressure pipes.
11906 - 1986	(ii) The Cement Mortar lining in the pipe.
4985 - 2000	Unplasticized PVC pipes for potable water supply.
7634 (Part-3) - 2003	Selection, Handling, storage and installation of UPVC Pipes.
7834 (Part-I to VIII) - 1987.	Specification of Injection Moulded PVC socket fittings with solvent cement joints.
1239 (Part-I & II) -1990	Mild steel tubes, tubular & other wrought steel fittings-specification
14846 - 2000	Sluice valves for water works purposes (50 to 1200 mm size).
13095 - 1991	Butterfly valves for General purpose.
2685 - 1971	Installation and maintenance of sluice valves.
5312 - 2003 (Part I & II)	Non return valve/reflux valve shall be as per IS 5312 - 2003 (Part I & II).
14845 - 2000	Air valve shall be as per IS 14845 - 2000.
2800 (part-1):1991 (Reaffirmed 2001)-	Code of practice for construction & testing of tube wells/Bore wells
2800 (part-II): 1979 (Reaffirmed 1999)-	Code of practice for construction & testing of tube wells/Bore wells.
11189-1985 (Reaffirmed 1999):	Method of tube well development
4097-1988 (Reaffirmed 1999):	Specification for gravel for use as pack in tube wells.
15500 (Part-I to VIII)	Deep well hand pumps, components and special tools- specification.
12818 : 1992	Unplasticized PVC screen and casing pipes for bore/tube well-specification.
4427 - 1996	Code of practice for Providing and Supplying Blue MDPE pipes.
SS 304 BS EN 12201	Providing & Supply of Electro Fusion Tapping Ferrule (Branch Tapping Saddle) female BSP Threaded with SS 304 insert fittings.
4422-4	Providing & Supply of PVC Ball Valves.
1592-2003	Code of practice for Asbestos cement pressure pipes & Asbestos Cement Couplings
8794 : 1988	Code of practice for Cast Iron detachable Joints for use with asbestos cement pressure pipe
5531-1988.	Code of practice for Cast Iron Specials for ACP Pipe
10292 -1988.	Rubber rings – Rubber rings used in jointing.
6530 - 1972	Code of practice for Laying of pipe
651 - 2007	Salt glazed stone ware pipe.
4127	Laying of glazed stone ware pipe
15328	Unplasticized polyvinyl chloride (PVC - U) pipes
14182	Code of practice for solvent cement.
458 - 2003	Specification for concrete pipes. (with and without reinforcement)
3597	Method of tests for concrete pipes.
12709 - 1994	GRP Pipes, Joints and Fittings for use for Potable Water Supply.
14402 - 1996	Glass Fibre reinforced plastics (GRP) Pipes, Joints and fittings for use for sewerage, industrial waste and water (other than Potable).
13916 - 1994	Installation of GRP Piping system –code of practice.

3589	Seamless/Electrically Welded Steel Pipes for Water, Gas, Sewage Specification.
7322	Specification for Specials for Steel Cylinder Reinforced Concrete Pipes
432	Mild Steel and Medium Tensile Bars Reinforcement
2328	Flattening Test for Seamless Pipes
12269	Specification for 53 Grade Ordinary Portland Cement (OPC)
6452	Specification for High Alumina Cement for Structural Use .
8112	Specification for Curing of High Strength OPC
8041	Specifications for Curing of Rapid Hardening Cement
455	Specification for Portland Slag Cement
1489	Specification for Portland Pozzolana Cement
8043	Specification for Hydrophobic Portland Cement
3600 Part I	Methods of Testing Fusion Welded Joints and Weld Metal in Steel :
226	Specifications for structural Steel (Standard Quality)
1566	Specifications for Hard Drawn Steel Wire for Concrete Reinforcement
3658	Code of Practice for liquid penetrant flaw detection
15155	Specifications for Bar Wrapped steel Cylinder Pipes (including Fittings)
EN 641	Reinforced Concrete Pressure Pipe, Cylinder Type, including Joints & fittings.
1343	Code of Practice for Prestressed Concrete
15450	PE-AL-PE Pipes shall Conform to IS: 15450 duly inspected and tested and having BIS certification mark.
7328	Polyethylene compounds
4853	Recommended Practice for Radiographic Inspection of Fusion Welded Butt Joints in Steel Pipes (First Revision)
4260	Recommended Practice for Ultrasonic Butt Welds in Ferritic Steel
7208 -1974	Code of practice for Flocculator
10313 - 1982	Code of practice for Vertical / Horizontal flow circular tank,
849 (I) - 77	Code of practice for rapid filter Sand.
9222 part-I/1979.	Code of practice for solution tanks.
10553 (Part-1 & 2) 1983	Code of practice for Vacuum feed type chlorinator, chlorinator equipment and
Reaffirmed 2001	container room.
2026, 1962	Code of practice for Transformer
3639 - 1966	Code of practice for Transformer Accessories
355, 1972	Code of practice for Transformer Oil
6600 : 1972	Code of practice for Loading of Transformer
2099 - 1973, 3347	Code of practice for Transformer Bushing
3043-1987	Code of practice for Earthing
5613	Code of practice for Over Head Power Lines
1678 - 1960	Code of practice for P.C.C. Poles
2141-1968	Code of practice for Stay Wire
1445, 731-1971	Code of practice for Insulators
398-1961	Code of practice for ACSR Conductors
3070-1965	Code of practice for Lightning Arrestors
2551-1963	Code of practice for Danger Board
1554	Code of practice for Cables
1255 - 1967	Code of practice for Installation / laying of Cables
9921-1981	Code of practice for Isolator Switch
5613 Part I & II	Code of practice for design installation and maintenance of cover head power lines
Section I & II 1969/1970	
15472-2004	Guidelines for planning and design of low level outlets for evacuating storage reservoirs.
5477 (Part 1-4)	Code of practice for Fixing the capacities of reservoirs
6939 - 1992	Code of practice for Methods for determination of evaporation from reservoirs
7323 - 1994	Operation of reservoirs - Guidelines
3370 Part-I, II & IV	Code of practice for the Reinforced Concrete structure for the storage of liquids.
456	Code of practice for the plain and Reinforced Concrete.
1786	Code of practice for Cold twisted steel bars

11682-1985	Specifications for Criteria for Design of RCC Staging for overhead Water Tanks.
Reaffirmed 1991, 98	
456	Code of practice for the plain and Reinforced Concrete.
779 - 1994	Specification of Water Meter
4064 - 1993	Standard with EEC/MID certification mark for water meters.
8034 : 1976	Submersible Pumpsets for Clear, Cold, Fresh Water
8110 : 1976	Well Screens and Slotted Pipes
5120 - 1968	Units, terminology and classification relating to roto dynamic special purpose pumps for clear, cold, fresh water.