

माननीय मुख्यमंत्री  
छत्तीसगढ़



माननीय मंत्री  
लोक स्वास्थ्य यांत्रिकी विभाग

## GOVERNMENT OF CHHATTISGARH PUBLIC HEALTH ENGINEERING DEPARTMENT



### UNIFIED SCHEDULE OF RATES FOR WATER SUPPLY, SEWERAGE & ALLIED WORKS

In Force From – 01<sup>st</sup> June, 2020  
Issued by

Engineer - in - Chief  
Public Health Engineering Department  
Nava Raipur, Chhattisgarh

**GOVERNMENT OF CHHATTISGARH**  
**PUBLIC HEALTH ENGINEERING DEPARTMENT**



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**Price: 1000/-**

गुरु रूद्र कुमार  
मंत्री

छत्तीसगढ़ शासन

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क्रमांक .....VIP-९...../लो.स्वा.यां.ग्रामो.वि./2020

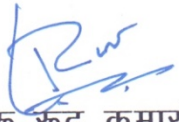
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## संदेश

यह अत्यंत हर्ष का विषय है कि लोक स्वास्थ्य यांत्रिकी विभाग द्वारा पेयजल योजनाओं के क्रियान्वयन से संबंधित समस्त कार्यों के लिए नवीन यू.एस.ओ.आर.-2020 का निर्माण किया गया है। नवीन यू.एस.ओ.आर.-2020 के लागू होने के पश्चात राज्य मद की पेयजल योजनाओं के कार्यों को जहाँ गति मिलेगी वही जल जीवन मिशन के अंतर्गत योजनाओं के क्रियान्वयन हेतु मार्ग प्रशस्त होगा। यह नवीन यू.एस.ओ.आर.-2020 पेयजल योजनाओं के लिए "मील का पत्थर" साबित होगा।

नवीन यू.एस.ओ.आर.-2020 के निर्माण में जिन अधिकारियों ने कड़ी मेहनत के साथ इस कार्य को संपादित किया है उनकी मैं सराहना करता हूँ।

विभाग के सभी अभियंताओं को मेरी हार्दिक शुभकानाएँ।

  
(गुरु रूद्र कुमार)



अविनाश चम्पावत

आई.ए.एस.

सचिव

छत्तीसगढ़ शासन




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दिनांक 31 / 05 / 2020

## संदेश

लोक स्वास्थ्य यांत्रिकी विभाग द्वारा सात वर्षों के पश्चात् पेयजल योजनाओं के क्रियान्वयन से संबंधित समस्त कार्यों के लिए नवीन यू.एस.ओ.आर.-2020 का निर्माण किया गया है। इस नवीन यू.एस.ओ.आर.-2020 में पेयजल योजनाओं के क्रियान्वयन के साथ-साथ संचालन एवं संधारण के कार्यों को भी सम्मिलित किया गया है, जो ग्रामीण जलप्रदाय योजनाओं के लिए आने वाले समय में बहुउपयोगी सिद्ध होगा। भारत सरकार द्वारा जल जीवन मिशन के अंतर्गत "हर घर नल" जिसमें राज्य शासन की भी बराबर की हिस्सेदारी है, जिसमें प्रत्येक ग्रामीण घर को 55 लीटर प्रति व्यक्ति प्रतिदिन पेयजल की उपलब्धता सुनिश्चित किया जाना है। इस योजना के साथ-साथ राज्य के अन्य सभी मदों की योजनाओं के क्रियान्वयन को ध्यान में रखते हुए अनेक कार्य जॉब वर्क के रूप में नवीन यू.एस.ओ.आर. में सम्मिलित किया गया है, जो मैदानी अमलो के लिए कारगर साबित होगा।

नवीन यू.एस.ओ.आर.-2020 के निर्माण में यू.एस.ओ.आर. समिति के अधिकारियों ने अत्यंत सीमित समय में अथक परिश्रम के साथ समय सीमा में इस कार्य को अमली जामा पहनाया है, मैं उन्हें बधाई सहित शुभकामनाएँ प्रेषित करता हूँ।



(अविनाश चम्पावत)



**कार्यालय प्रमुख अभियंता  
लोक स्वास्थ्य यांत्रिकी विभाग  
छत्तीसगढ़, अटल नगर, नवा रायपुर**

क्रमांक 55 /स्था.शा./प्र.अ./लो.स्वा.यां.वि./2020

रायपुर, दिनांक 01/06/2020

**कार्यालयीन आदेश**

एतद द्वारा लोक स्वास्थ्य यांत्रिकी विभाग छत्तीसगढ़ में Unified Schedule of Rate for Water Supply Sewerage & Allied Works के नवीन एकीकृत दर को इस आदेश के जारी होने की तिथि 01 जून, 2020 से प्रभावशील किया जाता है। इस दर अनुसूची के प्रभावशील होने की तिथि 01 जून, 2020 से संबंधित कार्य हेतु विभाग में लागू पूर्व की दर अनुसूची वर्ष 2013 (समस्त संशोधनों सहित) अप्रभावशील माना जावेगा।

यह एकीकृत दर अनुसूची विभागीय वेबसाईट <https://phed.cg.gov.in> पर देखी जा सकती है। यह आदेश 01 जून, 2020 से प्रभावशील होगा।

(डॉ.एम.एल.अग्रवाल)

प्रमुख अभियंता

लोक स्वास्थ्य यांत्रिकी विभाग  
छत्तीसगढ़ अटल नगर, नवा रायपुर

पृ० क्रमांक 3070/तक.शा./प्र.अ./लो.स्वा.यां.वि./2020

रायपुर, दिनांक 01/06/2020

प्रतिलिपि :-

1. विशेष सहायक, माननीय मंत्रीजी, छत्तीसगढ़ शासन, लोक स्वास्थ्य यांत्रिकी विभाग, मंत्रालय महानदी भवन, अटल नगर, नवा रायपुर ।
2. उपसचिव, कार्यालय मुख्य सचिव की ओर अध्यक्ष एवं, एस.डब्ल्यू.एस.एम., (जे.जे.एम.) एवं मुख्य सचिव, छत्तीसगढ़ शासन की ओर अवगत कराने हेतु ।
3. अपर मुख्य सचिव वित्त विभाग, छत्तीसगढ़ शासन, मंत्रालय महानदी भवन, अटल नगर, नवा रायपुर ।
4. सचिव, छत्तीसगढ़ शासन, लोक स्वास्थ्य यांत्रिकी विभाग, मंत्रालय महानदी भवन, अटल नगर, नवा रायपुर ।
5. सचिव, नगरीय प्रशासन एवं विकास विभाग, छत्तीसगढ़ शासन, मंत्रालय महानदी भवन, अटल नगर, नवा रायपुर ।
6. महोलखाकार, छत्तीसगढ़ रायपुर ।
7. मुख्य तकनीकी परीक्षक, प्रथम तल, इन्द्रावती भवन, अटल नगर, नवा रायपुर ।
8. प्रमुख अभियंता, जल संसाधन विभाग/लोक निर्माण विभाग/ग्रामीण यांत्रिकी सेवा रायपुर ।
9. समस्त मुख्य अभियंता, लोक स्वास्थ्य यांत्रिकी विभाग परिक्षेत्र ..... ।
10. समस्त अधीक्षण अभियंता, लोक स्वास्थ्य यांत्रिकी विभाग मंडल ..... ।
11. समस्त कलेक्टर एवं अध्यक्ष, जिला जल एवं स्वच्छता समिति (जे.जे.एम.) जिला..... ।
12. समस्त कार्यपालन अभियंता, लोक स्वास्थ्य यांत्रिकी खंड..... ।
13. लेखा शाखा/तकनीकी शाखा/एम.आई.एस.शाखा, कार्यालय प्रमुख अभियंता, लोक स्वास्थ्य यांत्रिकी विभाग, छत्तीसगढ़ अटल नगर, नवा रायपुर ।
14. कार्यालयीन आदेश नस्ती।

संलग्न :- नवीन यू.एस.ओ.आर. की एक प्रति।

प्रमुख अभियंता

लोक स्वास्थ्य यांत्रिकी विभाग  
छत्तीसगढ़ अटल नगर, नवा रायपुर

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## PREFACE

The Unified Schedule of Rates for Water Supply & Sewerage Works were made applicable in Public Health Engineering Department for the entire state of Chhattisgarh as “Unified Schedule of Rates” which was enforced from 7<sup>th</sup> February 2013. As seven years have passed since the issue of this USOR and meanwhile the new taxation system in the form of Goods & Service Tax (GST) has also been enforced from 1<sup>st</sup> July 2017. Recently, GoI, Ministry of Jal Shakti, Department of Drinking Water and Sanitation has also launched Jal-Jeevan Mission with the theme of “Har Ghar Nal Se Jal” in which our state has a target of providing 41,32,535 functional household tap connections (FHTC) up to Sept., 2023. This has substantially effected the rates of all the items of the USOR. So, it was necessary to revise the USOR looking to the hike in the prices of materials and labour etc. involved in above works and segregate the **GST portion to be paid separately over and above the USOR rates** as per the prevailing government norms from time to time.

This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates based on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount. The probable amount of cost (PAC) put to tenders shall be exclusive of GST.

This Unified Schedule of Rates for all the works related to the Public Health Engineering Department have been revised. This new USOR also included- (i) E&M works of Mechanical wings and (ii) O&M of various schemes to facilitate the preparation of realistic estimates and bringing uniformity in the rates and specifications of various type of works to be executed by the Public Health Engineering Department in the State.

I extend my deepest sense of gratitude towards Shri Guru Rudra Kumar Hon’ble Minister, Govt. of CG, PHED and Shri Avinash Champawat, IAS, Secretary, Govt. of CG, PHED for their invaluable directions, supervision and perpetual encouragement during preparation of this USOR.

I express my sincere thanks to members of the new USOR committee- Shri A.K. Sahu, Chief Engineer; Shri Dharmendra Sahu, Joint-director (Finance); Shri Rajesh Gupta, Superintending Engineer; Shri R.K. Dewangan, Shri Samir Gaur, Shri Mohan Singh Thakur, Executive Engineer; and member-secretary of the committee- Ms Ashalata Gupta, Executive Engineer; Shri Budhad Deo, Assistant Engineer (E&M) and Shri Parate, Stenographer for their commendable efforts in preparing this schedule of rates.

This Unified Schedule of Rates (USOR) for the work of Water Supply, Sewerage and Allied works shall come in to force **from 01<sup>st</sup> June, 2020.**

**(Dr. M.L. Agrawal)**

Chairman New USOR Committee and  
Engineer-in-Chief  
Public Health Engineering Department  
Chhattisgarh, Raipur

# **PART (A)**

## **WATER SUPPLY & SEWERAGE WORKS**

**UNIFIED SCHEDULE OF RATES**  
**GENERAL NOTES**  
**WATER SUPPLY AND SEWERAGE WORKS**

**1. Definitions:-**

The following terms and expressions wherever they appear in the schedule of rates shall have the meaning and implications assigned to them.

- (i) **Engineer in Charge:-**Engineer in Charge would refer to the Executive Engineer of Public Health Engineering Division in charge of work.
- (ii) **Diameter:-**Diameter of pipes, specials, valves etc. shall be the nominal internal diameter of the bore except for PVC, PVC-O and HDPE pipes for which the diameter of pipe will denote the outer nominal diameter of pipe. These would be as per IS codes.
- (iii) **Providing & Fixing:-** The provision of all materials and labour and the performance of all workmanship together with the use of all materials and labour, transport, tools, plants, appliances and all other provisions necessary for the proper execution of work as described in the concerned item of schedule of rates and the provision and uses of all coverings or casing etc. necessary to protect the work from inclement weather etc. and from damages from falling materials or other causes and all required safety arrangements.
- (iv) **Laying and Fixing only:-**As defined, for 'providing and fixing' except the provision of the materials (which will be supplied free of cost by the department for incorporation in the work) to be fixed or laid, but including taking supply of the articles from the Public Health Engineering Department stores and the provisions of materials necessary for the proper execution of the work as described in the item of schedule of rates which are subsidiary to, but are not supplied as part of the principal articles such as bolts, nuts, packing, jointing materials etc, and the like unless other-wise specifically excluded and mentioned in the tender documents.  
This also include testing, closing, preparing, loading and returning empty cases, containers, bags & baggage of the articles provided by the Department if any, to the place of issue without any extra charges.
- (v) **Loading and unloading of pipe:-**During unloading, the pipe shall not be drawn on hard ground and shall be gently unloaded using proper supports without causing any damage to the pipe etc. Unloading of pipes on timber skids without steadying rope and thus allowing the pipe to bump against one another shall not be allowed and the contractor shall be responsible for any damage.
- (vi) **Best:-**With reference to quality of materials and workmanship the word 'Best' when used shall mean that in the opinion of the Engineer-in-Charge, there is no superior material or article or class of workmanship obtainable in the market.



- (vii) **(a) ISS:-**The Indian Standard Specifications as issued by the Bureau of Indian Standards, New Delhi, wherever mentioned in this USOR shall be considered as current and duly updated.
- (viii) **(b) BSS:-**The British Standard Specifications as issued by the British Standard Institution, wherever mentioned in this USOR shall be considered as current and duly updated.
- (ix) **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 manner but not particularly described in the items of schedule of rates due to their petty nature.

## **2. Rate for completed items include the cost of following:-**

- (i) All material, labour, workmanship, templates, tools, hire and running charges of plants & machinery required to complete the work, unless specified otherwise.
- (ii) All lead & lift of materials required for execution of work inclusive of charges like duties, cess, tax, royalty etc.
- (iii) 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.
- (iv) 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.
- (v) Curing wherever required including arrangement of water and also including its lead or lift whatsoever.
- (vi) The mode of measurements shall be as per provisions contained in the relevant chapters and in specifications/relevant IS codes.
- (vii) 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.
- (viii) Material obtained from excavation shall be the property of the Department.
- (x) 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.

## **3. Cement:-**

- (i) 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 269-1989 for 33 grade cement, IS 8112-1989 for 43 grade cement, IS

12269-2013 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.

- (ii) 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.
- (iii) For pre-stressed concrete works where the strength of concrete required is more than M-30, then Ordinary Portland Cement (OPC) - 53 grade cement conforming to relevant IS code shall be used.
- (iv) In specific cases requiring higher grade of strength, use of OPC should be invariably ensured.
- (v) 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.
- (vi) 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.

4. 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.

**5. Approval of materials**

All materials shall be used strictly in accordance with the specifications and of the description and make as detailed in items of schedule of rate. The quantity of the various kinds of materials to be used in the works shall in all cases be determined by the Executive Engineer. All materials before use in the works shall require prior approval of the Engineer-in-charge. When materials are specified to comply with an I.S. or BIS. The contractor shall, if required, furnish the manufactures' certificate that the materials satisfy the requirement of the IS or BIS respectively.

**6. Alternative**

No alternative materials other than those specified in the agreement 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 import restrictions or any other particular reasons beyond control of the contractor. But in all such cases, the Executive Engineer after satisfying himself about the facts will permit in writing the use of such alternatives and will recommend suitable alternation in rates for such works to the competent authority. No permission for using such alternative material shall however be granted if so mentioned in the tender documents.

**7. Laying**

The approximate positions of all fittings shall generally be shown on the plans prepared for the purpose. But it will be the sole responsibility of the contractor to ascertain the work on the spot and the exact position where each fitting is to be fixed from the Engineer-in-Charge before carrying out the work. When the pipe is closed and trench gets flooded by rain, due care shall be taken to prevent the pipe from flooding.

**8. Testing of materials**

The contractor, on completion, or whenever required by the Engineer-in-Charge, shall prove all materials and pipes, fittings, joints and other accessories etc. to be clear, clean, perfect in working conditions and strong enough to withstand the test so specified here-in-under different items of the specifications. For this purpose the contractor at his own expense, shall provide all instruments and suitable appliances and carry out the necessary test before the Engineer-in-Charge or his representative to his entire satisfaction. The contractor shall rectify any defects as to the materials or workmanship, so noticed, and the defective portions re-tested at his expense. Till such time the test is completed an extra 03% of the bill amount shall be withheld from the contractor's running bill and same will be released only after testing, up to the entire satisfaction of the Engineer-in-Charge such material/works shall be replaced/redone if so required by Engineer-in-Charge.

**9. Lead**

Rates include all leads & lifts for the materials and no extra lead on account of shifting of materials from one place to another is payable, unless it is specifically mentioned in the contract agreement.

**10. Specifications**

Work shall be executed in accordance with the specifications given in this schedule and the specifications for works in vogue in PHED, Govt of CG, and the specifications attached with the 'Notice Inviting Tenders' and the "Contract Agreement". Latest CPHEEO manual, published by the Ministry of Urban Development, Govt. of India shall also be applicable. In case of any



discrepancy, the specific provision in the 'Contract Agreement' will take precedence and the decision of the authority, sanctioning the tender, shall be binding and final. The materials to be used in works i.e. pipes; specials, valves etc. are to be supplied by the departmental store, unless otherwise mentioned in the contract document. As such, specifications for the same are not given in this schedule of rates. In case any materials are required to be supplied by the contractor for any particular work, materials conforming to relevant I.S. Specification, B.S. specification, material of best quality available in the market shall only to be used after the approval of the Engineer in Charge.

**11. Survey and Allied Civil Works**

It shall be done as per specification given in chapter XVIII and standard IS codes for each work.

**12. 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 consequences.

**13. Interpretation**

The Engineer in Chief PHED, Chhattisgarh, Raipur 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.

**14. Award of Contract**

The rates for various items of works given in this Unified Schedule of Rates are based on average current market rates of materials & labour for whole of the Chhattisgarh State. The market rates may vary from place to place in the State depending upon the local conditions. No contract should, therefore be awarded directly on the rates given in this Unified Schedule of Rates without inviting proper tenders.

**15. Application of Rates for Departmental Work**

The rates for various items of works given in this Unified Schedule of Rates includes for 10% contractor's profit, 1% T&P, 3% sundries, 1% water and 1 Labour welfare cess. If the work is carried out departmentally then the rates applicable for Departmental works shall be 10.35 %  $[(100 \times 12) / 116]$  less than the rates of various items given in this Unified Schedule of Rates. The over all rate to carry out the work departmentally shall be decided by the Superintending Engineer of the circle based on prevailing rate in circle after deducting 10.35% from the rates. No work shall be done departmentally

unless other wise permitted in writing by the competent authority as per manual provisions.

16. As per prevailing rules, excise duty exemption is not available. Therefore no excise duty is considered while computing the rates. All the concerned officers shall be responsible to get all the prevailing exemptions in any tax or duty as per prevailing policy. The computation of rates for D.I. pipes, S.W. pipes, R.C.C. pipe, U.P.V.C. pipes of G.I. pipes are exclusive of excise duty and if any, excise duty exemption shall be obtained as per prevailing rules for these pipes then, this benefit shall be availed by the department.
17. All necessary permissions regarding road cutting, blasting, electricalline/pole shifting, road diversion/closer, under ground utility services shifting/closer disturbance, tree cutting etc. and all other permissions or licenses or permits etc. where ever applicable, such as from Labour dept., Mining dept., P&T dept., PWD, WRD, Electricity board/ company, District administration, Local Urban bodies etc. shall also be obtained by the contractor from the competent authority at his own cost. The contractor shall be fully responsible for any consequences for any lapse in this.
18. Capacity of ESR/GSR to be constructed shall be rounded out to nearest 5000 litres - always on higher side i.e. if required capacity is 1,23,000 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.
19. Capacity of Unconventional/ Conventional Water 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.
20. **GST**  
**This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount. The probable amount of cost (PAC) put to tenders shall be exclusive of GST.**

**CHAPTER – I**

**CAST IRON PIPES AND SPECIALS WITH  
SOCKET AND SPIGOT JOINTS  
(LEAD JOINTS)**



## Chapter – I

### CAST IRON PIPES AND SPECIALS WITH SOCKET AND SPIGOT JOINTS (CLASS LA, A, B)

#### NOTES:

1. The C.I.pipe shall conform to IS:1536-1939
2. The C.I.fittings shall conform to IS -1538-1993 (Part I to XXIV).
3. The laying of C.I. pipes shall be done as per IS:3114:1994
4. The caulking lead shall conform to IS 782:1978
5. All measurements shall be of the finished work.
6. Work shall be executed in accordance with the relevant Indian Standard Specifications (Updated) and all the conditions of the agreement of the work.
7. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### SOCKET & SPIGOT CAST IRON PIPES WITH LEAD JOINTS (CLASS LA, A and B)

S.No.	Items	Unit	Rates in Rs.		
1.1	<b>Providing, laying and jointing following socket and spigot cast iron (Spun) Pipes including testing of joints, cost of pipes and jointing materials etc. complete.</b>		<b>Class LA</b>	<b>Class A</b>	<b>Class B</b>
	80mm Dia	RM	1103	1199	1285
	100mm Dia	RM	1367	1505	1625
	125mm Dia	RM	1751	1911	2051
	150mm Dia	RM	2182	2391	2582
	200mm Dia	RM	3138	3404	3656
	250mm Dia	RM	4154	4523	4827
	300mm Dia	RM	5356	5856	6203
	350mm Dia	RM	6627	7189	7769
	400mm Dia	RM	8065	8814	9369
	50mm Dia	RM	9726	10684	11268
	500mm Dia	RM	11385	12403	13138
	600mm Dia	RM	15173	16565	17577
	700mm Dia	RM	19223	21003	22418
	750mm Dia	RM	21132	23102	24761
	800mm Dia	RM	29861	32835	35809

S.No.	Items	Unit	Rates in Rs.		
	900mm Dia	RM	35741	39327	42974
	1000mm Dia	RM	42147	46440	50553
1.2	<b>Labour for laying in position following socket &amp; spigot cast iron (Spun) pipes.</b>		<b>Class LA</b>	<b>Class A</b>	<b>Class B</b>
	80mmDia	RM	18	20	21
	100mm Dia	RM	22	25	27
	125mm Dia	RM	29	33	35
	150mm Dia	RM	37	41	44
	200mm Dia	RM	54	59	63
	250mm Dia	RM	73	79	84
	300mm Dia	RM	94	103	109
	350mm Dia	RM	118	128	136
	400mm Dia	RM	144	158	168
	450mm Dia	RM	174	191	201
	500mm Dia	RM	203	222	235
	600mm Dia	RM	271	296	314
	700mm Dia	RM	350	382	408
	750mm Dia	RM	391	428	460
	800mm Dia	RM	554	609	664
	900mm Dia	RM	675	743	812
	1000mm Dia	RM	812	895	974
1.3	<b>Providing lead caulked joints to following socket &amp; spigot cast iron (spun) pipes and specials class 'LA' 'A' and 'B' including testing of the joints and cost of jointing materials (i.e. pig lead and spun yarn) etc. complete.</b>				
	80mmDia	Each	182	182	182
	100mm Dia	Each	240	240	240
	125mm Dia	Each	262	262	262
	150mm Dia	Each	353	353	353
	200mm Dia	Each	530	530	530
	250mm Dia	Each	642	642	642
	300mm Dia	Each	799	799	799
	350mm Dia	Each	859	859	859
	400mm Dia	Each	1016	1016	1016
	450mm Dia	Each	1349	1349	1349
	500mm Dia	Each	1557	1557	1557
	600mm Dia	Each	1751	1751	1751
	700mm Dia	Each	2056	2056	2056
	750mm Dia	Each	2407	2407	2407
	800mm Dia	Each	3042	3042	3042
	900mm Dia	Each	3696	3696	3696

S.No.	Items	Unit	Rates in Rs.		
	1000mm Dia	Each	4353	4353	4353
1.4	<b>Labour for providing lead caulked joints to following socket &amp; 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).</b>				
	80mmDia	Each	127	127	127
	100mm Dia	Each	175	175	175
	125mm Dia	Each	183	183	183
	150mm Dia	Each	254	254	254
	200mm Dia	Each	359	359	359
	250mm Dia	Each	430	430	430
	300mm Dia	Each	542	542	542
	350mm Dia	Each	613	613	613
	400mm Dia	Each	665	665	665
	450mm Dia	Each	900	900	900
	500mm Dia	Each	1076	1076	1076
	600mm Dia	Each	1148	1148	1148
	700mm Dia	Each	1356	1356	1356
	750mm Dia	Each	1596	1596	1596
	800mm Dia	Each	2153	2153	2153
	900mm Dia	Each	2708	2708	2708
	1000mm Dia	Each	3264	3264	3264
1.5	<b>Providing and laying in position following double socket cast iron 90° bend.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mmDia	Each		1417	1624
	100mm Dia	Each		2008	2159
	125mm Dia	Each		2597	2833
	150mm Dia	Each		3448	3713
	200mm Dia	Each		5282	5747
	250mm Dia	Each		7426	8140
	300mm Dia	Each		10078	11043
	350mm Dia	Each		13484	14805
	400mm Dia	Each		17226	18950
	450mm Dia	Each		21342	23666
	500mm Dia	Each		27000	29866
	600mm Dia	Each		38665	42981
	700mm Dia	Each		53698	59786
	750mm Dia	Each		62603	69815
	800mm Dia	Each		73344	81787

S.No.	Items	Unit	Rates in Rs.		
	900mm Dia	Each		96450	107821
	1000mm Dia	Each		122958	137406
1.6	<b>Providing and laying in position following double socket cast iron 45° bend.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mmDia	Each		1417	1624
	100mm Dia	Each		2008	2159
	125mm Dia	Each		2527	2763
	150mm Dia	Each		3308	3573
	200mm Dia	Each		4932	5396
	250mm Dia	Each		6866	7510
	300mm Dia	Each		9239	10064
	350mm Dia	Each		12110	13215
	400mm Dia	Each		15274	16637
	450mm Dia	Each		18739	20629
	500mm Dia	Each		23313	25529
	600mm Dia	Each		32592	35895
	700mm Dia	Each		44370	48868
	750mm Dia	Each		51251	56583
	800mm Dia	Each		59751	65880
	900mm Dia	Each		77144	85263
	1000mm Dia	Each		97363	107617
1.7	<b>Providing and laying in position following double socket cast iron 22½° bend.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mmDia	Each		1208	1485
	100mm Dia	Each		1798	1949
	125mm Dia	Each		2247	2413
	150mm Dia	Each		2958	3153
	200mm Dia	Each		4442	4767
	250mm Dia	Each		6097	6531
	300mm Dia	Each		7980	8595
	350mm Dia	Each		10302	11118
	400mm Dia	Each		12888	13888
	450mm Dia	Each		15630	16942
	500mm Dia	Each		19336	20901
	600mm Dia	Each		26591	28882
	700mm Dia	Each		35766	38674
	750mm Dia	Each		41274	44653
	800mm Dia	Each		47604	51780
	900mm Dia	Each		60803	66175

S.No.	Items	Unit	Rates in Rs.		
	1000mm Dia	Each		76034	82744
1.8	<b>Providing and laying in position following double socket cast iron 11¼° bend.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mmDia	Each		1278	1414
	100mm Dia	Each		1658	1809
	125mm Dia	Each		2107	2273
	150mm Dia	Each		2748	2944
	200mm Dia	Each		4093	4417
	250mm Dia	Each		5607	5972
	300mm Dia	Each		7350	7825
	350mm Dia	Each		9363	10034
	400mm Dia	Each		11659	12442
	450mm Dia	Each		14040	15134
	500mm Dia	Each		17384	18659
	600mm Dia	Each		23554	25338
	700mm Dia	Each		31210	33612
	750mm Dia	Each		35923	38724
	800mm Dia	Each		41313	44695
	900mm Dia	Each		52633	56703
	1000mm Dia	Each		65333	70308
1.9	<b>Providing and laying in position following all socket cast iron Tees (all sizes in Milimeters) Body Cross Branch Dia</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80x80	Each		1886	2024
	100x80	Each		2347	2385
	100x100	Each		2491	2645
	125x80	Each		2882	2963
	125x100	Each		3026	3222
	125x125	Each		3243	3483
	150x80	Each		3401	3612
	150x100	Each		3827	3872
	150x125	Each		3971	4132
	150x150	Each		4187	4530
	200x80	Each		5421	5893
	200x100	Each		5565	6038
	200x125	Each		5709	6182
	200x150	Each		5926	6399

S.No.	Items	Unit	Rates in Rs.	
	200x200	Each	6431	6904
	250x80	Each	7409	8067
	250x100	Each	7554	8212
	250x125	Each	7770	8427
	250x150	Each	7986	8644
	250x200	Each	8419	9077
	250x250	Each	8924	9654
	300x80	Each	9920	10835
	300x100	Each	9992	10907
	300x125	Each	10209	11124
	300x150	Each	10353	11268
	300x200	Each	10930	11846
	300x250	Each	11436	12422
	300x300	Each	12085	13072
	350x200	Each	13605	14852
	350x250	Each	14181	15429
	350x300	Each	14831	16079
	350x350	Each	15481	16800
	400x200	Each	16979	18555
	400x250	Each	17556	19133
	400x300	Each	18133	19783
	400x350	Each	18855	20505
	400x400	Each	19722	21370
	450x250	Each	21954	22572
	450x300	Each	22603	23536
	450x350	Each	23325	24378
	450x400	Each	24047	25412
	450x450	Each	24912	27016
	500x250	Each	26158	26973
	500x300	Each	26808	27937
	500x350	Each	27530	28779
	500x400	Each	28250	29885
	500x450	Each	29117	31418
	500x500	Each	30127	32917
	600x300	Each	37151	39194
	600x350	Each	37873	40036
	600x400	Each	38739	41215
	600x450	Each	39605	42819



S.No.	Items	Unit	Rates in Rs.	
	600x500	Each	40543	44174
	600x600	Each	42780	46944
	700x350	Each	51505	54324
	700x400	Each	52372	55575
	700x450	Each	53309	57251
	700x500	Each	54248	58607
	700x600	Each	56196	60871
	700x700	Each	58722	64150
	750x400	Each	60251	63729
	750x450	Each	61261	65406
	750x500	Each	62271	66905
	750x600	Each	64219	69242
	750x700	Each	66456	72088
	750x750	Each	68044	74449
	800x400	Each	69746	72894
	800x450	Each	70684	74570
	800x500	Each	71695	75997
	800x600	Each	73860	78551
	800x700	Each	76097	81469
	800x750	Each	77251	83397
	800x800	Each	78983	86472
	900x450	Each	90715	95641
	900x500	Each	91726	97069
	900x600	Each	94107	99983
	900x700	Each	96560	103046
	900x750	Each	97715	104974
	900x800	Each	99014	107472
	900x900	Each	102334	112242
	1000x500	Each	115227	122036
	1000x600	Each	117536	124807
	1000x700	Each	120423	128447
	1000x750	Each	121649	130447
	1000x800	Each	123020	133016
	1000x900	Each	125762	137066
	1000x1000	Each	129659	142349

S.No.	Items	Unit	Rates in Rs.		
1.10	<b>Providing and laying in position following all socketed cast iron crosses (all sizes in millimeter).</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mm	Each		2327	2464
	100mm	Each		2987	3209
	125mm	Each		3926	4162
	150mm	Each		5058	5392
	200mm	Each		7662	8195
	250mm	Each		10644	11429
	300mm	Each		14347	15381
1.11	<b>Providing and laying in position following socket &amp; spigot cast iron tapers (Reducer) (all sizes in mm).</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	100x80	Each		1481	1519
	125x80	Each		1871	1880
	125x100	Each		1943	2139
	150x80	Each		2383	2653
	150x100	Each		2456	2725
	150x125	Each		2672	2761
	200x100	Each		3545	3945
	200x125	Each		3689	4090
	200x150	Each		3905	4306
	250x125	Each		4884	5325
	250x150	Each		5028	5542
	250x200	Each		5460	6046
	300x150	Each		6673	7371
	300x200	Each		7178	7948
	300x250	Each		7683	8283
	350x200	Each		8337	8563
	350x250	Each		8914	9438
	350x300	Each		9491	10474
	400x250	Each		11134	11603
	400x300	Each		11856	12711
	400x350	Each		12577	13697
	450x350	Each		14377	15069
	450x400	Each		15243	16391
	500x350	Each		16560	16945
	500x400	Each		17427	18268

S.No.	Items	Unit	Rates in Rs.		
	500x450	Each		18364	20017
	600x400	Each		22647	23679
	600x450	Each		23658	25501
	600x500	Each		24740	27144
	700x500	Each		29640	31835
	700x600	Each		32094	35038
	750x600	Each		36293	39006
	750x700	Each		39251	43007
1.12	<b>Providing and laying in position including testing following Double Socket cast iron tapers (reducer) (all sizes in mm).</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	100x80	Each		1481	1663
	125x80	Each		1871	2313
	125x100	Each		1943	2645
	150x80	Each		2383	2942
	150x100	Each		2456	3158
	150x125	Each		2600	3266
	200x100	Each		3545	4162
	200x125	Each		3689	4450
	200x150	Each		1886	4739
	250x150	Each		5028	5758
	250x200	Each		5460	6479
	300x150	Each		6673	7011
	300x200	Each		7178	7659
	300x250	Each		7683	8139
	350x200	Each		8337	9502
	350x250	Each		8914	10736
	350x300	Each		9491	12133
	400x250	Each		11134	12036
	400x300	Each		11856	13433
	400x350	Each		12577	14780
	450x350	Each		14377	15790
	450x400	Each		15243	17401
	500x350	Each		16560	17739
	500x400	Each		17427	19422
	500x450	Each		18364	21171
	600x400	Each		22647	24401
	600x450	Each		23658	25068
	600x500	Each		24740	27072

S.No.	Items	Unit	Rates in Rs.		
	700x500	Each		29640	31113
	700x600	Each		32094	35038
	750x600	Each		36293	37419
	750x700	Each		39251	41781
1.13	<b>Providing and laying in position following cast iron collars.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each		1208	1344
	100mm dia	Each		1518	1670
	125mm dia	Each		1897	2063
	150mm dia	Each		2469	2664
	200mm dia	Each		3533	3858
	250mm dia	Each		4697	5132
	300mm dia	Each		6091	6565
	350mm dia	Each		7627	8226
	400mm dia	Each		9128	9984
	450mm dia	Each		11365	12314
	500 mm dia	Each		13480	14610
	600 mm dia	Each		17625	19121
	700 mm dia	Each		22752	24574
	750 mm dia	Each		25873	27951
	800 mm dia	Each		29745	32113
	900 mm dia	Each		36943	39784
	1000mm dia	Each		44943	48256
1.14	<b>Providing and laying in position following cast iron socket caps.</b>				
	80mm dia	Each		298	387
	100mm dia	Each		399	519
	125mm dia	Each		428	556
	150mm dia	Each		580	753
	200mm dia	Each		874	1049
	250mm dia	Each		1058	1271
	300mm dia	Each		1333	1599
	350mm dia	Each		1409	1691
	400mm dia	Each		1681	2017
	450mm dia	Each		2182	2400
	500 mm dia	Each		2561	2818
	600 mm dia	Each		2802	3083
	700 mm dia	Each		3302	3632
	750 mm dia	Each		3892	4282
	800 mm dia	Each		5089	5497
	900 mm dia	Each		6286	6789
	1000 mm dia	Each		7490	8089

S.No.	Items	Unit	Rates in Rs.	
1.15	<b>Providing and laying in position following cast iron plugs.</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each	438	574
	100mm dia	Each	609	760
	125mm dia	Each	778	944
	150mm dia	Each	1139	1334
	200mm dia	Each	1784	2039
	250mm dia	Each	2459	2823
	300mm dia	Each	3292	3697
	350mm dia	Each	4157	4683
	400mm dia	Each	5369	5935
	450mm dia	Each	6882	7687
	500 mm dia	Each	8418	9332
	600 mm dia	Each	11480	12685
	700 mm dia	Each	15666	17127
	750 mm dia	Each	18425	20069
	800 mm dia	Each	22081	23871
	900 mm dia	Each	28483	30601
	1000 mm dia	Each	35977	38422
1.16	<b>Providing and laying in position following sizes of socket &amp; spigot or all socketed cast iron specials class MEDIUM or HEAVY which does not appear in above items of schedule.</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm to 300mm Dia	Kg	88	88
	Above 300mm Dia	Kg	85	85
1.17	<b>Labour for laying in position following double socket cast iron 45° bends.</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each	35	39
	100mm dia	Each	50	52
	125mm dia	Each	64	69
	150mm dia	Each	83	88
	200mm dia	Each	124	133
	250mm dia	Each	178	191
	300mm dia	Each	242	259
	350mm dia	Each	317	341
	400mm dia	Each	404	433
	450mm dia	Each	491	532
	500 mm dia	Each	616	665
	600 mm dia	Each	884	961

S.No.	Items	Unit	Rates in Rs.		
	700 mm dia	Each		1218	1328
	750 mm dia	Each		1405	1536
	800 mm dia	Each		1622	1774
	900 mm dia	Each		2103	2310
	1000mm dia	Each		2667	2934
1.18	<b>Labour for laying in position following double socket cast Iron 90<sup>0</sup> bends</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each		35	39
	100mm dia	Each		50	52
	125mm dia	Each		66	71
	150mm dia	Each		88	93
	200mm dia	Each		135	143
	250mm dia	Each		195	210
	300mm dia	Each		268	290
	350mm dia	Each		358	388
	400mm dia	Each		462	502
	450mm dia	Each		568	622
	500 mm dia	Each		725	794
	600 mm dia	Each		1065	1171
	700 mm dia	Each		1496	1652
	750 mm dia	Each		1742	1929
	800 mm dia	Each		2025	2246
	900 mm dia	Each		2675	2980
	1000mm dia	Each		3427	3819
1.19	<b>Labour for laying in position following double socket cast iron 22½° bends.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each		27	35
	100mm dia	Each		43	45
	125mm dia	Each		56	58
	150mm dia	Each		73	75
	200mm dia	Each		110	114
	250mm dia	Each		155	161
	300mm dia	Each		203	215
	350mm dia	Each		264	279
	400mm dia	Each		332	352
	450mm dia	Each		399	423
	500 mm dia	Each		498	528
	600 mm dia	Each		706	753
	700 mm dia	Each		963	1026
	750 mm dia	Each		1109	1183
	800 mm dia	Each		1262	1356



S.No.	Items	Unit	Rates in Rs.		
	900 mm dia	Each		1618	1744
	1000mm dia	Each		2034	2197
1.20	<b>Labour for laying in position following double socket castiron 11¼ ° bends.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each		31	33
	100mm dia	Each		39	41
	125mm dia	Each		52	54
	150mm dia	Each		66	69
	200mm dia	Each		99	103
	250mm dia	Each		139	143
	300mm dia	Each		184	191
	350mm dia	Each		236	247
	400mm dia	Each		296	309
	450mm dia	Each		352	369
	500 mm dia	Each		440	462
	600 mm dia	Each		616	648
	700 mm dia	Each		828	875
	750 mm dia	Each		951	1007
	800 mm dia	Each		1075	1146
	900 mm dia	Each		1376	1463
	1000mm dia	Each		1716	1828
1.21	<b>Labour for laying in position including testing following all socket cast iron, tees (all Sizes in mm).</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80x80	Each		47	50
	100x80	Each		58	60
	100x100	Each		62	64
	125x80	Each		73	77
	125x100	Each		77	81
	125x125	Each		83	88
	150x80	Each		93	97
	150x100	Each		97	101
	150x125	Each		101	108
	150x150	Each		108	114
	200x80	Each		135	143
	200x100	Each		139	148
	200x125	Each		143	153
	200x150	Each		150	159
	200x200	Each		165	174
	250x80	Each		189	201
	250x100	Each		193	206

S.No.	Items	Unit	Rates in Rs.		
	250x125	Each		199	213
	250x150	Each		206	219
	250x200	Each		219	232
	250x250	Each		234	249
	300x80	Each		255	275
	300x100	Each		257	277
	300x125	Each		264	284
	300x150	Each		268	288
	300x200	Each		286	305
	300x250	Each		300	322
	300x300	Each		319	341
	350x200	Each		363	390
	350x250	Each		379	408
	350x300	Each		399	427
	350x350	Each		418	448
	400x200	Each		455	491
	400x250	Each		472	508
	400x300	Each		489	528
	400x350	Each		510	549
	400x400	Each		537	574
	450x250	Each		588	632
	450x300	Each		607	652
	450x350	Each		628	674
	450x400	Each		650	695
	450x450	Each		676	723
	500x250	Each		702	764
	500x300	Each		721	783
	500x350	Each		742	804
	500x400	Each		764	828
	500x450	Each		789	854
	500x500	Each		820	886
	600x300	Each		1021	1117
	600x350	Each		1042	1139
	600x400	Each		1069	1165
	600x450	Each		1094	1193
	600x500	Each		1123	1221
	600x600	Each		1189	1291

S.No.	Items	Unit	Rates in Rs.		
	700x350	Each		1433	1564
	700x400	Each		1459	1592
	700x450	Each		1487	1622
	700x500	Each		1515	1650
	700x600	Each		1573	1705
	700x700	Each		1647	1785
	750x400	Each		1676	1834
	750x450	Each		1705	1865
	750x500	Each		1736	1896
	750x600	Each		1794	1954
	750x700	Each		1860	2021
	750x750	Each		1907	2070
	800x400	Each		1923	2107
	800x450	Each		1950	2137
	800x500	Each		1981	2167
	800x600	Each		2045	2231
	800x700	Each		2111	2300
	800x750	Each		2145	2337
	800x800	Each		2197	2390
	900x450	Each		2510	2764
	900x500	Each		2540	2793
	900x600	Each		2611	2868
	900x700	Each		2684	2942
	900x750	Each		2718	2978
	900x800	Each		2757	3015
	900x900	Each		2855	3117
	1000x500	Each		3203	3535
	1000x600	Each		3272	3607
	1000x700	Each		3357	3697
	1000x750	Each		3394	3736
	1000x800	Each		3435	3773
	1000x900	Each		3516	3856
	1000x1000	Each		3632	3974
1.22	<b>Labour for laying in position following all socket cast iron crosses. (all sizes in mm).</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80mm dia	Each		62	64

S.No.	Items	Unit	Rates in Rs.		
	100mm dia	Each		79	83
	125mm dia	Each		108	112
	150mm dia	Each		137	143
	200mm dia	Each		208	219
	250mm dia	Each		294	311
	300mm dia	Each		399	423
1.23	<b>Labour for laying in position including testing following socket and spigot cast iron tapers, (reducer) (all Sizes in mm)</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	100x80	Each		33	35
	125x80	Each		43	45
	125x100	Each		45	50
	150x80	Each		54	58
	150x100	Each		56	60
	150x125	Each		62	66
	200x100	Each		79	85
	200x125	Each		83	90
	200x150	Each		90	97
	250x125	Each		114	120
	250x150	Each		118	126
	250x200	Each		131	141
	300x150	Each		159	172
	300x200	Each		174	189
	300x250	Each		189	208
	350x200	Each		206	223
	350x250	Each		223	242
	350x300	Each		240	264
	400x250	Each		281	307
	400x300	Each		303	330
	400x350	Each		324	356
	450x350	Each		363	397
	450x400	Each		388	427
	500x350	Each		416	452
	500x400	Each		442	483
	500x450	Each		470	514
	600x400	Each		590	644
	600x450	Each		620	678
	600x500	Each		652	715

S.No.	Items	Unit	Rates in Rs.		
	700x500	Each		783	854
	700x600	Each		856	937
	750x600	Each		963	1055
	750x700	Each		1051	1156
1.24	<b>Labour for laying in position including testing following Double Socket cast iron taper (reducer ) (all sizes in mm).</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	100x80	Each		33	39
	125x80	Each		43	58
	125x100	Each		45	64
	150x80	Each		54	66
	150x100	Each		56	73
	150x125	Each		60	81
	200x100	Each		79	93
	200x125	Each		83	101
	200x150	Each		90	110
	250x150	Each		118	133
	250x200	Each		131	155
	300x150	Each		159	161
	300x200	Each		174	180
	300x250	Each		189	203
	350x200	Each		206	251
	350x250	Each		223	281
	350x300	Each		240	313
	400x250	Each		281	319
	400x300	Each		303	352
	400x350	Each		324	388
	450x350	Each		363	418
	450x400	Each		388	457
	500x350	Each		416	476
	500x400	Each		442	518
	500x450	Each		470	549
	600x400	Each		590	665
	600x450	Each		620	665
	600x500	Each		652	713
	700x500	Each		783	833
	700x600	Each		856	937
	750x600	Each		963	1009
	750x700	Each		1051	1119

S.No.	Items	Unit	Rates in Rs.		
1.25	<b>Labour for laying in position including testing following cast Iron Collars.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80 mm Dia	Each		27	31
	100 mm Dia	Each		35	37
	125 mm Dia	Each		45	47
	150 mm Dia	Each		58	60
	200 mm Dia	Each		81	85
	250 mm Dia	Each		112	118
	300 mm Dia	Each		145	153
	350 mm Dia	Each		184	193
	400 mm Dia	Each		221	236
	450 mm Dia	Each		272	286
	500 mm Dia	Each		324	341
	600 mm Dia	Each		440	464
	700 mm Dia	Each		578	607
	750 mm Dia	Each		652	686
	800 mm Dia	Each		732	773
	900 mm Dia	Each		910	961
	1000 mm Dia	Each		1111	1173
1.26	<b>Labour for laying in position following socketed cast iron caps.</b>			<b>Medium Class</b>	<b>Heavy Class</b>
	80 mm Dia	Each		10	15
	100 mm Dia	Each		13	19
	125 mm Dia	Each		18	25
	150 mm Dia	Each		22	33
	200 mm Dia	Each		36	52
	250 mm Dia	Each		51	73
	300 mm Dia	Each		69	99
	350 mm Dia	Each		92	131
	400 mm Dia	Each		116	165
	450 mm Dia	Each		145	208
	500 mm Dia	Each		177	253
	600 mm Dia	Each		257	367
	700 mm Dia	Each		353	504
	750 mm Dia	Each		409	584
	800 mm Dia	Each		472	674
	900 mm Dia	Each		608	869
	1000 mm Dia	Each		772	1103

S.No.	Items	Unit	Rates in Rs.	
1.27	<b>Labour for laying in position including testing following cast iron plugs.</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80 mm Dia	Each	4	6
	100 mm Dia	Each	6	8
	125 mm Dia	Each	11	13
	150 mm Dia	Each	17	19
	200 mm Dia	Each	27	31
	250 mm Dia	Each	43	47
	300 mm Dia	Each	60	64
	350 mm Dia	Each	81	88
	400 mm Dia	Each	110	116
	450 mm Dia	Each	139	148
	500 mm Dia	Each	174	184
	600 mm Dia	Each	257	272
	700 mm Dia	Each	367	386
	750 mm Dia	Each	431	452
	800 mm Dia	Each	504	528
	900 mm Dia	Each	659	688
	1000 mm Dia	Each	845	882
1.28	<b>Labour for laying in position following sizes of socket &amp; spigot or all socketed cast iron standard specials class 'MEDIUM' or 'HEAVY' Which do not appear in above items of the schedule.</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80 mm to 750 mm Dia	Kg	2	2



**CHAPTER – II**

**CAST IRON TYTON PIPES**  
**WITH TYTON JOINTS**

## Chapter – II

### CAST IRON TYTON PIPES WITH TYTON JOINTS (CLASS LA, A, B)

#### NOTES:

1. The C.I. pipe shall conform to IS:1536-2001
2. The C.I. fittings shall conform to IS -1538-1993 (Part I to XXIV).
3. The laying of C.I. pipes shall be done as per IS:3114:1994
4. The caulking lead shall conform to IS 782:1978
5. All measurements shall be of the finished work.
6. Work shall be executed in accordance with the relevant Indian Standard Specifications (Updated) and all the conditions of the agreement of the work.
7. The rubber sealing rings for jointing of pipe line shall be conforming to IS 5382:1985
8. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### SOCKET AND SPIGOT CAST IRON PIPES WITH TYTON JOINTS (CLASS LA, A, AND B)

S.No.	Items	Unit	Rates in Rs.		
2.1	<b>Providing, laying and jointing following cast iron tyton pipes with tyton joints including testing of joints, cost of pipes and jointing materials etc complete.</b>				
			<b>Class LA</b>	<b>Class A</b>	<b>Class B</b>
	80mm Dia	Meter	1197	1225	1315
	100mm Dia	Meter	1472	1538	1661
	125mm Dia	Meter	1870	1953	2098
	150mm Dia	Meter	2319	2445	2640
	200mm Dia	Meter	3357	3481	3740
	250mm Dia	Meter	4420	4626	4939
	300mm Dia	Meter	5697	5990	6348
	350mm Dia	Meter	7023	7356	7373
	400mm Dia	Meter	8698	9018	9589
	450mm Dia	Meter	10456	10930	11535
	500mm Dia	Meter	12143	12691	13448
	600mm Dia	Meter	16119	16948	17992
	700mm Dia	Meter	20524	21494	22951
	750mm Dia	Meter	22559	23649	25354
	800mm Dia	Meter	31433	33608	36656
	900mm Dia	Meter	37624	40263	44002

S.No.	Items	Unit	Rates in Rs.		
	1000mm Dia	Meter	44307	47556	51778
2.2	<b>Labour for laying in position including testing following cast iron tyton pipes.</b>		<b>Class LA</b>	<b>Class- A</b>	<b>Class-B</b>
	80mm Dia	Meter	18	20	21
	100mm Dia	Meter	22	25	27
	125mm Dia	Meter	29	33	35
	150mm Dia	Meter	37	41	44
	200mm Dia	Meter	54	59	63
	250mm Dia	Meter	73	79	84
	300mm Dia	Meter	94	103	109
	350mm Dia	Meter	118	128	136
	400mm Dia	Meter	144	158	168
	450mm Dia	Meter	174	191	201
	500mm Dia	Meter	203	222	235
	600mm Dia	Meter	271	296	314
	700mm Dia	Meter	350	382	408
	750mm Dia	Meter	391	428	460
	800mm Dia	Meter	554	609	664
	900mm Dia	Meter	675	743	812
	1000mm Dia	Meter	812	895	974
2.3	<b>Providing tyton joints to following 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.).</b>				
	80mm Dia	Each			84
	100mm Dia	Each			94
	125mm Dia	Each			105
	150mm Dia	Each			119
	200mm Dia	Each			194
	250mm Dia	Each			232
	300mm Dia	Each			297
	350mm Dia	Each			341
	400mm Dia	Each			565
	450mm Dia	Each			651
	500mm Dia	Each			663
	600mm Dia	Each			822
	700mm Dia	Each			1142
	750mm Dia	Each			1254
	800mm Dia	Each			1328
	900mm Dia	Each			1592
	1000mm Dia	Each			1818

S.No.	Items	Unit	Rates in Rs.		
2.4	<b>Labour for providing tyton joints to following tyton pipes class 'LA' 'A'and 'B' including testing of joints but excluding cost of Rubber Gasket.</b>				
	80mmDia	Each			56
	100mm Dia	Each			59
	125mm Dia	Each			62
	150mm Dia	Each			66
	200mm Dia	Each			69
	250mm Dia	Each			83
	300mm Dia	Each			89
	350mm Dia	Each			104
	400mm Dia	Each			134
	450mm Dia	Each			148
	500mm Dia	Each			159
	600mm Dia	Each			193
	700mm Dia	Each			226
	750mm Dia	Each			236
	800mm Dia	Each			250
	900mm Dia	Each			294
	1000mm Dia	Each			315

**CHAPTER – III**

**CAST IRON PIPES AND SPECIALS WITH  
FLANGED JOINTS**

### Chapter – III

## CAST IRON PIPES AND SPECIALS WITH FLANGED JOINTS

#### NOTES:

1. The Horizontal C.I. double flanged pipe shall conform to IS:7181-1986
2. The C.I. fittings shall conform to IS -1538-1993 (Part I to XXIV).
3. The laying of C.I. pipes shall be done as per IS:3114:1994
4. All measurements shall be of the finished work.
5. Work shall be executed in accordance with the relevant Indian Standard Specifications (Updated) and all the conditions of the agreement of the work.
6. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

#### CAST IRON PIPES AND SPECIALS WITH FLANGED JOINTS (CLASS A, B)

S.No.	ITEMS	Unit	Rates in Rs.	
3.1	<b>Providing, fixing and testing following double flanged cast iron(horizontal cast) pipe per IS :7181 of <i>One Meter</i> length.</b>			
	80mm Dia	Each	1701	
	100mm Dia	Each	2176	
	125mm Dia	Each	2651	
	150mm Dia	Each	3270	
	200mm Dia	Each	4447	
	250mm Dia	Each	5939	
	300mm Dia	Each	7492	
	350mm Dia	Each	9289	
	400mm Dia	Each	11606	
	450mm Dia	Each	14060	
	500mm Dia	Each	16258	
	600mm Dia	Each	21515	
	700mm Dia	Each	27496	
	750mm Dia	Each	29941	
3.2	<b>Labour only for fixing including testing following double flanged cast iron (horizontal cast) pipe per IS : 7181 of <i>One Meter</i> length.</b>			
	80mm Dia	Each	130	
	100mm Dia	Each	141	
	125mm Dia	Each	155	
	150mm Dia	Each	169	

S.No.	ITEMS	Unit	Rates in Rs.	
	200mm Dia	Each	192	
	250mm Dia	Each	240	
	300mm Dia	Each	274	
	350mm Dia	Each	326	
	400mm Dia	Each	413	
	450mm Dia	Each	471	
	500mm Dia	Each	522	
	600mm Dia	Each	657	
	700mm Dia	Each	801	
	750mm Dia	Each	864	
3.3	<b>Providing, fixing including testing following double flanged cast iron (horizontal cast) pipe per IS: 7181 of Two Meterlength.</b>			
	80mm Dia	Each	3087	
	100mm Dia	Each	3915	
	125mm Dia	Each	4859	
	150mm Dia	Each	6034	
	200mm Dia	Each	8382	
	250mm Dia	Each	11166	
	300mm Dia	Each	14259	
	350mm Dia	Each	17599	
	400mm Dia	Each	21791	
	450mm Dia	Each	26406	
	500mm Dia	Each	30592	
	600mm Dia	Each	40657	
	700mm Dia	Each	51766	
	750mm Dia	Each	56636	
3.4	<b>Labour only for fixing including testing following double flanged cast iron (horizontal cast) pipe per IS: 7181 of Two Meter length.</b>			
	80mm Dia	Each	148	
	100mm Dia	Each	164	
	125mm Dia	Each	184	
	150mm Dia	Each	205	
	200mm Dia	Each	246	
	250mm Dia	Each	312	
	300mm Dia	Each	367	
	350mm Dia	Each	445	
	400mm Dia	Each	557	
	450mm Dia	Each	645	
	500mm Dia	Each	725	
	600mm Dia	Each	928	
	700mm Dia	Each	1151	



S.No.	ITEMS	Unit	Rates in Rs.	
	750mm Dia	Each	1256	
3.5	<b>Providing, fixing including testing following double flanged cast iron (horizontal cast) pipe per IS: 7181 of 2.75 Meter length.</b>			
	80mm Dia	Each	4113	
	100mm Dia	Each	5202	
	125mm Dia	Each	6493	
	150mm Dia	Each	8078	
	200mm Dia	Each	11292	
	250mm Dia	Each	15032	
	300mm Dia	Each	19264	
	350mm Dia	Each	23741	
	400mm Dia	Each	29322	
	450mm Dia	Each	35535	
	500mm Dia	Each	41189	
	600mm Dia	Each	54810	
	700mm Dia	Each	69705	
	750mm Dia	Each	76363	
3.6	<b>Labour only for fixing including testing following double flanged cast iron (horizontal cast) pipe per IS: 7181 of 2.75 Meter length.</b>			
	80mm Dia	Each	148	
	100mm Dia	Each	164	
	125mm Dia	Each	184	
	150mm Dia	Each	205	
	200mm Dia	Each	246	
	250mm Dia	Each	312	
	300mm Dia	Each	367	
	350mm Dia	Each	445	
	400mm Dia	Each	557	
	450mm Dia	Each	645	
	500mm Dia	Each	725	
	600mm Dia	Each	928	
	700mm Dia	Each	1151	
	750mm Dia	Each	1256	
3.7	<b>Providing flanged joints to following double flanged cast iron (horizontal cast) pipes and specials class 'A' and 'B' including labour &amp; cost of jointing materials (i.e. Bolt, Nuts and Rubber insertions) including testing of joint etc. complete.</b>			

S.No.	ITEMS	Unit	Rates in Rs.	
	80mm Dia	Each	158	
	100mm Dia	Each	218	
	125mm Dia	Each	222	
	150mm Dia	Each	253	
	200mm Dia	Each	256	
	250mm Dia	Each	356	
	300mm Dia	Each	362	
	350mm Dia	Each	490	
	400mm Dia	Each	711	
	450mm Dia	Each	857	
	500mm Dia	Each	963	
	600mm Dia	Each	1187	
	700mm Dia	Each	1614	
	750mm Dia	Each	1624	
	800mm Dia	Each	1787	
	900mm Dia	Each	2139	
	1000mm Dia	Each	2517	
3.8	<b>Labour for Providing Flanged joint to following flanged cast iron pipes and specials class 'A' and 'B' including testing of joints but excluding cost of jointing materials (i.e. Bolts &amp; Nut, Rubber insertion)</b>			
	80mm Dia	Each	56	
	100mm Dia	Each	59	
	125mm Dia	Each	62	
	150mm Dia	Each	66	
	200mm Dia	Each	69	
	250mm Dia	Each	83	
	300mm Dia	Each	89	
	350mm Dia	Each	104	
	400mm Dia	Each	134	
	450mm Dia	Each	148	
	500mm Dia	Each	159	
	600mm Dia	Each	193	
	700mm Dia	Each	226	
	750mm Dia	Each	236	
	800mm Dia	Each	250	
	900mm Dia	Each	294	
	1000mm Dia	Each	315	

S.No.	ITEMS	Unit	Rates in Rs.	
3.9	<b>Labour only for providing flanged joints to following double flanged horizontally cast iron pipes and specials in vertical or inclined direction including testing of joints but excluding cost or jointing materials (i.e. bolts, nuts and rubber insertion sheet)</b>			
	80mm to 750mm dia in truly vertical position		200% above the rates provided vide item No.3.2, 3.4 & 3.6	
	In inclined position at inclination 45% & above		100% above rates provided vide item No. 3.2, 3.4 & 3.6	
	In inclined position at inclination less than 45%		Same as rates provided vide item no. 3.2, 3.4 & 3.6	
3.10	<b>Providing &amp; Laying in position including testing following cast iron flanged sockets (all sizes in mm) confirming to IS: 1538</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm Dia	Each	876	949
	100mm Dia	Each	1095	1168
	125mm Dia	Each	1387	1460
	150mm Dia	Each	1825	1898
	200mm Dia	Each	2628	2702
	250mm Dia	Each	4234	4527
	300mm Dia	Each	5402	5767
	350mm Dia	Each	6862	7301
	400mm Dia	Each	8469	8979
	450mm Dia	Each	9783	10367
	500mm Dia	Each	11899	12630
	600mm Dia	Each	16134	17083
	700mm Dia	Each	21098	22340
	750mm Dia	Each	23945	25333
	800mm Dia	Each	26982	28545
	900mm Dia	Each	32846	34751
	1000mm Dia	Each	40023	42344
3.11	<b>Providing and laying in position including testing following cast iron flanged spigot (tailpiece)</b>			
	80mm Dia	Each	803	876
	100mm Dia	Each	949	1022
	125mm Dia	Each	1242	1387
	150mm Dia	Each	1533	1679
	200mm Dia	Each	2555	2847
	250mm Dia	Each	3432	3869
	300mm Dia	Each	4380	4964

S.No.	ITEMS	Unit	Rates in Rs.	
	350mm Dia	Each	5549	6205
	400mm Dia	Each	6717	7592
	450mm Dia	Each	7957	8979
	500mm Dia	Each	9491	10659
	600mm Dia	Each	14674	16573
	700mm Dia	Each	19055	21537
	750mm Dia	Each	21610	24384
	800mm Dia	Each	24087	24395
	900mm Dia	Each	28926	34709
	1000mm Dia	Each	34761	39787
3.12	<b>Providing and laying in position including testing following cast iron double flanged 90° bends (all sizes inmm)</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm Dia	Each	876	949
	100mm Dia	Each	1168	1679
	125mm Dia	Each	1533	2263
	150mm Dia	Each	2117	3577
	200mm Dia	Each	3285	5257
	250mm Dia	Each	4745	7301
	300mm Dia	Each	6570	10002
	350mm Dia	Each	8979	13214
	400mm Dia	Each	11827	16499
	450mm Dia	Each	18835	21172
	500mm Dia	Each	28619	32269
	600mm Dia	Each	41321	46650
	700mm Dia	Each	48767	55119
	750mm Dia	Each	57556	65129
	800mm Dia	Each	67811	76775
	900mm Dia	Each	89351	101707
	1000mm Dia	Each	117268	133192
3.13	<b>Providing and laying in position including testing following cast iron double flanged 45° bends (all sizes in mm)</b>			
	80mm Dia	Each	965	1022
	100mm Dia	Each	1240	1314
	125mm Dia	Each	1722	1825
	150mm Dia	Each	2343	2482
	200mm Dia	Each	3720	3942
	250mm Dia	Each	5511	5840
	300mm Dia	Each	7716	8177
	350mm Dia	Each	7923	8396
	400mm Dia	Each	10266	10878
	450mm Dia	Each	12745	13506

S.No.	ITEMS	Unit	Rates in Rs.	
	500mm Dia	Each	15915	16864
	600mm Dia	Each	23562	24968
	700mm Dia	Each	33414	35408
	750mm Dia	Each	39407	41760
3.14	<b>Providing and laying in position including testing following cast iron double flanged 90° Duck Foot Bend</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm Dia	Each	1460	1533
	100mm Dia	Each	1825	1898
	125mm Dia	Each	2482	2628
	150mm Dia	Each	3285	3432
	200mm Dia	Each	5110	5402
	250mm Dia	Each	7592	8104
	300mm Dia	Each	10659	11389
	350mm Dia	Each	14601	15623
	400mm Dia	Each	19128	20515
	450mm Dia	Each	23727	25552
	500mm Dia	Each	30224	32561
	600mm Dia	Each	45775	49425
3.15	<b>Providing and laying in position including testing following cast iron all flanged Tees (all sizes in mm) Body x Branch</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80x80	Each	1460	1533
	100x80	Each	1679	1825
	100x100	Each	1752	1898
	125x80	Each	2117	2337
	125x100	Each	2337	2482
	125x125	Each	2409	2628
	150x80	Each	2774	2993
	150x100	Each	2847	3067
	150x125	Each	2993	3285
	150x150	Each	3139	3432
	200x80	Each	4089	4527
	200x100	Each	4162	4599
	200x125	Each	4380	4819
	200x150	Each	4527	4964
	200x200	Each	4892	5402
	250x80	Each	5840	6497
	250x100	Each	5914	6570
	250x125	Each	6132	6789
	250x150	Each	6352	7009
	250x200	Each	6717	7447
	250x250	Each	7227	7957

S.No.	ITEMS	Unit	Rates in Rs.	
	300x80	Each	7957	8907
	300x100	Each	8104	9052
	300x125	Each	8249	9199
	300x150	Each	8469	9418
	300x200	Each	8907	9929
	300x250	Each	9418	10439
	300x300	Each	9929	11024
	350x200	Each	11097	12338
	350x250	Each	11389	12630
	350x300	Each	12411	13725
	350x350	Each	12776	14236
	400x200	Each	13798	15404
	400x250	Each	14090	15696
	400x300	Each	15185	16938
	400x350	Each	15623	17448
	400x400	Each	16134	17960
	450x250	Each	16938	18981
	450x300	Each	18033	20223
	450x350	Each	18470	20733
	450x400	Each	18908	21172
	450x450	Each	19346	21610
	500x250	Each	20515	22997
	500x300	Each	21755	24384
	500x350	Each	22267	24968
	500x400	Each	22778	25479
	500x450	Each	23215	25990
	500x500	Each	23727	26501
	600x300	Each	30224	34021
	600x350	Each	30954	34678
	600x400	Each	31539	35408
	600x450	Each	31976	35919
	600x500	Each	32487	36430
	600x600	Each	33656	37671
	700x350	Each	41613	46870
	700x400	Each	42197	47527
	700x450	Each	42855	48184
	700x500	Each	43438	48840
	700x600	Each	44607	50082
	700x700	Each	46140	51615
	750x400	Each	48330	54462
	750x450	Each	48914	55046
	750x500	Each	49717	55922
	750x600	Each	50666	56871
	750x700	Each	51615	57821
	800x400	Each	55631	62638

S.No.	ITEMS	Unit	Rates in Rs.	
	800x450	Each	56214	63296
	800x500	Each	56871	64026
	800x600	Each	58258	65486
	800x700	Each	59646	66873
	800x750	Each	60448	67749
	800x800	Each	61398	68698
	900x450	Each	70524	79649
	900x500	Each	71545	80744
	900x600	Each	73006	82350
	900x700	Each	74466	83883
	900x750	Each	75342	84760
	900x800	Each	76218	85635
	900x900	Each	77459	86877
3.16	<b>Providing and laying in position including testing following cast iron double flanged Tapers (all size in mm) Body x Branch</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	100x80	Each	803	876
	125x80	Each	1314	1460
	125x100	Each	1460	1607
	150x80	Each	1533	1679
	150x100	Each	1679	1825
	150x125	Each	1825	1972
	200x100	Each	2117	2263
	200x125	Each	2263	2482
	200x150	Each	2482	2702
	250x125	Each	2774	2993
	250x150	Each	2920	3212
	250x200	Each	3358	3650
	300x150	Each	3432	3723
	300x200	Each	3869	4234
	300x250	Each	4380	4745
	350x200	Each	5767	6352
	350x250	Each	6352	7009
	350x300	Each	7009	7739
	400x250	Each	7154	7957
	400x300	Each	7884	8761
	400x350	Each	8687	9637
	450x300	Each	8542	9491
	450x350	Each	9564	10586
	450x400	Each	10439	11534
	500x350	Each	10513	11681
	500x400	Each	11462	12703
	500x450	Each	12265	13579

S.No.	ITEMS	Unit	Rates in Rs.	
	600x400	Each	13871	15331
	600x450	Each	14601	16208
	600x500	Each	15769	17448
	700x500	Each	18543	20515
	700x600	Each	20953	23143
	750x600	Each	22340	24675
	750x700	Each	24384	26866
	800x600	Each	25114	27742
	800x700	Each	27158	29932
	800x750	Each	28326	31246
	900x700	Each	30297	33436
	900x750	Each	31611	34896
	900X800	Each	33656	37086
	1000x800	Each	37816	41613
	1000x900	Each	40883	45045
3.17	<b>Providing and laying in position including testing following all flanged cast iron crosses (all sizes in mm)</b>			
	80mm Dia	Each	1825	1972
	100mm Dia	Each	2263	2482
	125mm Dia	Each	2993	3358
	150mm Dia	Each	3942	4380
	200mm Dia	Each	6132	6789
	250mm Dia	Each	8907	9856
	300mm Dia	Each	12046	13141
3.18	<b>Providing and laying in position including testing following all flanged cast iron blank flanges (all sizes in mm)</b>			
	80mm Dia	Each	328	365
	100mm Dia	Each	395	438
	125mm Dia	Each	526	584
	150mm Dia	Each	723	803
	200mm Dia	Each	1051	1168
	250mm Dia	Each	1511	1679
	300mm Dia	Each	2103	2337
	350mm Dia	Each	2826	3139
	400mm Dia	Each	3614	4015
	450mm Dia	Each	4403	4892
	500mm Dia	Each	5585	6205
	600mm Dia	Each	8279	9199
	700mm Dia	Each	11630	12922
	750mm Dia	Each	13601	15113
	800mm Dia	Each	16098	17886



S.No.	ITEMS	Unit	Rates in Rs.	
	900mm Dia	Each	20566	22850
	1000mm Dia	Each	26677	29640
3.19	<b>Labour for laying in position including testing following cast iron flanged sockets (all sizes in mm)</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm Dia	Each	25	27
	100mm Dia	Each	33	35
	125mm Dia	Each	41	43
	150mm Dia	Each	54	56
	200mm Dia	Each	77	79
	250mm Dia	Each	124	133
	300mm Dia	Each	159	170
	350mm Dia	Each	201	215
	400mm Dia	Each	249	264
	450mm Dia	Each	288	305
	500mm Dia	Each	350	371
	600mm Dia	Each	474	502
	700mm Dia	Each	620	657
	750mm Dia	Each	704	744
	800mm Dia	Each	793	839
	900mm Dia	Each	965	1021
	1000mm Dia	Each	1176	1245
3.20	<b>Labour for laying in position including testing following cast iron flanged Spigot (all sizes in mm)</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm Dia	Each	23	25
	100mm Dia	Each	27	31
	125mm Dia	Each	37	41
	150mm Dia	Each	45	50
	200mm Dia	Each	75	83
	250mm Dia	Each	101	114
	300mm Dia	Each	129	145
	350mm Dia	Each	163	182
	400mm Dia	Each	197	223
	450mm Dia	Each	234	264
	500mm Dia	Each	279	313
	600mm Dia	Each	431	487
	700mm Dia	Each	560	632
	750mm Dia	Each	635	717
	800mm Dia	Each	708	717
	900mm Dia	Each	850	1020
	1000mm Dia	Each	1022	1169

S.No.	ITEMS	Unit	Rates in Rs.	
3.21	<b>Labour for laying in position including testing following cast iron double flanged 90° Bend (all sizes in mm)</b>		<b>Medium Class</b>	<b>Heavy class</b>
	80mm Dia	Each	25	27
	100mm Dia	Each	35	50
	125mm Dia	Each	45	66
	150mm Dia	Each	62	105
	200mm Dia	Each	97	155
	250mm Dia	Each	139	215
	300mm Dia	Each	193	294
	350mm Dia	Each	264	388
	400mm Dia	Each	348	485
	450mm Dia	Each	553	622
	500mm Dia	Each	841	949
	600mm Dia	Each	1214	1371
	700mm Dia	Each	1433	1620
	750mm Dia	Each	1691	1914
	800mm Dia	Each	1993	2256
	900mm Dia	Each	2625	2989
	1000mm Dia	Each	3446	3915
3.22	<b>Labour for laying in position including testing following cast iron double flanged 45° bend (all sizes in mm)</b>			
	80mm Dia	Each	27	31
	100mm Dia	Each	35	39
	125mm Dia	Each	48	54
	150mm Dia	Each	66	73
	200mm Dia	Each	105	116
	250mm Dia	Each	155	172
	300mm Dia	Each	217	240
	350mm Dia	Each	222	247
	400mm Dia	Each	288	319
	450mm Dia	Each	357	397
	500mm Dia	Each	446	495
	600mm Dia	Each	660	734
	700mm Dia	Each	936	1040
	750mm Dia	Each	1104	1227
3.23	<b>Labour for laying in position including testing following cast iron double flanged 90° duck foot bend. (all sizes in mm)</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mm Dia	Each	43	45
	100mm Dia	Each	54	56

S.No.	ITEMS	Unit	Rates in Rs.	
	125mm Dia	Each	73	77
	150mm Dia	Each	97	101
	200mm Dia	Each	150	159
	250mm Dia	Each	223	238
	300mm Dia	Each	313	335
	350mm Dia	Each	429	460
	400mm Dia	Each	562	603
	450mm Dia	Each	698	751
	500mm Dia	Each	889	957
	600mm Dia	Each	1345	1452
3.24	<b>Labour for laying in position including testing following cast iron all flanged tees (all sizes in mm) Body x Branch</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80x80	Each	43	45
	100x80	Each	50	54
	100x100	Each	52	56
	125x80	Each	62	69
	125x100	Each	69	73
	125x125	Each	71	77
	150x80	Each	81	88
	150x100	Each	83	90
	150x125	Each	88	97
	150x150	Each	93	101
	200x80	Each	120	133
	200x100	Each	122	135
	200x125	Each	129	141
	200x150	Each	133	145
	200x200	Each	143	159
	250x80	Each	172	191
	250x100	Each	174	193
	250x125	Each	180	199
	250x150	Each	187	206
	250x200	Each	197	219
	250x250	Each	213	234
	300x80	Each	234	261
	300x100	Each	238	266
	300x125	Each	242	270
	300x150	Each	249	277
	300x200	Each	261	292
	300x250	Each	277	307
	300x300	Each	292	324
	350x200	Each	326	363
	350x250	Each	335	371
	350x300	Each	365	404

S.No.	ITEMS	Unit	Rates in Rs.	
	350x350	Each	375	418
	400x200	Each	406	452
	400x250	Each	414	462
	400x300	Each	446	498
	400x350	Each	460	512
	400x400	Each	474	528
	450x250	Each	498	558
	450x300	Each	530	594
	450x350	Each	543	609
	450x400	Each	555	622
	450x450	Each	568	635
	500x250	Each	603	676
	500x300	Each	640	717
	500x350	Each	655	734
	500x400	Each	669	748
	500x450	Each	682	764
	500x500	Each	698	779
	600x300	Each	889	1000
	600x350	Each	910	1019
	600x400	Each	927	1040
	600x450	Each	940	1055
	600x500	Each	955	1071
	600x600	Each	989	1107
	700x350	Each	1223	1378
	700x400	Each	1240	1397
	700x450	Each	1260	1416
	700x500	Each	1276	1436
	700x600	Each	1311	1471
	700x700	Each	1356	1517
	750x400	Each	1420	1600
	750x450	Each	1438	1618
	750x500	Each	1461	1643
	750X600	Each	1489	1672
	750x700	Each	1517	1699
	750x750	Each	1545	1728
	800x400	Each	1635	1840
	800x450	Each	1652	1860
	800x500	Each	1672	1881
	800x600	Each	1712	1925
	800x700	Each	1753	1965
	800x750	Each	1776	1991
	800x800	Each	1805	2019
	900x450	Each	2072	2341
	900x500	Each	2103	2373
	900x600	Each	2145	2420

S.No.	ITEMS	Unit	Rates in Rs.	
	900x700	Each	2188	2465
	900x750	Each	2215	2491
	900x800	Each	2240	2517
	900x900	Each	2277	2553
3.25	<b>Labour for laying in position including testing following cast iron double flanged Tapers (all sizes in mm)</b>			
	<b>Body x Branch</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	100x80	Each	23	25
	125x80	Each	39	43
	125x100	Each	43	47
	150x80	Each	45	50
	150x100	Each	50	54
	150x125	Each	54	58
	200x100	Each	62	66
	200x125	Each	66	73
	200x150	Each	73	79
	250x125	Each	81	88
	250x150	Each	85	95
	250x200	Each	99	108
	300x150	Each	101	110
	300x200	Each	114	124
	300x250	Each	129	139
	350x200	Each	170	187
	350x250	Each	187	206
	350x300	Each	206	228
	400x250	Each	210	234
	400x300	Each	232	257
	400x350	Each	255	284
	450x300	Each	251	279
	450x350	Each	281	311
	450x400	Each	307	339
	500x350	Each	309	344
	500x400	Each	337	373
	500x450	Each	360	399
	600x400	Each	408	450
	600x450	Each	429	476
	600x500	Each	464	512
	700x500	Each	545	603
	700x600	Each	616	680
	750x600	Each	657	725
	750x700	Each	717	789
	800x600	Each	738	815

S.No.	ITEMS	Unit	Rates in Rs.	
	800x700	Each	798	880
	800x750	Each	833	918
	900x700	Each	891	982
	900x750	Each	929	1026
	900x800	Each	989	1090
	1000x800	Each	1111	1223
	1000x900	Each	1202	1324
3.26	<b>Labour for laying in position including testing following all flanged cast iron crosses (all sizes in mm)</b>		<b>Medium Class</b>	<b>Heavy Class</b>
	80mmDia	Each	54	58
	100mm Dia	Each	66	73
	125mm Dia	Each	88	99
	150mm Dia	Each	116	129
	200mm Dia	Each	180	199
	250mm Dia	Each	261	290
	300mm Dia	Each	354	386
3.27	<b>Labour for laying in position including testing following cast iron blank flanges (all sizes in mm)</b>			
	80mmDia	Each	9	11
	100mm Dia	Each	11	13
	125mm Dia	Each	15	17
	150mm Dia	Each	21	23
	200mm Dia	Each	31	35
	250mm Dia	Each	45	50
	300mm Dia	Each	62	69
	350mm Dia	Each	83	93
	400mm Dia	Each	106	118
	450mm Dia	Each	129	143
	500mm Dia	Each	164	182
	600mm Dia	Each	243	270
	700mm Dia	Each	342	379
	750mm Dia	Each	400	444
	800mm Dia	Each	473	526
	900mm Dia	Each	604	671
	1000mm Dia	Each	784	871
3.28	<b>Providing and laying in position including testing following sizes of flanged cast iron standard specials class medium or heavy which does not appear in above items of the schedule.</b>		<b>Medium Class</b>	<b>Heavy Class</b>

S.No.	ITEMS	Unit	Rates in Rs.	
	80mm to 300mm dia	Kg	63	63
	Above 300mm dia	Kg	72	72
3.29	<b>Labour for laying in position including testing following sizes of flanges, cast iron standard specials which does not appear in above items of the schedule</b>			
	80mm to 750mm dia	Kg	2	2
3.30	<b>Labour only for laying including testing following Horizontal Cast Iron Pipes in inclined or vertical position:-</b>			
	80mm to 750mm dia	<ul style="list-style-type: none"> <li>• In truly vertical position 200% above rates provided vide item No. 3.2, 3.4, and 3.6.</li> <li>• In inclined position at inclination less than 45% Same as rates provided vide item No. 3.2, 3.4 and 3.6</li> </ul>		

**CHAPTER – IV**

**DUCTILE IRON PRESSURE PIPES WITH**

**(TYTON JOINTS)**

**VALVES AND SPECIALS**



## Chapter – IV

### DUCTILE IRON PRESSURE PIPES WITH (TYTON JOINTS) VALVES AND SPECIALS

#### NOTES:

- 1 All the pipes, specials, joints to be used in the work shall confirm to relevant Indian standard duly inspected and tested and having B.I.S. certification Mark.
- 2 The jointing materials i.e. Tyton rings if supplied by the Department from departmental store, no extra charges for carting of the same to site of work will be payable. In case jointing materials are required to be arranged by the contractor the same should confirm to relevant Indian standard duly inspected and tested and bearing B.I.S. certification Mark.
- 3 The rates include charges for all tools and plant, chain pulley blocks, other appliances etc. required for lifting and laying the pipes and specials in position including testing as per approved drawings.
- 4 The rates include provision and use of all coverings etc. to protect the work from inclement weather etc. and from damages from falling materials and other causes.
- 5 The rate include provision of handling, storing under cover as required and returning of empty cases or container to Public Health Engineering Department Stores without any extra cost, for such materials as may be supplied by the department.
- 6 All measurements should be of the finished work.
- 7 Fitting must of superior quality & equivalent to Kiswak /Electrosteel/Kejriwal/Jindal.
- 8 Rates include the supply of pipes and specials at departmental store/site store.
- 9 Works will be executed in accordance with the general specifications given in P.H.E. Department and the specials notes if any, covered in the contract agreement of the work and all the relevant latest version of I.S. Specifications as detailed below:-

S.No.	I.S. Number	Title
1.	IS 8329:2000	Centrifugally cast (spun) ductile iron pressure pipes for water, gas and sewage (Third revision)
	IS 11906:1986	Cement mortar lining in the pipes.
2.	IS 9523:2000	Ductile Iron fittings for pressure pipes for water, gas and sewage.
3.	IS 12288:1987	Code of practice for use and laying of ductile iron pipes.
4.	IS 5382:2018	Rubber sealing rings for gas mains, water mains and sewage (First revision)
5.	IS 14846:2000	The Sluice Valves (50-1200 mm size)
6.	IS 14845: 2000	The resilient seated C.I. Air relief valve
7.	IS 5312: 2004(Part I & II)	The Swing check type reflux valves
8.	IS 13095:1991	The Butter fly valves

10. This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.

### DUCTILE IRON PRESSURE PIPES WITH (TYTON JOINTS) VALVES AND SPECIALS

S. No.	Items	Unit	Rates in Rs.
4.1	<b>Providing, laying and jointing including testing following socket &amp; 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:5382/2018</b>		
	100mm Dia	Metre	943
	150mm Dia	Metre	1324
	200mm Dia	Metre	1733
	250mm Dia	Metre	2284
	300mm Dia	Metre	2908
	350mm Dia	Metre	3496
	400mm Dia	Metre	4237
	450mm Dia	Metre	5032
	500mm Dia	Metre	6030
	600mm Dia	Metre	7862
	700mm Dia	Metre	10911
	750mm Dia	Metre	12314
	800mm Dia	Metre	13822
	900mm Dia	Metre	16817
	1000mm Dia	Metre	20223
4.2	<b>Labour for laying in position including testing following socket &amp; spigot Ductile Iron (K-7) pressure pipes</b>		
	100mm Dia	Metre	21
	150mm Dia	Metre	29
	200mm Dia	Metre	45
	250mm Dia	Metre	59
	300mm Dia	Metre	74
	350mm Dia	Metre	99
	400mm Dia	Metre	118

S. No.	Items	Unit	Rates in Rs.
	450mm Dia	Metre	139
	500mm Dia	Metre	163
	600mm Dia	Metre	215
	700mm Dia	Metre	272
	750mm Dia	Metre	357
	800mm Dia	Metre	452
	900mm Dia	Metre	556
	1000mm Dia	Metre	671
4.3	<b>Providing, laying and jointing including testing following socket &amp; 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:5382/2018</b>		
	100mm Dia	Metre	1058
	150mm Dia	Metre	1494
	200mm Dia	Metre	2037
	250mm Dia	Metre	2724
	300mm Dia	Metre	3461
	350mm Dia	Metre	4193
	400mm Dia	Metre	5055
	450mm Dia	Metre	5986
	500mm Dia	Metre	7104
	600mm Dia	Metre	9266
	700mm Dia	Metre	12170
	750mm Dia	Metre	13486
	800mm Dia	Metre	14762
	900mm Dia	Metre	17950
	1000mm Dia	Metre	21569
4.4	<b>Labour for laying in position including testing following socket &amp; spigot Ductile Iron (K-9) pressure pipes</b>	Metre	
	100mm Dia	Metre	21
	150mm Dia	Metre	29
	200mm Dia	Metre	45
	250mm Dia	Metre	59
	300mm Dia	Metre	74
	350mm Dia	Metre	99
	400mm Dia	Metre	118
	450mm Dia	Metre	139
	500mm Dia	Metre	163

S. No.	Items	Unit	Rates in Rs.
	600mm Dia	Metre	215
	700mm Dia	Metre	272
	750mm Dia	Metre	357
	800mm Dia	Metre	452
	900mm Dia	Metre	556
	1000mm Dia	Metre	671
4.5	<b>Providing Rubber ISI marked Gasket (push on) joint as per IS:5382/2018 to following DI pipes class K-7 and K-9 including testing of joints and cost of jointing materials (Rubber Gasket and soap solution etc.)</b>		
	100mm Dia	Each	94
	150mm Dia	Each	119
	200mm Dia	Each	194
	250mm Dia	Each	232
	300mm Dia	Each	297
	350mm Dia	Each	341
	400mm Dia	Each	565
	450mm Dia	Each	651
	500mm Dia	Each	663
	600mm Dia	Each	822
	700mm Dia	Each	1142
	750mm Dia	Each	1254
	800mm Dia	Each	1328
	900mm Dia	Each	1592
	1000mm Dia	Each	1818
4.6	<b>Labour for providing including testing, Rubber Gasket (push on) joints to following D.I. Pipes class K-7 &amp; K-9 including joints but excluding cost of Rubber Gasket.</b>		
	100mm Dia	Each	59
	150mm Dia	Each	66
	200mm Dia	Each	69
	250mm Dia	Each	83
	300mm Dia	Each	89
	350mm Dia	Each	104
	400mm Dia	Each	134
	450mm Dia	Each	148
	500mm Dia	Each	159

S. No.	Items	Unit	Rates in Rs.
	600mm Dia	Each	193
	700mm Dia	Each	226
	750mm Dia	Each	236
	800mm Dia	Each	250
	900mm Dia	Each	294
	1000mm Dia	Each	315
<b>DUCTILE IRON FITTING PN- 16</b>			
Note:-If PN-10 fitting is used than 90% of rate is payable for providing and fixing of fitting.			
4.7	<b>Providing and Laying including testing ductile iron PN 16 type flanged sockets conforming to IS: 9523/2000 having dimension as per table 23 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000.</b>		
	100mm	Each	1033
	150mm	Each	1608
	200mm	Each	2411
	250mm	Each	3215
	300mm	Each	4248
	350mm	Each	6606
	400mm	Each	8395
	450mm	Each	10459
	500mm	Each	13211
	600mm	Each	18147
	700mm	Each	28857
	750mm	Each	31637
	800mm	Each	38417
	900mm	Each	47804
	1000mm	Each	61885
4.8	<b>Labour only for Laying including testing Ductile Iron PN 16 type flanged sockets conforming to IS: 9523/2000 having dimension as per table 23 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS: 9523/2000.</b>		
	100mm	Each	19
	150mm	Each	31
	200mm	Each	45

S. No.	Items	Unit	Rates in Rs.
	250mm	Each	60
	300mm	Each	79
	350mm	Each	103
	400mm	Each	131
	450mm	Each	163
	500mm	Each	206
	600mm	Each	264
	700mm	Each	356
	750mm	Each	390
	800mm	Each	474
	900mm	Each	590
	1000mm	Each	764
4.9	<b>Providing and Laying including testing ductile PN 16 type iron flanged spigot conforming to IS: 9523/2000 having dimension as per table 24 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS: 9523/2000.</b>		
	100mm	Each	1148
	150mm	Each	1837
	200mm	Each	2641
	250mm	Each	3674
	300mm	Each	4823
	350mm	Each	7706
	400mm	Each	9633
	450mm	Each	12110
	500mm	Each	15138
	600mm	Each	21881
	700mm	Each	34072
	750mm	Each	38591
	800mm	Each	43111
	900mm	Each	51629
	1000mm	Each	64493
4.10	<b>Labour only for Laying including testing Ductile Iron PN 16 type flanged Spigot conforming to IS: 9523/2000 having dimension as per table 24 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS: 9523/2000.</b>		
	100mm	Each	21

S. No.	Items	Unit	Rates in Rs.
	150mm	Each	35
	200mm	Each	50
	250mm	Each	69
	300mm	Each	90
	350mm	Each	120
	400mm	Each	150
	450mm	Each	189
	500mm	Each	236
	600mm	Each	341
	700mm	Each	421
	750mm	Each	476
	800mm	Each	532
	900mm	Each	638
	1000mm	Each	796
4.11	<b>Providing and Laying including testing 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 following nominal diameter/sizes with external bitumen and internal cement mortar lining.</b>		
	100mm	Each	2122
	150mm	Each	3124
	200mm	Each	4037
	250mm	Each	6087
	300mm	Each	7137
	350mm	Each	11339
	400mm	Each	13878
	450mm	Each	15868
	500mm	Each	18711
	600mm	Each	23748
	700mm	Each	44467
	750mm	Each	49724
	800mm	Each	56479
	900mm	Each	66441
	1000mm	Each	85648
4.12	<b>Labour only for Laying including testing 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 following nominal diameter /sizes with internal cement mortar lining.</b>		
	100mm	Each	47

S. No.	Items	Unit	Rates in Rs.
	150mm	Each	65
	200mm	Each	82
	250mm	Each	118
	300mm	Each	137
	350mm	Each	190
	400mm	Each	222
	450mm	Each	253
	500mm	Each	295
	600mm	Each	371
	700mm	Each	557
	750mm	Each	620
	800mm	Each	701
	900mm	Each	817
	1000mm	Each	1021
4.13	<b>Providing and Laying including testing 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.</b>		
	100mm	Each	1145
	150 mm	Each	2081
	200mm	Each	3331
	250mm	Each	4788
	300mm	Each	6766
	350mm	Each	11506
	400mm	Each	14945
	450mm	Each	19441
	500mm	Each	24731
	600mm	Each	33475
	700mm	Each	51093
	750mm	Each	63443
	800mm	Each	68044
	900mm	Each	90137
	1000mm	Each	111988
4.14	<b>Labour only for Laying including testing 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.</b>		



S. No.	Items	Unit	Rates in Rs.
	100mm	Each	23
	150 mm	Each	43
	200mm	Each	69
	250mm	Each	99
	300mm	Each	139
	350mm	Each	187
	400mm	Each	242
	450mm	Each	315
	500mm	Each	402
	600mm	Each	611
	700mm	Each	862
	750mm	Each	1011
	800mm	Each	1199
	900mm	Each	1598
	1000mm	Each	2068
4.15	<b>Providing and Laying including testing Ductile Iron Double Socket 45° Bends conforming to IS: 9523/2000 having dimension as per table 16 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.</b>		
	100mm	Each	1041
	125mm	Each	1353
	150 mm	Each	1666
	200mm	Each	2707
	250mm	Each	3747
	300mm	Each	5100
	350mm	Each	8597
	400mm	Each	10845
	450mm	Each	14151
	500mm	Each	17854
	600mm	Each	26980
	700mm	Each	46421
	750mm	Each	53715
	800mm	Each	63662
	900mm	Each	84054
	1000mm	Each	107927
4.16	<b>Labour only for Laying including testing Ductile Iron Double Socket 45° Bends conforming to IS: 9523/2000 having dimension as per table 16 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.</b>		

S. No.	Items	Unit	Rates in Rs.
	100mm	Each	21
	125mm	Each	27
	150 mm	Each	35
	200mm	Each	56
	250mm	Each	77
	300mm	Each	105
	350mm	Each	139
	400mm	Each	176
	450mm	Each	230
	500mm	Each	290
	600mm	Each	437
	700mm	Each	601
	750mm	Each	695
	800mm	Each	824
	900mm	Each	1088
	1000mm	Each	1397
4.17	<b>Providing and Laying including testing Ductile Iron Double Socket 22.5° Bends conforming to IS: 9523/2000 having dimension as per table 17 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.</b>		
	100mm	Each	936
	125mm	Each	1249
	150 mm	Each	1457
	200mm	Each	2290
	250mm	Each	3226
	300mm	Each	4267
	350mm	Each	6878
	400mm	Each	8861
	450mm	Each	11242
	500mm	Each	14151
	600mm	Each	20700
	700mm	Each	35478
	750mm	Each	40783
	800mm	Each	48244
	900mm	Each	62501
	1000mm	Each	75930

S. No.	Items	Unit	Rates in Rs.
4.18	<b>Labour only for Laying including testing Ductile Iron Double Socket 22.5° Bends conforming to IS: 9523/2000 having dimension as per table 17 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.</b>		
	100mm	Each	19
	125mm	Each	25
	150 mm	Each	31
	200mm	Each	47
	250mm	Each	66
	300mm	Each	88
	350mm	Each	112
	400mm	Each	143
	450mm	Each	182
	500mm	Each	230
	600mm	Each	337
	700mm	Each	460
	750mm	Each	528
	800mm	Each	624
	900mm	Each	808
	1000mm	Each	982
4.19	<b>Providing and Laying including testing Ductile Iron Double Socket 11.25° bends conforming to IS:9523/2000 having dimension as per table 18 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining</b>		
	100mm	Each	936
	125mm	Each	1145
	150 mm	Each	1353
	200mm	Each	2186
	250mm	Each	2914
	300mm	Each	3852
	350mm	Each	6083
	400mm	Each	7538
	450mm	Each	9654
	500mm	Each	12035
	600mm	Each	17589
	700mm	Each	29179
	750mm	Each	33323
	800mm	Each	40120
	900mm	Each	53604
	1000mm	Each	63662

S. No.	Items	Unit	Rates in Rs.
4.20	<b>Labour only for Laying including testing Ductile Iron Double Socket 11.25° bends conforming to IS:9523/2000 having dimension as per table 18 of IS:9523/2000 in the following nominal diameter /sizes with external bitumencoating and internal cement mortar lining.</b>		
	100mm	Each	19
	125mm	Each	23
	150 mm	Each	27
	200mm	Each	45
	250mm	Each	60
	300mm	Each	79
	350mm	Each	99
	400mm	Each	122
	450mm	Each	157
	500mm	Each	195
	600mm	Each	286
	700mm	Each	377
	750mm	Each	431
	800mm	Each	520
	900mm	Each	663
	1000mm	Each	824
4.21	<b>Providing and Laying including testing Ductile Iron All socket Tees conforming to IS:9523/2000 having dimension as per table 21 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS: 9523/2000.</b>		
	100mm x 80mm	Each	1457
	100mm x 100mm	Each	1562
	150mm x 80mm	Each	1978
	150mm x 100mm	Each	2186
	150mm x 150mm	Each	2498
	200mm x 80mm	Each	2914
	200mm x 100mm	Each	3123
	200mm x 150mm	Each	3634
	200mm x 200mm	Each	4164
	250mm x 80mm	Each	3747
	250mm x 100mm	Each	3955
	250mm x 150mm	Each	4476

S. No.	Items	Unit	Rates in Rs.
	250mm x 250mm	Each	5725
	300mm x 100mm	Each	5100
	300mm x 200mm	Each	6454
	300mm x 300mm	Each	8014
4.22	<b>Labour only for Laying including testing Ductile Iron All socket Tees conforming to IS:9523/2000 having dimension as per table 21 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.</b>		
	100mm x 80mm	Each	31
	100mm x 100mm	Each	33
	150mm x 80mm	Each	41
	150mm x 100mm	Each	45
	150mm x 150mm	Each	52
	200mm x 80mm	Each	60
	200mm x 100mm	Each	64
	200mm x 150mm	Each	73
	200mm x 200mm	Each	85
	250mm x 80mm	Each	77
	250mm x 100mm	Each	81
	250mm x 150mm	Each	93
	250mm x 250mm	Each	118
	300mm x 100mm	Each	105
	300mm x 200mm	Each	133
	300mm x 300mm	Each	165
4.23	<b>Providing and Laying including testing Ductile Iron Double Socket branch flange Tee conforming to IS:9523/2000 having dimension as per table 21 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000.</b>		
	100mm x 80mm	Each	1722
	100mm x 100mm	Each	1837
	150mm x 80mm	Each	2411
	150mm x 100mm	Each	2526
	150mm x 150mm	Each	3100

S. No.	Items	Unit	Rates in Rs.
	200mm x 80mm	Each	3330
	200mm x 100mm	Each	3560
	200mm x 150mm	Each	4133
	200mm x 200mm	Each	4823
	250mm x 80mm	Each	4248
	250mm x 100mm	Each	4478
	250mm x 150mm	Each	5166
	250mm x 200mm	Each	5856
	250mm x 250mm	Each	6774
	300mm x 80mm	Each	5523
	300mm x 100mm	Each	5741
	300mm x 150mm	Each	6544
	300mm x 200mm	Each	7348
	300mm x 250mm	Each	8381
	300mm x 300mm	Each	9529
	350mm x 100mm	Each	8257
	350mm x 200mm	Each	10321
	350mm x 350mm	Each	14862
	400mm x 80mm	Each	9359
	400mm x 100mm	Each	9909
	400mm x 150mm	Each	11147
	400mm x 200mm	Each	12213
	400mm x 300mm	Each	15275
	400mm x 400mm	Each	19129
	450mm x 100mm	Each	12248
	450mm x 250mm	Each	16515
	500mm x 100mm	Each	14725
	500mm x 200mm	Each	17753
	500mm x 400mm	Each	25597
	500mm x 500mm	Each	31240
	600mm x 200mm	Each	24497
4.24	<b>Labour only for Laying including testing Ductile Iron Double Socketed Branch Flange Tee Conforming to IS: 9523/2000 having dimension as per table 21 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining.</b>		
	100mm x 80mm	Each	33
	100mm x 100mm	Each	35
	150mm x 80mm	Each	45

S. No.	Items	Unit	Rates in Rs.
	150mm x 100mm	Each	47
	150mm x 150mm	Each	58
	200mm x 80mm	Each	62
	200mm x 100mm	Each	66
	200mm x 150mm	Each	77
	200mm x 200mm	Each	90
	250mm x 80mm	Each	79
	250mm x 100mm	Each	83
	250mm x 150mm	Each	97
	250mm x 200mm	Each	110
	250mm x 250mm	Each	126
	300mm x 80mm	Each	103
	300mm x 100mm	Each	108
	300mm x 150mm	Each	122
	300mm x 200mm	Each	137
	300mm x 250mm	Each	157
	300mm x 300mm	Each	178
	350mm x 100mm	Each	129
	350mm x 200mm	Each	161
	350mm x 350mm	Each	232
	400mm x 80mm	Each	145
	400mm x 100mm	Each	155
	400mm x 150mm	Each	174
	400mm x 200mm	Each	191
	400mm x 300mm	Each	238
	400mm x 400mm	Each	298
	450mm x 100mm	Each	191
	450mm x 250mm	Each	257
	500mm x 100mm	Each	230
	500mm x 200mm	Each	277
	500mm x 400mm	Each	399
	500mm x 500mm	Each	487
	600mm x 200mm	Each	382
4.25	<b>Providing and Laying including testing Ductile Iron Double Socket Reducer conforming to IS: 9523/2000 having dimension as per table 21 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS: 9523/2000.</b>		
	100mm x 80mm	Each	837
	150mm x 80mm	Each	1355
	150mm x 100mm	Each	1353
	200mm x 100mm	Each	2077

S. No.	Items	Unit	Rates in Rs.
	200mm x 150mm	Each	1984
	250mm x 150mm	Each	2810
	300mm x 150mm	Each	3840
	300mm x 200mm	Each	3951
	300mm x 250mm	Each	3653
	350mm x 200mm	Each	6480
	350mm x 250mm	Each	6218
	350mm x 300mm	Each	5967
	400mm x 250mm	Each	8201
	400mm x 300mm	Each	7807
	400mm x 350mm	Each	7300
	450mm x 350mm	Each	9658
	450mm x 400mm	Each	9155
	500mm x 350mm	Each	12462
	500mm x 400mm	Each	11863
	600mm x 400mm	Each	18417
	600mm x 500mm	Each	17192
4.26	<b>Labour only for laying including testing ductile iron double socket reducer conforming to IS: 9523/2000 having dimension as per table 20 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS: 9523/2000</b>		
	100mm x 80mm	Each	21
	150mm x 80mm	Each	31
	150mm x 100mm	Each	27
	200mm x 100mm	Each	39
	200mm x 150mm	Each	47
	250mm x 150mm	Each	58
	300mm x 150mm	Each	69
	300mm x 200mm	Each	77
	300mm x 250mm	Each	85
	350mm x 200mm	Each	105
	350mm x 250mm	Each	103
	350mm x 300mm	Each	112
	400mm x 250mm	Each	135
	400mm x 300mm	Each	131
	400mm x 350mm	Each	143
	450mm x 350mm	Each	161
	450mm x 400mm	Each	178
	500mm x 350mm	Each	232



S. No.	Items	Unit	Rates in Rs.
	500mm x 400mm	Each	284
	600mm x 400mm	Each	332
	600mm x 500mm	Each	408
4.27	<b>Providing, Laying including testing and Jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes conforming to IS: 8329/2000 in the length of 1 m. for class K-9 with inside cement mortar lining for the following sizes/dia pipes.</b>		
	100mm Dia	Each	3098
	150mm Dia	Each	4041
	200mm Dia	Each	5322
	250mm Dia	Each	6776
	300mm Dia	Each	8262
	350mm Dia	Each	10415
	400mm Dia	Each	12716
	450mm Dia	Each	17162
	500mm Dia	Each	19274
	600mm Dia	Each	25492
	700mm Dia	Each	31810
	750mm Dia	Each	36992
	800mm Dia	Each	39029
	900mm Dia	Each	47834
	1000mm Dia	Each	57714
4.28	<b>Providing, Laying including testing and 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	5612
	150mm Dia	Each	7480
	200mm Dia	Each	9960
	250mm Dia	Each	12851
	300mm Dia	Each	15581
	350mm Dia	Each	19858
	400mm Dia	Each	24150
	450mm Dia	Each	32523
	500mm Dia	Each	36389
	600mm Dia	Each	48541

S. No.	Items	Unit	Rates in Rs.
4.29	<b>Providing , Laying including testing and Jointing of welded double flanged centrifugal cast (spun) ductile Iron pressure pipes conforming to IS:8329/2000 in the length of 3 m for class K-9 with inside cement mortar, lining for the following sizes/dia pipes</b>		
	100mm Dia	Each	8189
	150mm Dia	Each	10985
	200mm Dia	Each	14666
	250mm Dia	Each	18994
	300mm Dia	Each	23018
	350mm Dia	Each	29373
	400mm Dia	Each	35657
	450mm Dia	Each	47958
	500mm Dia	Each	53580
	600mm Dia	Each	71668
4.30	<b>Providing, Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	10767
	150mm Dia	Each	14491
	200mm Dia	Each	19371
	250mm Dia	Each	25137
	300mm Dia	Each	30455
	350mm Dia	Each	38887
	400mm Dia	Each	47164
	450mm Dia	Each	63393
	500mm Dia	Each	70772
	600mm Dia	Each	94796
4.31	<b>Providing, Laying including testing and Jointing welded double flanged centrifugal cast (spun) ductile Iron pressure pipes conforming to IS:8329/2000 in the length of 4.5 m. for class K-9 with inside cement mortar lining for the following sizes/dia pipes.</b>		
	100mm Dia	Each	12055
	150mm Dia	Each	16243
	200mm Dia	Each	21724
	250mm Dia	Each	28209

S. No.	Items	Unit	Rates in Rs.
	300mm Dia	Each	34050
	350mm Dia	Each	43645
	400mm Dia	Each	52918
	450mm Dia	Each	71111
	500mm Dia	Each	79367
	600mm Dia	Each	106360
4.32	<b>Providing, Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	13344
	150mm Dia	Each	17996
	200mm Dia	Each	24077
	250mm Dia	Each	31280
	300mm Dia	Each	37892
	350mm Dia	Each	48401
	400mm Dia	Each	58671
	450mm Dia	Each	78829
	500mm Dia	Each	87963
	600mm Dia	Each	117924
4.33	<b>Providing, Laying including testing 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 following sizes/dia pipes</b>		
	100mm Dia	Each	32509
	150mm Dia	Each	39222
	200mm Dia	Each	50305
	250mm Dia	Each	60973
	300mm Dia	Each	81916
	350mm Dia	Each	91400
	400mm Dia	Each	122551
	450mm Dia	Each	32509
	500mm Dia	Each	39222
	600mm Dia	Each	50305
4.34	<b>Labour only for Laying including testing 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 following sizes/dia pipes</b>		
	100mm Dia	Each	54
	150mm Dia	Each	85

S. No.	Items	Unit	Rates in Rs.
	200mm Dia	Each	116
	250mm Dia	Each	155
	300mm Dia	Each	197
	350mm Dia	Each	242
	400mm Dia	Each	290
	450mm Dia	Each	339
	500mm Dia	Each	397
	600mm Dia	Each	530
4.35	<b>Labour only for Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	93
	150mm Dia	Each	150
	200mm Dia	Each	201
	250mm Dia	Each	270
	300mm Dia	Each	346
	350mm Dia	Each	425
	400mm Dia	Each	508
	450mm Dia	Each	599
	500mm Dia	Each	700
	600mm Dia	Each	929
4.36	<b>Labour only for Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	131
	150mm Dia	Each	215
	200mm Dia	Each	288
	250mm Dia	Each	386
	300mm Dia	Each	543
	350mm Dia	Each	607
	400mm Dia	Each	727
	450mm Dia	Each	858
	500mm Dia	Each	1002
	600mm Dia	Each	1328

S. No.	Items	Unit	Rates in Rs.
4.37	<b>Labour only for Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	170
	150mm Dia	Each	279
	200mm Dia	Each	373
	250mm Dia	Each	502
	300mm Dia	Each	740
	350mm Dia	Each	789
	400mm Dia	Each	947
	450mm Dia	Each	1117
	500mm Dia	Each	1305
	600mm Dia	Each	1728
4.38	<b>Labour only for Laying including testing 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 following sizes/dia pipe.</b>		
	100mm Dia	Each	189
	150mm Dia	Each	311
	200mm Dia	Each	416
	250mm Dia	Each	560
	300mm Dia	Each	716
	350mm Dia	Each	881
	400mm Dia	Each	1055
	450mm Dia	Each	1248
	500mm Dia	Each	1456
	600mm Dia	Each	1927
4.39	<b>Labour only for Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	208
	150mm Dia	Each	344
	200mm Dia	Each	460
	250mm Dia	Each	618
	300mm Dia	Each	937
	350mm Dia	Each	972

S. No.	Items	Unit	Rates in Rs.
	400mm Dia	Each	1165
	450mm Dia	Each	1378
	500mm Dia	Each	1607
	600mm Dia	Each	2126
4.40	<b>Labour only for Laying including testing 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 following sizes/dia pipes.</b>		
	100mm Dia	Each	216
	150mm Dia	Each	356
	200mm Dia	Each	476
	250mm Dia	Each	641
	300mm Dia	Each	820
	350mm Dia	Each	1009
	400mm Dia	Each	1209
	450mm Dia	Each	1430
	500mm Dia	Each	1668
	600mm Dia	Each	2206

## DUCTILE IRON VALVES

S. No.	Item	Unit	Rates inRs.	
4.41	<b>Providing &amp; fixing of following Ductile iron double flanged sluice valves as per I.S.:14846-2000 fitted with cap including jointing &amp; testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete.</b>		<b>CLASS PN- 10</b>	<b>CLASS PN- 16</b>
	80mm dia	Each	6595	6913
	100mm dia	Each	8863	9289
	150mm dia	Each	13519	12187
	200mm dia	Each	22008	22330
	250mm dia	Each	31438	41817
	300mm dia	Each	49350	55115
	350mm dia	Each	72456	86515
	400mm dia	Each	109242	109242
	450mm dia	Each	153699	153699
	500mm dia	Each	205360	205360

S. No.	Item	Unit	Rates inRs.	
4.42	<b>Fixing of following Ductile iron double flanged sluice valves fitted with cap testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete (only valve to be supplied by depts. free of cost.</b>		<b>CLASS PN-10/PN-16</b>	
	80mm dia	Each	229	
	100mm dia	Each	358	
	150mm dia	Each	520	
	200mm dia	Each	718	
	250mm dia	Each	1160	
	300mm dia	Each	1312	
	350 mm dia	Each	2164	
	400 mm dia	Each	3322	
	450 mm dia	Each	4019	
	500 mm dia	Each	5074	
4.43	<b>Labour for laying and fixing of following ductile iron double flanged sluice valves (vide item no.1) including jointing and testing but without cost of Jointing materials.</b>		<b>CLASS PN-10/PN-16</b>	
	80mm dia	Each	109	
	100mm dia	Each	150	
	150mm dia	Each	220	
	200mm dia	Each	328	
	250mm dia	Each	472	
	300mm dia	Each	609	
	350 mm dia	Each	1064	
	400 mm dia	Each	1258	
	450 mm dia	Each	1504	
	500 mm dia	Each	1820	
4.44	<b>Providing &amp; fixing following ductile iron double flanged check valve without damper (non-return valve) including jointing &amp; testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 5312 (Part II)</b>		<b>CLASS PN- 10</b>	<b>CLASS PN- 16</b>
	200mm dia	Each	21842	22163
	250mm dia	Each	31061	41439
	300mm dia	Each	49281	58888
	350 mm dia	Each	72111	86169
	400 mm dia	Each	108659	108659
	500 mm dia	Each	205466	205466
	600 mm dia	Each	320491	320491
4.45	<b>Labour for laying and fixing of following ductile iron double flanged check valve without damper (non-return valve) including jointing &amp; testing with cost of jointing material such as bolts, nuts and</b>		<b>CLASS PN-10/PN-16</b>	

S. No.	Item	Unit	Rates inRs.	
	<b>rubber insertion all complete as per IS : 5312 (Part II)</b>			
	200mm dia	Each	551	
	250mm dia	Each	783	
	300mm dia	Each	1243	
	350 mm dia	Each	1818	
	400 mm dia	Each	2739	
	500 mm dia	Each	5180	
	600 mm dia	Each	8079	
4.46	<b>Labour for laying and fixing of following ductile iron double flanged check valve without damper (non-return valve)excluding jointing &amp; testing with cost of jointing material such as bolts,nuts and rubber insertion all complete as per IS: 5312 (Part II)</b>		<b>CLASS PN-10/PN-16</b>	
	200mm dia	Each	209	
	250mm dia	Each	343	
	300mm dia	Each	435	
	350 mm dia	Each	668	
	400 mm dia	Each	870	
	500 mm dia	Each	1223	
	600 mm dia	Each	1860	
4.47	<b>Providing &amp; fixing following ductile iron butterfly valves including jointing &amp; testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 13095-1991.</b>		<b>CLASS PN- 10</b>	<b>CLASS PN-16</b>
	100mm dia	Each	6406	8073
	150mm dia	Each	7504	9444
	200mm dia	Each	10145	12768
	250mm dia	Each	14956	20678
	300mm dia	Each	17946	26694
	350mm dia	Each	50478	63520
	400mm dia	Each	60209	75769
	450mm dia	Each	71117	89578
	500mm dia	Each	98344	123746
4.48	<b>Labour for laying and fixing of following ductile iron butterfly valves including jointing &amp; testing but without cost of jointing materials.</b>		<b>CLASS PN-10/PN-16</b>	
	100mm dia	Each	120	
	150mm dia	Each	138	
	200mm dia	Each	169	
	250mm dia	Each	209	
	300mm dia	Each	343	
	350mm dia	Each	492	
	400mm dia	Each	587	



S. No.	Item	Unit	Rates inRs.	
	450mm dia	Each	693	
	500mm dia	Each	959	
4.49	<b>Labour for laying and fixing of following Ductile Iron butterfly valves including jointing &amp; testing but with cost of jointing materials.</b>		<b>CLASS PN-10/PN-16</b>	
	100mm dia	Each	162	
	150mm dia	Each	189	
	200mm dia	Each	256	
	250mm dia	Each	377	
	300mm dia	Each	452	
	350mm dia	Each	1273	
	400mm dia	Each	1518	
	450mm dia	Each	1793	
	500mm dia	Each	2479	
4.50	<b>Providing &amp; fixing following ductile iron single chamber triple function temper proof air valves, small orifice with screwed end as per IS : 14845-2000 including jointing &amp; testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991</b>		<b>CLASS PN- 10</b>	<b>CLASS PN-16</b>
	50mm dia	Each	6240	6544
	80mm dia	Each	6531	6849
	100mm dia	Each	8726	9151
	150mm dia	Each	11969	11969
4.51	<b>Labour for laying and fixing of following ductile iron single chamber triple function temper proof air valves small orifice with screwed end i/c jointing &amp; testing but without cost of jointing material.</b>		<b>CLASS PN-10/PN-16</b>	
	50mm dia	Each	61	
	80mm dia	Each	87	
	100mm dia	Each	120	
	150mm dia	Each	138	
4.52	<b>Labour for laying and fixing of following ductile iron single chamber triple function temper proof Air valves small orifice with screwed end i/c jointing &amp; testing but with cost of jointing material.</b>		<b>CLASS PN-10/PN-16</b>	
	50mm dia	Each	158	
	80mm dia	Each	165	
	100mm dia	Each	220	
	150mm dia	Each	302	

## DUCTILE IRON SOFT SEATED VALVES

S. No.	Item	Unit	Rates inRs.	
4.53	Providing & fixing of following Ductile iron double flanged sluice valves glandless, resilient (soft seated) non-rising spindle with body bonnet of ductile cast iron of grade GGG 40/SGI 400/12 or equivalent grade or of higher tensile strength grade, as per IS: 3896 part-II-1986 and subsequent revision, wedge fully rubber lined with EPDM food grade quality and seals of NBR. The valve should be with replaceable nut and replaceable sliding shoes, valve stems shall be of single piece thread rolled. Sluice valve shall be suitable for buried applications without valve chambers. The valve should be vacuum tight and 100% leakproof with face to face dimensions as BS: 5163-89/ IS: 14846/2000/DIN 3204 F4 and flange connections as per IS: 1538. Valve should be with electrostatic powder coating both inside and outside (thickness 250 micron) with pocketless straight through body passage including jointing and testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete.		CLASS PN- 10	CLASS PN- 16
	100mm dia	Each	11981	11981
	150mm dia	Each	17507	17507
	200mm dia	Each	27718	27718
	250mm dia	Each	55826	55826
	300mm dia	Each	76742	76742
	350mm dia	Each	134116	167123
	400mm dia	Each	170131	212227
	450mm dia	Each	209706	262180
	500mm dia	Each	263596	328988
	600mm dia	Each	390402	487625

**CHAPTER – V**

**ASBESTOS CEMENT PRESSURE PIPES**

**AND**

**CAST IRON FITTINGS**

## Chapter – V

### ASBESTOS CEMENT PRESSURE PIPES AND CAST IRON FITTINGS

#### NOTES:

1. The A.C.P. pipes shall be confirming to IS -1592:2003
2. Pipes shall be tested in the factory as per IS 5913:1970
3. The laying of A.C.P pipes shall be done as per IS - 6530:1972
4. C.I. specials for A.C.P. pipes shall be done as per IS -5531:1988
5. The C.I.D. joints shall be confirming to IS -8794:1988
6. The rubber sealing of the D. Joint shall be confirming to IS -10292:1988
7. All measurements shall be of the finishedwork.
8. Work shall be executed in accordance with the Indian Standards Specifications and special notes if any, covered in the agreement of thework.
9. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### ASBESTOS CEMENT PRESSURE PIPES AND CAST IRON FITTINGS

Item No.	Items	Unit	Rate in Rupees		
			Class 15	Class 20	Class 25
5.1	<b>Providing, laying and jointing of following Asbestos cement pressure pipe ISI marked and conforming to IS:1592/03 tested to the required pressure including testing of joints, cost of pipes &amp; detachable joint ISI markedconforming to IS: 8794/1988 all complete manufactured by mazza process.</b>				
	80mm Dia	Mtr.	270	301	339
	100mm Dia	Mtr.	357	437	528
	125 mm Dia	Mtr.	467	563	689
	150mm Dia	Mtr.	634	771	950
	200mm Dia	Mtr.	1036	1298	1609
	250mm Dia	Mtr.	1344	1758	2074
	300mm Dia	Mtr.	1829	2331	2908
	350 mm Dia	Mtr.	2360	2960	3607

Item No.	Items	Unit	Rate in Rupees		
5.2	<b>Providing, laying and jointing of following Asbestos cement pressure pipe with A.C. coupler Joint ISImarked and conforming to IS:1592/03 tested to the required pressure including testing of joints, cost of pipes all complete manufactured by mazza process.</b>				
	80mm Dia	Mtr.	367	387	356
	100mm Dia	Mtr.	493	577	673
	125 mm Dia	Mtr.	613	709	840
	150mm Dia	Mtr.	714	841	1008
	200mm Dia	Mtr.	1086	1312	1607
	250mm Dia	Mtr.	1398	1719	2088
	300mm Dia	Mtr.	1856	2328	2892
	350 mm Dia	Mtr.	2323	2932	3596
5.3	<b>Labour for laying in position including testing following Asbestos cement pressure pipes class 15,20,25.</b>				
	80mm Dia	Mtr.	7	7	7
	100mm Dia	Mtr.	8	8	8
	125 mm Dia	Mtr.	11	11	11
	150mm Dia	Mtr.	13	13	13
	200mm Dia	Mtr.	21	21	21
	250mm Dia	Mtr.	27	27	27
	300mm Dia	Mtr.	36	36	36
	350 mm Dia	Mtr.	44	44	44
5.4	<b>Providing detachable joints to following asbestos cement pressure pipes and fittings including C.I. detachable joints confirming to IS/8794/1988 with bolts, nuts and rubber rings confirming to IS: 5382/85 &amp; IS: 10292/1988 manufactured by mazza process including testing.</b>				
	80mm Dia	Each	299	323	347
	100mm Dia	Each	366	401	413
	125 mm Dia	Each	483	514	548
	150mm Dia	Each	561	605	659
	200mm Dia	Each	761	875	929
	250mm Dia	Each	1014	1167	1242
	300mm Dia	Each	1229	1448	1542
	350 mm Dia	Each	1880	1883	1885

Item No.	Items	Unit	Rate in Rupees		
5.5	<b>Labour for providing detachable joints to following asbestos cement pressure pipes and fittings class 15, 20 &amp; 25 including testing of joints but excluding cost of C.I. Detachable joints.</b>				
	80mm Dia	Each	87	89	93
	100mm Dia	Each	103	105	108
	125 mm Dia	Each	118	120	123
	150mm Dia	Each	133	135	138
	200mm Dia	Each	148	150	154
	250mm Dia	Each	164	167	169
	300mm Dia	Each	179	182	184
	350 mm Dia	Each	194	197	199
5.6	<b>Providing A.C. Coupler joints to following A.C. pressure pipes confirming to IS specification including testing of joints rubber ring complete manufactured by mazza process.</b>				
	80mm Dia	Each	140	148	163
	100mm Dia	Each	148	157	176
	125 mm Dia	Each	238	264	319
	150mm Dia	Each	367	442	532
	200mm Dia	Each	390	489	625
	250mm Dia	Each	568	774	877
	300mm Dia	Each	896	1227	1550
	350 mm Dia	Each	2236	2301	2365
5.7	<b>Labour for providing A.C. Coupler joint for the following asbestos cement pressure pipes and fittings class 15, 20 &amp; 25 including testing of joint but excluding cost of A.C. Coupler and rubber rings.</b>				
	80mm Dia	Each	69	71	74
	100mm Dia	Each	82	84	87
	125 mm Dia	Each	95	95	98
	150mm Dia	Each	105	108	110
	200mm Dia	Each	118	120	123
	250mm Dia	Each	130	133	135
	300mm Dia	Each	143	145	148
	350 mm Dia	Each	154	154	154
5.8	<b>Providing &amp; laying in position including testing following cast iron plain ended standard specials confirming to IS/5531/1988 (Reaffirmed 2002).</b>				

Item No.	Items	Unit	Rate in Rupees		
(i)	Cast Iron Plain ended 90° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm Dia	Each	554	634	715
	100mm Dia	Each	773	948	1072
	125 mm Dia	Each	1079	1313	1488
	150mm Dia	Each	1531	1874	2107
	200mm Dia	Each	2661	3259	3682
	250mm Dia	Each	3893	4768	5278
	300mm Dia	Each	5687	6984	7728
	350 mm Dia	Each	7655	9332	10862
(ii)	Cast Iron Plain ended 45° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm Dia	Each	561	642	722
	100mm Dia	Each	759	933	1057
	125 mm Dia	Each	1021	1254	1421
	150mm Dia	Each	1429	1743	1976
	200mm Dia	Each	2376	2930	3346
	250mm Dia	Each	3339	4119	4629
	300mm Dia	Each	4753	5883	6663
	350 mm Dia	Each	6197	7655	8967
(iii)	Cast Iron Plain ended 22½° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm Dia	Each	416	474	554
	100mm Dia	Each	561	700	816
	125 mm Dia	Each	743	926	1094
	150mm Dia	Each	1049	1297	1531
	200mm Dia	Each	1750	2187	2610
	250mm Dia	Each	2384	2996	3507
	300mm Dia	Each	3383	4264	5045
	350 mm Dia	Each	4301	5432	6554
(iv)	Cast Iron Plain ended 11¼° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm Dia	Each	343	386	467
	100mm Dia	Each	460	584	700
	125 mm Dia	Each	605	759	926
	150mm Dia	Each	860	1072	1305
	200mm Dia	Each	1436	1823	2245
	250mm Dia	Each	1902	2435	2946
	300mm Dia	Each	2698	3463	4236
	350 mm Dia	Each	3360	4323	5329
(v)	Cast Iron Plain ended Tees				
	Body & Branch		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80x80mm	Each	707	809	933
	100x80mm	Each	918	1057	1196
	100x100mm	Each	1014	1254	1436
	125X80mm	Each	1166	1385	1553
	125X100mm	Each	1290	1647	1852
	125X125mm	Each	1451	1778	2026

Item No.	Items	Unit	Rate in Rupees		
	150x80mm	Each	1764	2136	2406
	150x100mm	Each	1844	2260	2552
	150X125mm	Each	1946	2384	2705
	150x150mm	Each	2121	2596	2939
	200X80 mm	Each	3018	3702	4141
	200X100 mm	Each	3105	3806	4287
	200X125mm	Each	3215	3937	4447
	200X150 mm	Each	3448	4156	4687
	200X200 mm	Each	3799	4666	5301
	250X80 mm	Each	4462	4710	5986
	250X100 mm	Each	4549	5570	6138
	250X125mm	Each	4673	5715	6313
	250X150 mm	Each	4855	5942	6568
	250X200 mm	Each	5285	6474	7196
	250X250 mm	Each	5679	6977	7728
(vi)	Cast Iron Plain ended Tees				
	300x80 to 350x350mm				
	Body & Branch		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	300X80mm	Each	6568	8019	8822
	300X100mm	Each	6656	8165	8967
	300X125mm	Each	6787	8311	9186
	300X150mm	Each	6897	8457	9332
	300X200mm	Each	7436	9113	10061
	300X250mm	Each	7874	9623	10352
	300X300mm	Each	8457	10425	11591
	350X200mm	Each	9843	12030	13925
	350X250mm	Each	10280	12539	14581
	350X300mm	Each	10936	13341	15528
	350X350mm	Each	11519	14144	16404
(vii)	Cast Iron Plain ended Crosses		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80X80mm	Each	890	1006	1166
	100X100mm	Each	1261	1568	1808
	125X125mm	Each	1794	2201	2537
	150X150mm	Each	2631	3222	3682
	200X200mm	Each	4717	5789	6635
	250X250mm	Each	6991	8603	9623
	300X300mm	Each	10425	12831	14362
	350X350mm	Each	14144	17278	20121
(viii)	Cast Iron Plain ended Reducers		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	100X80mm	Each	612	729	831
	125X80mm	Each	722	860	984
	125X100mm	Each	802	984	1130
	150X80mm	Each	883	1057	1210
	150X100mm	Each	962	1189	1364



Item No.	Items	Unit	Rate in Rupees		
	150X125mm	Each	1072	1313	1516
	200X100mm	Each	1327	1640	1911
	200X125mm	Each	1429	1764	2063
	200X150mm	Each	1596	1969	2297
	250X125mm	Each	1735	2173	2500
	250X150mm	Each	1902	2362	2734
	250X200mm	Each	2260	2814	3281
	300X150mm	Each	2369	2960	3463
	300X200mm	Each	2734	3412	4017
	300X250mm	Each	3026	3645	4432
	350X200mm	Each	4294	5271	6088
	350X250mm	Each	4753	5847	6722
	350X300mm	Each	5388	6635	7655
(ix)	Cast Iron Adopter (Flange Spigot)		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	(T.P.)				
	80mm	Each	540	576	619
	100mm	Each	663	743	802
	125mm	Each	853	948	1072
	150mm	Each	1115	1247	1364
	200 mm	Each	1655	1881	2093
	250 mm	Each	2683	3084	3339
	300mm	Each	3485	4032	4425
	350mm	Each	4338	5016	5650
(x)	Cast Iron Blank end cap		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	(Dead end cap)				
	80mm	Each	248	269	320
	100mm	Each	357	430	518
	125mm	Each	496	591	722
	150mm	Each	743	883	1065
	200mm	Each	1356	1633	1983
	250mm	Each	1925	2311	2756
	300mm	Each	2850	3419	4112
	350mm	Each	3740	4476	5292
5.9	<b>Labour for laying in position including testing following cast iron plain ended standard specials confirming to IS/5531/1988 (Reaffirmed 2002).</b>				
(i)	Cast Iron Plain ended 90° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm	Each	16	18	21
	100mm	Each	22	27	32
	125mm	Each	32	39	44
	150mm	Each	45	55	62
	200mm	Each	78	96	108
	250mm	Each	114	139	155

Item No.	Items	Unit	Rate in Rupees		
	300mm	Each	167	204	226
	350 mm	Each	224	274	318
(ii)	Cast Iron Plain ended 45° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm	Each	16	18	21
	100mm	Each	22	27	31
	125mm	Each	29	37	42
	150mm	Each	42	51	58
	200mm	Each	69	85	98
	250mm	Each	98	121	135
	300mm	Each	139	172	195
	350mm	Each	181	224	262
(iii)	Cast Iron Plain ended 22½° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm	Each	12	14	16
	100mm	Each	16	20	24
	125mm	Each	21	27	32
	150mm	Each	31	38	45
	200mm	Each	51	64	76
	250mm	Each	70	87	103
	300mm	Each	99	125	147
	350mm	Each	126	159	192
(iv)	Cast Iron Plain ended 11¼° Bend		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm	Each	10	11	13
	100mm	Each	13	17	20
	125mm	Each	17	22	27
	150mm	Each	25	32	39
	200mm	Each	42	53	66
	250mm	Each	56	71	86
	300mm	Each	79	102	124
	350mm	Each	99	126	156
(v)	Cast Iron Plain ended Tees				
	<b>Body &amp; Branch</b>		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80x80mm	Each	20	23	27
	100x80mm	Each	26	31	35
	100x100mm	Each	29	37	42
	125X80mm	Each	35	41	46
	125X100mm	Each	38	48	54
	125X125mm	Each	43	52	59
	150x80mm	Each	52	62	70
	150x100mm	Each	54	66	74
	150X125mm	Each	57	70	79
	150x150mm	Each	62	76	86
	200X80 mm	Each	88	108	121
	200X100 mm	Each	90	112	125
	200X125mm	Each	95	115	130

Item No.	Items	Unit	Rate in Rupees		
	200X150 mm	Each	101	122	137
	200X200 mm	Each	111	136	156
	250X80 mm	Each	130	138	175
	250X100 mm	Each	133	163	180
	250X125mm	Each	137	168	185
	250X150 mm	Each	142	174	192
	250X200 mm	Each	155	189	210
	250X250 mm	Each	166	204	226
(vi)	Cast Iron Plain ended Tees				
	<b>Body &amp; Branch</b>		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	300X80mm	Each	192	235	258
	300X100mm	Each	195	239	262
	300X125mm	Each	198	243	268
	300X150mm	Each	202	247	274
	300X200mm	Each	218	266	295
	300X250mm	Each	231	282	303
	300X300mm	Each	247	305	340
	350X200mm	Each	288	352	408
	350X250mm	Each	301	367	427
	350X300mm	Each	320	390	455
	350X350mm	Each	338	414	480
(vii)	Cast Iron Plain ended Crosses		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80X80mm	Each	26	29	35
	100X100mm	Each	37	46	53
	125X125mm	Each	53	64	74
	150X150mm	Each	77	95	108
	200X200mm	Each	138	170	194
	250X250mm	Each	204	252	282
	300X300mm	Each	305	375	420
	350X350mm	Each	414	505	589
(viii)	Cast Iron Plain ended Reducers		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	100X80mm	Each	18	21	24
	125X80mm	Each	21	25	28
	125X100mm	Each	23	28	34
	150X80mm	Each	25	31	36
	150X100mm	Each	28	35	40
	150X125mm	Each	32	39	45
	200X100mm	Each	39	48	56
	200X125mm	Each	42	52	60
	200X150mm	Each	47	58	67
	250X125mm	Each	51	64	73
	250X150mm	Each	56	69	80
	250X200mm	Each	66	82	96
	300X150mm	Each	69	86	102

Item No.	Items	Unit	Rate in Rupees		
	300X200mm	Each	80	100	118
	300X250mm	Each	88	107	130
	350X200mm	Each	126	155	178
	350X250mm	Each	139	171	197
	350X300mm	Each	158	197	224
(ix)	Cast Iron Adopter (Flange Spigot) (T.P.)		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm	Each	16	17	18
	100mm	Each	19	21	23
	125mm	Each	25	27	32
	150mm	Each	33	37	40
	200mm	Each	49	55	61
	250 mm	Each	78	90	98
	300mm	Each	102	118	129
	350mm	Each	127	146	166
(x)	Cast Iron Blank end cap(Dead end cap)		<b>Class 15</b>	<b>Class 20</b>	<b>Class 25</b>
	80mm	Each	7	8	9
	100mm	Each	10	12	15
	125mm	Each	14	17	21
	150mm	Each	21	25	32
	200mm	Each	40	48	58
	250mm	Each	5	68	80
	300mm	Each	83	100	120
	350mm	Each	110	131	155
5.10	<b>Labour for laying in position Cast Iron Plain Ended Specials all sizes of any class which does not appear in this U.S.O.R.</b>				
	80mm to 350mm dia	Qntl	214	214	214

## **CHAPTER – VI**

### **GALVANISED IRON PIPES, GUN METAL / BRASS VALVES AND FITTINGS**

## Chapter – VI

### GALVANISED IRON PIPES, SPECIALS, GUN METAL/ BRASS VALVES AND FITTINGS

#### NOTES:

1. The G.I. pipes shall be confirming to IS - 1239:2004 (Pt -I), 1239:1992 (Pt-II)
2. The hot dip Zinc coating on M.S. tubes shall be confirming to IS - 4736:1986
3. The Copper alloy Gate valves, Globe wheel valves, Check valves shall be confirming to IS - 778: 1984 (Reaffirmed 2005)
4. The ferrules for water service related IS - 8794:1988 and IS - 2692-1989
5. All measurement shall be of the finishedwork.
6. Work shall be executed in accordance with the Indian Standards Specifications and special notes if any, covered in the agreement of thework.
7. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### GALVANISED IRON PIPES, SPECIALS, GUN METAL /BRASS VALVES AND FITTINGS

Item No.	ITEMS	Unit	Rate in Rupees		
6.1	<b>Providing laying and jointing of following galvanized Iron (MS) Pipes with specials (such as bends, elbows, tees etc) class light, medium &amp; heavy including testing of joints, cost of pipes, specials and jointing materials all complete. Pipes and sockets conforming to IS:1239/2011 Part-II.</b>				
				<b>Medium</b>	<b>Heavy</b>
	15mm dia	R Mtr.		108	127
	20mm dia	R Mtr.		136	162
	25mm dia	R Mtr.		207	249
	32mm dia	R Mtr.		254	308
	40mm dia	R Mtr.		301	366

Item No.	ITEMS	Unit	Rate in Rupees		
	50mm dia	R Mtr.		409	498
	65mm dia	R Mtr.		540	658
	80mm dia	R Mtr.		676	796
	100mm dia	R Mtr.		998	1176
	125mm dia	R Mtr.		1305	1462
	150mm dia	R Mtr.		1457	1634
6.2	<b>Labour for laying and jointing of following galvanized Iron (MS) pipes with specials (such as bends, elbows, tees etc) class light, medium &amp; heavy including testing of joints and cost of jointing materials but excluding cost of pipes &amp; specials.</b>				
				<b>Medium</b>	<b>Heavy</b>
	15mm dia	R Mtr.		11	12
	20mm dia	R Mtr.		12	13
	25mm dia	R Mtr.		17	19
	32mm dia	R Mtr.		18	20
	40mm dia	R Mtr.		24	26
	50mm dia	R Mtr.		26	29
	65mm dia	R Mtr.		44	48
	80mm dia	R Mtr.		47	52
	100mm dia	R Mtr.		69	76
	125mm dia	R Mtr.		89	98
	150mm dia	R Mtr.		107	117
6.3	<b>Providing and fixing following gate (full way) valves tested to 300lbs/Sq inch or 21.00 kg/sq.cm. confirming to IS 778/1984 (Reaffirmed 2005) Class-I</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		423	550
	20mm dia	Each		546	710
	25mm dia	Each		900	1170
	32mm dia	Each		1309	1701
	40mm dia	Each		1681	2185
	50mm dia	Each		2525	3282
	65mm dia	Each		4643	6036
	80mm dia	Each		6489	8436
	100mm dia	Each		12269	15949
6.4	<b>Providing and fixing following gate (full way) valves tested to 300lbs/Sq inch or 21.00 kg/sq.cm.</b>				

Item No.	ITEMS	Unit	Rate in Rupees		
	<b>confirming to IS 778/1984 (Reaffirmed 2005) Class-II</b>				
			<b>Screwed</b>	<b>Flanged</b>	
	15mm dia	Each	528	685	
	20mm dia	Each	672	874	
	25mm dia	Each	1117	1452	
	32mm dia	Each	1633	2123	
	40mm dia	Each	1996	2595	
	50mm dia	Each	3165	4115	
	65mm dia	Each	5773	7505	
	80mm dia	Each	7958	10346	
	100mm dia	Each	14707	19119	
6.5	<b>Providing and fixing following class-I Globe wheel valves, confirming to IS 778/1984 (Reaffirmed 2005), tested to 21.09 kg/sq.cmt.</b>				
			<b>Screwed</b>	<b>Flanged</b>	
	15mm dia	Each	384	499	
	20mm dia	Each	558	726	
	25mm dia	Each	865	1125	
	32mm dia	Each	1405	1827	
	40mm dia	Each	1923	2499	
	50mm dia	Each	2637	3428	
	65mm dia	Each	5093	6620	
	80mm dia	Each	6762	8790	
	100mm dia	Each	11546	15010	
6.6	<b>Providing and fixing following class-II Globe wheel valves, confirming to IS 778/1984 (Reaffirmed 2005), tested to 21.09 kg/sq.cmt.</b>				
			<b>Screwed</b>	<b>Flanged</b>	
	15mm dia	Each	475	617	
	20mm dia	Each	673	875	
	25mm dia	Each	1071	1392	
	32mm dia	Each	1751	2276	
	40mm dia	Each	2389	3106	
	50mm dia	Each	3339	4342	
	65mm dia	Each	5922	7698	
	80mm dia	Each	7694	10002	
	100mm dia	Each	13830	17980	



Item No.	ITEMS	Unit	Rate in Rupees		
6.7	<b>Providing and fixing following check (non-return) valves Class-I, confirming to IS: 778/1984 (Reaffirmed 2005) female ends, tested to 21.09 kg/sq.cmt.</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		384	499
	20mm dia	Each		558	726
	25mm dia	Each		865	1125
	32mm dia	Each		1405	1827
	40mm dia	Each		1923	2499
	50mm dia	Each		2637	3428
	65mm dia	Each		5093	6620
	80mm dia	Each		6762	8790
	100mm dia	Each		11546	15010
6.8	<b>Providing and fixing following check (non-return) valves Class-II, confirming to IS:778/1984 (Reaffirmed 2005) female ends, tested to 21.09 kg/sq.cmt.</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		461	598
	20mm dia	Each		670	870
	25mm dia	Each		1038	1349
	32mm dia	Each		1686	2192
	40mm dia	Each		2306	2999
	50mm dia	Each		3164	4113
	65mm dia	Each		6112	7945
	80mm dia	Each		8114	10549
	100mm dia	Each		13855	18011
6.9	<b>Providing and fixing following GM or brass ferrules confirming to IS: 2692/1989 (Reaffirmed 2005), tested to 21.09 kg/sq.cm. i/c boring and tapping themain.</b>				
				<b>Screwed</b>	
	15mm dia	Each		503	
	20mm dia	Each		724	
	25mm dia	Each		1900	
6.10	<b>Labour for laying, fixing including testing and carriage of Screwed or flanged Gate valves (full way) Class-I</b>				

Item No.	ITEMS	Unit	Rate in Rupees		
				Screwed	Flanged
	15mm dia	Each		15	19
	20mm dia	Each		19	25
	25mm dia	Each		33	42
	32mm dia	Each		47	61
	40mm dia	Each		60	78
	50mm dia	Each		90	117
	65mm dia	Each		166	216
	80mm dia	Each		232	302
	100mm dia	Each		438	570
6.11	<b>Labour for laying, fixing and including testing carriage of Screwed or flanged Gate valves (full way) Class-II</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		19	24
	20mm dia	Each		24	32
	25mm dia	Each		40	52
	32mm dia	Each		58	76
	40mm dia	Each		71	93
	50mm dia	Each		113	147
	65mm dia	Each		206	268
	80mm dia	Each		285	370
	100mm dia	Each		526	683
6.12	<b>Labour for laying, fixing and including testing carriage of Screwed or flanged globe wheel valves Class-I</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		14	18
	20mm dia	Each		20	26
	25mm dia	Each		31	41
	32mm dia	Each		50	65
	40mm dia	Each		69	89
	50mm dia	Each		95	123
	65mm dia	Each		182	237
	80mm dia	Each		242	314
	100mm dia	Each		413	537
6.13	<b>Labour for laying, fixing and including testing carriage of Screwed or flanged globe wheel valves Class-II</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		17	22

Item No.	ITEMS	Unit	Rate in Rupees		
	20mm dia	Each		24	32
	25mm dia	Each		39	50
	32mm dia	Each		63	81
	40mm dia	Each		85	111
	50mm dia	Each		119	156
	65mm dia	Each		211	276
	80mm dia	Each		276	358
	100mm dia	Each		494	643
6.14	<b>Labour for laying, fixing and including testing carriage of Screwed or flanged check (non-return) valves Class-I</b>				
	15mm dia	Each		14	18
	20mm dia	Each		20	26
	25mm dia	Each		31	41
	32mm dia	Each		50	65
	40mm dia	Each		69	89
	50mm dia	Each		95	123
	65mm dia	Each		182	237
	80mm dia	Each		242	314
	100mm dia	Each		413	537
6.15	<b>Labour for laying, fixing and including testing carriage of Screwed or flanged check (non-return) valves Class-II</b>				
				<b>Screwed</b>	<b>Flanged</b>
	15mm dia	Each		16	21
	20mm dia	Each		24	32
	25mm dia	Each		38	48
	32mm dia	Each		60	78
	40mm dia	Each		82	107
	50mm dia	Each		113	147
	65mm dia	Each		219	284
	80mm dia	Each		290	377
	100mm dia	Each		495	644
6.16	<b>Labour for laying, fixing and including testing carriage of following GM or brass ferrules</b>				
				<b>Screwed</b>	
	15mm dia	Each		134	
	20mm dia	Each		194	
	25mm dia	Each		508	

Item No.	ITEMS	Unit	Rate in Rupees		
6.17	Providing & fixing including testing watertaps				
			Stainless Steel	CI self closing	Brass Heavy Duty
	15mm dia	Each	198	254	370
	20mm dia	Each	254	315	498
6.18	Labour for fixing including testing and carriage of water taps				
			Stainless Steel	CI self closing	Brass Heavy Duty
	15mm dia	Each	8	10	13
	20mm dia	Each	10	12	18
6.19	Providing and fixing Screwed Ball valves tested to 21.09 kg/cm confirming to IS: 778/1984				
	15mm dia	Each		413	
	20mm dia	Each		568	
	25mm dia	Each		885	
	32mm dia	Each		1510	
	40mm dia	Each		2143	
	50mm dia	Each		3156	
	65mm dia	Each		6684	
	80mm dia	Each		11490	
	100mm dia	Each		17854	
6.20	Labour only for fixing and carriage of Ball valves tested to 21kg/cm confirming to IS: 778/1984				
	15mm dia	Each		15	
	20mm dia	Each		20	
	25mm dia	Each		32	
	32mm dia	Each		54	
	40mm dia	Each		76	
	50mm dia	Each		113	
	65mm dia	Each		239	
	80mm dia	Each		411	
	100mm dia	Each		639	
6.21	Providing and fixing G. I. Union in G.I. Pipe line i/c cutting threading testing etc. complete (New work) confirming to IS 1879				
	15mm dia	Each		109	
	20mm dia	Each		187	
	25mm dia	Each		242	
	32mm dia	Each		318	

Item No.	ITEMS	Unit	Rate in Rupees		
	40mm dia	Each		432	
	50mm dia	Each		559	
	65mm dia	Each		891	
	80mm dia	Each		1354	
	100mm dia	Each		2110	
6.22	<b>Labour for fixing G. I. Union in G.I. Pipe line i/c cutting threading, testing and carriage of etc. complete (New work)</b>				
	15mm dia	Each		13	
	20mm dia	Each		22	
	25mm dia	Each		29	
	32mm dia	Each		39	
	40mm dia	Each		53	
	50mm dia	Each		68	
	65mm dia	Each		109	
	80mm dia	Each		165	
	100mm dia	Each		256	
6.23	<b>Providing and fixing G. I. Union in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS1879</b>				
	15mm dia	Each		132	
	20mm dia	Each		227	
	25mm dia	Each		294	
	32mm dia	Each		385	
	40mm dia	Each		524	
	50mm dia	Each		677	
	65mm dia	Each		1080	
	80mm dia	Each		1641	
	100mm dia	Each		2557	
6.24	<b>Labour for fixing G. I. Union in G.I. Pipe line i/c cutting threading, testing and carriage etc. complete (Old work)</b>				
	15mm dia	Each		36	
	20mm dia	Each		61	
	25mm dia	Each		78	
	32mm dia	Each		103	
	40mm dia	Each		140	
	50mm dia	Each		181	
	65mm dia	Each		289	
	80mm dia	Each		439	
	100mm dia	Each		684	

Item No.	ITEMS	Unit	Rate in Rupees		
6.25	<b>Providing and fixing G. I. socket in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS 1879</b>				
	15mm dia	Each		22	
	20mm dia	Each		34	
	25mm dia	Each		46	
	32mm dia	Each		68	
	40mm dia	Each		83	
	50mm dia	Each		140	
	65mm dia	Each		183	
	80mm dia	Each		272	
	100mm dia	Each		453	
	125mm dia	Each		613	
	150mm dia	Each		716	
6.26	<b>Labour only for fixing G.I. socket in G.I. Pipe line i/c cutting threading, testing and carriage of etc. complete (Old work).</b>				
	15mm dia	Each		6	
	20mm dia	Each		9	
	25mm dia	Each		12	
	32mm dia	Each		18	
	40mm dia	Each		22	
	50mm dia	Each		38	
	65mm dia	Each		49	
	80mm dia	Each		73	
	100mm dia	Each		121	
	125mm dia	Each		164	
	150mm dia	Each		191	
6.27	<b>Providing and fixing G. I. Bend 90 degree in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS 1879</b>				
	15mm dia	Each		46	
	20mm dia	Each		66	
	25mm dia	Each		113	
	32mm dia	Each		192	
	40mm dia	Each		229	
	50mm dia	Each		351	
	65mm dia	Each		435	
	80mm dia	Each		513	

Item No.	ITEMS	Unit	Rate in Rupees		
	100mm dia	Each		1477	
	125mm dia	Each		1680	
	150mm dia	Each		2045	
6.28	<b>Labour only for fixing G. I. Bend 90 degree in G.I. Pipe line i/c cutting threading, testing and carriage etc. complete (Oldwork)</b>			.	
	15mm dia	Each		12	
	20mm dia	Each		17	
	25mm dia	Each		31	
	32mm dia	Each		51	
	40mm dia	Each		61	
	50mm dia	Each		94	
	65mm dia	Each		116	
	80mm dia	Each		137	
	100mm dia	Each		396	
	125mm dia	Each		449	
	150mm dia	Each		547	
6.29	<b>Providing and fixing G.I. Tee in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS: 1879</b>				
	15mm dia	Each		70	
	20mm dia	Each		115	
	25mm dia	Each		158	
	32mm dia	Each		267	
	40mm dia	Each		348	
	50mm dia	Each		570	
	65mm dia	Each		980	
	80mm dia	Each		1255	
	100mm dia	Each		2327	
6.30	<b>Labour only for fixing G. I. Tee in G.I. Pipe line i/c cutting threading, testing and carriage etc. complete (Oldwork)</b>				
	15mm dia	Each		18	
	20mm dia	Each		31	
	25mm dia	Each		42	
	32mm dia	Each		71	
	40mm dia	Each		93	
	50mm dia	Each		153	
	65mm dia	Each		262	
	80mm dia	Each		336	
	100mm dia	Each		622	

Item No.	ITEMS	Unit	Rate in Rupees		
6.31	<b>Providing and fixing G. I. Elbow in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS: 1879</b>				
	15mm dia	Each		49	
	20mm dia	Each		84	
	25mm dia	Each		116	
	32mm dia	Each		190	
	40mm dia	Each		239	
	50mm dia	Each		449	
	65mm dia	Each		705	
	80mm dia	Each		951	
	100mm dia	Each		1849	
6.32	<b>Labour only for fixing G. I. Elbow in G.I. Pipe line i/c cutting threading testing etc. complete (Oldwork)</b>				
	15mm dia	Each		13	
	20mm dia	Each		22	
	25mm dia	Each		31	
	32mm dia	Each		51	
	40mm dia	Each		64	
	50mm dia	Each		120	
	65mm dia	Each		189	
	80mm dia	Each		254	
	100mm dia	Each		495	
6.33	<b>Providing and fixing G. I. Nipple of minimum length in G.I. Pipe line i/c cutting, threading, testing and carriage etc. complete (Old work) confirming to IS: 1879</b>				
	15mm dia	Each		31	
	20mm dia	Each		47	
	25mm dia	Each		68	
	32mm dia	Each		115	
	40mm dia	Each		141	
	50mm dia	Each		210	
	65mm dia	Each		388	
	80mm dia	Each		573	
	100mm dia	Each		1072	



Item No.	ITEMS	Unit	Rate in Rupees		
6.34	<b>Labour only for fixing G.I. Nipple of minimum length in G.I. Pipe line i/c cutting threading testing etc. complete (Old work)</b>				
	15mm dia	Each		8	
	20mm dia	Each		12	
	25mm dia	Each		18	
	32mm dia	Each		31	
	40mm dia	Each		38	
	50mm dia	Each		56	
	65mm dia	Each		104	
	80mm dia	Each		154	
	100mm dia	Each		287	
6.35	<b>Providing and fixing G. I. Barrel Nipple (reducer) in G.I. Pipe line i/c cutting threading testing etc. complete (New work) confirming to IS: 1879</b>				
	15x80mm	Each		25	
	15x100mm	Each		31	
	20x80mm	Each		32	
	20x100mm	Each		35	
	25x80mm	Each		43	
	25x100mm	Each		44	
	32x80mm	Each		59	
	32x100mm	Each		76	
	40x80mm	Each		82	
	40x100mm	Each		105	
	50x80mm	Each		88	
	50x100mm	Each		115	
	50x150mm	Each		124	
	65x80mm	Each		92	
	65x100mm	Each		147	
	65x150mm	Each		214	
	80x100mm	Each		170	
	80x150mm	Each		181	
	100x150mm	Each		270	
	80x125mm	Each		298	
	100x125mm	Each		368	
	125x150mm	Each		495	
6.36	<b>Labour only for fixing G. I. Barrel Nipple (reducer) G.I. Pipe line i/c cutting threading testing etc. complete (New work)</b>				

Item No.	ITEMS	Unit	Rate in Rupees		
	15x80mm	Each		3	
	15x100mm	Each		4	
	20x80mm	Each		4	
	20x100mm	Each		4	
	25x80mm	Each		5	
	25x100mm	Each		5	
	32x80mm	Each		7	
	32x100mm	Each		9	
	40x80mm	Each		10	
	40x100mm	Each		13	
	50x80mm	Each		11	
	50x100mm	Each		14	
	50x150mm	Each		15	
	65x80mm	Each		11	
	65x100mm	Each		18	
	65x150mm	Each		26	
	80x100mm	Each		20	
	80x150mm	Each		22	
	100x150mm	Each		33	
	80x125mm	Each		37	
	100x125mm	Each		45	
	125x150mm	Each		60	
6.37	<b>Providing and fixing G. I. Barrel Nipple (reducer) in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS: 1879</b>				
	15x80mm	Each		31	
	15x100mm	Each		37	
	20x80mm	Each		38	
	20x100mm	Each		43	
	25x80mm	Each		51	
	25x100mm	Each		53	
	32x80mm	Each		72	
	32x100mm	Each		93	
	40x80mm	Each		100	
	40x100mm	Each		127	
	50x80mm	Each		107	
	50x100mm	Each		139	
	50x150mm	Each		150	
	65x80mm	Each		111	
	65x100mm	Each		179	
	65x150mm	Each		259	
	80x100mm	Each		206	

Item No.	ITEMS	Unit	Rate in Rupees		
	80x150mm	Each		220	
	100x150mm	Each		327	
	80x125mm	Each		362	
	100x125mm	Each		446	
	125x150mm	Each		600	
6.38	<b>Labour only for fixing G. I. Barrel Nipple (reducer) G.I. Pipe line i/c cutting threading testing etc. complete (Old work)</b>				
	15x80mm	Each		8	
	15x100mm	Each		10	
	20x80mm	Each		10	
	20x100mm	Each		11	
	25x80mm	Each		13	
	25x100mm	Each		14	
	32x80mm	Each		19	
	32x100mm	Each		24	
	40x80mm	Each		26	
	40x100mm	Each		35	
	50x80mm	Each		28	
	50x100mm	Each		38	
	50x150mm	Each		41	
	65x80mm	Each		29	
	65x100mm	Each		48	
	65x150mm	Each		69	
	80x100mm	Each		55	
	80x150mm	Each		59	
	100x150mm	Each		87	
	80x125mm	Each		97	
	100x125mm	Each		119	
	125x150mm	Each		161	
6.39	<b>Providing and fixing G. I. threaded Flange in G.I. Pipe line i/c cutting threading testing etc. complete (New work) confirming to IS: 1879</b>				
	15mm dia	Each		77	
	20mm dia	Each		81	
	25mm dia	Each		103	
	32mm dia	Each		121	
	40mm dia	Each		149	
	50mm dia	Each		192	
	65mm dia	Each		228	
	80mm dia	Each		306	

Item No.	ITEMS	Unit	Rate in Rupees		
	100mm dia	Each		407	
	125mm dia	Each		663	
	150mm dia	Each		755	
	200mm dia	Each		1233	
6.40	<b>Labour only for fixing G.I. threaded Flange in G.I. Pipe line i/c cutting threading, testing and carriage etc. complete (New work)</b>				
	15mm dia	Each		9	
	20mm dia	Each		10	
	25mm dia	Each		12	
	32mm dia	Each		14	
	40mm dia	Each		18	
	50mm dia	Each		23	
	65mm dia	Each		27	
	80mm dia	Each		38	
	100mm dia	Each		50	
	125mm dia	Each		80	
	150mm dia	Each		92	
	200mm dia	Each		149	
6.41	<b>Providing and fixing G. I. threaded Flange in G.I. Pipe line i/c cutting threading testing etc. complete (Old work) confirming to IS 1879</b>				
	15mm dia	Each		94	
	20mm dia	Each		99	
	25mm dia	Each		124	
	32mm dia	Each		146	
	40mm dia	Each		181	
	50mm dia	Each		233	
	65mm dia	Each		277	
	80mm dia	Each		371	
	100mm dia	Each		492	
	125mm dia	Each		803	
	150mm dia	Each		916	
	200mm dia	Each		1495	
6.42	<b>Labour only for fixing G. I. threaded Flange in G.I. Pipe line i/c cutting threading, testing and carriage etc. complete (Old work)</b>				
	15mm dia	Each		25	
	20mm dia	Each		26	
	25mm dia	Each		34	

Item No.	ITEMS	Unit	Rate in Rupees		
	32mm dia	Each		40	
	40mm dia	Each		49	
	50mm dia	Each		62	
	65mm dia	Each		74	
	80mm dia	Each		100	
	100mm dia	Each		132	
	125mm dia	Each		215	
	150mm dia	Each		245	
	200mm dia	Each		400	
6.43	<b>Providing and fixing wrought steel Plug in G.I. Pipe line with outer threading testing etc.complete (New &amp; Old work) confirming to IS: 1879</b>				
	15mm dia	Each		20	
	20mm dia	Each		27	
	25mm dia	Each		45	
	32mm dia	Each		74	
	40mm dia	Each		106	
	50mm dia	Each		163	
	65mm dia	Each		209	
	80mm dia	Each		262	
	100mm dia	Each		467	
6.44	<b>Labour only for fixing wrought steel Plug in G.I. Pipe line with outer threading, testing and carriage etc. complete. (Old Work)</b>				
	15mm dia	Each		5	
	20mm dia	Each		7	
	25mm dia	Each		12	
	32mm dia	Each	+	20	
	40mm dia	Each		28	
	50mm dia	Each		44	
	65mm dia	Each		56	
	80mm dia	Each		70	
	100mm dia	Each		125	
6.45	<b>Providing and fixing wrought steel Cap Plug with threading in G.I. Pipe line testing etc. complete confirming to IS:1879 (New &amp; Old Work)</b>				
	15mm dia	Each		40	
	20mm dia	Each		58	

Item No.	ITEMS	Unit	Rate in Rupees		
	25mm dia	Each		92	
	32mm dia	Each		130	
	40mm dia	Each		171	
	50mm dia	Each		239	
	65mm dia	Each		304	
	80mm dia	Each		491	
	100mm dia	Each		843	
6.46	<b>Labour only for fixing wrought steel Cap Plug with threading in G.I. Pipe line, testing and carriage etc. complete (Old work)</b>				
	15mm dia	Each		10	
	20mm dia	Each		15	
	25mm dia	Each		24	
	32mm dia	Each		35	
	40mm dia	Each		46	
	50mm dia	Each		64	
	65mm dia	Each		81	
	80mm dia	Each		131	
	100mm dia	Each		226	
6.47	<b>Providing and fixing G. I. Cross with outer threading in G.I. Pipe line i/c cutting threading testing etc. complete (Old work)</b>				
	15mm dia	Each		111	
	20mm dia	Each		146	
	25mm dia	Each		218	
	32mm dia	Each		344	
	40mm dia	Each		435	
	50mm dia	Each		687	
6.48	<b>Labour only for fixing G. I. cross outer threading in G.I. Pipe line i/c cutting, threading, testing and carriage etc. complete (Old work)</b>				
	15mm dia	Each		29	
	20mm dia	Each		40	
	25mm dia	Each		58	
	32mm dia	Each		92	
	40mm dia	Each		117	
	50mm dia	Each		184	

Item No.	ITEMS	Unit	Rate in Rupees		
6.49	<b>Providing and fixing Tank Nipple with outer threading in G.I. Pipe line i/c cutting threading testing etc. complete confirming to IS: 1879</b>				
	15mm dia	Each		82	
	20mm dia	Each		114	
	25mm dia	Each		191	
	32mm dia	Each		272	
	40mm dia	Each		358	
	50mm dia	Each		567	
6.50	<b>Labour only for Tank Nipple with outer threading in G.I. Pipe line i/c cutting, threading, testing and carriage etc. complete</b>				
	15mm dia	Each		10	
	20mm dia	Each		14	
	25mm dia	Each		23	
	32mm dia	Each		34	
	40mm dia	Each		44	
	50mm dia	Each		69	

**CHAPTER – VII**

**P.V.C. PIPES, O-PVC PIPES  
AND FITTINGS**



## Chapter – VII

### P.V.C. PIPES & FITTINGS

#### NOTES:

1. The Unplasticized P.V.C. pipes shall be confirming to IS - 4985:2000
2. The laying and jointing of UPVC pipes shall be done as per IS - 4736:1986
3. Selection, handlings, storage and instattation of UPVC pipes IS-7634:2003 (Pt-3)
4. The injection mould PVC fitting with solvent cement joint shall be confirming to IS - 7834: 1987 (Part I to VIII)
5. All measurements shall be of the finishedwork.
6. Work shall be executed in accordance with the Indian Standards Specifications and special notes if any, covered in the agreement of thework.
7. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### P.V.C. PIPES & FITTINGS

S.No.	Items	Unit	Rates in RS.		
7.1	<b>Providing, laying and jointing following P.V.C. pipes with solvent cement joint for 6, 8 and 10 kg/ sq. cm. pressures including testing of joints, cost of jointing materials etc. complete in all respect.</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	R. mtr.	159	230	261
	110 mm dia.	R. mtr.	221	312	357
	140 mm dia.	R. mtr.	368	525	580
	160 mm dia.	R. mtr.	471	666	750
	180 mm dia.	R. mtr.	613	885	970
	200 mm dia.	R. mtr.	828	1139	1319
7.2	<b>Labour for laying in position including testing following PVC pipes of 6, 8 and 10Kg/Sqcm. pressure.</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	R. mtr.	4	4	4
	110 mm dia.	R. mtr.	5	5	5
	140 mm dia.	R. mtr.	6	6	6
	160 mm dia.	R. mtr.	7	7	7
	180 mm dia.	R. mtr.	9	9	9

S.No.	Items	Unit	Rates in RS.		
	200 mm dia.	R. mtr.	12.00	12.00	12.00
7.3	<b>Providing, Solvent Cement Joints to PVC Pipes and fittings of 6, 8 and 10 Kg/Sq cm. Pressure including testing of joints and cost of jointing materials (i.e. socket, coupler &amp; solvent cement)</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	Each	24	24	24
	110 mm dia.	Each	27	27	27
	140 mm dia.	Each	34	34	34
	160 mm dia.	Each	40	40	40
	180 mm dia.	Each	43	43	43
	200 mm dia.	Each	59	59	59
7.4	<b>Labour for providing solvent cement joints to PVC pipes and fittings of 6, 8 and 10Kg /Sq cm. Pressure including testing of joints but excluding cost of jointing materials (i.e. coupler and solvent cement)</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	Each Joint	19	19	19
	110 mm dia.	Each Joint	20	20	20
	140 mm dia.	Each Joint	22	22	22
	160 mm dia.	Each Joint	24	24	24
	180 mm dia.	Each Joint	26	26	26
	200 mm dia.	Each Joint	33	33	325
7.5	<b>Providing and laying in position including testing following PVC bends suitable for 6, 8 and 10 Kg/Sq. cm. pressure pipes.</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	Each	156	205	254
	110 mm dia.	Each	252	342	405
	140 mm dia.	Each	602	828	958
	160 mm dia.	Each	801	1129	1344
	180 mm dia.	Each	1210	1538	1846
	200 mm dia.	Each	1495	1976	2387

S.No.	Items	Unit	Rates in RS.		
7.6	<b>Providing and laying in position including testing following PVC Tees, suitable for 6, 8 and 10 Kg/Sqm. Pressure pipes.</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	Each	93	114	129
	110 mm dia.	Each	122	214	255
	140 mm dia.	Each	319	337	354
	160 mm dia.	Each	530	556	678
	180 mm dia.	Each	656	800	1004
	200 mm dia.	Each	885	1165	1537
7.7	<b>Providing and laying in position including testing following PVC flanged tail pieces suitable for 6, 8 and 10 Kg./Sq. cm. Pressure pipes.</b>				
			<b>6Kg/Cm2</b>	<b>8 Kg/Cm2</b>	<b>10Kg/Cm2</b>
	90 mm dia.	Each	66	70	75
	110 mm dia.	Each	130	139	148
	140 mm dia.	Each	207	222	237
	160 mm dia.	Each	356	380	408
	180 mm dia.	Each	477	509	546
	200 mm dia.	Each	631	675	725
7.8	<b>Providing and laying in position including testing following PVC end Cap (plugs) suitable for 6, 8 and 10 Kg/Sq cm. Pressure pipes.</b>				
			<b>6Kg/Cm2</b>	<b>8 Kg/Cm2</b>	<b>10Kg/Cm2</b>
	90 mm dia.	Each	38	45	59
	110 mm dia.	Each	54	64	85
	140 mm dia.	Each	84	103	137
	160 mm dia.	Each	139	170	230
	180 mm dia.	Each	186	228	309
	200 mm dia.	Each	225	277	375
7.9	<b>Providing and laying in position including testing PVC coupler suitable for 6, 8 and 10 Kg/Sq. cm. Pressure pipes.</b>				
			<b>6Kg/Cm2</b>	<b>8 Kg/Cm2</b>	<b>10Kg/Cm2</b>
	90 mm dia.	Each	51	61	86
	110 mm dia.	Each	80	96	135
	140 mm dia.	Each	150	181	282
	160 mm dia.	Each	264	320	362
	180 mm dia.	Each	370	440	453
	200 mm dia	Each	477	517	545

S.No.	Items	Unit	Rates in RS.		
7.10	<b>Providing and laying in position including testing of following PVC Reducers suitable for 6, 8 and 10 Kg/Sq cm. Pressure pipes.</b>				
			<b>6Kg/Cm2</b>	<b>8 Kg/Cm2</b>	<b>10Kg/Cm2</b>
	110x90 mm dia.	Each	71	84	101
	140x90 mm dia.	Each	113	132	143
	160x90 mm dia.	Each	143	170	247
	180x90 mm dia.	Each	149	177	262
	140x110 mm dia.	Each	116	137	161
	160x110 mm dia.	Each	143	170	249
	180x110 mm dia.	Each	201	240	269
	200x110 mm dia.	Each	258	307	357
	160x140 mm dia.	Each	148	176	210
	180x140 mm dia.	Each	210	250	291
	200x140 mm dia	Each	348	415	481
	180x160 mm dia	Each	228	270	314
	200x160 mm dia.	Each	366	437	507
	200x180 mm dia.	Each	378	451	524
7.11	<b>Labour for laying in position including testing all types of PVC fittings such as bends, tees, plugs etc. for following PVC pipes.</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	Each	7	7	7
	110 mm dia.	Each	8	8	8
	140 mm dia.	Each	10	10	10
	160 mm dia.	Each	12	12	12
	180 mm dia.	Each	12	12	12
	200 mm dia.	Each	14	14	14
7.12	<b>Providing and fixing PVC D-joint (Detachable joint) in PVC pipe line suitable for classes up to 10kg/sqcm Pressure pipes. i/c nut bolt, cutting of pipe, testing of joints etc complete.</b>				
			<b>6Kg/Cm<sup>2</sup></b>	<b>8 Kg/Cm<sup>2</sup></b>	<b>10Kg/Cm<sup>2</sup></b>
	90 mm dia.	Each	112	112	112
	110 mm dia.	Each	126	126	126
	140 mm dia.	Each	169	169	169
	160 mm dia.	Each	196	196	196
	180mm dia.	Each	232	232	232
	200mm dia.	Each	337	337	337

S.No.	Items	Unit	Rates in RS.		
7.13	<b>Labour only for fixing PVC D-joint (Detachable joint) in PVC pipe line suitable for classes up to 10kg/sq.cm Pressure pipes. i/c cutting of pipe, testing of joints etc complete.</b>				
			6Kg/Cm <sup>2</sup>	8 Kg/Cm <sup>2</sup>	10Kg/Cm <sup>2</sup>
	90 mm dia.	Each	18	18	18
	110 mm dia.	Each	20	20	20
	140 mm dia.	Each	26	26	26
	160 mm dia.	Each	32	32	32
	180mm dia.	Each	37	37	37
	200mm dia.	Each	54	54	54

## ORIENTED P.V.C (O-PVC) PIPES

### NOTES:-

1. The Oriented Un-plasticized Polyvinyl Chloride O-PVC pipes for potable water supply as per IS 16647:2017 duly inspected and tested and having BIS certification mark.
2. Selection, Handling, Storage and Installation of UPVC Pipes also applicable for O-PVC pipe as per IS 7634:2003 (Part-3)
3. Pipes should be stacked on a surface flat and free from sharp objects, stones of projection in order to avoid deformation of damages. Ends of pipes should be protected from abrasion and chipping.
4. In rocky area 15 cm cushion of sand or moorum below and above the pipes should be provided as per IS 7634:2003 (Part III)
5. All measurement shall be of the finished work. The net length of pipes as laid or fixed shall be measured in running meters correct to 10 mm. Specials shall be excluded and measured and paid separately under the relevant item. The portion of the pipe inside the joints 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.
6. Work shall be executed in accordance with the Indian Standards Specifications and special notes if any, covered in the agreement of the work.
7. DI fittings of relevant class and size shall be used for connecting and laying the O-PVC pipe line.
8. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### ORIENTED P.V.C. (O-PVC) PIPES

Sl.No.	Item	Unit	Rate In Rs
7.14	<b>Providing, laying and jointing followings ISI marked O-PVC (Oriented uplasticized polyvinyl chloride) ring fit type pipe having orientation class 500 (IS 16647) with integral homogeneous spigot having elastomeric seeling ring made of EPDM rubber (one per pipe) including testing of joint, cost of jointing materials etc. complete in all respect. Presure Rating as per IS Code – IS: 16647:2017, PN-16</b>		
	110 mm dia	RMT	610
	160 mm dia	RMT	1001
	200 mm dia	RMT	1233
	250 mm dia	RMT	1809
	315 mm dia	RMT	2383
	400 mm dia	RMT	3589
7.15	<b>Providing, laying and jointing followings ISI marked O-PVC (Oriented uplasticized polyvinyl chloride) ring fit type pipe having orientation class 500 (IS 16647) with integral homogeneous spigot having elastomeric seeling ring made of EPDM rubber (one per pipe) including testing of joint, cost of jointing materials etc. complete in all respect. Presure Rating as per IS Code – IS: 16647:2017, PN-25</b>		
	110 mm dia	RMT	723
	160 mm dia	RMT	1146
	200 mm dia	RMT	1492
	250 mm dia	RMT	2208
	315 mm dia	RMT	3291
	400 mm dia	RMT	5149

## **CHAPTER – VIII**

### **CAST IRON VALVES**

## Chapter – VIII

### CAST IRON VALVES

#### NOTES:

1. The Sluice Valves (50-1000 mm size) shall be confirming to IS:14846:2000
2. The resilient seated C.I. Air relief valve shall be confirming to IS:14845: 2000
3. The Swing check type reflux valves as per IS: 5312:2004 (Part I & II)
4. The Butter fly valves shall be conforming to IS -13095:1991
5. All measurement shall be of the finishedwork.
6. Work shall be executed in accordance with the Indian Standards Specifications and special notes if any, covered in the agreement of thework.
7. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### CAST IRON VALVES

S.No.	Items	Unit	Rates in Rupees	
8.1	<b>Providing &amp; fixing of following Cast iron double flanged sluice valves as per I.S.:14846-2000 fitted with cast iron cap including jointing &amp; testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete</b>		<b>PN-1.0</b>	<b>PN-1.6</b>
	50mm dia	Each	2473	2654
	65mm dia	Each	2918	3137
	80mm dia	Each	3454	3708
	100mm dia	Each	4749	5090
	125mm dia	Each	5773	6203
	150mm dia	Each	7049	7559
	200mm dia	Each	12271	13183
	250mm dia	Each	18040	19213
	300mm dia	Each	22580	24067



S.No.	Items	Unit	Rates in Rupees	
8.2	<b>Fixing of following 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 deptt. free of cost.</b>		<b>PN-1.0</b>	
	50mm dia	Each	211	
	65mm dia	Each	219	
	80mm dia	Each	229	
	100mm dia	Each	358	
	125mm dia	Each	390	
	150mm dia	Each	520	
	200mm dia	Each	718	
	250mm dia	Each	1160	
	300mm dia	Each	1312	
	350 mm dia	Each	2164	
	400 mm dia	Each	3322	
	450 mm dia	Each	4019	
	500 mm dia	Each	5074	
	600 mm dia	Each	7351	
	700 mm dia	Each	8747	
	750 mm dia	Each	9406	
	800 mm dia	Each	12380	
	900 mm dia	Each	14009	
	1000 mm dia	Each	17783	
8.3	<b>Labour for laying and fixing of following cast iron double flanged sluice valves (vide item no.1) including jointing and testing but without cost of Jointing materials.</b>			
	50mm dia	Each	77	
	65mm dia	Each	97	
	80mm dia	Each	109	
	100mm dia	Each	150	
	125mm dia	Each	177	
	150mm dia	Each	220	
	200mm dia	Each	328	
	250mm dia	Each	472	
	300mm dia	Each	609	
	350mm dia	Each	1064	
	400mm dia	Each	1258	
	450mm dia	Each	1504	
	500mm dia	Each	1820	
	600mm dia	Each	2769	
	700mm dia	Each	3175	

S.No.	Items	Unit	Rates in Rupees	
	750mm dia	Each	3297	
	800mm dia	Each	3746	
8.4a	<b>Providing &amp; fixing following cast iron double flanged single door reflux (non return) valves including jointing &amp; testing with cost of jointing material such as bolts,nuts and rubber insertion all complete as per IS :5312 (Part I)</b>		<b>CLASS-PN- 1.0</b>	
	50mm dia	Each	1904	
	65mm dia	Each	2386	
	80mm dia	Each	2972	
	100mm dia	Each	3808	
	150mm dia	Each	6590	
	200mm dia	Each	12793	
	250mm dia	Each	19073	
	300mm dia	Each	24694	
	350mm dia	Each	42789	
8.4b	<b>Providing &amp; fixing following cast iron double flanged multi door reflux (non return) valves including jointing &amp; testing with cost of jointing material such as bolts,nuts and rubber insertion all complete as per IS : 5312 (Part II)</b>		<b>CLASS PN- 1.0</b>	<b>CLASS PN- 1.60</b>
	400mm dia	Each	51266	60610
	450mm dia	Each	60228	86661
	500mm dia	Each	107469	162225
	600mm dia	Each	147937	202516
	700mm dia	Each	168653	255722
	750mm dia	Each	247478	297522
	800mm dia	Each	281305	340179
8.5	<b>Labour for laying and fixing of following Cast Iron Double Flanged reflux (non return) valves including jointing &amp; testing but without cost of jointingmaterials</b>			
	50mm dia	Each	61	
	65mm dia	Each	76	
	80mm dia	Each	87	
	100mm dia	Each	120	
	125mm dia	Each	138	
	150mm dia	Each	169	
	200mm dia	Each	209	
	250mm dia	Each	343	

S.No.	Items	Unit	Rates in Rupees	
	300mm dia	Each	435	
	350mm dia	Each	668	
	400mm dia	Each	870	
	450mm dia	Each	980	
	500mm dia	Each	1223	
	600mm dia	Each	1860	
	700mm dia	Each	2134	
	750mm dia	Each	2216	
	800mm dia	Each	2518	
8.6	<b>Providing &amp; fixing following cast iron butterfly valves including jointing &amp; testing with cost of jointing material such as bolts,nuts and rubber insertion all complete as per IS :13095-1991</b>		<b>CLASS PN- 1.0</b>	<b>CLASS PN- 1.6</b>
	50mm dia	Each	1560	1637
	65mm dia	Each	1785	1875
	80mm dia	Each	2043	2144
	100mm dia	Each	2720	2855
	150mm dia	Each	3464	3637
	200mm dia	Each	6634	6965
	250mm dia	Each	11114	11669
	300mm dia	Each	15169	15927
8.7	<b>Labour for laying and fixing of following Cast Iron butterfly valves including jointing &amp; testing but without cost of jointing materials</b>			
	50mm dia	Each	61	
	65mm dia	Each	76	
	80mm dia	Each	87	
	100mm dia	Each	120	
	150mm dia	Each	138	
	200mm dia	Each	169	
	250mm dia	Each	209	
	300mm dia	Each	343	
8.8	<b>Providing &amp; fixing following cast iron single air valves, small orifice with screwed end as per IS: 14845-2000 including jointing &amp; testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991</b>		<b>CLASS PN- 1.0</b>	<b>CLASS PN- 1.6</b>
	25mm dia	Each	2912	3057
	40mm dia	Each	3087	3242

S.No.	Items	Unit	Rates in Rupees	
8.9	<b>Labour for laying and fixing of following Cast Iron Air valves small orifice with screwed end i/c jointing &amp; testing but without cost of jointing material.</b>			
	25mm dia	Each	25	
	40mm dia	Each	34	
8.10	<b>Providing &amp; fixing following cast iron single acting air valves, large orifice with screwed end as per IS : 14845-2000 including jointing &amp; testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991</b>		<b>CLASS PN- 1.0</b>	<b>CLASS PN- 1.6</b>
	25mm dia	Each	2912	3057
	40mm dia	Each	3087	3242
	50mm dia	Each	3582	3761
8.11	<b>Labour for laying and fixing of following Cast Iron Air valves large orifice with screwed end i/c jointing &amp; testing but without cost of jointing material.</b>			
	25mm dia	Each	25	
	40mm dia	Each	34	
	50mm dia	Each	61	
8.12	<b>Providing &amp; fixing following cast iron double acting air valves, flanged without inbuilt isolating valve as per IS : 14845-2000 including jointing &amp; testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991</b>		<b>CLASS PN- 1.0</b>	<b>CLASS PN- 1.6</b>
	40mm dia	Each	3309	3473
	50mm dia	Each	3918	4113
	65mm dia	Each	4134	4341
	80mm dia	Each	5768	6056
	100mm dia	Each	9023	9473
	150mm dia	Each	16688	17522
	200mm dia	Each	28443	29865
8.13	<b>Labour for laying and fixing including testing following Cast Iron double acting air valves, flanged without in-built isolating valve.</b>			
	40mm dia	Each	34	
	50mm dia	Each	61	
	65mm dia	Each	76	
	80mm dia	Each	87	

S.No.	Items	Unit	Rates in Rupees	
	100mm dia	Each	120	
	150mm dia	Each	138	
	200mm dia	Each	169	
8.14	<b>Providing &amp; fixing following cast iron double acting air valves, flanged with inbuilt isolating valve as per IS : 14845-2000 including jointing &amp; testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991</b>		<b>CLASS PN- 1.0</b>	<b>CLASS PN- 1.6</b>
	40mm dia	Each	3636	3818
	80mm dia	Each	6337	6653
	100mm dia	Each	9915	10411
	150mm dia	Each	18343	19260
	200mm dia	Each	29297	30761
8.15	<b>Labour for laying and fixing, including testing following Cast Iron double acting air valves, flanged with in-built isolating valve.</b>			
	40mm dia	Each	34	
	80mm dia	Each	61	
	100mm dia	Each	120	
	150mm dia	Each	138	
	200mm dia	Each	169	

## **CHAPTER - IX**

### **HDPE PIPE, MDPE PIPE & SPECIALS**

## CHAPTER -IX

### HDPE PIPE, MDPE PIPE & SPECIALS

#### NOTES:

1. This specification covers the requirements for successfully designing, manufacturing, supplying, laying, jointing and testing at works and site of High Density Polyethylene Pipes used for water supply. Use of HDPE Pipes shall be of pressure class of minimum PN 6 or above.

2. **Applicable Codes**

The manufacturing, testing, supplying, laying, jointing and testing at work sites of HDPE pipes shall comply with IS: 4984-2016 all currently applicable statutes, regulations, standards and amendments and others as follows-

Code no.	Title / Specification
IS 4984	High Density Polyethylene Pipes renamed as PE (Polyethylene Pipes) for Water Supply
IS 2530	Methods of test for polyethylene molding materials and polyethylene compounds GRP Pipes, Joints and Fittings for use for Potable Water Supply
IS 5382	Rubber sealing rings for gas mains, water mains and sewers.
IS 4905	Methods for random sampling
IS 7328	High density polyethylene materials for molding and extrusion
IS 7634	Laying & Jointing of Polyethylene (PE) Pipes
IS 9845	Method of analysis for the determination of specific and/or overall migration of constituents of plastics material and articles intended to come into contact with foodstuffs
IS 10141	Positive list of constituents of polyethylene in contact with food stuffs, pharmaceuticals and drinking water.
IS 10146	Polyethylene for its safe use in contact with foodstuff, Pharmaceuticals and drinking water.

3. **Color**

The color of the pipe shall be black.

4. **Materials**

The material used for the manufacturer of pipes should not constitute toxicity hazard, should not support microbial growth, should not give rise to unpleasant taste or odour, cloudiness or discoloration of water. Pipe manufacturers shall obtain a certificate to this effect from the manufacturers of raw material by any internationally reputed organization as per the satisfaction of the Engineer-in-Charge.

**5. Raw Material**

- (a) Resin used to manufacture the HDPE pipes shall be 100% virgin PE Black pre-compounded confirming to IS: 4984, IS: 7328 and ISO: 4427-2007 (latest version). The resin proposed to be used for manufacturing of the pipes should also comply with the following norms as per ISO 9080-2003 (latest version).
- (b) The resin should also have been certified by an independent laboratory of international repute like Bodycote/Slevan/Advantica for having passed 10,000 hour long term hydrostatic strength (LTHS) test extrapolated to 50 years to show that the resin has a minimum MRS of over 10MPa. There should not be any brittle knee at 80°C before 5000 hours. Internal certificate of any resin manufacturer will not be acceptable.
- (c) Certificate from reputed organization OR Raw material supplier for having passed the full scale rapid crack propagation test as per ISO 13478. High density Polyethylene (HDPE) used for the manufacture of pipes shall conform to designation PEEWA-50-T-003 of IS 7328. HDPE conforming to designation PEEWA-50-T-003 of IS: 7328 may also be used. Melt Flow Rate (MFR) of the specific base density material shall also conform to clause of IS: 7328.
- (d) The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5±0.5% and the dispersion of carbon black shall be satisfactory when tested as per IS: 2530.

**6. Anti-oxidant**

The percentage of anti-oxidant used shall not be more than 0.3 percent by mass of finished resin. The anti-oxidant used shall be physiologically harmless and shall be selected from the list given in IS: 10141

**7. Reworked Material**

No addition of Reworked/ Recycled Material from the manufacturer's own rework material resulting from the manufacture of pipes is permissible and the vendor is required to use only 100% virgin resin compound.

**8. Maximum Ovality of Pipe**

The outside diameter of pipes, tolerance on the same and ovality of pipe shall be as given in table 2 of IS: 4984.

**9. Detectability**

HDPE Pipes shall be detectable when buried underground, by providing an insulated copper wire having minimum diameter of 1.20 mm, firmly attached along the entire length of pipe.

To avoid theft or dislocation during handling / laying or earth refilling in trench, the insulated Copper wire shall be firmly fixed on the outer surface of HDPE pipe at Pipe manufacturer's works through external adhesion or co-extrusion or any other appropriate method.

**10. Length of Straight Pipe**

The length of straight pipe used shall be more than 6 m or as agreed by Engineer-in-Charge in charge. Short lengths of 3 meter (minimum) up to a maximum of 10% of the total supply may be permitted.

**11. Coiling**

The pipes supplied in coils shall be coiled on drums of minimum diameter of



25 times the nominal diameter of the pipe ensuring that kinking of pipe is prevented. Pipe beyond 110mm dia shall be supplied in straight length not less than 6m.

**12. Fittings & Specials**

All HDPE fittings/ specials shall be of minimum PN 6 or above Pressure class, fabricated in accordance with IS: 8360 (Part I & III). PE Injection molded fittings shall be as per IS:8008 (Part I to IX). All fittings/specials shall be fabricated or molded at factory only. No fabrication or molding will be allowed at site, unless specifically permitted by the Engineer-in-Charge. Fittings will be welded on to the pipes or other fittings by use of Electro-fusion process. Recommended makes for PE/ Compression fittings / specials are Kimplas, Georg-Fischer, Glynwed, Trustlene, Astore, Magnum and GPS.

**13. Bends**

HDPE bends shall be plain square ended conforming to IS: 8360 Part I & III Specifications.

Bends shall be molded.

**14. Tees**

HDPE Tees shall be plain square ended conforming to IS: 8360 Part I & II Specifications.

Tees may be equal tees or reduced take off tees. Tees shall be molded.

**15. Reducers**

HDPE Reducers shall be plain square ended conforming to IS: 8008 Part I & VII

Specifications. Reducer must be molded.

**16. Flanged HDPE Pipe Ends**

HDPE Stub ends shall be square ended conforming to IS: 8008 Part I & VI Specifications. Stub ends will be welded on the pipe. Flange will be of slip on flange type as described below.

**17. Slip-On Flanges**

Slip-on flanges shall be metallic flanges covered by epoxy coating or plastic powder coating. Slip-on-flanges shall be conforming to standard mating relevant flange of valves, pipes etc. Nominal pressure rating of flanges will be PN10.

**18. Electro Fusion Tapping Saddle, Branch Saddle & Electro Fusion fittings:**

- a. All the Electro fusion fittings should be manufactured with top quality virgin pre-compounded PE 100 resin which should be compatible with the distribution mains.
- b. The products shall comply with the requirements of EN 12201-3, EN 1555-3 or ISO 8085-3.
- c. All the fittings shall be of SDR 11 rating.
- d. The fittings shall have the approval from any three Agencies like KIWA, DVGW, WRC-NSF, U.K. CIPET etc.

- e. All the products shall be manufactured by injection molding using virgin compounded PE 100 polymer having a melt flow rate between 0.2- 1.4 grams/10 minutes and shall be compatible for fusing on PE 100 distribution mains manufactured according to the relevant national or international standards. The polymer used should comply with the requirements of EN 12201-1.
- f. Process voltage of all saddles must not exceed a maximum of 40 volts.

**19. Compression Fitting-**

Compression fitting used for House service connection should comply as per ISO 14236 with Threaded metal inserts –SS 304 with BSP Threads

**Pressure Testing-**

The Pressure rating of compression fittings should be as per clause 8 of ISO 14236 which shall be PN 16

**Dimensions-**

The Dimension of compression fittings shall be as per clause 7.1 of ISO 14236 Performed.

- Leaktightness under internal pressure.
- Leaktightness under internal Vacuum.
- Long term Pressure Test for Leaktightness for assembled joint
- MRS Value as per ISO 9080
- Resistance to Internal Pressure.

**Effects on Quality of Water-**

The Compression fitting for intended for conveyance of Potable water for Human consumption to be tested to comply with BS 6920 specifications in any of the laboratories like DVGW/ KIWA/ SPGN/ WRC –NSF and certificate of compliance to be produced for the following parameters:

- a. Odor & Flavor of Water.
- b. Appearance of Water.
- c. Growth of Micro Organism.
- d. Extraction of Metals.
- e. All fittings with threaded ends should be with BSP threads.

- 8. This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

**HDPE PIPE (NOW RENAMED AS POLYETHYLENE PIPES)  
MDPE PIPE & SPECIALS**

S.No.	Items	Unit	Rates in Rs.		
9.1	<b>Providing, Laying, Jointing &amp; field testing of HDPE pipes (High Density Polyethylene Pipes) confirming to IS 4984/14151/12786/13488 with necessary jointing material like mechanical connector of 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 &amp; leak proof joint by thermosetting process. It may be required to be done with Jack/ Hydraulic Jacks/ Butt fusion machine. (50 mm &amp; above fusion jointed &amp; below 50mm mechanical jointed)</b>				
	<b>Pressure →</b>		<b>6Kg/ sq.cm :</b>	<b>8Kg/ sq.cm :</b>	<b>10 Kg/ sq.cm:</b>
	63 mm dia	R. mtr.	116	142	176
	75 mm dia	R. mtr.	167	204	250
	90 mm dia	R. mtr.	236	287	359
	110 mm dia	R. mtr.	395	433	527
	125 mm dia	R. mtr.	459	555	679
	140 mm dia	R. mtr.	572	698	851
	160 mm dia	R. mtr.	766	915	1115
	180 mm dia	R. mtr.	946	1148	1412
	200 mm dia	R. mtr.	1170	1418	1737
	225 mm dia	R. mtr.	1480	1795	2207
	250 mm dia	R. mtr.	1825	2209	2713
	280 mm dia	R. mtr.	2278	2777	3405
	315 mm dia	R. mtr.	2872	3518	4309
9.2	<b>Providing and laying including testing Bend 90° confirming to specification.</b>				
	<b>Pressure →</b>		<b>6Kg/ sq.cm :</b>	<b>8Kg/ sq.cm :</b>	<b>10Kg/ sq.cm:</b>
	63 mm dia	Each	84	90	126
	75 mm dia	Each	131	135	162
	90 mm dia	Each	202	217	259
	110 mm dia	Each	268	313	351
	125 mm dia	Each	385	465	589
	140 mm dia	Each	523	652	805
	160 mm dia	Each	749	942	1171
	180 mm dia	Each	1035	1310	1641
	200 mm dia	Each	1387	1762	2217

S.No.	Items	Unit	Rates in Rs.		
9.3	<b>Providing and laying including testing Bend 45° confirming to IS specification.</b>				
	<b>Pressure →</b>		<b>6Kg/ sq.cm :</b>	<b>8Kg/ sq.cm :</b>	<b>10Kg/ sq.cm:</b>
	63 mm dia	Each	98	98	128
	75 mm dia	Each	148	148	196
	90 mm dia	Each	214	214	290
	110 mm dia	Each	317	365	460
	125 mm dia	Each	441	535	676
	140 mm dia	Each	644	750	967
	160 mm dia	Each	928	1141	1389
	180 mm dia	Each	1256	1387	1904
	200 mm dia	Each	1654	1788	2524
9.4	<b>Providing and laying including testing Equal Tee confirming to IS specification.</b>				
	<b>Pressure →</b>		<b>6Kg/ sq.cm: PN6</b>	<b>8Kg/ sq.cm: PN8</b>	<b>10Kg/ sq.cm: PN10</b>
	63 mm dia	Each	104	115	127
	75 mm dia	Each	172	179	220
	90 mm dia	Each	305	310	375
	110 mm dia	Each	446	461	539
	125 mm dia	Each	493	617	730
	140 mm dia	Each	674	844	1001
	160 mm dia	Each	973	1227	1463
	180 mm dia	Each	1352	1714	2058
	200 mm dia	Each	1821	2319	2792
9.5	<b>Providing and laying including testing Pipe end confirming to IS specification.</b>				
	<b>Pressure →</b>		<b>6Kg/ sq.cm : PN 6</b>	<b>8Kg/ sq.cm : PN 8</b>	<b>10Kg/ sq.cm: PN 10</b>
	63 mm dia	Each	75	77	79
	75 mm dia	Each	97	105	105
	90 mm dia	Each	140	158	158
	110 mm dia	Each	178	210	210
	125 mm dia	Each	277	313	313
	140 mm dia	Each	348	396	396
	160 mm dia	Each	354	416	416
	180 mm dia	Each	547	625	625
	200 mm dia	Each	583	646	668

S.No.	Items	Unit	Rates in Rs.		
9.6	<b>Providing and laying including testing Reducer: confirming to IS specifications.</b>				
	<b>Pressure →</b>		<b>6Kg/ sq. cm PN6</b>	<b>8Kg/ sq.cm PN 8</b>	<b>10Kg/ sq. cm PN 10</b>
	63 mm dia	Each	93	94	97
	75 mm dia	Each	118	120	126
	90 mm dia	Each	127	133	140
	110 mm dia	Each	129	156	166
	125 mm dia	Each	135	181	185
	140 mm dia	Each	161	199	205
	160 mm dia	Each	209	260	290
	180 mm dia	Each	246	332	369
	200 mm dia	Each	284	387	413
9.7	<b>Providing butt fusion welded joint/joining by heating to the ends with the help of Teflon coated electric mirror/heater ends together etc. by thermosetting processes to HDPE Pipe and specials. (6 kg. 8 kg. 10 kg.) (50 mm &amp; above fusion jointed &amp; below 50 mm mechanical jointed) including testing</b>				
	63 mm dia	Each	107		
	75 mm dia	Each	134		
	90 mm dia	Each	148		
	110 mm dia	Each	164		
	125 mm dia	Each	197		
	140 mm dia	Each	209		
	160 mm dia	Each	227		
	180 mm dia	Each	239		
	200 mm dia	Each	254		
9.8	<b>Providing and laying including testing End Cap confirming to IS specifications.</b>				
	<b>Pressure →</b>		<b>6Kg/ sq.cm</b>	<b>8Kg/ sq.cm</b>	<b>10Kg/ sq.cm</b>
	63 mm dia	Each	76	77	81
	75 mm dia	Each	95	100	104
	90 mm dia	Each	107	108	115
	110 mm dia	Each	112	112	118

S.No.	Items	Unit	Rates in Rs.		
	125 mm dia	Each	134	185	188
	140 mm dia	Each	193	220	226
	160 mm dia	Each	230	320	334
	180 mm dia	Each	330	385	402
	200 mm dia	Each	395	461	480
9.9	<b>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)/ DVGM /KIWA /SPGN etc. for usage in Drinking Water System The cost shall include testing of all materials, Inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.</b>				
	<b>PN 16 (SDR 9)</b>		<b>6Kg/ sq.cm</b>	<b>8Kg/ sq.cm</b>	<b>10 Kg/ sq.cm</b>
	20 mm dia	R. mtr	37		
	25 mm dia	R. mtr	51		
	32 mm dia	R. mtr	84		
	40 mm dia	R. mtr	110		
	50 mm dia	R. mtr	167		
9.10	<b>Providing &amp; 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/PE100 pipes, in pressure rating SDR 11 with minPN 12.5 rated. The cost such as testing, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.</b>				
9.10.1	<b>Electo Fusion Tapping Ferrule Saddle</b>				
9.10.1	63x15mm	Each	1016		
9.10.2	63x20mm	Each	1016		
9.10.3	63x25mm	Each	1016		
9.10.4	75x15mm	Each	1016		
9.10.5	75x20mm	Each	1016		
9.10.6	75x25mm	Each	1016		

S.No.	Items	Unit	Rates in Rs.
9.10.7	90x15mm	Each	1016
9.10.8	90x20mm	Each	1016
9.10.9	90x25mm	Each	1016
9.10.10	90x32mm	Each	1318
9.10.11	90X40mm	Each	1318
9.10.12	90X50mm	Each	1318
9.10.13	110X15mm	Each	1016
9.10.14	110X20mm	Each	1016
9.10.15	110X25mm	Each	1016
9.10.16	110X32mm	Each	1318
9.10.17	110x40mm	Each	1318
9.10.18	110x50mm	Each	1318
9.10.19	160x15mm	Each	1016
9.10.20	160x20mm	Each	1016
9.10.21	160x25mm	Each	1016
9.10.22	160x32mm	Each	1440
9.10.23	160x40mm	Each	1440
9.10.24	160x50mm	Each	1440
9.10.25	200x15mm	Each	1434
9.10.26	200x20mm	Each	1434
9.10.27	200x25mm	Each	1434
9.10.28	200x32mm	Each	2074
9.10.29	200x40mm	Each	2074
9.10.30	200x50mm	Each	2074
9.11	<b>Providing &amp; Supply of Compression fitting, PN 16 rated in conformation to ISO: 14236-2000 and shall be tested as per ISO: 3459, ISO: 3501 &amp; ISO:3503, suitable for drinking water &amp; approved by WRAS, UKI KIWA etc., in food grade polypropylene and shall be inclusive of all cost such as testing, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.</b>		
9.11.1.1	<b>Compression Fittings Metal inserted Compression Female Threaded Adaptor with SS 304 Material</b>		
9.11.1.1	20x15mm	Each	173
9.11.1.2	25x20mm	Each	224

S.No.	Items	Unit	Rates in Rs.
9.11.1.3	32x25mm	Each	305
9.11.1.4	40x32mm	Each	519
9.11.1.5	50x40mm	Each	671
9.11.1.6	63x50mm	Each	915
9.11.2	<b>Metal inserted Compression Male Threaded Adaptor with SS 304Material</b>		
9.11.2.1	20x15mm	Each	173
9.10.2.2	25X20mm	Each	224
9.11.2.3	32X25mm	Each	305
9.11.2.4	40X32mm	Each	519
9.11.2.5	50x40mm	Each	671
9.11.2.6	63x50mm	Each	915
9.11.3	<b>Compression 90° Elbow threaded male off take in Metal</b>		
9.11.3.1	20x15mm	Each	183
9.11.3.2	25X20mm	Each	244
9.11.3.3	32X25mm	Each	336
9.11.3.4	40X32mm	Each	1169
9.11.3.5	50x40mm	Each	1525
9.11.3.6	63x50mm	Each	2237
9.11.4	<b>Compression 90° Elbow threaded Female off take inMetal</b>		
9.11.4.1	20x15mm	Each	183
9.11.4.2	25X20mm	Each	244
9.11.4.3	32X25mm	Each	336
9.11.4.4	40X32mm	Each	1169
9.11.4.5	50x40mm	Each	1525
9.11.4.6	63x50mm	Each	2237
9.11.5	<b>Compression 90° Elbow</b>		
9.11.5.1	20mm	Each	112
9.11.5.2	25mm	Each	153
9.11.5.3	32mm	Each	198
9.11.5.4	40mm	Each	397
9.11.5.5	50mm	Each	563
9.11.5.6	63mm	Each	764
9.12	<b>Providing &amp; Supply of PVC Ball Valves in PN16 rating with one end compression using Blue color compression nut in polypropylene</b>		



S.No.	Items	Unit	Rates in Rs.
	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, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc.complete.		
	PVC Ball Valve with Compression & Female Threads.		
9.12.1	20x15mm	Each	178
9.12.2	25X20mm	Each	231
9.12.3	32X25mm	Each	260
9.12.4	40X32mm	Each	559
9.12.5	50x40mm	Each	749
9.12.6	63x50mm	Each	1152
9.13	Providing & Supplying 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 elastomer 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 elastomer seal matching to the curvature of the pipe. The seal shall be of elastomer 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. and shall be inclusive of all cost such as testing,		

S.No.	Items	Unit	Rates in Rs.
	<b>inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.</b>		
9.13.1	80 NB x 15mm, 20mm, 25mm	Each	1017
9.13.2	100 NB x 15mm, 20mm, 25mm	Each	1118
9.13.3	150 NB x 15mm, 20mm, 25mm	Each	1322
9.13.4	200 NB x 15mm, 20mm, 25mm	Each	1525
9.13.5	250 NB x 15mm, 20mm, 25mm	Each	1729
9.13.6	300 NB x 15mm, 20mm, 25mm	Each	1932
9.14	<b>Providing &amp; Supply of Electro Fusion Fittings in accordance with BS EN 12201 : Part-3 suitable for drinking water with in black/blue color manufactured from compounded PE80/PE100 virgin polymer and compatible with PE80/PE100 pipes, in pressure rated SDR 11 with min PN 12.5 rated for water application and shall be inclusive of all cost such as testing, inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.</b>		
9.14.1	<b>Electro Fusion Coupler</b>		
9.14.1.1	20mm	Each	102
9.14.1.2	25mm	Each	102
9.14.1.3	32mm	Each	102
9.14.1.4	40mm	Each	188
9.14.1.5	50mm	Each	233
9.14.1.6	63mm	Each	251
9.14.1.7	75mm	Each	451
9.14.1.8	90mm	Each	484
9.14.1.9	110mm	Each	689
9.14.1.10	125mm	Each	701
9.14.1.11	140mm	Each	1503
9.14.1.12	160mm	Each	1647
9.14.1.13	180mm	Each	2460
9.14.1.14	200mm	Each	3211
9.14.1.15	225mm	Each	3812
9.14.1.16	250mm	Each	4645
9.14.1.17	280mm	Each	9307

S.No.	Items	Unit	Rates in Rs.
9.14.1.18	315mm	Each	9340
9.14.2	<b>Electro Fusion Equal Tee</b>		
9.14.2.1	20mm	Each	254
9.14.2.2	25mm	Each	254
9.14.2.3	32mm	Each	254
9.14.2.4	40mm	Each	862
9.14.2.5	50mm	Each	958
9.14.2.6	63mm	Each	1068
9.14.2.7	75mm	Each	1424
9.14.2.8	90mm	Each	1769
9.14.2.9	110mm	Each	2135
9.14.2.10	125mm	Each	2644
9.14.2.11	140mm	Each	5991
9.14.2.12	160mm	Each	8744
9.14.2.13	180mm	Each	11185
9.14.2.14	200mm	Each	13218
9.14.2.15	225mm	Each	19319
9.14.2.16	250mm	Each	21353
9.14.2.17	280mm	Each	23386
9.14.3	<b>Electro Fusion Elbow 90°</b>		
9.14.3.1	20mm	Each	193
9.14.3.2	25mm	Each	193
9.14.3.3	32mm	Each	193
9.14.3.4	40mm	Each	508
9.14.3.5	50mm	Each	508
9.14.3.6	63mm	Each	508
9.14.3.7	75mm	Each	1118
9.14.3.8	90mm	Each	1525
9.14.3.9	110mm	Each	2034
9.14.3.10	125mm	Each	2440
9.14.3.11	140mm	Each	5186
9.14.3.12	160mm	Each	6711
9.14.3.13	180mm	Each	8643
9.14.3.14	200mm	Each	16269
9.14.3.15	225mm	Each	18302
9.14.3.16	250mm	Each	20336

S.No.	Items	Unit	Rates in Rs.
9.14.3.17	280mm	Each	22369
9.14.3.18	315mm	Each	25420
9.16.4	<b>Electro Fusion Reducer</b>		
9.14.4.1	25x20mm	Each	203
9.14.4.2	32x20mm	Each	203
9.14.4.3	32x25mm	Each	203
9.14.4.4	40x32mm	Each	681
9.14.4.5	50x32mm	Each	854
9.14.4.6	50x40mm	Each	944
9.14.4.7	63x32mm	Each	1007
9.14.4.8	63x40mm	Each	1018
9.14.4.9	63x50mm	Each	1179
9.14.4.10	90x63mm	Each	1669
9.14.4.11	90x75mm	Each	2135
9.14.4.12	110x75mm	Each	2694
9.14.4.13	110x90mm	Each	3071
9.14.4.14	125x90mm	Each	3884
9.14.4.15	125x110mm	Each	3884
9.14.4.16	140x90mm	Each	4271
9.14.4.17	140x110mm	Each	4271
9.14.4.18	140x125mm	Each	4271
9.14.4.19	160x110mm	Each	5592
9.14.4.20	160x125mm	Each	5592
9.14.4.21	160x140mm	Each	5592
9.14.4.22	180x125mm	Each	6304
9.14.4.23	180x140mm	Each	6304
9.14.4.24	180x160mm	Each	6304
9.14.4.25	200x160mm	Each	7524
9.14.4.26	200x180mm	Each	7524
9.14.4.27	225x160mm	Each	9151
9.14.4.28	225x180mm	Each	9151
9.14.4.29	225x200mm	Each	9151
9.14.4.30	250x160mm	Each	11185
9.14.4.31	250x200mm	Each	11185
9.14.4.32	250x225mm	Each	11185
9.14.5	<b>Electro Fusion End Cap</b>		
9.14.5.1	20mm	Each	155

S.No.	Items	Unit	Rates in Rs.
9.14.5.2	25mm	Each	155
9.14.5.3	32mm	Each	155
9.14.5.4	40mm	Each	336
9.14.5.5	50mm	Each	407
9.14.5.6	63mm	Each	590
9.14.5.7	75mm	Each	885
9.14.5.8	90mm	Each	1118
9.14.5.9	110mm	Each	1424
9.14.5.10	125mm	Each	1729
9.14.5.11	140mm	Each	2542
9.14.5.12	160mm	Each	3660
9.14.5.13	180mm	Each	4474
9.14.5.14	200mm	Each	5287
9.14.5.15	225mm	Each	8643
9.14.5.16	250mm	Each	10168
9.14.5.17	280mm	Each	11185
9.14.5.18	315mm	Each	12201
9.14.6	<b>Spigot Long Neck Pipe End (Stub End) for Electro Fusion Joint</b>		
9.14.6.1	63mm	Each	364
9.14.6.2	75mm	Each	410
9.14.6.3	90mm	Each	513
9.14.6.4	110mm	Each	783
9.14.6.5	125mm	Each	1233
9.14.6.6	140mm	Each	1403
9.14.6.7	160mm	Each	2008
9.14.6.8	180mm	Each	2708
9.14.6.9	200mm	Each	3183
9.14.6.10	225mm	Each	3818
9.14.6.11	250mm	Each	4385
9.14.6.12	280mm	Each	4909
9.14.6.13	315mm	Each	6380

**CHAPTER- X**

**MILD STEEL PIPES AND SPECIALS**

## CHAPTER – X

### MILD STEEL PIPES AND SPECIALS

#### NOTES :

1. This Specification covers the requirements for manufacturing, supplying, laying, jointing, testing at worksite 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 Drawn Steel Wire (Third Revision) Part II

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 Specifications for Ordinary Portland Cement (OPC)

IS:455 Specifications for Portland Slag Cement

IS : 1489 Specifications for Portland Pozzolana Cement

IS : 8043 Specifications for Hydrophobic Portland Cement

IS : 3600 Methods of Testing Fusion Welded Joints and Weld Metal in Steel cylinder pipes with concrete lining and crating (specifications)

#### **Part I**

#### **Steel :**

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. The preferred outside Diameter and thickness of the pipes shall be as per the Table -1 of IS : 1916:1969
4. Length: The pipes shall be manufactured in lengths of 6m, 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 onground.

7. **Measurement:**

The net length of pipes as laid or fixed should be measured in running meters correct to a fraction of the decimal. 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, required for lifting and laying the pipes and specials in positions as per approved drawing and specifications.

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. The rates shown in item are exclusive of the cost of any type of coating but dimensionally suitable for internal epoxy lining. In case of inside cement mortar lining extra weight of shell shall be adjusted at the rate of Rs. 82.00 (Eighty two only) per kg according to the following factor.

$$\text{Extra mass per meter length of pipe} = t_c \times t \times 0.01233$$

Where in  $t_c$  = Cement mortar coating thickness in mm

$t$  = Shell thickness in mm

10. The estimate rates for pipe using steel plate (shell) thickness other than mentioned in item shall be adjusted to the rate of Rs. 82.00 per kg for deffered thickness.
- 11 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

## M.S. PIPES AND SPECIALS

S. No.	Item	Unit	Rate (in Rs.)
10.1	Manufacturing, Supplying at site & laying, jointing of following M.S. pipes as per IS specifications, duly testing for usage in Drinking water inclusive of all materials, inspection charges, transit insurance, loading/unloading, FOR site and stacking etc. complete as per direction of Engineer-in-Charge. (Excluding protective coating)		



S. No.	Item	Unit	Rate (in Rs.)
10.1.1	Dia of pipe 100.00 mm (I.D) Thickness of pipe		
(i)	4mm	RM	682
(ii)	6mm	RM	1047
(iii)	8mm	RM	1428
10.1.2	Dia of pipe 150.00 mm (I.D) Thickness of pipe		
(i)	4mm	RM	1011
(ii)	6mm	RM	1540
(iii)	8mm	RM	2088
10.1.3	Dia of pipe 200.00 mm (I.D) Thickness of pipe		
(i)	4mm	RM	1339
(ii)	6mm	RM	2035
(iii)	8mm	RM	2748
10.1.4	Dia of pipe 250.00 mm (I.D) Thickness of pipe		
(i)	4mm	RM	1667
(ii)	6mm	RM	2528
(iii)	8mm	RM	3409
10.1.5	Dia of pipe 300.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	1995
(ii)	6mm	RM	3022
(iii)	8mm	RM	4070
10.1.6	Dia of pipe 350.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	2322
(ii)	6mm	RM	3515
(iii)	8mm	RM	4730
10.1.7	Dia of pipe 400.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	2651
(ii)	6mm	RM	4009
(iii)	8mm	RM	5391
(iv)	10mm	RM	6765
10.1.8	Dia of pipe 450.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	2979
(ii)	6mm	RM	4503
(iii)	8mm	RM	6051
(iv)	10mm	RM	7589
10.1.9	Dia of pipe 500.00 mm (I.D) Thickness of pipe :		
(i)	5mm	RM	4122
(ii)	6mm	RM	4997
(iii)	8mm	RM	6712
(iv)	10mm	RM	8415
(v)	12mm	RM	10189
10.1.10	Dia of pipe 550.00 mm (I.D) Thickness of pipe		
(i)	5mm	RM	4530
(ii)	6mm	RM	5491
(iii)	8mm	RM	7373
(iv)	10mm	RM	9240

S. No.	Item	Unit	Rate (in Rs.)
(v)	12mm	RM	11184
10.1.11	Dia of pipe 600.00 mm (I.D) Thickness of pipe :		
(i)	6mm	RM	5984
(ii)	8mm	RM	8033
(iii)	10mm	RM	10063
(iv)	12mm	RM	12179
10.1.12	Dia of pipe 650.00 mm (I.D) Thickness of pipe		
(i)	6mm	RM	6478
(ii)	8mm	RM	8592
(iii)	10mm	RM	10889
(iv)	12mm	RM	13174
10.1.13	Dia of pipe 700.00 mm (I.D) Thickness of pipe :		
(i)	6mm	RM	6971
(ii)	8mm	RM	9353
(iii)	10mm	RM	11713
(iv)	12mm	RM	14168
(v)	14mm	RM	16491
10.1.14	Dia of pipe 750.00 mm (I.D) Thickness of pipe :		
(i)	7mm	RM	8686
(ii)	8mm	RM	10014
(iii)	10mm	RM	12538
(iv)	12mm	RM	15162
10.1.15	Dia of pipe 800.00 mm (I.D) Thickness of pipe :		
(i)	7mm	RM	9260
(ii)	8mm	RM	10675
(iii)	10mm	RM	13364
(iv)	12mm	RM	16158
10.1.16	Dia of pipe 850.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	11335
(ii)	10mm	RM	14188
(iii)	12mm	RM	17152
10.1.17	Dia of pipe 900.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	11996
(ii)	10mm	RM	15013
(iii)	12mm	RM	18147
10.1.18	Dia of pipe 950.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	12656
(ii)	10mm	RM	15838
(iii)	12mm	RM	19141
10.1.19	Dia of pipe 1000.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	13317
(ii)	10mm	RM	16662
(iii)	12mm	RM	20137
10.1.20	Dia of pipe 1050.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	13978

S. No.	Item	Unit	Rate (in Rs.)
(ii)	10mm	RM	17487
(iii)	12mm	RM	21131
10.1.21	Dia of pipe 1100.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	18312
(ii)	12mm	RM	22126
10.1.22	Dia of pipe 1150.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	19137
(ii)	12mm	RM	23121
10.1.23	Dia of pipe 1200.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	19962
(ii)	12mm	RM	24115
10.1.24	Dia of pipe 1250.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	20786
(ii)	12mm	RM	25110
10.1.25	Dia of pipe 1300.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	21611
(ii)	12mm	RM	26104
10.1.26	Dia of pipe 1350.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	22435
(ii)	12mm	RM	27099
10.1.27	Dia of pipe 1400.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	28094
(ii)	14mm	RM	3550
10.1.28	Dia of pipe 1450.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	29088
(ii)	14mm	RM	33810
10.1.29	Dia of pipe 1500.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	30083
(ii)	14mm	RM	34964
10.1.30	Dia of pipe 1550.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	31078
(ii)	14mm	RM	36119
10.1.31	Dia of pipe 1600.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	37273
(ii)	16mm	RM	42488
10.1.32	Dia of pipe 1650.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	38429
(ii)	16mm	RM	43802
(iii)	18mm	RM	49189
10.1.33	Dia of pipe 1700.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	39583
(ii)	16mm	RM	45117
(iii)	18mm	RM	50664
10.1.34	Dia of pipe 1750.00 mm (I.D) Thickness of pipe		
(i)	14mm	RM	40738

S. No.	Item	Unit	Rate (in Rs.)
(ii)	16mm	RM	46431
(iii)	18mm	RM	52138
10.1.35	Dia of pipe 1800.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	41892
(ii)	16mm	RM	47745
(iii)	18mm	RM	53612
10.1.36	Dia of pipe 1850.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	43047
(ii)	16mm	RM	49060
(iii)	20mm	RM	61126
10.1.37	Dia of pipe 1900.00 mm (I.D) Thickness of pipe :		
(i)	16mm	RM	50375
(ii)	18mm	RM	56561
(iii)	20mm	RM	62761
10.1.38	Dia of pipe 1950.00 mm (I.D) Thickness of pipe :		
(i)	16mm	RM	51689
(ii)	18mm	RM	58035
(iii)	20mm	RM	64395
10.1.39	Dia of pipe 2000.00 mm (I.D) Thickness of pipe :		
(i)	16mm	RM	53003
(ii)	18mm	RM	59510
(iii)	20mm	RM	66029
	<b>FABRICATION OF M.S. PIPE AND SPECIALS</b>		
10.2	<b>Fabrication of M.S. pipes &amp; specials from steel plates as per relevant IS specifications inclusive of cost of all materials, for any thickness as per design, inspection charges, testing, transit insurance, loading/ unloading, FOR site and stacking etc. complete as per direction of the Engineer in charge. fabricating of pipes and specials from steel plates.</b>	Kg.	74
10.3	<b>Labour only for lowering and laying of MS pipe and specials as per approved specification complete as directed by Engineer in charge</b>	Kg	1
10.4	<b>Providing and applying primer and one coat of red oxide externally</b>	Sqm	34
10.5	<b>Providing and applying primer and one coat of red oxide of iron paint, internally</b>	Sqm	72
	<b>Laying of M.S. Pipes and Specials</b>		
10.6	<b>Labour Only for lowering &amp; laying of M.S. Pipes as per approved specification and as directed by Engineer in charge.</b>		
10.6.1	4mm to 8mm thick		

S. No.	Item	Unit	Rate (in Rs.)
	100mm Upto 500mm. dia	RM	72
	Above 500mm. Upto 750mm. dia	RM	118
	Above 750mm. Upto 1050mm. dia	RM	163
10.6.2	10mm to 12mm thick		
	400mm Upto 750mm. dia	RM	194
	Above 750mm. Upto 1050mm. dia	RM	268
	Above 1050mm. Upto 1200mm. dia	RM	335
	Above 1200mm. Upto 1550mm. dia	RM	401
10.6.3	14mm to 20mm thick		
	Above 700mm. Upto 1000mm. dia	RM	319
	Above 1000mm. Upto 1250mm. dia	RM	399
	Above 1250mm. Upto 1450mm. dia	RM	476
	Above 1450mm. Upto 1750mm. dia	RM	563
	Above 1750mm. Upto 2000mm. dia	RM	660
10.7	<b>Providing rigid welded joint to the following MS pipes including testing of joints and cost of jointing material as per relevant approved specification complete.</b>		
10.7.1	Dia of pipe 250.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	56
(ii)	6mm	RM	114
(iii)	8mm	RM	238
10.7.2	Dia of pipe 300.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	66
(ii)	6mm	RM	135
(iii)	8mm	RM	274
10.7.3	Dia of pipe 350.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	77
(ii)	6mm	RM	158
(iii)	8mm	RM	327
10.7.4	Dia of pipe 400.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	87
(ii)	6mm	RM	179
(iii)	8mm	RM	372
(iv)	10mm	RM	458
10.7.5	Dia of pipe 450.00 mm (I.D) Thickness of pipe :		
(i)	4mm	RM	99
(ii)	6mm	RM	201
(iii)	8mm	RM	418
(iv)	10mm	RM	512
10.7.6	Dia of pipe 500.00 mm (I.D) Thickness of pipe :		
(i)	5mm	RM	110
(ii)	6mm	RM	223
(iii)	8mm	RM	463
(iv)	10mm	RM	567

S. No.	Item	Unit	Rate (in Rs.)
(v)	12mm	RM	1020
10.7.7	Dia of pipe 550.00 mm (I.D) Thickness of pipe :		
(i)	5mm	RM	121
(ii)	6mm	RM	246
(iii)	8mm	RM	507
(iv)	10mm	RM	621
(v)	12mm	RM	1116
10.7.8	Dia of pipe 600.00 mm (I.D) Thickness of pipe :		
(i)	6mm	RM	267
(ii)	8mm	RM	552
(iii)	10mm	RM	676
(iv)	12mm	RM	1214
10.7.9	Dia of pipe 650.00 mm (I.D) Thickness of pipe :		
(i)	6mm	RM	289
(ii)	8mm	RM	597
(iii)	10mm	RM	730
(iv)	12mm	RM	1311
10.7.10	Dia of pipe 700.00 mm (I.D) Thickness of pipe :		
(i)	6mm	RM	311
(ii)	8mm	RM	642
(iii)	10mm	RM	785
(iv)	12mm	RM	1408
(v)	14mm	RM	1416
10.7.11	Dia of pipe 750.00 mm (I.D) Thickness of pipe :		
(i)	7mm	RM	334
(ii)	8mm	RM	686
(iii)	10mm	RM	839
(iv)	12mm	RM	1506
10.7.12	Dia of pipe 800.00 mm (I.D) Thickness of pipe :		
(i)	7mm	RM	356
(ii)	8mm	RM	730
(iii)	10mm	RM	894
(iv)	12mm	RM	1709
10.7.13	Dia of pipe 850.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	775
(ii)	10mm	RM	948
(iii)	12mm	RM	1701
10.7.14	Dia of pipe 900.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	820
(ii)	10mm	RM	1003
(iii)	12mm	RM	1776
10.7.15	Dia of pipe 950.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	865
(ii)	10mm	RM	1057
(iii)	12mm	RM	1895

S. No.	Item	Unit	Rate (in Rs.)
10.7.16	Dia of pipe 1000.00 mm (I.D) Thickness of pipe		
(i)	8mm	RM	910
(ii)	10mm	RM	1111
(iii)	12mm	RM	1992
10.7.17	Dia of pipe 1050.00 mm (I.D) Thickness of pipe :		
(i)	8mm	RM	955
(ii)	10mm	RM	1166
(iii)	12mm	RM	2090
10.7.18	Dia of pipe 1100.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	1221
(ii)	12mm	RM	2186
10.7.19	Dia of pipe 1150.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	1276
(ii)	12mm	RM	2284
10.7.20	Dia of pipe 1200.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	1330
(ii)	12mm	RM	2381
10.7.21	Dia of pipe 1250.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	1385
(ii)	12mm	RM	2478
10.7.22	Dia of pipe 1300.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	1439
(ii)	12mm	RM	2576
10.7.23	Dia of pipe 1350.00 mm (I.D) Thickness of pipe :		
(i)	10mm	RM	1494
(ii)	12mm	RM	2673
10.7.24	Dia of pipe 1400.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	2771
(ii)	14mm	RM	2778
10.7.25	Dia of pipe 1450.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	2867
(ii)	14mm	RM	2875
10.7.26	Dia of pipe 1500.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	2965
(ii)	14mm	RM	2972
10.7.27	Dia of pipe 1550.00 mm (I.D) Thickness of pipe :		
(i)	12mm	RM	3062
(ii)	14mm	RM	3070
10.7.28	Dia of pipe 1600.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	3166
(ii)	16mm	RM	3175
10.7.29	Dia of pipe 1650.00 mm (I.D) Thickness of pipe		
(i)	14mm	RM	3265
(ii)	16mm	RM	3272
(iii)	18mm	RM	3280

S. No.	Item	Unit	Rate (in Rs.)
10.7.30	Dia of pipe 1700.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	3362
(ii)	16mm	RM	3370
(iii)	18mm	RM	3377
10.7.31	Dia of pipe 1750.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	3459
(ii)	16mm	RM	3466
(iii)	18mm	RM	3474
10.7.32	Dia of pipe 1800.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	3557
(ii)	16mm	RM	3564
(iii)	18mm	RM	3571
10.7.33	Dia of pipe 1850.00 mm (I.D) Thickness of pipe :		
(i)	14mm	RM	3653
(ii)	16mm	RM	3660
(iii)	20mm	RM	3677
10.7.34	Dia of pipe 1900.00 mm (I.D) Thickness of pipe :		
(i)	16mm	RM	3758
(ii)	18mm	RM	3766
(iii)	20mm	RM	3774
10.7.35	Dia of pipe 1950.00 mm (I.D) Thickness of pipe		
(i)	16mm	RM	3856
(ii)	18mm	RM	3864
(iii)	20mm	RM	3444
10.7.36	Dia of pipe 2000.00 mm (I.D) Thickness of pipe :		
(i)	16mm	RM	3953
(ii)	20mm	RM	3969
10.8	<b>Providing &amp; applying 30 mm thick 1:3 cement mortar coating out side face of M.S pipe as per relevant IS specification including testing along with fixing of (100 x3 mm) wire meshas per approved specification per Sqmm</b>	Sqm	437
10.9	<b>Providing &amp; applying inside 20 mm thick 1:2 cement mortar on inside face of pipe as per relevant IS specification including testing as directed by Engineer in Charge</b>	Sqm	320
10.10	<b>Providing &amp; applying 400 micron epoxy coating as per relevant IS specification on out side face of pipe including testing.</b>	Sqm	146
10.11	<b>Providing &amp; applying 400 micron food grade epoxy coating on inside face of pipe as per relevant IS specification including testing.</b>	Sqm	229



## **CHAPTER- XI**

### **BAR WRAPPED STEEL CYLINDER PIPES (BWSC)**

## CHAPTER-XI

### BAR WRAPPED STEEL CYLINDER PIPES (BWSC)

NOTES :

#### 1. Scope

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: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
EN641	Reinforced Concrete Pressure Pipe, Cylinder Type, including Joints & fittings.
Other I.S.	Codes not specifically mentioned here but pertaining to the use of BWSC pipes form part of these Specifications.

#### 3. Design Criteria

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:-

At factory test pressure, stress shall not exceed  $187 \text{ N/mm}^2$  nor 75 percent of the minimum yield strength of the steel used in the cylinder.

At site test pressure, stress shall neither exceed  $165 \text{ N/mm}^2$  nor 75 percent of the minimum yield strength of the steel used in the cylinder.

At working pressure, stress shall not exceed  $125 \text{ N/mm}^2$  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  $90^\circ$  to each other shall be made at each end and centre. The internal diameter shall be maintained within the tolerances 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 are different, the principal contractor shall enter in to the 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.

- 12 This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### BAR WRAPPED STEEL CYLINDER PIPES (BWSC)

Sr.No.	Item	Unit	Rate (In Rs.)
11.1.	<b>Providing Bar Wrapped Steel Cylinder Pipes test Presure 4 Kg/Sqcm including testing, inspection, trasportaion at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2400
	400 mm	RM	2741
	450 mm	RM	3172
	500 mm	RM	3531
	600 mm	RM	4700
	700 mm	RM	5520
	800 mm	RM	6308
	900 mm	RM	7976
	1000 mm	RM	9206
	1100 mm	RM	13443
	1200 mm	RM	14914
	1300 mm	RM	16326
	1400 mm	RM	18163
	1500 mm	RM	21034
	1600 mm	RM	22398

<b>Sr.No.</b>	<b>Item</b>	<b>Unit</b>	<b>Rate (In Rs.)</b>
11.2.	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 4 Kg/Sqcm including testing &amp; cost of jointing materials per relevant IS Specifications.</b>		
	350 mm	RM	488
	400 mm	RM	561
	450 mm	RM	642
	500 mm	RM	765
	600 mm	RM	864
	700 mm	RM	1018
	800 mm	RM	1166
	900 mm	RM	1473
	1000 mm	RM	1483
	1100 mm	RM	2116
	1200 mm	RM	2354
	1300 mm	RM	2498
	1400 mm	RM	2186
	1500 mm	RM	2356
	1600 mm	RM	2696
11.3	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 6 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2404
	400 mm	RM	2745
	450 mm	RM	2160
	500 mm	RM	3539
	600 mm	RM	4707
	700 mm	RM	5535
	800 mm	RM	6316
	900 mm	RM	7984
	1000 mm	RM	9219
	1100 mm	RM	13451
	1200 mm	RM	14926
	1300 mm	RM	16335
	1400 mm	RM	18175
	1500 mm	RM	21051
	1600 mm	RM	22418

Sr.No.	Item	Unit	Rate (In Rs.)
11.4	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipes test Presure 6 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS specification.</b>		
	350 mm	RM	489
	400 mm	RM	563
	450 mm	RM	645
	500 mm	RM	768
	600 mm	RM	868
	700 mm	RM	1021
	800 mm	RM	1169
	900 mm	RM	1475
	1000 mm	RM	1488
	1100 mm	RM	2117
	1200 mm	RM	2356
	1300 mm	RM	2500
	1400 mm	RM	2187
	1500 mm	RM	2358
	1600 mm	RM	2698
11.5	<b>Providing Bar Wrapped Steel Cylinder Pipes test Presure 8 Kg/Sqcm including testing, inspection, trasportaion at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2407
	400 mm	RM	2753
	450 mm	RM	3182
	500 mm	RM	3550
	600 mm	RM	4713
	700 mm	RM	5553
	800 mm	RM	6326
	900 mm	RM	7989
	1000 mm	RM	9232
	1100 mm	RM	13463
	1200 mm	RM	14944
	1300 mm	RM	16344
	1400 mm	RM	18191
	1500 mm	RM	21069
	1600 mm	RM	22433

Sr.No.	Item	Unit	Rate (In Rs.)
11.6	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 8 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specifications.</b>		
	350 mm	RM	489
	400 mm	RM	567
	450 mm	RM	649
	500 mm	RM	772
	600 mm	RM	873
	700 mm	RM	1025
	800 mm	RM	1172
	900 mm	RM	1476
	1000 mm	RM	1491
	1100 mm	RM	2119
	1200 mm	RM	2359
	1300 mm	RM	2504
	1400 mm	RM	2189
	1500 mm	RM	2361
	1600 mm	RM	2701
11.7	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 10 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2408
	400 mm	RM	2763
	450 mm	RM	3189
	500 mm	RM	3560
	600 mm	RM	4722
	700 mm	RM	5574
	800 mm	RM	6339
	900 mm	RM	7994
	1000 mm	RM	9249
	1100 mm	RM	13481
	1200 mm	RM	14964
	1300 mm	RM	16357
	1400 mm	RM	18212
	1500 mm	RM	21090
	1600 mm	RM	22454

Sr.No.	Item	Unit	Rate (In Rs.)
11.8	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 10 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specification.</b>		
	350 mm	RM	490
	400 mm	RM	571
	450 mm	RM	653
	500 mm	RM	777
	600 mm	RM	877
	700 mm	RM	1029
	800 mm	RM	1177
	900 mm	RM	1477
	1000 mm	RM	1496
	1100 mm	RM	2122
	1200 mm	RM	2363
	1300 mm	RM	2508
	1400 mm	RM	2192
	1500 mm	RM	2364
	1600 mm	RM	2704
11.9	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 12 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2411
	400 mm	RM	2769
	450 mm	RM	3194
	500 mm	RM	3572
	600 mm	RM	4734
	700 mm	RM	5597
	800 mm	RM	6632
	900 mm	RM	8001
	1000 mm	RM	9635
	1100 mm	RM	13501
	1200 mm	RM	14985
	1300 mm	RM	16373
	1400 mm	RM	18237
	1500 mm	RM	21328
	1600 mm	RM	22465



Sr.No.	Item	Unit	Rate (In Rs.)
11.10	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 12 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specification.</b>		
	350 mm	RM	490
	400 mm	RM	578
	450 mm	RM	658
	500 mm	RM	782
	600 mm	RM	883
	700 mm	RM	1034
	800 mm	RM	1238
	900 mm	RM	1479
	1000 mm	RM	1568
	1100 mm	RM	2126
	1200 mm	RM	2367
	1300 mm	RM	2512
	1400 mm	RM	2196
	1500 mm	RM	2551
	1600 mm	RM	2830
11.11	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 14 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2413
	400 mm	RM	2779
	450 mm	RM	3204
	500 mm	RM	3636
	600 mm	RM	4824
	700 mm	RM	6008
	800 mm	RM	7256
	900 mm	RM	8777
	1000 mm	RM	11059
	1100 mm	RM	13551
	1200 mm	RM	15153
	1300 mm	RM	17174
	1400 mm	RM	19708
	1500 mm	RM	24598
	1600 mm	RM	25892

Sr.No.	Item	Unit	Rate (In Rs.)
11.12	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 14 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specification.</b>		
	350 mm	RM	491
	400 mm	RM	582
	450 mm	RM	674
	500 mm	RM	791
	600 mm	RM	892
	700 mm	RM	1128
	800 mm	RM	1445
	900 mm	RM	1613
	1000 mm	RM	1752
	1100 mm	RM	2135
	1200 mm	RM	2401
	1300 mm	RM	2659
	1400 mm	RM	2416
	1500 mm	RM	2716
	1600 mm	RM	3377
11.13	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 16 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2417
	400 mm	RM	2791
	450 mm	RM	3226
	500 mm	RM	3833
	600 mm	RM	5088
	700 mm	RM	6374
	800 mm	RM	7243
	900 mm	RM	9366
	1000 mm	RM	11323
	1100 mm	RM	13993
	1200 mm	RM	16164
	1300 mm	RM	18491
	1400 mm	RM	21199
	1500 mm	RM	25225
	1600 mm	RM	27734

Sr.No.	Item	Unit	Rate (In Rs.)
11.14	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 16 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specification.</b>		
	350 mm	RM	492
	400 mm	RM	587
	450 mm	RM	700
	500 mm	RM	858
	600 mm	RM	971
	700 mm	RM	1237
	800 mm	RM	1517
	900 mm	RM	1743
	1000 mm	RM	1771
	1100 mm	RM	2284
	1200 mm	RM	2670
	1300 mm	RM	2903
	1400 mm	RM	2698
	1500 mm	RM	3046
	1600 mm	RM	3462
11.15	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 18 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2421
	400 mm	RM	2799
	450 mm	RM	3382
	500 mm	RM	4025
	600 mm	RM	5371
	700 mm	RM	6742
	800 mm	RM	7724
	900 mm	RM	9953
	1000 mm	RM	12141
	1100 mm	RM	14860
	1200 mm	RM	17217
	1300 mm	RM	19671
	1400 mm	RM	22777
	1500 mm	RM	26940
	1600 mm	RM	30097

Sr.No.	Item	Unit	Rate (In Rs.)
11.16	<b>Labour only for laying &amp; jointing Bar Wrapped Steel Cylinder Pipe test Pressure 18 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specification.</b>		
	350 mm	RM	493
	400 mm	RM	594
	450 mm	RM	714
	500 mm	RM	889
	600 mm	RM	1015
	700 mm	RM	1292
	800 mm	RM	1635
	900 mm	RM	1829
	1000 mm	RM	1872
	1100 mm	RM	2394
	1200 mm	RM	2805
	1300 mm	RM	3122
	1400 mm	RM	2855
	1500 mm	RM	3199
	1600 mm	RM	3771
11.17	<b>Providing Bar Wrapped Steel Cylinder Pipes test Pressure 20 Kg/Sqcm including testing, inspection, transportation at site, transit insurance, loading unloading &amp; stacking etc. complete.</b>		
	350 mm	RM	2503
	400 mm	RM	2961
	450 mm	RM	3579
	500 mm	RM	4293
	600 mm	RM	5725
	700 mm	RM	7233
	800 mm	RM	9041
	900 mm	RM	10803
	1000 mm	RM	13444
	1100 mm	RM	16101
	1200 mm	RM	18678
	1300 mm	RM	21402
	1400 mm	RM	25027
	1500 mm	RM	30086
	1600 mm	RM	33247

Sr.No.	Item	Unit	Rate (In Rs.)
11.18	<b>Labour only for laying &amp; jointing Bar WrappedSteelCylinderPipe test Pressure 20 Kg/Sqcm including testing &amp; cost of jointing material as per relevant IS Specification.</b>		
	350 mm	RM	498
	400 mm	RM	605
	450 mm	RM	746
	500 mm	RM	956
	600 mm	RM	1093
	700 mm	RM	1401
	800 mm	RM	1766
	900 mm	RM	2011
	1000 mm	RM	2052
	1100 mm	RM	2637
	1200 mm	RM	3082
	1300 mm	RM	3438
	1400 mm	RM	3104
	1500 mm	RM	3494
	1600 mm	RM	4048

**CHAPTER –XII**

**STONE WARE PIPES FOR SEWERS**

## **CHAPTER - XII**

### **STONE WARE PIPES FOR SEWERS**

**(Pipes conforming to IS: 651-1992)**

#### **Notes :**

The salt Glazed stoneware pipe shall be confirming to IS:651 :1992.

The laying to S.W. pipes shall be done as per IS - 4127 :1983

The bedding of the S.W. pipes shall be as per the specification given in the CPHEEO manual of sewerage & sewage treatment, payment for which shall be made as per chapter XII allied civilworks.

The testing of the sewer line& refilling shall be done as per CPHEEO manual on sewerage and sewage management.

In order to avoid damage to the pipes and especially to the spigot end, pipes shall not be dragged along concrete and similar pavements with hard surfaces.

The pipes and fittings shall be inspected for defects and be rung with a light hammer preferable while suspended to detect cracks.

All lumps, blisters and excess coating materials shall be removed gently from the socket and spigot of each pipe. The out side of the spigot and the inside of the socket shall be wiped clean and dry before the pipe is laid.

In shallow trenches, manual handling is enough but in deep trenches, they shall be lowered in to the trench by mean of ropes. Under no circumstances the pipe shall be dropped or dumped into the trench.

Every precaution shall be taken to prevent foreign material from entering the pipe when it is being placed in the line.

The pipe between two manholes shall be laid truly in a straight line without vertical and horizontal undulations. The pipe shall be laid true to line and grade as specified in the relevant specifications.

#### **2      Unloading of pipes:**

While unloading, pipes shall not be thrown from the truck on hard ground.

#### **3.      Trenches:**

The width of trench at and below the top of sewer should be the minimum necessary for its proper installation with the due consideration to its bedding. It should be as per clause 7.1.1 page 126 of construction of sewers as per CPHEEO manual on sewerage and sewage treatment (second edition).

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

Where the sewer has to be laid in a soft under ground strata or in a reclaimed land, the trench shall be excavated deeper than what is ordinary required. The trench bottom shall be stabilised by the addition of coarse gravel or rock, in case of very bed soil the trench bottom shall be filled in with cement concrete. For class of bedding details clause 6.5.3.1 page 116 of CPHEEO manual on sewerage and sewage treatment should be followed.

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.

The pipe and fittings shall be inspected for defects and be rung with a light hammer preferably while suspended, to detect cracks.

All lumps, blisters and excess coating materials shall be removed gently from the socket and spigot end of each pipe and the outside of the spigot and the inside of the socket shall be wiped clean and dry before the pipe is laid.

In shallow trenches manual handling is enough but in deep trenches, they should be lowered into the trench by means of ropes. Under no circumstances shall not the pipes be dropped or dumped into the trench.

Every precaution shall be taken to prevent foreign materials from entering the pipe when it is being placed in the line.

The pipes between two main holes shall be laid truly in a straight line without vertical and horizontal undulations. The pipes shall be laid true to line and grade as specified.

Sight rails provided at all changes of direction or gradient and at distances of about 15 meters along straight lengths, with centre line marked each horizontal rail, which is fixed at true level, shall be used for laying all inverts.

Normally the socket ends should face the up stream. When the line runs up hill the socket ends should face the up grade.

The stone ware pipes shall be laid with sockets facing up the gradient, on desired, special bedding. Hunching or encasing may be provided where conditions so demand as discussed in clause 6.5 of CPHEEO manual on sewerage and sewage treatment.

Where pipes are not bedded on concrete, the trench floor shall be left slightly high and carefully buttoned up as pipe laying proceeds, so that the pipes barrels rest on firm and undisturbed ground. If the excavation has been carried too low the desired levels shall be made up with concrete 1:5:10 (1 cement: 5 fine cement: 10 graded stone aggregate 40 mm nominal size) for which no extra payment shall be made. The pipe shall be secured in place with approved back fill material or concrete tamped under it except at the socket.



Pipe and fittings, which do not allow a sufficient and uniform space for joints, shall be removed and replaced with pipe and fittings of proper dimensions to ensure such uniform space.

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 incharge.

Trenches shall be kept free from water until the material in the joints has hardens.

When the pipe is closed and the trench to be flooded by rain; care shall be taken to prevent the pipe from floating.

The cutting of pipe for inserting, fittings or closure pieces shall be done in a neat and work manlike manner without damage to the pipe or inside coating so as to leave a smooth surface and at right angle to the axis of the pipe.

The Engineer In-charge should consult the appropriate authorities before preparing plans and specifications for pipeline crossing Railway lines, Irrigation channels or similar works.

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

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.

The pipes when laid, should not be subjected to superimposed load beyond their safe crushing strength.

#### **4. Jointing:**

The stoneware pipes shall be cement jointed.

The materials shall consist of the following.

- (a) Spun yarn or tarred gaskets.
- (b) Cement.
- (c) Sand

- 4.3. In each joint, spun yarn soaked in neat cement slurry or tarred gasket shall be passed round the joint and inserted in it by means of a caulking tool.

More yarn or gasket shall be added if necessary and shall be well caulked. Yarn or gasket so rammed shall not occupy more than one fourth of the depth of socket.

Cement mortar (1:1) (one part of cement to one part of sand) shall be slightly moistened and carefully inserted by hand into the remaining space of the joint after caulking of yarn or gasket. The mortar shall then be caulked into the joint with a caulking tool. More cement mortar shall be added until the joint space has been completely filled with tightly caulked mortar. The joint shall then be finished off neatly outside the socket at an angle of 45 degrees (IS4127-1983)

The cement mortar joints shall be cured at least for seven days before testing.

The joint with cast iron or concrete pipes shall be made with cement joints.

## **5. Testing:**

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

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 pipewall.

The sewers are tested by plugging the upper end with a provision for an air out let 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 any leaks in the pipe or joints (small sweating on the pipe surface is permitted).

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.

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.

It should be done as per clause 7.1.5 page 131 of CPHEEO manual on sewerage and sewage treatment.

6. **Refilling:**

No trench shall be filled in unless the sewer stretches have been tested and approved for water tightness of joints. However partial filling may be done keeping the joints open to avoid disturbance. Soft material screened free from stones or hard substances shall first be used and hand pressured under and around the pipes to half their height. Similarly soft material shall be put up to a height of 30cm above top of pipe and then this will be moistened with water and well rammed. The reminder of the trench can be filled with hard material, in stages, 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. It should be done as per procedure given in clause 7.1.9 page 133 of CPHEEO manual on sewerage and sewage treatment.

7. **Measurements:**

The lengths of pipe shall be measured in the running meters nearest to a cm 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, junction, etc., which shall not be measured separately. Excavation refilling shoring and timbering in trenches and cement concreting where ever required shall be measured separately under relevant item of work.

8. **Rate:**

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

9. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

**STONE WARE PIPES FOR SEWERS**  
(Pipes conforming to IS: 651-1992)

S. No.	Items	Unit	Rates in Rs.
12.1	Providing and Laying and Jointing salt glazed stone ware (S.W.) pipes socket and spigot with stiff cement mortar 1:1 including testing of joints complete		
	100mm	R. Meter	256
	150 mm	R. Meter	370
	200 mm	R. Meter	598
	250 mm	R. Meter	958
	300 mm	R. Meter	1271
12.2	Labour only for 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	R. Meter	82
	150 mm	R. Meter	119
	200 mm	R. Meter	141
	250 mm	R. Meter	185
	300 mm	R. Meter	210
12.3	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 100mm dia. to 300mm dia pipe. (For type "Concrete Around")		
	100mm dia SW pipe	R. Meter	523
	150mm dia	R. Meter	639
	200mm dia	R. Meter	745
	250mm dia	R. Meter	815
	300mm dia	R. Meter	988
12.4	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")		

<b>S. No.</b>	<b>Items</b>	<b>Unit</b>	<b>Rates in Rs.</b>
	100mm dia pipe	R. Meter	248
	150mm dia	R. Meter	401
	200mm dia	R. Meter	473
	250mm dia	R. Meter	551
	300mm dia	R. Meter	635
12.5	Dismantling of old S.W. pipes including breaking of joints and bed concrete stacking of useful materials near the site within 50 m lead and disposal of unserviceable materials in to municipal dumps :		
	100mm dia pipe	R. Meter	27
	150mm dia	R. Meter	31
	200mm dia	R. Meter	33
	250mm dia	R. Meter	35
	300mm dia	R. Meter	37

## **CHAPTER- XIII**

### **REINFORCED CEMENT CONCRETE PIPES**

## **CHAPTER- XIII**

### **REINFORCED CEMENT CONCRETE PIPES**

#### **(PIPES CONFORMING TO IS: 458-1988)**

**NOTES :**

All the pipes, specials, joints to be used in the work shall conform to relevant Indian Standards duly inspected and tested and having B.I.S. certification mark.

**1. Laying:**

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.

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.

All pipe sections and connections shall be inspected carefully before being laid. Broken or defective pipes or connections shall not be used.

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.

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.

Every precaution shall be taken to prevent foreign materials from entering the pipe when it is being placed in the line

Pipes shall be laid in true line and grade, as specified.

Sight rails provided at all change of directions or gradients and at distances of about 15 meters along. 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.

Laying of pipes shall always proceed up grade of a slope. If the pipes have spigot and socket joints, the socket ends shall face upstream. In the cases of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.

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

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

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.

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

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

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 backfilling.

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.

The Engineer-in-Charge should consult the appropriate authorities before preparing plans and specifications for pipe line crossing railway lines, Irrigation, channels or similar other works and services.

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

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.

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

## **2. Pipe Bedding:**

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.

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 either concrete cradle or concrete arch depend 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.
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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.

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

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

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.

The bedding shall be as per details given in chapter VI 'Structural design of buried sewer' given in CPHEEO manual on sewerage and sewage treatment (1993 second edition).

### **3. Jointing:**

- (a) The socket and spigot pipes are laid and jointed with rubber gasket.
- (b) 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 shall be followed as per I.S. 783 –1985.

### **4. Testing:**

Each section of sewer shall be tested for water tightness preferably between manholes. In case of cement mortar joints, the sewer line shall be tested three days after the cement mortar joints have been made. 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. 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 inlet 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).

Any sewer or part thereof that doesn't meet the test shall be emptied and repaired or re-laid as required and tested again. 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 liters/mm diameter of pipe per Km. length per day. For non pressure pipes the leakage should be observed for a period of 24 hours. Exfiltration test for detection of leakage shall be carried out at a time when the ground water table is low. Air testing shall be done particularly in large diameter pipes when the required quantity of water is not available for testing subjected to the provisions made in the agreement. It is done as per procedure given in CPHEEO manual (1993 second edition).

**5. Back filling of trenches:**

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.

- (1) In open country, it shall be sufficient to mound the trench and after natural settlement return to regrade the areas.
- (2) In developed streets, it shall be compacted to minimize the load.
- (3) 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. This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerned department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

**CHAPTER XIII**  
**REINFORCED CEMENT CONCRETE PIPES**  
(PIPES CONFORMING TO IS: 458-1988)

Sr.No.	Item	Unit	Rate (In Rs.)
13.1	<b>Providing and Laying non-pressure (NP2) RCC socket &amp; spigot pipes with rubber gasket joint including testing of joints.</b>		
	100 mm Dia	Per Meter	425
	150 mm Dia	Per Meter	443
	200 mm Dia	Per Meter	517
	250 mm Dia	Per Meter	627
	300 mm Dia	Per Meter	857
	350 mm Dia	Per Meter	981
	400 mm Dia	Per Meter	1146
	450 mm Dia	Per Meter	1384
	500 mm Dia	Per Meter	1506
	600 mm Dia	Per Meter	1899
	700 mm Dia	Per Meter	2490
	800 mm Dia	Per Meter	3255
	900 mm Dia	Per Meter	3813
	1000 mm Dia	Per Meter	4414
	1100 mm Dia	Per Meter	5298
	1200 mm Dia	Per Meter	6603
	1600 mm Dia	Per Meter	10595
13.2	<b>Labour only for Laying and Jointing non-pressure (NP2) RCC socket &amp; spigot pipes with rubber gasket joint including testing of joints.</b>		
	100 mm Dia	Per Meter	77
	150 mm Dia	Per Meter	122
	200 mm Dia	Per Meter	141
	250 mm Dia	Per Meter	183
	300 mm Dia	Per Meter	227
	350 mm Dia	Per Meter	230
	400 mm Dia	Per Meter	262
	450 mm Dia	Per Meter	301
	500 mm Dia	Per Meter	335
	600 mm Dia	Per Meter	406
	700 mm Dia	Per Meter	455
	800 mm Dia	Per Meter	543
	900 mm Dia	Per Meter	653
	1000 mm Dia	Per Meter	715
	1100 mm Dia	Per Meter	788
	1200 mm Dia	Per Meter	905
	1600 mm Dia	Per Meter	1307
13.3	<b>Providing and Laying non-pressure (NP3) RCC socket &amp; spigot pipes with rubber gasket joint including testing of joints.</b>		

Sr.No.	Item	Unit	Rate (In Rs.)
	150 mm Dia	Per Meter	578
	250 mm Dia	Per Meter	903
	300 mm Dia	Per Meter	1128
	350 mm Dia	Per Meter	1527
	400 mm Dia	Per Meter	1959
	450 mm Dia	Per Meter	2165
	500 mm Dia	Per Meter	2451
	600 mm Dia	Per Meter	2950
	700 mm Dia	Per Meter	3895
	800 mm Dia	Per Meter	4930
	900 mm Dia	Per Meter	5849
	1000 mm Dia	Per Meter	6674
	1100 mm Dia	Per Meter	7623
	1200 mm Dia	Per Meter	8381
	1400 mm Dia	Per Meter	10493
	1600 mm Dia	Per Meter	12372
	1800 mm Dia	Per Meter	15829
13.4	<b>Labour only for laying and Jointing non-pressure (NP3) RCC socket &amp; spigot pipes with rubber gasket joint including testing of joints.</b>		
	150 mm Dia	Per Meter	122
	250 mm Dia	Per Meter	168
	300 mm Dia	Per Meter	233
	350 mm Dia	Per Meter	361
	400 mm Dia	Per Meter	396
	450 mm Dia	Per Meter	451
	500 mm Dia	Per Meter	485
	600 mm Dia	Per Meter	601
	700 mm Dia	Per Meter	664
	800 mm Dia	Per Meter	810
	900 mm Dia	Per Meter	1002
	1000 mm Dia	Per Meter	1115
	1100 mm Dia	Per Meter	1159
	1200 mm Dia	Per Meter	1254
	1400 mm Dia	Per Meter	1626
	1600 mm Dia	Per Meter	1931
	1800 mm Dia	Per Meter	2265
13.5	<b>Providing and Laying non-pressure (NP4) RCC socket &amp; spigot pipes with rubber gasket joint including testing of joints.</b>		
	250 mm Dia	Per Meter	1009
	300 mm Dia	Per Meter	1434
	350 mm Dia	Per Meter	2013
	400 mm Dia	Per Meter	2340
	450 mm Dia	Per Meter	2808
	500 mm Dia	Per Meter	3176
	600 mm Dia	Per Meter	3687
	700 mm Dia	Per Meter	4540
	800 mm Dia	Per Meter	5751

Sr.No.	Item	Unit	Rate (In Rs.)
	900 mm Dia	Per Meter	6733
	1000 mm Dia	Per Meter	7626
	1100 mm Dia	Per Meter	8383
	1200 mm Dia	Per Meter	9322
	1400 mm Dia	Per Meter	11931
	1600 mm Dia	Per Meter	14441
	1800 mm Dia	Per Meter	18539
13.6	<b>Labour only for laying and jointing non-pressure (NP4) RCC socket &amp; spigot pipes with rubber gasket joint including testing of joints.</b>		
	250 mm Dia	Per Meter	194
	300 mm Dia	Per Meter	253
	350 mm Dia	Per Meter	368
	400 mm Dia	Per Meter	416
	450 mm Dia	Per Meter	459
	500 mm Dia	Per Meter	506
	600 mm Dia	Per Meter	608
	700 mm Dia	Per Meter	685
	800 mm Dia	Per Meter	839
	900 mm Dia	Per Meter	1023
	1000 mm Dia	Per Meter	1140
	1100 mm Dia	Per Meter	1189
	1200 mm Dia	Per Meter	1338
	1400 mm Dia	Per Meter	1714
	1600 mm Dia	Per Meter	1931
	1800 mm Dia	Per Meter	2265
13.7	<b>Providing, Laying &amp; jointing non-pressure (NP2) RCC pipes with collars jointed with stiff mixture of cement mortar in the proportion 1:2 ( 1 cement : 2 sand ) including testing of joints.</b>		
	150 mm Dia	Per Meter	274
	200 mm Dia	Per Meter	399
	250 mm Dia	Per Meter	425
	300 mm Dia	Per Meter	500
	350 mm Dia	Per Meter	621
	400 mm Dia	Per Meter	721
	450 mm Dia	Per Meter	863
	500 mm Dia	Per Meter	894
	600 mm Dia	Per Meter	990
	700 mm Dia	Per Meter	1560
	800 mm Dia	Per Meter	2075
	900 mm Dia	Per Meter	2673
	1000 mm Dia	Per Meter	3232
	1100 mm Dia	Per Meter	3733
	1200 mm Dia	Per Meter	4548
13.8	<b>Labour only for laying &amp; jointing non-pressure (NP2) RCC pipes with collars jointed</b>		

Sr.No.	Item	Unit	Rate (In Rs.)
	<b>with stiff mixture of cement mortar in the proportion 1:2 ( 1 cement : 2 sand ) including testing of joints.</b>		
	150 mm Dia	Per Meter	66
	200 mm Dia	Per Meter	87
	250 mm Dia	Per Meter	110
	300 mm Dia	Per Meter	117
	350 mm Dia	Per Meter	130
	400 mm Dia	Per Meter	136
	450 mm Dia	Per Meter	149
	500 mm Dia	Per Meter	159
	600 mm Dia	Per Meter	189
	700 mm Dia	Per Meter	208
	800 mm Dia	Per Meter	224
	900 mm Dia	Per Meter	282
	1000 mm Dia	Per Meter	357
	1100 mm Dia	Per Meter	432
	1200 mm Dia	Per Meter	532
13.9	<b>Providing, Laying &amp; jointing non-pressure (NP3) RCC pipes with collars jointed with stiff mixture of cement mortar in the proportion 1:2 ( 1 cement : 2 sand )including testing of joints</b>		
	150 mm Dia	Per Meter	350
	200 mm Dia	Per Meter	519
	250 mm Dia	Per Meter	573
	300 mm Dia	Per Meter	667
	350 mm Dia	Per Meter	998
	400 mm Dia	Per Meter	1399
	450 mm Dia	Per Meter	1499
	500 mm Dia	Per Meter	1679
	600 mm Dia	Per Meter	1947
	700 mm Dia	Per Meter	3025
	800 mm Dia	Per Meter	3193
	900 mm Dia	Per Meter	3735
	1000 mm Dia	Per Meter	4485
	1100 mm Dia	Per Meter	5316
	1200 mm Dia	Per Meter	5620
13.10	<b>Labour only for laying &amp; jointing non-pressure (NP3) RCC pipes with collars jointed with stiff mixture of cement mortar in the proportion 1:2 (1 cement : 2 sand) includingtesting of joints.</b>		
	150 mm Dia	Per Meter	69
	200 mm Dia	Per Meter	92
	250 mm Dia	Per Meter	114
	300 mm Dia	Per Meter	122
	350 mm Dia	Per Meter	136
	400 mm Dia	Per Meter	141

Sr.No.	Item	Unit	Rate (In Rs.)
	450 mm Dia	Per Meter	156
	500 mm Dia	Per Meter	165
	600 mm Dia	Per Meter	196
	700 mm Dia	Per Meter	217
	800 mm Dia	Per Meter	233
	900 mm Dia	Per Meter	293
	1000 mm Dia	Per Meter	370
	1100 mm Dia	Per Meter	449
	1200 mm Dia	Per Meter	553
13.11	<b>Providing, Laying &amp; jointing non-pressure (NP4) RCC pipes with collars jointed with stiff mixture of cement mortar in the proportion 1:2 ( 1 cement : 2 sand )including testing of joints</b>		
	150 mm Dia	Per Meter	377
	200 mm Dia	Per Meter	529
	250 mm Dia	Per Meter	616
	300 mm Dia	Per Meter	846
	350 mm Dia	Per Meter	1382
	400 mm Dia	Per Meter	1464
	450 mm Dia	Per Meter	1572
	500 mm Dia	Per Meter	1804
	600 mm Dia	Per Meter	2076
	700 mm Dia	Per Meter	3209
	800 mm Dia	Per Meter	3363
	900 mm Dia	Per Meter	3953
	1000 mm Dia	Per Meter	4764
	1100 mm Dia	Per Meter	5390
	1200 mm Dia	Per Meter	5834
13.12	<b>Labour only for Laying &amp; jointing non-pressure (NP4) RCC pipes with collars jointed with stiff mixture of cement mortar in the proportion 1:2 ( 1 cement : 2 sand ) including testing of joints.</b>		
	150 mm Dia	Per Meter	72
	200 mm Dia	Per Meter	96
	250 mm Dia	Per Meter	119
	300 mm Dia	Per Meter	127
	350 mm Dia	Per Meter	141
	400 mm Dia	Per Meter	147
	450 mm Dia	Per Meter	162
	500 mm Dia	Per Meter	171
	600 mm Dia	Per Meter	203
	700 mm Dia	Per Meter	225
	800 mm Dia	Per Meter	242
	900 mm Dia	Per Meter	303
	1000 mm Dia	Per Meter	383
	1100 mm Dia	Per Meter	467
	1200 mm Dia	Per Meter	576

## **CHAPTER- XIV**

### **DOUBLE WALL CORRUGATED (DWC) PIPES**



## CHAPTER- XIV

### DOUBLE WALL CORRUGATED (DWC) PIPES

- **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.
- **Marking:-**The colour of marking shall be different from the basic colour of the pipe. It shall be as under. (i) Identification of the source of manufacture. (ii) Outside diameter, (iii) Stiffness class, and (iv) Batch or lot number
- **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.
- **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.
- **Minimum Cover**  
A minimum cover of 0.9 m should be ensured when normal truck traffic is expected and 1.8m should be ensured when heavy truck traffic is expected. Bedding and backfill material must be free from boulders, sharp stones, flints etc.  
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
- 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
- **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.

- **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.

- 9 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### DOUBLE WALL CORRUGATED (DWC) PIPES

S.No.	Items	Unit	Rate in Rs.		
14.1	Providing of DWC/ PE (Earlier HDPE) Pipes of renowned manufacturer duly tested and inspected i/c transportation charges, transit insurance, loading/ unloading and stacking at site/ store etc, complete.	RM			
	Internal Dia/Outer dia				
14.1.1	100 mm/ 120 mm	RM			149
14.1.2	135 mm/ 160 mm	RM			224
14.1.3	150 mm/ 180 mm	RM			264
14.1.4	170 mm/ 200 mm	RM			319
14.1.5	200 mm/ 238 mm	RM			438
14.1.6	250 mm/ 290 mm	RM			682
14.1.7	300 mm/ 345 mm	RM			910
14.1.8	400 mm/ 480 mm	RM			1646
14.1.9	500 mm/ 580 mm	RM			2400
14.1.10	600 mm/ 715 mm	RM			4137
14.1.11	800 mm/ 955 mm	RM			6860
14.1.12	1000 mm/ 1200 mm	RM			11174
14.2	Laying and jointing of DWC /PE (HDPE) Pipes of renowned manufacturer duly tested, and inspected i/c transportation charges, transit insurance, loading/ unloading and stacking at site/ store etc, complete.				
	Internal Dia/Outer dia				
14.2.1	100 mm/ 120 mm	RM			24

S.No.	Items	Unit	Rate in Rs.		
14.2.2	135 mm/ 160 mm	RM			26
14.2.3	150 mm/ 180 mm	RM			38
14.2.4	170 mm/ 200 mm	RM			38
14.2.5	200 mm/ 238 mm	RM			38
14.2.6	250 mm/ 290 mm	RM			48
14.2.7	300 mm/ 345 mm	RM			92
14.2.8	400 mm/ 480 mm	RM			92
14.2.9	500 mm/ 580 mm	RM			148
14.2.10	600 mm/ 715 mm	RM			148
14.2.11	800 mm/ 955 mm	RM			192
14.2.12	1000 mm/ 1200 mm	RM			262
14.3	Providing fittings for structural wall polyethylene piping systems ( pipe with online/offline coupler and elasticmeric sealing ring) with non-smooth external annular corrugated and smooth internal surfaces (double wall) for non – pressure underground sewerage, drainage as per IS 16098(PART-2):2013&EN 13476-3.				
	Internal dia/Outer dia		<b>Coupler Rate</b>	<b>Sealing Ring Rate</b>	<b>Bend rate</b>
14.3.1	100 mm/ 120 mm	RM	47.00	11.00	207
14.3.2	135 mm/ 160 mm	RM	81.00	20.00	315
14.3.3	150 mm/ 180 mm	RM	110.00	23.00	376
14.3.4	170 mm/ 200 mm	RM	167.00	34.00	547
14.3.5	200 mm/ 238 mm	RM	204.00	59.00	656
14.3.6	250 mm/ 290 mm	RM	502.00	128.00	1167
14.3.7	300 mm/ 345 mm	RM	1053.00	280.00	1785
14.3.8	400 mm/ 480 mm	RM	1670.00	516.00	3396
14.3.9	500 mm/ 580 mm	RM	2344.00	617.00	4873
14.3.10	600 mm/ 715 mm	RM	3292.00	1623.00	8148
14.3.11	800 mm/ 955 mm	RM	7037.00	3967.00	17129
14.3.13	1000 mm/ 1200 mm	RM	10398.00	5908.00	24891

**CHAPTER-XV**  
**SURGE PROTECTION WORKS**

## CHAPTER-XV

### SURGE PROTECTION WORKS

#### NOTES:

- 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.
2. **Zero Velocity Valve**
3. 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.
4. 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.
5. 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.
6. 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.
7. 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:
  - Controlled closing characteristics, and
  - Low loss of head due to streamlined design.

8.       **Air Cushion Valve**

9.       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.
10.      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.
11.      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.
12.      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.

13.      **Measurement**

Zero velocity valves and Air cushion valves shall be enumerated.

14.      **Rate**

- 14.1     The rate shall include cost of all the materials and labour involved in the all the operation described in the item.

- 14.2     **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

## SURGE PROTECTION WORKS

Sr. No.	Description of Item	Unit	Rate is Rs
15.1	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.		
15.1.1	100mm 10 kg/cm2	Each	77326
15.1.2	100mm 15 kg/cm2	Each	83224
15.1.3	100mm 20 kg/cm2	Each	85189
15.1.4	100mm 25 kg/cm2	Each	97771
15.1.5	150mm10 kg/cm2	Each	99474
15.1.6	150mm15 kg/cm2	Each	106945
15.1.7	150mm20 kg/cm2	Each	117693
15.1.8	150mm25 kg/cm2	Each	135254
15.1.9	200mm10 kg/cm2	Each	103931
15.1.10	200mm15 kg/cm2	Each	111795
15.1.11	200mm20 kg/cm2	Each	122934
15.1.12	200mm25 kg/cm2	Each	141545
15.1.13	250mm10 kg/cm2	Each	117299
15.1.14	250mm15 kg/cm2	Each	126211
15.1.15	250mm20 kg/cm2	Each	138662
15.1.16	250mm25 kg/cm2	Each	159500
15.1.17	300mm10 kg/cm2	Each	132109
15.1.18	300mm15 kg/cm2	Each	141938
15.1.19	300mm20 kg/cm2	Each	156093
15.1.20	300mm25 kg/cm2	Each	179290
15.1.21	350mm10 kg/cm2	Each	136827
15.1.22	350mm15 kg/cm2	Each	147181
15.1.23	350mm20 kg/cm2	Each	161728
15.1.24	350mm25 kg/cm2	Each	186105
15.1.25	400mm10 kg/cm2	Each	151243
15.1.26	400mm15 kg/cm2	Each	162515
15.1.27	400mm20 kg/cm2	Each	178897
15.1.28	400mm25 kg/cm2	Each	205765
15.1.29	450mm10 kg/cm2	Each	175883
15.1.30	450mm15 kg/cm2	Each	189120
15.1.31	450mm20 kg/cm2	Each	207992
15.1.32	450mm25 kg/cm2	Each	239317
15.1.33	500mm10 kg/cm2	Each	203275
15.1.34	500mm15 kg/cm2	Each	218477

<b>Sr. No.</b>	<b>Description of Item</b>	<b>Unit</b>	<b>Rate is Rs</b>
15.1.35	500mm20 kg/cm2	Each	240496
15.1.36	500mm25 kg/cm2	Each	276669
15.1.37	600mm10 kg/cm2	Each	249146
15.1.38	600mm15 kg/cm2	Each	267888
15.1.39	600mm20 kg/cm2	Each	294624
15.1.40	600mm25 kg/cm2	Each	338791
15.1.41	700mm10 kg/cm2	Each	351373
15.1.42	700mm15 kg/cm2	Each	377716
15.1.43	700mm20 kg/cm2	Each	415461
15.1.44	700mm25 kg/cm2	Each	477847
15.1.45	750mm10 kg/cm2	Each	397375
15.1.46	750mm15 kg/cm2	Each	427256
15.1.47	750mm20 kg/cm2	Each	469852
15.1.48	750mm25 kg/cm2	Each	540494
15.1.49	800mm10 kg/cm2	Each	438528
15.1.50	800mm15 kg/cm2	Each	471424
15.1.51	800mm20 kg/cm2	Each	471424
15.1.52	800mm25 kg/cm2	Each	596587
15.1.53	900mm10 kg/cm2	Each	521358
15.1.54	900mm15 kg/cm2	Each	560545
15.1.55	900mm20 kg/cm2	Each	616377
15.1.56	900mm25 kg/cm2	Each	709037
15.1.57	1000mm10 kg/cm2	Each	662904
15.1.58	1000mm15 kg/cm2	Each	712576
15.1.59	1000mm20 kg/cm2	Each	783741
15.1.60	1000mm25 kg/cm2	Each	901565
15.1.61	1100mm10 kg/cm2	Each	813230
15.1.62	1100mm15 kg/cm2	Each	874304
15.1.63	1100mm20 kg/cm2	Each	961722
15.1.64	1100mm25 kg/cm2	Each	1106019
15.1.65	1200mm10 kg/cm2	Each	1003268
15.1.66	1200mm15 kg/cm2	Each	1078628
15.1.67	1200mm20 kg/cm2	Each	1186359
15.1.68	1200mm25 kg/cm2	Each	1364470
15.1.69	1300mm10 kg/cm2	Each	1444810
15.1.70	1300mm15 kg/cm2	Each	1535896
15.1.71	1300mm20 kg/cm2	Each	1635372
15.1.72	1300mm25 kg/cm2	Each	1796969
15.1.72	1400mm10 kg/cm2	Each	1576919
15.1.73	1400mm15 kg/cm2	Each	1695135
15.1.74	1400mm20 kg/cm2	Each	1864597
15.1.75	1400mm25 kg/cm2	Each	2144411
15.1.76	1500mm10 kg/cm2	Each	241177
15.1.77	1500mm15 kg/cm2	Each	2160400
15.1.78	1500mm25 kg/cm2	Each	2733003



<b>Sr. No.</b>	<b>Description of Item</b>	<b>Unit</b>	<b>Rate is Rs</b>
15.2	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		
15.2.1	100 mm TP 10 kg/cm2	Each	86238
15.2.2	100 mm TP 15 kg/cm2	Each	94756
15.2.3	100 mm TP 20 kg/cm2	Each	104193
15.2.4	100 mm TP 25 kg/cm2	Each	119920
15.2.5	150 mm TP 10 kg/cm2	Each	130798
15.2.6	150 mm TP 15 kg/cm2	Each	143774
15.2.7	150 mm TP 20 kg/cm2	Each	158190
15.2.8	150 mm TP 25 kg/cm2	Each	181911
15.2.9	200 mm TP 10 kg/cm2	Each	139580
15.2.10	200 mm TP 15 kg/cm2	Each	153603
15.2.11	200 mm TP 20 kg/cm2	Each	168937
15.2.12	200 mm TP 25 kg/cm2	Each	194100
15.2.13	300 mm TP 10 kg/cm2	Each	196329
15.2.14	300 mm TP 15 kg/cm2	Each	216119
15.2.15	300 mm TP 20 kg/cm2	Each	248491
15.2.16	300 mm TP 25 kg/cm2	Each	285712

**CHAPTER-XVI**  
**SMOOTH FLOW PIPES**

## CHAPTER - XVI SMOOTH FLOW PIPES

### NOTES:-

#### 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 Tensile Bars Reinforcement
IS: 432 Part II	Specifications for Mild Steel and Medium Tensile Bars and Hard Drawn Steel Wire (Third Revision)
IS: 2328	Flattening Test for Seamless Pipes
IS: 6452	Specification for High Alumina Cement for Structural Use (Ist 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 Ferric Steel
IS: 3600 Part I	Methods of Testing Fusion Welded Joints and Weld Metal in Steel

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

2. The Smooth flow 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 buried 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:-**

- 12.1 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.
- 12.2 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
- 12.3 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

## SMOOTH FLOW PIPES

Sr. No.	Description of Item	Unit	Rate in Rs.
<b>16.1</b>	Providing, laying, Jointing & field testing of Smooth Flow Pipes (3 Layer Polyethylene -3LPE) Coated & fusion bonded Epoxy lined Steel pipes) for drinking water purposes for underground 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.		
16.1.1	300mm	RM	5787
16.1.2	350mm	RM	6755
16.1.3	400mm	RM	7721
16.1.4	450mm	RM	8616
16.1.5	500mm	RM	9517
16.1.6	550mm	RM	11894
16.1.7	600mm	RM	12951
16.1.8	700mm	RM	16491
16.1.9	750mm	RM	17651
16.1.10	800mm	RM	18901
16.1.11	900mm	RM	21208
16.1.12	1000mm	RM	25887
16.1.13	1200mm	RM	31054
16.1.14	1400mm	RM	39798
16.1.15	1500mm	RM	42597
16.1.16	1600mm	RM	45425
16.1.17	1800mm	RM	51037
16.1.18	2000mm	RM	66092
<b>16.2</b>	Providing, laying, Jointing & field testing of Smooth Flow Pipes (3 Layer Polyethylene-3LPE) Coated & fusion bonded Epoxy lined Steel pipes) for drinking water purposes for underground 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.		

<b>Sr. No.</b>	<b>Description of Item</b>	<b>Unit</b>	<b>Rate in Rs.</b>
16.2.1	300mm	RM	6473
16.2.2	350mm	RM	7510
16.2.3	400mm	RM	8544
16.2.4	450mm	RM	9577
16.2.5	500mm	RM	10616
16.2.6	550mm	RM	13041
16.2.7	600mm	RM	14201
16.2.8	700mm	RM	18143
16.2.9	750mm	RM	19424
16.2.10	800mm	RM	20793
16.2.11	900mm	RM	25462
16.2.12	1000mm	RM	28261
16.2.13	1200mm	RM	33896
16.2.14	1400mm	RM	46415
16.2.15	1500mm	RM	49562
16.2.16	1600mm	RM	53001
16.2.17	1800mm	RM	59567
16.2.18	2000mm	RM	75548

**CHAPTER- XVII**  
**SEWER APPURTENANCES**

## **CHAPTER- XVII**

### **SEWER APPURTENANCES**

#### **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.

#### **1 Manholes**

##### **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.

##### **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.

##### **Spacing:-**

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

<u>Pipe dia (mm)</u>	<u>Max. Spacing (mt)</u>
Upto 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.

##### **Types of manholes:**

Following is the general classification of manholes-

##### **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.



### **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.

### **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.

### **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 rodding 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 advantageousto

provide adequate means for rodding 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 raked 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 drops 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.

#### **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.

#### **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 allowed to head up and which will rush on with great velocity when the planks are removed. Alternatively, an overhead water tank 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 chock ages 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: -

No.	Slope	Quantity of water (litres)		
		200mm dia	250mm dia	300mm dia
1	1: 200	2300	2500	3000
2	1: 133	1500	1800	2300
3	1: 100	1300	1500	2000
4	1: 50	500	800	1000
5	1: 33	400	500	700

## 2. 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 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 0.9m and upto 2.5m, 1200mm x 900mm
- (j) **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.

## 3. 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 into proportion 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.

- For depths 0.9m and up to 1.65m, 900mm diameter.
- For depths above 1.65m and up to 2.30m, 1200mm diameter.
- For depths above 2.30m and up to 9.0m, 1500mm diameter.
- For depths above 9.0m and up to 14.0m, 1800mm diameter.

Typical circular manholes are shown in fig.6

If the sewer is constructed in a tunnel, the manhole should be located at the access or working shaft and the manhole chamber may be 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 may be fixed at lower level but in each case 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.

#### **4. Covers and frames: -**

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). 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.

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. Fibre reinforcement plastic covers (FRP) conforming to relevant IS: may be used wherever such covers are available.

#### **5. Inverted siphon**

##### **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 ease of cleaning.

### **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 siphons 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.

### **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 function. 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 rodding. 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.

### **6. Hatchbox:**

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

### **7. 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 may be 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.

### **8 Storm water inlets:-**

There are devices 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 may be 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 may be 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.

**9. 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.

**9.1 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.

**9.2. 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.

- 10 This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

## SEWER APPURTENANCES

S.No.	Items	Unit	Rate (Rs.)
17.1	Providing and fixing SW gully trap complete with CI grating, Brick masonry chamber in cement mortar 1:5 (1 cement :5 fine sand) water tight CI cover with frame of 30x30cm size including necessary Excavation, cement concrete CC 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm size),CC 1:2:4(1cement:2coarse sand:4 graded stone aggregate 20mm nominal size ) for fixing CI cover with frame,12 mm thick cement plaster 1:2 (1 cement:2 coarse sand ) finished with a floating coat of neat cementcomplete.		
17.1.1	100x100mm size "P" Gully Trap Chamber	Each	1881
17.1.2	125x100mm size "P", "Q" or "S" type Gully trap chamber	Each	1959
17.1.3	180x150mm size "P" or "S" type	Each	2053
	<b>MAN HOLES</b>		
17.2	Constructing Brick Masonry Manhole in Cement Mortar 1 :4 (1 cement : 4 fine sand) R.C.C. top slab 1:1.5:3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1cement : 4 coarse sand : 8 graded stone aggregate 40mm nominal size) inside plastering 12mm thick with cement mortar 1:3 (1cement : 3 fine sand) finished with a floating coat of neat cement and making channels in CC 1:2:4 (1 cement : 2 coarsesand : 4 graded stone aggregate 20mm nominal size) including finishing the channel to shape, curing etc. ( Excavation foot rest and external cementplaster shall be paid for separately)		
17.2.1	Inside size 90x80 cm and 45 cm deep including CI cover with frame 455x610 mm internal dimensions total weight of cover and frames to be not less than (23+15) 38 kg.	Each	9627
17.2.2	Inside size 90x80 cm and 60 cm deep including CI cover with frame 455x610mm internal dimensions totalweightofcoverandframestobenotlessthan (23+15) 38kg	Each	10438



S.No.	Items	Unit	Rate (Rs.)
17.2.3	Inside size 120x90 cm and 90 cm deep Manhole including CI cover with frame ( medium duty ) 500 mm internal diameter total weight of cover and frame to be not less than (58+58) 116 kg.	Each	20777
17.2.4	Inside size 120x90 cm and 90 cm deep Manhole including CI cover with frame ( Heavy duty ) 560 mm internal diameter total weight of cover and frame to be not less than (108+100) 208 kg.	Each	27793
17.2.5	Manhole for property ( House ) connection		
(i)	Inside size 60x60 cm and 90 cm deep manhole with fixing of ISI marked pre cast RCC manhole cover & frame i/c transportation etc. 600x600 mm size heavy duty.	Each	8120
(ii)	Inside size 60x45 cm and 60 cm deep manhole with fixing of ISI marked pre cast RCC manhole cover & frame i/c transportation etc. 600x450mm size heavy duty	Each	6155
17.3	Extra for depth up to 1.00 m for man holes over item 15.2		
17.3.1	90x80cm size manhole over item	per meter	5410
17.3.2	120x90cm size manhole over item.	per meter	6465
17.3.3	60x60cm size manhole over item	per meter	4092
17.3.4	60x45 cm size manhole over item	per meter	3696
17.4	Constructing Brick Masonry Circular Man Hole 1500 mm internal dia at bottom & 560 mm dia at top in cement Mortar 1:4 (1 cement: 4 fine sand), inside Cement plaster 12 mm thick with cement mortar 1:3 (1 cement : 3 fine sand) finished with a floating coat of neat cement, foundation concrete 20 cm thick in 1:3:6 ( 1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size ) and making channels in cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finishedwithafloatingcoatofneatcement etc. all complete.		

S.No.	Items	Unit	Rate (Rs.)
17.4.1	For one manhole upto 2650 mm deep with fixing of 560 mm dia ISI marked reinforcement cement concrete cover & frame heavy duty including transportation etc. in cement concrete 1:2:4 all complete. ( Excavation, foot rests & cement plaster at the	Each	25918
17.4.2	For one manhole upto 2650 mm deep with fixing of 560 mm dia CI cover & frame (medium duty) weight not less than (58+58) 116 kg. including transportation etc. in cement concrete 1:2:4 all complete. ( Excavation, foot rests & cement plaster at the	Each	32478
17.5	Extra for depth for circular manholes over item 15.4		
17.5.1	Depth 2.65m to 4.25 m	per meter	10367
17.5.2	Depth 4.25m to 9.75m	per meter	14255
17.6	Constructing Brick Masonry Circular Man Hole 1200 mm internal dia at bottom & 560 mm dia at top in cement Mortar 1:4 (1 cement: 4 fine sand), inside Cement plaster 12 mm thick with cement mortar 1:3 (1 cement : 3 fine sand) finished with a floating coat of neat cement, foundation concrete 20 cm thick in 1:3:6 ( 1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size ) and making channels in cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement etc. allcomplete.		
17.6.1	For one manhole upto 1650 mm deep with fixing of 560 mm dia ISI marked reinforcement cement concrete cover & frame heavy duty including transportation etc. in cement concrete 1:2:4 all complete. ( Excavation, foot rests & cement plaster at the	Each	16397
17.6.2	Add extra for depth 1.65 to 2.30 mtr.	Per Mtr.	6558

S.No.	Items	Unit	Rate (Rs.)
17.7	Constructing Brick Masonry Circular Man Hole 900 mm internal dia at bottom & 560 mm dia at top in cement Mortar 1:4 (1 cement: 4 fine sand), inside Cement plaster 12 mm thick with cement mortar 1:3 (1 cement : 3 fine sand) finished with a floating coat of neat cement, foundation concrete 20 cm thick in 1:3:6 ( 1 cement : 3 fine sand : 6 graded stone aggregate 40 mm nominal size ) and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement etc. all complete.		
17.7.1	For one Manhole 900mm deep with fixing of 560 mm dia ISI marked reinforcement cement concrete cover & frame heavy duty including transportation etc. in cement concrete 1:2:4 all complete. (Excavation, foot rests & cement plaster at the external surface shall be paid for separately)	Each	11924
17.7.2	Add extra for depth 0.90 to 1.65mtr.	Each	4770
17.8	Providing MS foot rests i/c fixing in manhole with 20x20x10cm CC blocks of 1:3:6 (1 cement:3 coarse sand : 6 graded stone aggregate 20mm nominal size)		
17.8.1	With 20mm square bar foot rest	Each	259
17.8.2	With 20mm round bar foot rest	Each	229
17.9	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 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size), cement plastered with CM 1:3(1 cement : 3 coarse sand) finished with a floating coat of neat cement and making necessary channels etc. complete.		
17.9.1	For 100 to 200 mm dia pipes	Each	353
17.9.2	For 250 to 300 mm dia pipes	Each	405
17.9.3	For 350 to 450 mm dia pipes	Each	661

S.No.	Items	Unit	Rate (Rs.)
17.10	Providing SCI (Sand Cast Iron) drop connection with SCI (Sand Cast Iron) drop pipe and bend encased alround with CC 1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate 40 mm 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 fine sand ) on inside walls including lead caulked joints and jointing SW pipes & SCI pipes with stiff cement mortar 1:1(1 cement: 1fine sand) including making required channel etc.complete.		
17.10.1	100 mm dia Sand cast iron drop connection	Each	4745
17.10.2	150 mm dia Sand cast iron drop connection	Each	7119
17.10.3	Extra rate shall be payable for depths of drop more than 60 cm		
(i)	100 mm dia Sand cast iron drop connection	Per mtr.	1424
(ii)	150 mm dia Sand cast iron drop connection	Per mtr.	2135
75.11	Road Gully Chambers ConstructionofBrickmasonryroadgullychambers with brick work in cement mortar 1:5 (1 cement: 5 fine sand ) and 12mm thick plaster in cement mortar 1:3includingfoundationconcrete1:5:10(1cement :5 coarse sand :10 graded stone aggregate40mm nominal size )including excavation etc. complete.		
17.11.1	Chamber 45x45x77.5cm with vertical grating 450x100 mm	each	4376
17.11.2	Chamber 50x45x60cm with horizontal grating 500x450 mm	each	3878
17.11.3	Chamber 110 x 50 x 77.5cm with horizontal 500 x 450 mm and vertical gratings 450x100 mm both.	each	6779
	<b>REPAIRING</b>		
17.12	Dismantling of manhole including R.C.C./C.C. top slab, CI / pre cast RCC cover with frame including stacking of useful materials near the site and disposal of unserviceable materials into municipal dumps within 50 m lead		
17.12.1	Manhole size 90x80 and 45 cmdeep	Each	846
17.12.2	Manhole size 90x80 and 60 cm deep	Each	933
17.12.3	Manhole size 120x90 and 90 cm deep	Each	1398
17.12.4	Manholes size 60x45 and 60 cm deep.	Each	458
17.12.5	Manholes size 60x60 and 90 cm deep.	Each	664

S.No.	Items	Unit	Rate (Rs.)
17.12.6	Extra for depth of manholes dismantling		
(i)	Manhole size 90x80 cm, depth above 60 cm	Per Mtr.	537
(ii)	Manhole size 120x90cm, depth above 90 cm	Per Mtr.	640
(iii)	Manholes size 60x45 cm, depth above 60 cm	Per Mtr.	377
(iv)	Manholes size 60x60 cm, depth above 90 cm	Per Mtr.	416
17.12.7	Manhole 1.50 m dia circular and upto 2.65 m deep	Each	2920
17.12.8	Manhole 1.20 m dia circular, and upto 1.65 m deep	Each	1818
17.12.9	Manhole 0.90 m dia circular and upto 0.90 m deep	Each	1098
17.12.10	Extra for depth of manholes dismantling		
(i)	Manhole 1.50 m dia circular, depth 2.65 to 4.25m	Per Mtr.	1168
(ii)	Manhole 1.50 m dia circular, depth 4.25 to 9.75m	Per Mtr.	1607
(iii)	Manhole 1.20 m dia circular, depth 1.65 to 2.30 m	Per Mtr.	727
(iv)	Manhole 0.90 m dia circular, depth 0.90 to 1.65m	Per Mtr.	439
17.13	Replacement of M.S. Foot rests in manhole including dismantling concrete block and fixing with 20x20x10 cm C.C. blocks of 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20mmnominalsize)		
17.13.1	With 20mm square bar foot rest.	Each	289
17.13.2	With 20mm round bar foot rest.	Each	259
17.14	Pumping out to remove the sewers blockages by using suitable pump sets operated by generators , whole assembly mounted on two/four wheelstrailer /pickup van. Including diesel & labour charges etc.	Per Hours	219
17.15	Providing and fixing in position Cast Iron Manhole Covers and frame conforming to IS 1726. Allexposed edgesroundedendfinishedincementmortar etc. complete.	Kg.	76
17.16	Labour only for fixing in position Cast Iron Manhole Covers & frame conforming to IS:1726.	Kg	5
17.17	<b>Providing &amp; fixing of ISI marked pre cast reinforced cement concrete manhole cover including frame and transporting at site, cost of all material etc.</b>		
17.17.1	500 mm dia extra heavy duty	Each	2680

S.No.	Items	Unit	Rate (Rs.)
17.17.2	560 mm dia extra heavy duty	Each	2884
17.17.3	600 mm dia extra heavy duty	Each	3290
17.17.4	500 mm dia heavy duty	Each	2019
17.17.5	560 mm dia heavy duty	Each	2375
17.17.6	600 mm dia heavy duty	Each	2629
17.17.7	600 x 900 mm size extra heavy duty	Each	4612
17.17.8	600 x 900 mm size heavy duty	Each	4053
17.17.9	450 x 900 mm size heavy duty	Each	3595
17.17.10	600 X 600 mm size extra heavy duty	Each	3290
17.17.11	600 X 600 mm size heavy duty	Each	2528
17.17.12	600 X 600 mm size mediumduty	Each	2070
17.17.13	600 X 450 mm size heavy duty	Each	2324
17.17.14	600 X 450 mm size medium duty	Each	1969
17.17.15	450 X 450 mm size heavy duty	Each	1765
17.17.16	450 X 450 mm size medium duty	Each	1460
17.18	<b>Providing &amp; fixing of ISI marked pre cast reinforced cement concrete manhole cover without frame and transporting at site, cost of all material etc.</b>		
17.18.1	500 mm dia extra heavy duty	Each	1657
17.18.2	560 mm dia extra heavy duty	Each	1962
17.18.3	600 mm dia extra heavy duty	Each	2267
17.18.4	500 mm dia heavy duty	Each	1301
17.18.5	560 mm dia heavy duty	Each	1657
17.18.6	600 mm dia heavy duty	Each	2064
17.18.7	600 x 900 mm size extra heavy duty	Each	3996
17.18.8	600 x 900 mm size heavy duty	Each	3691
17.18.9	450 x 900 mm size heavy duty	Each	2776
17.18.10	600 X 600 mm size extra heavy duty	Each	2013
17.18.11	600 X 600 mm size heavy duty	Each	1861
17.18.12	600 X 600 mm size mediumduty	Each	1301
17.18.13	600 X 450 mm size heavy duty	Each	1607
17.18.14	600 X 450 mm size medium duty	Each	1068
17.18.15	450 X 450 mm size heavy duty	Each	1098
17.18.16	450 X 450 mm size medium duty	Each	895

**CHAPTER XVIII**

**SURVEY**  
**&**  
**ALLIED CIVIL WORKS**

## CHAPTER XVIII

### SURVEY & ALLIED CIVIL WORKS

#### 1. SURVEY

##### 1      **Applicable Codes:**

<b>IS Code No.</b>	<b>Title</b>
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      The rate are based on the following average daily progress that can be normally achieved under average conditions by one surveyparty:-



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

- 4 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.)
- 5 For levelling (above 15m interval) the labour strength considered is mazdoors (2 chain and tape man, 1 staff man, 1 instrument man, 1 umbrella man, 1 waterman and 2 axe men to removing obstacles).
- 6 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.
- 7 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.
- 8 **Measurement:**  
The survey work shall be measured in Km/Hectare. No payment shall be made for surveying equipments.
9. **Ultra High Resolution UAV Mapping:-**
  - 9.1 The surveying capacity of UAV should be of capacity more than 1000 Hect. per hour. In suitable flying conditions per day surveying coverage should be 2000 Hect.
  - 9.2 The UAV should have accuracy range up to 25 cm X 25 cm to ensure meeting the surveying requirements as per need.
- 10 **Rates:**
  - 10.1 The rates include charges for all tools & plants, survey equipments, other appliances etc. required for the work
  - 10.2 The rates include provision and use of all covering etc. to protect the works from inclement weather etc.
- 11 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount**

## 1. SURVEY

Sr.No	Particulars of Items	Unit	Rates (in Rs.)
18.1	Chain and compass survey	Km	1035
18.2	Chain and theodolite survey	Km	1035
18.3	Theodolite work involving fixing of stones at every tenth chain, tangent apex and vertex point of final alignment	Km	2071
18.4	Fly levelling for fixing temporary bench marks :		
18.4.1	Up to 15m interval	Km	1035
18.4.2	Above 15m interval	Km	518
18.5	Levelling Head works		
18.5.1	Below 5m interval (for basin survey and dam seat survey)	Km	1726
18.5.2	5 to 10m interval	Km	1381
18.5.3	more than 10 but up to 15m interval	Km	1035
18.5.4	Above 15m interval	Km	690
18.6	Double levelling for transfer of bench marks:		
18.6.1	Up to 15m interval	Km	4142
18.6.2	Above 15m interval	Km	2071
18.7	<b>Total Station Survey</b> 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.		
18.7.1	Upto 5 Hect.	Hect.	1496

18.7.2	5 Hect to 10 Hect.	Hect.	998
18.7.3	10 Hect to 25 Hect.	Hect.	748
18.7.4	Above 25 Hect.	Hect.	499
18.7.5	Add extra in above for following grid levels in place of 30 mtr x 30 mtr grid size		
18.7.5.1	Grid size 10mtr. x 10mtr.	Hect.	200
18.7.5.2	Grid size 20mtr. x 20mtr.	Hect.	100
18.8	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.		
18.8.1	For 20 cm dia holes	Each	137
18.8.2	For 25 cm dia holes	Each	168
18.8.3	Add to or deduct from the rate for the trial holes of 3.5m depth if the trial holes are deeper or shallower		
18.8.3.1	For 20 cm dia holes	Meter	39
18.8.3.2	For 25 cm dia holes	Meter	48
18.9	<b>“Unmanned Aerial Vehicle (UAV)”</b> – Detailed Geo Referenced topographical mapping with a surveying capacity of 1000 Hect. per hour of more and development of graphical database for any selected area using digital state of art UAV, automatic levels grid size 30M X 30M etc. as per site condition requirement and as directed by the Engineer-in-charge including transfer of entire area data set to computer system in different geo referenced layer/themes using features of standard photogrammetric software. Compatible with urban water/waste-water supply/drainage system design software packages including supply of soft copies and 5 hard copies in appropriate scale.		
18.9.1	Up to 5 Hect	Hect	1600
18.9.2	5 Hect. to 10 Hect	Hect	1100
18.9.3	10 Hect. to 25 Hect	Hect	850
18.9.4	Above 25 Hect	Hect	700
18.10	Add extra in 18.9 the above for following grid levels in place of 30mx30m grid size:-		
18.10.1	Grid Size 25 CM X 25 CM	Hect	400
18.10.2	Grid Size 50 CM X 50 CM	Hect	350
18.10.3	Grid Size 1 M X 1 M	Hect	300

18.10.4	Grid Size 5 M X 5 M	Hect	250
18.10.5	Grid Size 10 M X 10 M	Hect	200
18.10.6	Grid Size 20 M X 20 M	Hect	100
18.11	Survey and Leveling Head works by UAV - Detailed Geo Referenced topographical mapping (covering 15 m with on either side of center line) with a minimum surveying capacity of 10 km per hour and development of graphical database for any selected area using digital state of art UAV, automatic levels with 15 m interval as per site condition requirement and as directed by the Engineer-in-charge including transfer of entire area data set to computer system in different geo referenced layer/themes using features of standard photogrammetric software. Compatible with urban water/waste-water supply/drainage system design software packages including supply of soft copies and 5 hard copies in appropriate scale.		
18.11.1	Up to 5 km	Km	12000
	5 Km to 10 Km	Km	9500
	10 Km to 25 Km	Km	8500
	Above 25 Km	Km	7500
18.12	Add extra in above for following levels in place of 15 m interval		
18.12.1	25cm to 50cm interval	Km	1600
18.12.2	50cm to 1m interval	Km	1400
18.12.3	1m to 3 m interval	Km	1200
18.12.4	3m to 5 m interval	Km	1000
18.12.5	5m to 10 m interval	Km	800
18.12.6	10m to 15 m interval	Km	700

## **2. ALLIED CIVIL WORKS**

### **Excavation and Preparation of Trench**

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 have already been given in the relevant chapters.
2. The trenches shall run in perfectly straight line between points or manholes, as shown on the approved drawings.
3. The excavation of the trench shall be commenced at the downstream end of the sewer and be continued up the gradient.
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.
5. The trench shall be so shored and drained that the workmen may work there in safely and efficiently.
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.
7. The excavation shall be carried out with manual labour or with suitable mechanical equipment as approved by the Engineer in charge.
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 and any other such services 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 if necessary shall be arranged by the engineer in charge.
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 200mm 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.

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 or 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.
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.
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.
  - (a) 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
  - (b) 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.
  - (c) 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.
  - (d) 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 or granular material.
13. If the sides of the trench are not vertical the toes of the side slopes shall end at the top of the pipe and practically, vertical sided trench shall be dug from these down to the subgrade.

14. The bottom of the trench shall be properly trimmed off to present a plain surface and all irregularities shall be levelled.
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 broken stone (passing sieve of 12.5mm aperture size) and compacted so as to provide a smooth bedding for the pipes.
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.
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.
18. Trench excavation in rock in inhabited areas should be done by hammering and chiselling or other appropriate mechanical means but not by blasting.
19. Excavation for trenches in rock by blasting shall be permitted only in open areas, with the written permission of the competent 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. All necessary licenses etc shall be the responsibility of the contractor.
20. Proper precautions shall be taken for the protection of persons or property during blasting by the contractor after obtaining necessary permission for blasting from the concerned authorities..
21. The hours of blasting shall be fixed by the Engineer in charge in consultation with the concerned local authorities.
22. The procedure of blasting shall conform to the requirements of local administration controlling authorities.
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. Payment shall be regulated as per terms of the agreement.

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.
25. Engineer 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 (1993 Second edition) for which no extra payment shall be made.
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.
27. Sheetting done in trenches near heavy or important buildings shall be left in ground, if any settlement of the buildings is anticipated as per direction of Engineer in Charge and for which no extra payment shall be made.
28. Sheetting 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.
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.
30. Sheetting 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.
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.
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.
33. (a) 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 50m lead, on either side of pipe and upto 30cm 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. 16.11. In this case overall rock shall be compulsorily issued at the rate of Rs 170 per cum 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.

- (b) 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.
- 34. Hydrants under pressure, surface boxes, fire or other utility controls shall be left unobstructed and accessible until the work is completed.
- 35. Gutters shall be kept clear or other satisfactory provisions made for street drainage and natural watercourses shall not be obstructed.
- 36. 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.
- 37. 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.
- 38. The rules and regulations or the local authority regarding safety provisions shall be observed.
- 39. 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.
- 40. Where it is necessary for traffic to cross open trenches, suitable cross over planks shall be provided.
- 41. Suitable signs indicating that a street is closed shall be placed and necessary detour signs for the proper maintenance of traffic shall be provided.
- 42. 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.

- 43 The structure, which may have to be disturbed, shall be restored upon completion of the work.
- 44 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.
- 45 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.
- 46 No valve or other control of the existing serving shall be operated without the permission of the Engineer in charge.
- 47 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.
- 48 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.
- 49 The work should not be accepted in any case if the contractor fails to observe the instruction of department regarding testing of material.
- 50 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.
- 51 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 and report.
- As mentioned in para 12.9, the width of excavation shall be as per specification given in the relevant I.S. Specification. The bottom width, which shall be kept as minimum required for the work as per ISS and if the depth of the trench is more the top width shall depend on the angle of repose for a particular type of soil where the pipe line is to be laid.
- 52 The rate for cutting and making in the same condition include all lead of the material and also required work and equipment to complete the work as per specification and as directed by Engineer in charge.
- 53 The contractor shall be fully responsible to carry out the work in a most safe way and he shall be fully liable and responsible for any accidents due to any reason, during the currency of the contract.

## II. SPECIFICATION FOR CIVILWORKS

All the civil works shall be done strictly as per relevant I.S. Specifications and all the materials shall also confirm to the relevant I.S. Specifications. All the necessary tests of material and work shall be carried out for each work. Where applicable, the contractor shall also submit manufacturer's test certificates for materials to the Engineer in Charge.

### Materials Specification

**(a) Cement:**

Cement to be used in the work shall be any of the following types with prior approval of Engineer-in-charge.

Ordinary Portland cement 43 or 53 grade confirming to IS: 8112-1489 or P.P.C. conforming to IS : 1489 bearing ISI mark.

**(b) Coarse Aggregate:**

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

All coarse aggregate shall confirm 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

**(c) Sand / Fine Aggregate:**

Sand shall not contain dust, lumps and 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 modulus of fine aggregate shall neither be less than 2.0 nor greater than 3.5. Sand to be used in work shall confirm to IS:1542-1960 for plaster and IS: 166-1965 for masonry work. Clay content should not be more than permissible limit.

**(d) Water:**

Water used for mixing and curing shall be clean and free from injurious amounts of oils, acids, salts, sugar, organic material or other substances that may be deleterious to concrete potable water in generally consider satisfactory for mixing and curing of concrete.

- (e) **Steel:**  
For R.C.C. works steel to be used shall confirm to IS:1786. All steel be procured from original producer and no re-rolled steel shall be used in the work. Only new steel shall be delivered to site. Brittle burnt, defective, cracked bar shall be discarded.
- (f) **Concrete:**  
Normally concrete shall be mixed either in a concrete mixer or in a batching & mixing plant. Hand mixing is prohibited and under unavoidable circumstances it should be done only with the prior permission of Engineer-in-charge. Mixing shall be continued till materials are uniformly distributed and a uniform colour of entire mass is obtained and each particle of aggregate shows coating of cement. In no case mixing shall be done for less than 2 minutes. Concrete shall be transported and placed as near as practicable to its final position within 30 minutes of its discharge from the mixer.
- (i) Structural steel shall be of tested, standard quality confirming to IS:226-69 and commercial quality shall confirm to IS:1977-69.
  - (ii) Steel work riveted or bolted shall confirm to IS:1148-1968 and IS:800-1962.
  - (iii) Welding of steel shall be electric arc welding as per IS:816-1956 and shall be on the lines given in IS: 800-1962.
  - (iv) Rolled steel section for fabrication of steel shall confirm to IS:7452-1974.
  - (v) Rates of steel angle includes all forgoing, reducing to required size, shape and figure, drilling, tapping, punching etc. and every description of workmanship that may be necessary to fabricate, finish, erect and fix in position in perfect manner.
- (g) **Bricks:**
- (i) The brick work shall be carried out as per relevant I.S. Specifications and the drawing, specification and direction by the Engineer-in-charge.
  - (ii) Burnt clay bricks shall confirm to the requirement of IS:1077. They shall be free from cracks and flaws and nodules of free lime. The brick shall have smooth rectangular faces with sharp edges and corners.
  - (iii) Cement mortar for work shall be as per the relevant specification.
  - (iv) All bricks shall be thoroughly soaked in tank filled with water for minimum period one hour prior to being laid such soaked bricks shall be stacked on a clean place where they are not contaminated with earth / dirt etc.
  - (v) The thickness of joint shall not exceed 10mm
  - (vi) The Brick work shall be built in uniform layers.
  - (vii) Brick work shall be done true to plumb in specified manner. All courses shall be laid truly horizontal and vertical joints shall be truly vertical.
  - (viii) In case of vertical or inclined joints proper bond between old and new masonry has to be ensured by interlocking the bricks.

- (ix) Green work / fresh work shall be protected from rain by suitable covering and shall be kept constantly moist on all faces for minimum of 7 days.

(h) **MORTAR:**

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

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

(i) **PLASTER:**

Plastering shall be done where shown on as per drawing. Plastering shall be started from top and worked down. Wooden screeds 75mm wide and of the thickness of the plaster shall be fixed vertically 2.5 to 4 mt. apart to act as gauge and guide in applying plaster. The mortar shall be laid on the wall between the screeds using the plaster's 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 plaster's wooden float metal floats shall not be used.

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

(j) **FORM WORK:**

- (i) Form work shall include all temporary form for forming concrete of shape with all props, staging and centring required for support.
- (ii) All material shall conform to relevant I.S. specifications
- (iii) Form work shall be constructed with metal or timber, for metal all bolts should be countersunk.
- (iv) The form work should be robust and strong and joint shall be leak proof, staging must have cross bracing and diagonal bracing in both directions.
- (v) 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 mt. 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.

**This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

## 2. ALLIED CIVIL WORKS

S.No.	Items	Unit	Rates in Rs.
	<b>EXCAVATION</b>		
18.13	Surface dressing of the ground including removing vegetation and in - equalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m. All kind of soil	100 Sqm	1055
18.13.1	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the Periphery of the area cleared.	100 Sqm	544
18.13.2	Clearing grass and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared.	100 Sqm	279
18.14	Installation of HDPE pipe by Horizontal Direction Drilling Method including preparing and setting up the plant and equipment, making string of new pipe material, installing new pipe string and making the system ready for commissioning by HDD operation including drilling, stringing, reaming and pulling back the new pipe on the designed bore path alignment, proper disposal of drilling fluid, as per code of practice for horizontal direction drilling technique suiting indian conditions. Required pipes/ specials and other civil work shall be paid separately-in all types of soils. (This item shall be executed only after prior permission of Superintending Engineer)		
	HDPE pipe of any class-90 mm outer dia	Meter	459
	HDPE pipe of any class-110 mm outer dia	Meter	500
18.15	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.	Cum	161

S.No.	Items	Unit	Rates in Rs.
18.16	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.	cum	213
18.17	Earth work in excavation for pipe trench in Laterite soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.	Cum	308
18.18	For muddy area, extra rate for item No. 18.15 (extra percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions).	Cum	20 %
18.19	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.		
18.19.1	Soft rock with or without blasting or bituminous pavement / cement concrete road.	Cum	373
18.19.2	Hard rock (requiring blasting.)	Cum	458
18.19.3	Hard rock requiring chiseling / where blasting is prohibited.	Cum	532
18.20	Extra for every additional lift of 1.5m or part there of		
18.20.1	All kind of soils (over item No. 18.15, 18.16 and 18.17)	Cum	54
18.20.2	Ordinary soft and Hard rock (over item No. 18.19.1, 18.19.2 and 18.19.3)	Cum	96
18.19	Extra for every additional lead up to 50 m or part thereof over item 18.15 to 18.19.3	cum	56
18.20	Earthwork 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 matel, dressing of sites and bottom and back filling with approved materials etc. and as per relavent codes in practice.		
	Ordinary soil		
18.20.1	Up to 3m depth	cum	165
18.20.2	3m to 6m depth	cum	201

S.No.	Items	Unit	Rates in Rs.
18.21	Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like.	KL	57
18.22	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	cum	66
18.23	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.	Cum	50
18.24	Supply & Filling moorum/river sand for pipe bedding or over the pipe (including supply)	cum	693
18.25	Supply & Filling crusher stone dust for pipe bedding or over the pipe (including supply of crusher stone dust.)	cum	897
	<b>DISMANTLING &amp; DEMOLISHING</b>		
18.26	Demolishing Brick work in lime or cement mortar in any mix including stacking of serviceable material and disposal of unserviceable material with in 50 meter lead as per direction of engineer-in-charge. ( In cement mortar)	Cum	640
18.27	Demolishing stone rubble masonry manually/mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50 meter lead as per direction of engineer-in-charge.(In lime mortar)	Cum	360
18.28	Demolishing stone rubble masonry manually/mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50 meter lead as per direction of engineer-in-charge.(In cement mortar )	Cum	763
18.29	Demolishing cement concrete manually / by mechanical means including disposal of material within 50 m lead as per direction of engineer-in-charge.		
18.29.1	Nominal concrete 1:3:6 or richer mix ( i/c equivalent design mix )	Cum	758
18.29.2	Nominal concrete 1:4:8 or Leaner mix ( i/c equivalent design mix )	Cum	467



S.No.	Items	Unit	Rates in Rs.
18.29.3	Dismantling of Cement Concrete Pavment by mechanical means using pneumatic tools, cutter breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately	Cum	984
18.30	Demolishing R.C.C. work manually / by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 m lead as per direction of engineer-in- charge.	Cum	1105
18.31	Dismantling old plaster or skirting raking out joints and cleaning the surface for plaster including disposal of rubbish to the dumping within 50 meters lead.	Sqm	14
18.32	Dismantling stone slab flooring laid in cement mortar including stacking of serviceable material and disposal of unserviceable material within 50 m lead	Sqm	83
18.33	Dismantling kharanja of any thickness in cement mortar of any mix	Sqm	64
	<b>REPAIRS TO BUILDING/ ROAD WORK</b>		
18.34	Providing& Fixing of stone slab 30 mm thick in cement mortar 1:6 (1 cement 6 sand)	Sqm	150
18.35	Labour only for Fixing of stone slab 30 mm thick in cement mortar 1:6 (1 cement 6 sand)	Sqm	69
18.36	Providing & Fixing of Kharanja of any thickness in C.M. 1:6 ( 1 cement 6 sand )	Sqm.	506
18.37	Labour only for fixing of Kharanja of any thickness.	Sqm	134
18.38	Cutting of Water bound macadam road and making good the same including supply of extra quantities of materials i.e. aggregate, moorum screening and labour required including compaction inlayer by appropriate methods.	Cum	1063
18.39	Cutting of Bituminous road and making good the same including supply of extra quantities of materials i.e. aggregate, moorum screening and labour required including compaction inlayer by appropriate methods.	Cum	2157
	<b>CEMENT CONCRETE</b>		

S.No.	Items	Unit	Rates in Rs.
18.40	<b>Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate)</b>		
18.40.1	In foundation and plinth		
18.40.1.1	1:5:10 ( M-5)	cum	3530
18.40.1.2	1:4:8 (M-7.5)	cum	3744
18.40.1.3	1:3:6 (M-10)	cum	4032
18.40.1.4	1:2:4 (M-15)	cum	4739
18.40.2	<b>In walls &amp; Superstructure up to 4 mt. height above plinth (with 40mm nominal graded metal)</b>		0
18.40.2.1	1:3:6(M-10)	cum	4106
18.40.2.2	1:2:4(M-15)	cum	4812
18.41	<b>Providing &amp; laying mechanically mixed cement concrete 20mm nominal size graded crushed stone excluding cost of centering &amp; shuttering.</b>		
18.41.1	<b>In Plinth &amp; foundation</b>		
18.41.1.1	1:3:6 (M-10)	cum	4182
18.41.1.2	1:2:4 (M-15)	cum	4774
18.41.1.3	1:1 <sup>1</sup> / <sub>2</sub> :3 (M-20 )	cum	5248
18.41.1.4	1:1:2(M-25)	cum	6492
18.41.2	<b>In walls and superstructure up to 4 mt. height above plinth (with 20mm nominal graded metal)</b>		
18.41.2.1	1:3:6 (M-10)	Cum	4257
18.41.2.2	1:2:4 (M-15)	Cum	4849
18.41.2.3	1:1 <sup>1</sup> / <sub>2</sub> :3 (M-20 )	Cum	5323
18.41.2.4	1:1:2(M-25)	Cum	6566
	<b>REINFORCED CEMENT CONCRETE</b>		
18.42	<b>Providing &amp; laying mechanically mixed R.C.C. excluding centering &amp; shuttering and reinforcement in foundation/plinth (20mm graded metal)</b>		

S.No.	Items	Unit	Rates in Rs.
18.42.1	1: 1 <sup>1</sup> / <sub>2</sub> :3 (M 20)	cum	4831
18.42.2	1:1:2 (M 25)	cum	6074
18.42.3	1:0.75:1.5 (M 30)	cum	6400
18.43	<b>Providing &amp; laying mechanically mixed R.C.C. excluding centering &amp; shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal)</b>		
18.43.1	1: 1 <sup>1</sup> / <sub>2</sub> :3 (M 20)	cum	4867
18.43.2	1:1:2 (M 25)	cum	6111
18.43.3	1:0.75:1.5 (M 30)	cum	6437
	<b>STEEL</b>		
18.44	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/ccost of binding wire and wastage.	Kg	56
18.45	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting fixing in position and applying a priming coat of approved steel primer all complete.	Kg	60
18.46	Structural steel work riveted, bolted or welded in built-up section trusses and framed work i/c cutting/hoisting /fixing in position and applying a priming coat of approved steel primer all complete.	Kg	77
18.47	Steel work in welded built-up section/ framed work, including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.		
18.47.1	In stringers treads landings etc. of stair cases including use of chequered plate wherever required all complete.	Kg	80
18.47.2	In gratings, frames, guard bar, ladder ,railings, brackets, gates and similar works	Kg	99
18.48	Providing and fixing 1mm thick M.S. sheet door shutters with frame and diagonal braces of 40x40x6 mm angle iron, 3mm M.S. gusset plates at the junctions and corners i/c all necessary fittings complete including applying a priming coat of approved steel primer. with diagonal braces and central cross pieces of M.S. angle / flats as required.	Sqm	2941

S.No.	Items	Unit	Rates in Rs.
	<b>CEMENT MORTAR</b>		
18.49	Cement Mortar 1:3 (1 Cement : 3 sand)	Cum	4749
18.50	Cement Mortar 1:4 (1 Cement : 4 sand)	Cum	3983
18.51	Cement Mortar 1:5 (1 Cement : 5 sand)	Cum	3509
18.52	Cement Mortar 1:6 (1 Cement : 6 sand)	Cum	3213
18.53	Cement Mortar 1:8 (1 Cement : 8 sand)	Cum	3114
	<b>BRICK WORK</b>		
18.54	Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm <sup>2</sup> and water absorption not more than 20 % in foundation & plinth i/c curing etc. complete.		
18.54.1	In Cement Mortar 1:3	Cum	6085
18.54.2	In Cement Mortar 1:4	Cum	5799
18.54.3	In Cement Mortar 1:5	Cum	5681
18.54.4	In Cement Mortar 1:6	Cum	5607
18.55	Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm <sup>2</sup> and water absorption not more than 20% in super structure above plinth level and up to floor two level i/c form work &curing etc. complete.		
18.55.1	In Cement Mortar 1:3	Cum	6629
18.55.2	In Cement Mortar 1:4	Cum	6105
18.55.3	In Cement Mortar 1:5	Cum	5977
18.55.4	In Cement Mortar 1:6	Cum	5891
18.56	Extra rate for Brick work in superstructure above floor two level for each additional floor or part thereof respective item.	Cum	162
18.57	Half brick masonry with well burnt chimney bricks crushing strength not less than 25kg/cm <sup>2</sup> and water absorption not more than 20% is superstructure aboveplinth level and up to floor two level.		
18.57.1	Cement mortar 1:3	Sqm	765

S.No.	Items	Unit	Rates in Rs.
18.57.2	Cement mortar 1:4	Sqm	702
18.58	<b>Brick work with open Bhatta bricks having crushing strength not less than 20 kg/cm<sup>2</sup> and water absorption not more than 25% in foundation &amp; plinth i/c curing etc.complete.</b>		
18.58.1	In Cement Mortar 1:3	Cum	5791
18.58.2	In Cement Mortar 1:4	Cum	5583
18.58.3	In Cement Mortar 1:5	Cum	5454
18.58.4	In Cement Mortar 1:6	Cum	5376
18.59	<b>Brick work with open Bhatta bricks having crushing strength not less than 20 kg/cm<sup>2</sup> and water absorption not more than 25% in super structure above plinth level and up to floor two level i/c form work &amp; curing etc. complete.</b>		
18.59.1	In Cement Mortar 1:3	Cum	6502
18.59.2	In Cement Mortar 1:4	Cum	5809
18.59.3	In Cement Mortar 1:5	Cum	5681
18.59.4	In Cement Mortar 1:6	Cum	5601
	<b>PLASTER</b>		
18.60	<b>12mm thick cement plaster in single coat including finishing even, smooth and curing complete.</b>		
18.60.1	1:3(Cement 1: Sand 3)	Sqm	159
18.60.2	1:4(Cement 1: Sand 4)	Sqm	148
18.60.3	1:5(Cement 1: Sand 5)	Sqm	141
18.60.4	1:6(Cement 1: Sand 6)	Sqm	137
18.61	<b>15mm thick cement plaster in single coat i/c finished even, smooth and curing complete</b>		
18.61.1	in CM 1:3	Sqm	172
18.61.2	in CM 1:4	Sqm	160
18.61.3	in CM 1:5	Sqm	150
18.61.4	in CM 1:6	Sqm	145
18.61.5	Neat cement punning	Sqm	27
18.62	<b>18mm thick cement plaster in 2 coats under layer 12mm CP 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 curingcomplete.</b>	Sqm	199

S.No.	Items	Unit	Rates in Rs.
18.63	<b>20 mm thick cement plaster in single coat i/c finishing even, smooth and curing complete</b>		
18.63.1	in CM 1:3	Sqm	215
18.63.2	in CM 1:4	Sqm	197
18.63.3	in CM 1:5	Sqm	186
18.63.4	in CM 1:6	Sqm	180
	<b>FORM WORK</b>		
18.64	<b>Providing &amp; fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for:</b>		
18.64.1	Foundation , footing, bases of columns ,etc for mass concrete	sqm	185
18.64.2	Wall ( any thickness ) including attached pilasters, buttresses, plinth and string courses etc.	sqm	322
18.64.3	Suspended floors, roofs, landings, balconies and access platform.	sqm	360
18.64.4	Lintels, beams , plinth beams, girders, bressumers and cantilevers.	sqm	303
18.64.5	Columns, pillars, piers, Abutments, posts and Struts	sqm	413
18.64.6	Stairs, ( excluding landings ) except spiral- staircases	sqm	436
18.65	<b>Close timbering in trenches including strutting, shoring and packing cavities (wherever required) complete (Measurement to be taken of the face area timbered)</b>		
18.65.1	Depth not exceeding 1.5 mtr.	Sqm	171
18.65.2	Depth exceeding 1.5 mtr. but not exceeding 3.0 mtr.	Sqm	176
18.65.3	Depth exceeding 3.0 mtr. but not exceeding 4.5 mtr.	Sqm	181
18.65.4	Depth exceeding 4.5 mtr. but not exceeding 6.0 mtr.	Sqm	186
18.65.5	Depth exceeding 6.0 mtr. but not exceeding 7.5 mtr.	Sqm	191
18.65.6	Depth exceeding 7.5 mtr. but not exceeding 9.0 mtr.	Sqm	196
18.66	<b>Close Timbering in case of shafts, wells, cesspits manholes and the like including strutting, shoring and packing cavities ( wherever required ) etc. complete (Measurements to be taken of the face area timbered )</b>		
18.66.1	Depth not exceeding 1.5 mtr.	Sqm	174
18.66.2	Depth exceeding 1.5 mtr. but not exceeding 3.0 mtr.	Sqm	184
18.66.3	Depth exceeding 3.0 mtr. but not exceeding 4.5 mtr.	Sqm	195
18.66.4	Depth exceeding 4.5 mtr. but not exceeding 6.0 mtr.	Sqm	205

S.No.	Items	Unit	Rates in Rs.
18.66.5	Depth exceeding 6.0 mtr. but not exceeding 7.5 mtr.	Sqm	216
18.66.6	Depth exceeding 7.5 mtr. but not exceeding 9.0 mtr.	Sqm	226
	<b>STONE WORK</b>		
18.67	Coursed rubble masonry ( first sort ) with hard stone in foundation and plinth cement mortar 1:6	cum	4414
18.68	Coursed rubble masonry ( Second sort ) with hard stone in foundation and plinth Cement mortar 1:6	cum	4115
18.69	<b>Coursed rubble masonry with hard stone (first or Second sort) in Superstructure above plinth level and up to floor two level.</b>		
18.69.1	Masonry work (first sort) in Cement mortar 1:6	cum	5054
18.69.2	Masonry work (Second sort) in Cement mortar 1:6	cum	4756
18.70	Extra Coursed rubble masonry with hard stone (first or Second sort) in Superstructure above floor II level for every floors or part thereof.	cum	112
18.71	<b>Extra Coursed rubble masonry with hard stone (first or Second sort) in</b>		
18.71.1	Square or rectangular pillars	cum	372
18.71.2	Circular pillars	cum	1249
18.72	<b>Pointing on stone work with cement mortar 1:3 ( 1 cement : 3 fine sand )</b>		
18.72.1	Flush / ruled pointing	sqm	129
18.72.2	Raised and cut pointing	sqm	236
	<b>FINISHING WORK</b>		
18.73	White washing with lime to give an even shade : New work ( three or more coats )	sqm	15
18.74	White washing with lime to give an even shade :		
18.74.1	Old work ( two or more coats )	sqm	9
18.74.2	Old work ( One or more coats )	sqm	5
18.75	Finishing walls with water proofing cement paint of required shade : New work ( two or more coats applied @ 3.84 kg/10 sqm)	sqm	54

S.No.	Items	Unit	Rates in Rs.
18.76	Finishing walls with Acrylic Smooth exterior paint of required shade : New work ( two or more coats applied @ 1.67 ltr/10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/ 10sqm)	sqm	93
18.77	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade : ( two or more coats ) on New work	sqm	69
18.78	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade : (One or more coats ) on Old work	sqm	46
	<b>CONSTRUCTION OF BRICK MASONARY VALVE CHAMBER</b>		
18.79	Construction of Brick masonry valve chamber with 20 cm thick wall in 1:6 C.M. with 12mm thick 1:4 Cement Plaster and base course 10 cm. thick in M-15. Inside Dimensions 110x80x100cm M-20 RCC chamber cover size 130x100cmx120cm including cost of materials, labour etc.complete.	No.	6323



**CHAPTER- XIX**  
**GENERAL MISCELLANEOUS**

## **CHAPTER – XIX**

### **GENERAL MISCELLANEOUS**

#### **NOTES:**

1. The rates include all tools and plants, chain, pulley blocks, other appliances etc. required for execution of the works.
2. The works to be executed in accordance with the I.S.Specifications, General specifications in vogue in P.H.E. Department and the special notes if any covered under the N.I.T. of the work.
3. Rates for items of cutting and making good roads etc. include lead for the materials and reconstruction by appropriate compaction equipment and methods as per relevant IS Codes.
4. 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 for 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.
5. During the course of execution, it sometimes becomes necessary to provide a non-standard special to fit into the pipeline. This can be made out of steel plates.
6. All materials shall conform to relevant ISS.
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 than 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. 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.
9. 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 reused. No Permanent pavements 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.

10. All construction material, and all tools and temporary structures shall be removed from the site as directed by the Engineer in charge. All dirt, rubbish and excess earth from 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.
11. **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### GENERAL MISCELLANEOUS

S. No.	Items	Unit	Rates in Rs.
19.1	Labour for cutting following cast iron pipes of any type and class.		
	80 mm dia.	Per Cut	49
	100 mm dia.	Per Cut	66
	150 mm dia.	Per Cut	123
	200 mm dia.	Per Cut	165
	250 mm dia.	Per Cut	204
	300 mm dia.	Per Cut	245
	350 mm dia.	Per Cut	285
	400 mm dia.	Per Cut	325
	450 mm dia.	Per Cut	365
	500 mm dia.	Per Cut	407
	600 mm dia.	Per Cut	483
	700 mm dia.	Per Cut	523
	750 mm dia.	Per Cut	562
	800 mm dia.	Per Cut	603
	900 mm dia.	Per Cut	644
19.2	Labour for cutting following Asbestos Cement Pressure Pipes of any type and class.		
	80 mm dia.	Per Cut	24
	100 mm dia.	Per Cut	34
	150 mm dia.	Per Cut	62
	200 mm dia.	Per Cut	82
	250 mm dia.	Per Cut	102

S. No.	Items	Unit	Rates in Rs.
	300 mm dia.	Per Cut	113
	350 mm dia.	Per Cut	130
19.3	Labour for cutting following P. V. C. Pipes of any type and class.		
	80 mm dia.	Per Cut	12
	100 mm dia.	Per Cut	16
	150 mm dia.	Per Cut	31
	200 mm dia.	Per Cut	42
19.4	Labour only for cutting following Ductile Iron pipes of any type and class.		
	80 mm dia.	Per Cut	43
	100 mm dia.	Per Cut	58
	150 mm dia.	Per Cut	108
	200 mm dia.	Per Cut	144
	250 mm dia.	Per Cut	180
	300 mm dia.	Per Cut	216
	350 mm dia.	Per Cut	250
	400 mm dia.	Per Cut	286
	450 mm dia.	Per Cut	321
	500 mm dia.	Per Cut	358
	600 mm dia.	Per Cut	425
	700 mm dia.	Per Cut	460
	750 mm dia.	Per Cut	495
	800 mm dia.	Per Cut	531
	900 mm dia.	Per Cut	566
19.5	Labour for cutting following Galvanised Iron (MS) Pipes of any type and class.		0
	15 mm dia.	Per Cut	4
	20 mm dia.	Per Cut	7
	25 mm dia.	Per Cut	10
	32 mm dia.	Per Cut	15
	40 mm dia.	Per Cut	20
	50 mm dia.	Per Cut	24
	65 mm dia.	Per Cut	29
	80 mm dia.	Per Cut	38
	100 mm dia.	Per Cut	40
	125 mm dia.	Per Cut	46
	150 mm dia.	Per Cut	51
19.6	Chamfering of CI/DI pipes of all types and classes to make suitable for tyton joints.		
	Up to 150 mm dia.	Each End	865

S. No.	Items	Unit	Rates in Rs.		
	200 mm dia.	Each End	1077		
	250 mm dia.	Each End	1187		
	300 mm dia.	Each End	1348		
	400 mm dia.	Each End	1618		
	450 mm dia.	Each End	1759		
	500 mm dia.	Each End	1888		
	600 mm dia.	Each End	2158		
	700 mm dia.	Each End	2427		
	750 mm dia.	Each End	2697		
	800 mm dia.	Each End	2967		
	900 mm dia.	Each End	3236		
	1000 mm dia.	Each End	3201		
19.7	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 60mtrs.		<b>Class LA</b>	<b>Class A</b>	<b>Class B</b>
	80 mm dia.	R.Mtr.	9	10	11
	100 mm dia.	R.Mtr.	11	12	13
	125 mm dia.	R.Mtr.	15	16	17
	150 mm dia.	R.Mtr.	18	20	22
	200 mm dia.	R.Mtr.	27	29	32
	250 mm dia.	R.Mtr.	37	40	43
	300 mm dia.	R.Mtr.	48	52	55
	350 mm dia.	R.Mtr.	60	65	69
	400 mm dia.	R.Mtr.	73	80	85
	450 mm dia.	R.Mtr.	88	98	103
	500 mm dia.	R.Mtr.	104	113	120
	600 mm dia.	R.Mtr.	138	152	160
	700 mm dia.	R.Mtr.	178	194	206
	750 mm dia.	R.Mtr.	198	217	232

S. No.	Items	Unit	Rates in Rs.		
	800 mm dia	R.Mtr.	280	307	335
	900 mm dia	R.Mtr.	341	375	410
	1000 mm dia.	R.Mtr.	410	451	491
19.8	Unloading from railway wagon, pipes and machinery				
(a)	Pipes upto 500 mm dia and machinery below 1.00 tonne	Tonne	458		
(b)	Pipes 500 mm dia and above heavy Machinery weighing more than one tonne require use of crane etc.	Tonne	2074		
19.9	Stacking of pipe and machinery at station Yard.	Tonne	590		
19.10	Carriage of Material by Mechanical transport including loading unloading & stacking etc.				
19.10.1	Lime, Alum., Bleaching Powder	Distance	Per	Rates in Rs.	
	1. Distance	1 Km.	Cum	92	
	2. Distance	2 km	Cum	105	
	3. Distance	3 km	Cum	118	
	4. Distance	4 km	Cum	130	
	5. Distance	5 km	Cum	142	
	6. Beyond 5km upto 10km. add per km		Cum	10	
	7. Beyond 10km upto 20km add per km		Cum	8	
	8. Beyond 20km. add per km.		Cum	7	
19.10.2	Earth & Moorum		Cum		
	1. Distance	1 km	Cum	115	
	2. Distance	2 km	Cum	131	
	3. Distance	3 km	Cum	147	
	4. Distance	4 km	Cum	163	
	5. Distance	5 km	Cum	178	
	6. Beyond 5km upto 10km. add per km		Cum	12	
	7. Beyond 10km upto 20km add per km		Cum	10	
	8. Beyond 20km. add per km.		Cum	8	
19.10.3 (a)	G.I.,C.I.,ACP Pipes below 100mm dia and other heavy material and machinery		Cum		
	1. Distance	1 km	Per Tonne	81	
	2. Distance	2 km	Per Tonne	94	
	3. Distance	3 km	Per Tonne	105	
	4. Distance	4 km	Per Tonne	116	
	5. Distance	5 km	Per Tonne	126	
	6. Beyond 5km upto 10km. add per km		Per Tonne	9	

S. No.	Items	Unit	Rates in Rs.	
	7. Beyond 10km upto 20km add per km		Per Tonne	7
	8. Beyond 20km. add per additional		Per Tonne	6
19.10.3 (b)	<b>PVC pipes- 90,110,140,160,180,200 mm dia pipes</b>			
	1. Distance	1 km	Per Tonne	207
	2. Distance	2 km	Per Tonne	235
	3. Distance	3 km	Per Tonne	264
	4. Distance	4 km	Per Tonne	290
	5. Distance	5 km	Per Tonne	317
	7. Beyond 5km upto 10km add per km		Per Tonne	23
	7. Beyond 10km upto 20km add per km		Per Tonne	19
	8. Beyond 20 km. add per additional		Per Tonne	16
19.10.4	<b>Steel ( All types)</b>			
	1. Distance	1 km	Per Tonne	81
	2. Distance	2 km	Per Tonne	94
	3. Distance	3 km	Per Tonne	105
	4. Distance	4 km	Per Tonne	116
	5. Distance	5 km	Per Tonne	126
	6. Beyond 5km upto 10km. add per km		Per Tonne	9
	7. Beyond 10km. upto 20km. add per km.		Per Tonne	7
	8. Beyond 20km. add per additional km.		Per Tonne	6
19.10.5	<b>R.C.C., Pipes, Steel Pipes, ACP pipes, CI &amp; DI Pipes</b>			
19.10.5.1	<b>100,150,200,250,&amp;300 mm dia</b>			
	1. Distance	1 Km.	Per Tonne	187
	2. Distance	2 km	Per Tonne	213
	3. Distance	3 km	Per Tonne	237
	4. Distance	4 km	Per Tonne	260
	5. Distance	5 km	Per Tonne	284
	6. Beyond 5km upto 10km. Add per km		Per Tonne	20
	7. Beyond 10km. upto 20km. add per km.		Per Tonne	17
	8. Beyond 20km. add per additional km.		Per Tonne	13
19.10.5.2	<b>350,100,450,&amp; 500 mm dia</b>			
	1. Distance	1 Km.	Per Tonne	1249
	2. Distance	2 km	Per Tonne	1414
	3. Distance	3 km	Per Tonne	1579
	4. Distance	4 km	Per Tonne	1737
	5. Distance	5 km	Per Tonne	1890

S. No.	Items	Unit	Rates in Rs.	
	6. Beyond 5km upto 10km. add per km		Per Tonne	137
	7. Beyond 10km. upto 20km. add per km.		Per Tonne	112
	8. Beyond 20km. add per additional km		Per Tonne	92
19.10.5.3	<b>600,700,750,800&amp;900mm dia</b>			
	1. Distance	1 Km.	Per Tonne	3122
	2. Distance	2 km	Per Tonne	3536
	3. Distance	3 km	Per Tonne	3947
	4. Distance	4 km	Per Tonne	4341
	5. Distance	5 km	Per Tonne	4725
	6. Beyond 5km upto 10km. add per km		Per Tonne	342
	7. Beyond 10km. upto 20km. add per km.		Per Tonne	281
	8. Beyond 20km. add per additional km.		Per Tonne	228
19.10.5.4	<b>1000,1100, and 1200 mm dia</b>			
	1. Distance	1 Km.	Per Tonne	6242
	2. Distance	2 km	Per Tonne	6800
	3. Distance	3 km	Per Tonne	7893
	4. Distance	4 km	Per Tonne	8682
	5. Distance	5 km	Per Tonne	9449
	6. Beyond 5km upto 10km. add per km		Per Tonne	684
	7. Beyond 10km. upto 20km. add per km.		Per Tonne	560
	8. Beyond 20km. add per additional km.		Per Tonne	456
19.11	Providing and installation of automatic water level indicator for supervisory control cum auto on/off of motor pump assembly inclusive of control panel ,500 mtr long 2 core ,4 pair cable for small rural water supply scheme, having source within 500mtr as per approved specification and as directed by Engineer in charge.(In case of lesser length of cable,equivalent amount @ Rs 12 /-per meter of short length will be deducted from above rate)	1 Job		18302



S. No.	Items	Unit	Rates in Rs.	
19.12	Providing and installation of automatic water level indicator for supervisory control cum auto on/off panel of motor pump assembly, using GSM module based water level controller and accessories for small water supply scheme, having source more than 500mtr but within 10 Kms as per approved specification and as directedby Engineer in charge.	1 Job		25420
19.13	Providing and 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 color manufactured from compounded PE 80/ PE-100 virgin polymer and compatible with PE80/PE 100 pipes, in pressure rating SDR 11 withminPN 12.5 rated for water application with electro fusion tapping ferrule saddle, 90x15mm and providing and supplying blue 20mm dia PN-16 MDPE pipes 5-10 mtr confirming to IS 4427:1996 Manufactured from virgin resin PE 80 food grade compounded Raw Material having Blue color only with quality assurance certificate from quality agencies like WRC/ CIPET (India) / DVGW/ KIWA/ SPGNetc. 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 i/c cost of 15mm dia UPVC pipe socket, Elbow, Union 20x15 mm dia PVC reducer and providing and stainless steel water tap with grouting of vertical pipe as per requirement as per approved specification and as directed by Engineer incharge.	No.		2013

S. No.	Items	Unit	Rates in Rs.	
19.14	House hold connection with 15mm S.S. tap including earth work in excavaton for pipe trench in all kinds of soil & W.B.M. in areas with demolishing cement concrete road and reconstruction of same good with providing and fixing 15mm G.M./ brass ferrule 90x15mm MS/ PVC Clamp in main line 15mm dia PVC pipe heavy class from main pipe line to house of consumer up to 5 to 10 meter long as per site condition PVC specials such as 15mm PVC sockets elbows, union with all other work pertaining to it job completed, as per approved specification and as directedbyEngineer incharge	1 Job		1647
19.15	House hold connection with 15mm S.S. tap including earth work in excavaton for pipe trench in all kinds of soil & W.B.M. in areas with demolishing cement concrete road and reconstruction of same good with providing and fixing 15mm G.M./ brass ferrule 90x15mm MS/ PVC Clamp in main line, 15mm dia G.I. pipe from main pipe line to house of consumer up to 5 to 10 meter long as per site condition i/c specials such as G.I. Bends, elbows, tees,union etc. with all other work pertaining to job completed, as per approved specificationand as directed by Engineer incharge	Job		1830
	<b>RECTANGULAR CONCRETE BLOCK PAVEMENT</b>			
19.16	Manufacturing, laying of cement concrete blocks of cement Concrete (C.C.) M30 grade and spreading 25mm thick sand under neath and filling joints with sand on existing baseincludingtesting.			
(i)	Concrete M30 grade for block, (0.600x0.450x0.200) with	Sqm		1292
	(Concrete M30 for edge block, (0.300x0.300x0.300))			

S. No.	Items	Unit	Rates in Rs.	
(ii)	Concrete M30 grade for block, (0.450x0.300x0.150) with	Sqm		1094
	(Concrete M30 for edge block, (0.300x0.300x0.300))			
	<b>INTERLOCKING CONCRETE BLOCK PAVEMENT</b>			
19.17 (i)	Providing and Laying of Interlocking Concrete Block Pavements having thickness 80 mm over bedding sand conforming to table 1500.6 shall be uniformly laid to a compacted thickness of 30mm complete including testing.	Sqm		506
(ii)	Providing and Laying of Interlocking Concrete Block Pavements having thickness 60 mm over bedding sand conforming to table 1500.6 shall be uniformly laid to a compacted thickness of 25mm complete.	Sqm		438
19.18	Supply & erection of readymade mini pump house (control panel box) GI sheet of 18 gauge of size 90cmx90cm x60cm with 40x40x5mm angle Iron frame to fix it 200mm below ground level with hold fasts grouted in foundation and 300mm above ground level for clearance suitable for fixing of control panel, fuse unit, main switch etc. as per approved specification.	Each		13727
19.19	Provision for Jointing of TW to Rising Main with cost of Material/ specials such as GI Union / CI Flange, GI Reducer UPVC MTA FTA etc. as per	Job		2745
	requirement of site i/c cost of labour etc. complete as per approved specification and as directed by Engineer in charge.			
19.20	Provision for jointing of Rising main to sump well/OHT and OHT to Distribution pipe line with cost of material/specials such as Bends, MTA as per requirement of site i/c cost of labour with excavation, labour as per requirement complete as per approved specification and as directed by Engineer in charge.	Job		4576

S. No.	Items	Unit	Rates in Rs.	
19.21	Providing and Installation of automatic water level controller (Auto switch off) with accessories i/c labour and material etc. complete, as per approved specification and directed by Engineer in charge.	Job		7321
19.22	Provision for inter connection of old to new pipe line with excavation of trench as per requirement/ repairing of leakage of pipe line of any diameter & type of pipe line in muddy area i/c searching of leakage point, dewetering the trench, repairing the leakage laying & jointing of pipe and specials, back filling the trench i/c testing of joints cost of labour & specials such as D-joints couplers, solvent cement etc. complete Job work as per approved specification and as directed by Engineer in charge.			
	50mm dia	Job		1373
	90mm dia	Job		1830
	110mm dia	Job		2288
19.23	Provision for inter connection of old to new pipe line with excavation of trench as per requirement of any diameter & type of pipe line in muddy area i/c dewetering the trench laying & jointing of pipe and specials, back filling the trench i/c testing of joints cost of labour & specials such as D-Joints couplers, solvent cement etc, complete job work as per approved specification and as directed by Engineer in charge.			
	50/90mm dia	Job		1601
	90/110 mm dia	Job		2059
	110/110mm dia	Job		2288
	90/90 mm dia	Job		1830

S. No.	Items	Unit	Rates in Rs.	
19.24	Supply of Woltman Turbine Bulk meter class b, multijet, magnetically coupled as per specifications conforming to IS 770/1994, ISO 4064/1 and EEC approved, including transportation to site, storage, safety, installation, testing commissioning, making connection with existing pipeline having total measuring capacity of 10,000 Kilolitre with least count of one Kilolitre including excavation at site, dewatering and reinstating the same after completion and as per specifications including all taxes.	Job		13727
19.25	Provision for Rewinding of submersible Motor of any diameter i/c cost of material, labour, transportation etc. complete in case of breakdown maintenance as per approved specification and as directed by Engineer in charge.	Job		4576
19.26	Provision for Repairing of submersible pump of any diameter i/c cost of material, labour, transportation etc. in case of breakdown maintenance as per approved specification and as directed by Engineer in charge	Job		2288
19.27	Provision for Repairing of Starter/control panel i/c cost of material, labour, transportation etc. complete as per approved specification and as directed by Engineer in charge	Job		1098
19.28	Provision for Repairing of old existing CI Sluice Valve i/c repairing of spindle, check nut, changing of gland, lathe work as per requirement, changing of nut bolt, rubber sheet etc. complete as per approved specification and as directed by Engineer in charge.	Job		1271
	<b>BOUNDARY PILLAR</b>			
19.29	Reinforced cement concrete M15 grade boundary pillars/local stone of standard design, fixed in position including finishing and lettering but excluding painting .	Each		478

S. No.	Items	Unit	Rates in Rs.	
	<b>G.I.BARBED WIRE FENCING 1.2 M. HIGH</b>			
19.30	Providing and fixing 1.2 m high GI barbed wire fencing with 1.8 m RCC posts 150 mm x 150 mm placed every 3 m centre-to-centre founded in M15 grade cement concrete, 0.6 m below ground level, every 15th post, last but one end post and corner post shall be struttred on both sides and end post on one side only and provided with 9 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with GI staples, turn buckles etc. omplete.	R.M.		363
	<b>G.I. BARBED WIRE FENCING 1.8 M. HIGH</b>			
19.31	Providing and fixing 1.8 m high GI barbed wire fencing with 2.4 m RCC M15 grade 150 mm x 150 mm concrete post placed every 3 m centre-to-centre founded in M15 grade cementconcrete, 0.6 m below ground level, every 15th post, last but one end post and corner post shall be struttred on both sides and end post on one side only and provided with 12 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with GI staples, turn buckles etc. complete.	R.M.		511
	<b>SIGN BOARD</b>			
19.32	Providing and fixing of typicalinformatory sign board. Three MS Plates of 1.6 mm thick, top and middle plate duly welded with MS flat iron 25mm x 5m size on back on edges. The lower plate will be welded with MS angle iron frame of 25mm x 25mm x 5mm. The angle iron frame of the lower most plate and flat iron frame of middle plate will be welded to 2 nos. 75mm x 75 mm of 12 SWG sheet tubesposts duly embedded in cement concreteM-	Job		12676

S. No.	Items	Unit	Rates in Rs.	
	15 grade blocks of 450mm x 450mm x 600mm, 600mm below ground level. The top most diamond plate will be welded to middle plate by 47mm x 47mm of 12 SWG steel platetube. All M.S. will be stove enameled on both sides. Lettering and printing arrows, border etc. will be painted with readymixed synthetic enamel paint of superior quality in required shade and colour. All sections of framed posts and steel tube will be painted with primer and two coats of epoxy paint complete.			
19.33	Construction of cement concrete information board in CC 1:2.5:5 (M15) with skin reinforcement of 8 mm dia HYSD bars @ 300 mm C/C both ways size including excavation, base concrete (M-15), priming, painting two coats synthetic enamel paint on new concrete surface including painting-fingring Logo and Slogen including writing of all information about the project etc. complete. As directed by the Engineer in charge.	Job		9306
19.34	Providing and fixing of typical information board made of 75mm square or 75mm dia. circular steel tube of 12 SWG 3.2 m high and cross member 2 Nos. 1m long, fixed with Angle iron 50 x 50 x 5 mm MS angle on the back side 2Nos vertical and 4 Nos horizontal. It is mounted by 2 plates of 1.6mm thick and size 900 x 750 mm, the pipe shall be erracted on 600 x 600 x 750 mm foundation blocks at appropriate depth made of cement concrete 1:2:4, painted by standard color with lettering, border, heading and logo etc. using sinthetic enamel paint of superior quality including welding, excavation, concreting, painting of base, border and lettering, painting and other required details etc complete as directed by Engineer-in-charge.	Job		17322

## **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.

### **13 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.

13. Polyethylene compounds shall Conform to IS 7328 as follows:

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

### **14. 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.

15. 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 :-

- The interior layer of polyethylene
- The adhesive layer
- Aluminium tube
- The adhesive layer
- The external layer of polyethylene



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

S No.	Nominal Pipe Size mm	Nominal Aluminium Thickness 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

#### 16. MARKING

- The marking shall be repeated at intervals of 1 m and shall consist of the following information:
  - a) Manufacturer's name and trade-mark,
- Two labels of suitable dimensions should be carefully attached to each coil indicating:
  - b) suppliers name;
  - c) BIS Certification Marking
- Each pipe may also be marked with the Standard Mark.

#### 17. The jointing of the pipe to ensure a leak proof joint :

- Cut the pipe square by cutter to the required and proper length.
- Select the fitting to be used and dismantle its nuts and split rings.
- Place the nut and split ring over the pipe
- 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.
- Push the split ring and nut towards connector till split ring touches the support groove.
- Tighten the nut over connector with spanner.

#### 18. 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.

#### 19. 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 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.

- 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.

## 20. Rates

- The rates include charges pipes/specials/civil works (like digging of trenches, refilling of trenches), 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.
- **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount**

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

Sr. No.	Particulars of Item	Unit	Rate in Rs
19.35	Providing and constructing one 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 1.5mx1.5m with side curb and bucket rest of 80 mm dia. 160mm dia PVC pipe central post duly filled therein with C.C. 1:2:4, 2.2m long, 15 mm dia medium G.I. pipe. From point of tapping to stand post additional 1620 (20 mm dia) composite pipe 6.0 m long. Providing and fixing of 15 mm dia, one steel water tap, one flow control valve SS, 5 LPM complete together with all labour and material charges as per drawing and as directed by Engineer-in-charge when good foundation is available. Rate includes draining arrangement by excavating open gutters complete	Each	6969

Sr. No.	Particulars of Item	Unit	Rate in Rs
19.36	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 with stand temperature up to 80 <sup>0</sup> C including all specials and fittings of composite material (engineering plastic. gland and brass insert wherever required) e.g. elbws, tees. reducers, couplers and connectors wiith clamp at 1m spacing. This includes testing of joints complete as per the directions of engineer- in-charge (Exposed on wall).		
19.36.1	1216 ( 16 mm OD ) Pipe	RM	149
19.36.2	1620( 20mm OD ) Pipe	RM	180
19.36.3	2025( 25mm OD ) Pipe	RM	235
19.36.4	2532( 32 mm OD ) Pipe	RM	345
19.36.5	3240(40mm OD ) Pipe	RM	451
19.36.6	4050(50 mm OD ) Pipe	RM	657
19.37	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 with stand temperature up to 80 <sup>0</sup> C including all specials and fittings of composite material (engineering plastic. gland and brass insert wherever required) e.g. elbws, tees. reducers, couplers and connectors wiith clamp at 1m spacing. This includes testing of joints complete as per the directions of engineer- in-charge (Concealed work including cutting chases& making good the wall etc )		
19.37.1	1216 ( 16 mm OD ) Pipe	RM	210
19.37.2	1620( 20mm OD ) Pipe	RM	260
19.37.3	2025( 25mm OD ) Pipe	RM	335

<b>Sr. No.</b>	<b>Particulars of Item</b>	<b>Unit</b>	<b>Rate in Rs</b>
19.37.4	2532( 32 mm OD ) Pipe	RM	467
19.37.5	3240(40mm OD ) Pipe	RM	600
19.37.6	4050(50 mm OD ) Pipe	RM	868
19.38	Providing and fixing Polyethylene-Aluminum-Polyethylene (PE-AL-PE) Composite Pressure pipes Conforming to IS: 15450-2004 U.V. Stablshed with carbon black having thermal stability for hot & cold water supply, capable to with stand temperature up to 80 <sup>0</sup> C including all specials and fittiings of composite material (engineering plastic. gland and brass insert wherever required) e.g. elbws, tees. reducers, couplers and connectors wiith clamp at 1m spacing. This includes testing of joints complete as per the directions of engineer- in-charge (External work)		
19.38.1	1216 ( 16 mm OD ) Pipe	RM	137
19.38.2	1620( 20mm OD ) Pipe	RM	175
19.38.3	2025( 25mm OD ) Pipe	RM	218
19.38.4	2532( 32 mm OD ) Pipe	RM	316
19.38.5	3240(40mm OD ) Pipe	RM	408
19.38.6	4050(50 mm OD ) Pipe	RM	599
19.39	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.)		
19.39.1	5063 (63 mm OD) Pipe	RM	617
19.39.2	6375 (75 mm OD) Pipe	RM	804
19.39.3	7590 (90 mm OD) Pipe	RM	1067
19.39.4	90110 (110 mm OD) Pipe	RM	1115

<b>Sr. No.</b>	<b>Particulars of Item</b>	<b>Unit</b>	<b>Rate in Rs</b>
19.40	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).		
19.40.1	<b>Equal Tee</b>		
19.40.1.1	5063	Each	1408
19.40.1.2	6375	Each	1619
19.40.1.3	7590	Each	1882
19.40.1.4	90110	Each	1975
19.40.2	<b>Reducing Tee</b>		
19.40.2.1	6375 x with all branches	Each	1580
19.40.2.2	7590 x with all branches	Each	2228
19.40.3	<b>Equal Elbow</b>		
19.40.3.1	5063	Each	625
19.40.3.2	6375	Each	1355
19.40.3.3	7590	Each	1758
19.40.3.4	90110	Each	2056
19.40.4	<b>Male Thread Connector</b>		
19.40.4.1	5063 x 63 mm thread	Each	174
19.40.4.2	6375 x 75 mm thread	Each	404
19.40.4.3	7590 x 90 mm thread	Each	524
19.40.4.4	90110 x 110 mm thread	Each	732
19.40.5	<b>Straight Couplers</b>		
19.40.5.1	5063	Each	640
19.40.5.2	6375	Each	770
19.40.5.3	7590	Each	1152
19.40.5.4	90110	Each	1563
19.40.6	<b>Reducers</b>		
19.40.6.1	7590 x with all sizes	Each	1124
19.40.6.2	90110 x with all sizes	Each	1506
19.40.6.3	<b>FLOW CONTROL VALVE</b>		
19.41	Flow control valve threaded with SS-304 outward fitting in accordance with BS EN 120201 Part-3, suitable for drinking water supply 5 lpm, 10 lpm and 15 lpm capacity.	Each	402

**PART (B)**

**INTAKEWELL,  
WATER TREATMENT PLANTS,  
ELEVATED SERVICE RESERVOIR,  
GROUND SERVICE RESERVOIRS,  
WATER METRES,  
ANCILLARY ITEMS,  
MIISCELLANESOUS ITEMS  
AND  
OUTDOOR TRANSFORMERS**

## **CHAPTER- XX**

### **INTAKE WELL WORKS**

## CHAPTER - XX

### INTAKE WELL WORKS

#### **General Note:**

1     **Scope**

2     The Specification covers the requirements for Survey, structural design & Construction of Intake Well.

3     **Intake Well:-**

It 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.

4     **Selection for Intake Site :**

While taking a decision regarding the location of the intake site, the following points should be kept in view:-

- 4.1   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.
- 4.2   The location should provide the most suitable quality of water available.
- 4.3   The site should have firm strata for good foundations.
- 4.4   The site should avoid the existence of currents that may endanger the safety of the structure or deposit silt against or on it.
- 4.5   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
- 4.6   The distance from where the power is available should be considered.
- 4.7   The distance of pumping station from the proposed site of intake also deserves consideration.
- 4.8   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.

5.    **Surveys needed for intake well :-**

Following surveys shall have to be conducted for preparation of detailed drawings & designing of intake well

- 5.1   River gauging
- 5.2   Geological and soil investigation
- 5.3   Cross sectional survey
- 5.4   Contour survey of the area



- 5.5 Hydrological survey of the source
- 5.6 Catchment area survey (the catchment area of the source should be located on the map)
- 5.7 Fixing of maximum HFL etc
- 5.8 Sanitary survey.
  - 5.8.1 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
  - 5.8.2 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.
- 5.9 Measurement of flow.
  - 5.9.1 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.
- 6. **Measurement:**
  - 6.1 All the measurement shall be recorded under the relevant item of the work.
  - 6.2 Generally the work of survey, design & construction of intake well is awarded on turnkey basis and payment is made on lump-sum basis as per payment schedule given in the tender.
- 7. **Rates**
  - 7.1 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.

## INTAKEWELL WORKS

Sr. No.	Item Description	Unit	Rate (in Rs.)
20.1	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	694
	<b>Note :</b> 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 measurements 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/ semipervious 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.		
20.2	Providing and fabricating at work shop, carting to site of work, including transport, loading, unloading, hoisting, lowering and setting out at actual site of well, sinking 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 200x 12 mm thick M. S. plate with 12 nos. of 20 mm dia. crurshank headed bolts (gusset plates 14mm from bottom so that 15mm side should be in contact with cutting edge with overlap of 300 mm joints. 16 mm dia bar should be	Kg	86

Sr. No.	Item Description	Unit	Rate (in Rs.)
	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.		
20.3	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	Cum	144
	Above 3.0 m to 6.0 m depth	Cum	165
	Above 6 m depth	Cum	201
20.4	Providing and filling puddle (selected good impervious clay) in Kolhapur type weirs in proper layers of 15 cm including watering, ramming and compaction, etc. complete with all leads and lifts.	Cum	278
20.5	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	876
20.6	Providing, and fixing 80 mm dia A.C./ P.V.C. pipe weep holes at 1.5 M c/c staggered including cost of all materials and labour involved with all leads and lifts etc. complete with all leads and lifts.	Rmt	193
20.7	Providing and fixing M.S. chaquered plate flooring of following thickness supported on M.S.angles (25 x 25 x 5 mm size) including welding, cutting and fabricating the plate to the required square or rounding shape, making holes in the plate, including providing and applying 3 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge.		
	6 mmthick	Sqm	3706
	8 mmthick	Sqm	4698

Sr. No.	Item Description	Unit	Rate (in Rs.)
20.8	Providing at site of works ISI standard RCC slotted pipes of NP-3 class including cost of all central and local taxes, octroi, inspection, transportation, etc. complete including cost of RCC collar, etc.complete.		
	450 mmdia	RM	3848
	600 mmdia	RM	5985
20.9	Lowering, laying and jointing RCC slotted pipes of following diameters including all leads and lifts, cost of jointing material, labour, etc. complete as directed by Engineer-in-charge.		
	450 mmdia	RM	216
	600 mmdia	RM	287
20.10	Lowering, laying and jointing CI 'B' class connecting mains with rubber gaskets including transportation of pipes from store to site of works, cost of jointing materials, cost of rubber gasket with all leads and lifts, etc. complete.		
	300 mm dia	RM	296
	350 mm dia	RM	361
	400 mm dia	RM	439
	450 mm dia	RM	464
	500 mm dia	RM	494
	600 mm dia	RM	689
	700 mm dia	RM	903
	750 mm dia	RM	1023
20.11	Providing, lowering, laying and placing in position, shrouding 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.		

Sr. No.	Item Description	Unit	Rate (in Rs.)
	40 mm pebbles	Cu.m	1493
	12 mm to 20 mm pebbles	Cu.m	1807
	6 mm to 12 mm pebbles	Cu.m	2059
	Coarse Sand (from river sand at site)	Cu.m	900
	Fine Sand (from river sand at site)	Cu.m	1000
20.12	Providing and fixing in position C.I./M.S. steps or 22 mm dia. MS bar steps with proper anchorage, etc. and providing and applying 3 coats of ant-corrosive paint, etc complete as directed by Engineer-in-charge.	No.	454
20.13	Providing and fixing M.S. sluice gates 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	106
20.14	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	79
20.15	Providing and spreading around the well 1 mm thick polyethylene sheet complete as directed by Engineer-in-charge.	Sq.m	24
20.16	Dewatering charges for estimation purpose for head works in river basin or dam		
	Approach channel	RM	5723
	Intake well of 3 M dia	No	76330
	Inspection well of 2 M dia	No	49149
	Connecting main	RM	4587
	Jack well of 6 M dia	No.	228977
	Approach Bridge	RM	771
	<b>Notes:-</b> (i) The Contractor at his request may be allowed to start construction of masonry steining so as not to allow silting of well in coming monsoon and while paying masonry 25% amount shall be withheld and released only when excavation to the full depth is completed.		

Sr. No.	Item Description	Unit	Rate (in Rs.)
	<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 shall be as under:-  25% for last 1 M depth.  20%for2Mdepthwhichjustabovelast1M depth.  15%for2Mdepthwhichjustabovelast 3M depth.  15%fortherestofdepthfromwatertablelevel</p> <p>(iii)The provisions made for dewatering inthetender being on lump-sum basis, the same shallhave to be reduced/ increased proportionatelyas the length of approach channel, connectingmain or approach bridge reduces/ increasesduring actual execution. Condition No. 1 and 2 shall appear in Tender document.</p>		
20.17	<p>Carrying out recuperation / Yield test for ascertaining 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 upto full depth rise is recorded. The normal water level / subsoil 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, overload, labours etc. complete as directed.</p> <p>The test shall be carried out as per technical circular No. 2597 dt. 20.11.1997 and shall be carried out for 7days.</p>		
	<p>a) Lps more than25000  b) Lps less than25000</p>	<p>Day  Day</p>	<p>2591  1865</p>
20.18	<p>Providing and laying HDPE Geo-membrane sheet of following thickness 100% acid, alkali proof, 100% rain forced sealing quality, every joints electronically welded, as per relevant IS specification &amp; placing in proper position on prepared bed on foundation/ embankment with</p>		

Sr. No.	Item Description	Unit	Rate (in Rs.)
	welding the joints of sheet using hot sedge and extrusion welding techniques according to the liner manufacturers specifications at ambienttemperatures of 5 <sup>0</sup> C to 45 <sup>0</sup> C including all taxes & labour for jointing and placing etc. complete.		
	500 micron	Per Sqm.	259
	250 micron	Per Sqm.	179
20.19	Providing and fixing in position copper lighteningconductor including copper rod of 20 mm dia as perupper terminal 1.5 M long with a knob at end andwith conical spike at top, copper tape conductor 20x 3 mm size, copper earth plate of 3 mm thick and0.81 sqm. in area, clamps at 1 M centre to centreincluding, necessary excavation, laying and fixingthe conductor, providing and fixing 40 mm G.I pipeupto 3 M height from ground and 0.5 M belowground including making all connections, filling theearthing pit with charcoal, salt, etc. and refilling andwatering, etc. complete as per specifications laiddown in relevent I.S. codes.		
	(i) For Tape of 10M length	No	11250
	(i) Rebate / Extra rate per metre length or part thereof	Mtr	294
20.20	Providing and applying outside weather coats and inside epoxy paint ofapproved make (as desired by Engineer-in-charge) to concrete surface of Intake well /other structure includingcleaning the surfaceby 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. code:		
	a) For new surfaces - Twocoats.	Sq.m	640
	b) For old surfaces - Twocoats.	Sq.m	721

Sr. No.	Item Description	Unit	Rate (in Rs.)
20.21	<p>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 &amp; 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:-</p> <p>(i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.</p> <p>(ii) Architectural/ Structural drawing having following items :-</p> <p>(a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, Intake well, and different small element relevant to complete item of Intake well.</p> <p>(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.</p>	Job	5 % Estimated cost
20.22	<p>Provision of (i) Gantry crane for lifting of machineries, single girder hand operated, circular travelling gantry of capacity minimum 5 T, operational at motor floor, and (ii) Mud pump for removal of deposited sludge from bottom floor . The cost of these items shall be included under mechanical and electrical works.</p>	Job	5 % of estimated cost.



**CHAPTER- XXI**

**WATER TREATMENT**

**PLANTS**

## CHAPTER-XXI

### WATER TREATMENT PLANT

#### 1. CONVENTIONAL WTP

- 1.1 Designing(aesthetically),providingandconstructingand commissioning conventionalWater Treatment Plant consisting of all Civil,works including cost of Providing and applyingEpoxy paint to inside surface of water retainingstructures in contact with chlorine and providinganti - termite treatment to entire structure belowGround level, ceramic tiles for flooring, Acrylicemulsion with silicon additives paint from outside, stainless steel railing, Mechanical and Electrical components of various sub-works asgiven below: including necessary hydraulictesting, structural testing equipment testing, trialrun for a period of 3 months, etc. complete asdirected by Engineer-in-charge (turn-key job).
- 1.2 **Aeration Fountain:**  
Plan area not less than 1.25 square meter per MLD
- 1.3 **Ventury Flume:**  
With necessary devices, consisting of simple mechanical indicator. (Pedestal type gauge)
- 1.4 **Flash Mixer:**  
Rapid mixing device, detention time 60 seconds to give velocity gradient 300 to 400 sec-1 vane mixer type confirming to I.S. 7090 of 1985.
- 1.5 **Flocculator:**  
Confirming to I.S. 7208 of 1974 (Type-C) withdetention period of 30 minutes.
- 1.6 **Clarifier:**  
Horizontal flow circular tank, detention period 2-5hours, overflow rate 30 cubic metre per squaremetre per day (to be specified), Weir loading notmore than 300 cubic metre per metre per day, withmechanical sludge scraper conforming to I.S. No.10313 -1982 with necessary inlet arrangements.
- 1.7 **Rapid Sand Filters and Filter House**  
Filter designed for filtration rate of 4800 litersper square metre per hour for normal run and itshall not exceed 6000 liters per square metre perhour when one bed is undermaintenance,minimum 2 beds for plant upto 10 MLD, for larger plants as specified, filters to be located in filter house with

roof slab, pipe gallery and platform minimum 5.5 metre in width with constant rate filtration or declining rate filtration. All valve shall be glandless.

- 1.7.1 **Filter Sand :** Effective size 0.45 to 0.70 mm, uniformity coefficient not more than 1.7, nor less than 1.3, depth of water over sand 0.75 M, free board 50 cm, gravel 0.45 M in depth, sand and gravel conforming to I.S. 849 (i)-77, back wash by air wash, standard appurtenances
- 1.7.2 **Wash Water Tank**  
Capacity to be specified and suitable to supply water to wash specified number of filter beds at a time 12 minutes @ 600 lit/sqm/min under a head of 12m at under drain.
- 1.7.3 **Wash WaterPumps**  
Capacity to fill water tank in 1 hour with 100 % standby.
- 1.7.4 **Air Blowers**  
Capable of delivering 600 LMP per square metre of free air, of filter area at 0.4 kg/square cm at the underdrains (100% stand by) for period of 5 min. Air blowers shall be adopted for WTP having capacity more than 3 mld only. Below 3 mld capacity, Air blowers shall not be adopted.
- 1.8 **Chemical House in Two Storied**
  - 1.8.1 Ground floor to accommodate 7 days alum requirement and sundry storage (Minimum 4 m height)
  - 1.8.2 First floor to accommodate alum and lime tanks. Chain pulley block etc. (min. 5 mheight) shall be provided.
- 1.9 **Solutiontanks**  
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 0.30 M, trays for dissolving, level indicator, mechanical agitation devices, solution feed and drain lines, solution feed device (constant head device,strength of solution upto 10% only) conforming to I.S. 9222part-I/1979.
- 1.10 **Pure Water Sump and Pump House**
  - 1.11 **Capacity of sump**  
One hour of designed flow.
  - 1.12 **Pump House**

Pump house of required size over the sump or by the side.

**1.13 Store House**

Suitable for alum storage of three months and 7 days temporary storage, 7 days TCL requirement in monsoon with 20 % extra capacity for other sundry articles.

**1.14 Vacuum feed type chlorinators**

1.14.1 Make to be approved by PHED CG.  
Confirming to I.S. 10533 - A Part-II 1983.

1.14.2 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		Tonner Container
	(45 Kg)	(67 Kg)	
10	6.35	9.50	110
15	10.75	16.10	130
20	14.50	21.54	254
27 and above	18.70	28.12	315

1.14.3 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 4 containers to a manifold.

**1.15 Chlorinator Equipment and Container room**

- Handling, storage and safety shall confirm to I.S. 10553 Part - I 1983.
- 100% Standby shall be provided.
- 100 kg chlorine cylinder for capacity upto 5 mld and chlorine tonner for capacity above 5 mld.

**1.16 By pass arrangements:**

- By passing all units of T.P.
- By passing flash mixer, clariflocculator.
- By passing flash mixer, clariflocculator & filter units
- Only CI pipes shall be provided in above by passing arrangements.

**1.17 Disposal of waste/sludge from WTP:**

Safe disposal arrangement shall be provided. This provision shall be comprised of RCC NP-2 pipe of minimum 250mm dia with manholes at an interval of 30m C/C. The manholes shall be of RCC chamber with RCC cover. The waste water/sludge disposal arrangements upto length of 100m is included in the Para 19.4- Notes (under item No. 8) and it should be safely disposed to nearby nallah.

- 1.18      **Recycling of Waste Water Arrangement**
  - WTP of capacity 5 MLD and above, it is mandatory to provide backwash water recycle arrangements which includes sump, pumping machinery, rising main etc.complete.
  - However, provision of the same may also be made in the WTP of lower capacity.
  - The cost of recycling arrangement is not included in the cost of WTP.
- 1.19      **Electrical installation.**  
Both internal and external including entire plant area.
- 1.20      **Laboratory equipment.**  
As per requirement (As per provisions made in the CPHEEO Manual-1999–duly amended)
- 1.20      **Sanitary blocks.**  
Carpet area-15 square metre minimum upto 25Mld and 25 square metre above 25 Mld.
- 1.21      **Administrative block and internal road:**  
To accommodate office room. chlorine room,laboratory room, panel board room, blower roometc. and WBM road to connect all units frommain gate of plot.
- 1.22      **Rates**  
Rates givenbelow are inclusive of uplift pressure if any and dewatering during entire work. These rates are applicable for seismic zones-2,3 and 4.
- 1.23      **RCC Structures**  
All RCC structures shall be constructed in M-30
- 1.24      **Overloading Capacity:**  
Allpipesandconduitschannelwith25%overloading capacity.All the structural steel work / fabrications are tobe provided with application of Hot Dip Zinccoatingaccording      tospecificationsasperIS: 4759:1996 (Reaffirmed 2006)
- 1.25      All the treatment units e.g. Cascade aerator, Flash mixture, Clariflocculator,

Filtration units should be connected with walkway of 1.2 m wide suitably have provision of 25 mm dia. GI (medium class) railings and railing post.

1.26 **Notes:**

1.26.1 All the conditions from 19.1.1 to 19.1.21 shall form a part and partial of the tender document and must be incorporated in the draft NIT of conventional WTP.

1.26.2 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

#### 1.27 **Rates for Conventional Treatment Plants**

Sr. No.	Capacity in Mld	Unit	Rate (Rs in Lakhs)	
21.1.1	Cost of 1 MLD Treatment Plant	Job		57.69
21.1.2	Add for capacity above 1 MLD upto 5MLD	Per MLD	32.58	
21.1.3	Cost of 5 MLD Treatment Plant	Job		188.01
21.1.4	Add for capacity above 5 MLD upto 10 MLD	Per MLD	28.23	
21.1.5	Cost of 10 MLD Treatment Plant	Job		329.17
21.1.6	Add for capacity above 10 MLD upto 20 MLD	Per MLD	19.76	
21.1.7	Cost of 20 MLD Treatment Plant	Job		526.80
21.1.8	Add for capacity above 20 MLD upto 50 MLD	Per MLD	16.80	
21.1.9	Cost of 50 MLD Treatment Plant	Job		1030.88
21.1.10	Add for capacity above 50 MLD upto 100 MLD	Per MLD	14.28	
21.1.11	Cost of 100 MLD Treatment Plant	Job		1744.77
21.1.12	Add for capacity above 100 MLD	Per MLD	8.42	
21.1.13	Cost of 150 MLD Treatment Plant	Job		2165.77

## 2. UNCONVENTIONAL WTP

- .2.1 Designing (structurally & aesthetically), providing and constructing high rate Unconventional Water Treatment Plant i.e. Simplified Water Treatment Plants consisting of Civil Works, Electrical and Mechanical Works as static mixture, flocculation tank, lamella clarifier with facility of sludge recirculation, multi-grade filter with best quality filter charging materials including all fittings like valve and other special fittings, filter feed pumps, clarified water tank, treated water sump well with pump house, chemical dosing pumps and chemical mixing system for alum, lime & polymer with administrative cum laboratory building, chemical house cum dosing system room, foundations, MCC panel, cabling, laboratory items and applying epoxy paint to inside & outside surface of WTP, necessary testing and free trial run for 03 Months etc. complete as directed by Engineer-in-charge .
- 2.2 NaOCl dosing in feed water line which works as an oxidizing agent and a very effective disinfection also and kills the toxic microbes and bacteria in the **water**. This does not allow algae formation in clarifier zone. Also, **aeration** takes place when the water leaves top of each place through a pair of circular openings in the adjustable weir plate located along each side of the clarifier.
- 2.3 There is an inlet pipe provided with chemical dosing pumps, dosing tanks and chemical mixing systems for Alum, Lime, Polymer & Sodium Hypochloride.
- 2.4 **Static Mixer** in the inlet piping.
- 2.5 **Flocculator Tank**- Designing and fabricating of M.S. SMFT tank of capacity 20 minutes of designed flow with slow speed agitator, motor and fan. A static mixer cum flocculation tank is provided and water to be treated is fed to the bottom of the flash mix compartment where it is intimately mixed. In this compartment, formation of flocs continues and flocculation is complete. Water containing the floc, passed into the lamella clarifier.
- 2.6 **Lamella Clarifier** - Designing, fabricating and construct the lamella clarifier with removable FRP plates consists of inclined overlapping plates, which are arranged to form a separate sedimentation chamber or the cells between each pair of adjacent plates. The overlapping additive projected area of several plates is a factor of increased surface settling area proportion to the number of plates used.
- 2.6.1 The inlet flow is divided and enters the tower part of each sedimentation cell from its two opposite sides. As the water is displaced upward in smooth, gently flow, the suspended solids coalesce to form precipitates

which settle in the chambers on the lower portion of each lamella plate. Influent water flows upwards over the plates. The deposited precipitates increase in size until they slide or roll down the inclined surface of the plates. This is then collected in the hopper provided at the bottom of the separator.

- 2.7            **Clarified Water Storage Tank** of capacity equal to 12 minutes of designed quantity of filtered water in an hour is provided to feed water to multi-grade pressure sand filter with the help of pumps on ground level.
- 2.8            **Clarified Water Filter Feed pumps** with 100% standby and canopy.
- 2.9            **Multigrade Pressure Sand Filter** - The clarified water, which comes out from the Lamella Clarifier, will enter Multigrade Pressure Sand Filter with the help of pump to remove the suspended solids. This is the special type of filter developed that offers coarse as well as deep bed filtration and it can operate on very high specific velocity. There are two grades of sand in the filter, which increase the porosity of the filtering media. Once the pressure drop across the filter bed becomes  $1 \text{ Kg/cm}^2$  back washing of the filter media is to be carried out. During backwash the specific velocity is higher so that the dirt particles that have been accumulated in the filter bed can be taken out from the filter. MS pressure sand filter is installed in open area.
- 2.10          **Treated Water Tank** (sump) capacity equal to 1 hour pumping capacity of WTP.
- 2.11          **Treated water pump house.**
  - Two electronic dosing pumps are provided for lime solution preparation tank with agitator and a day tank in inlet line.
  - Two electronic dosing pumps are provided for alum solution preparation tank with agitator and a day tank in inlet line.
  - Two electronic dosing pumps are provided for polymer solution preparation tank with agitator and a day tank in inlet line.
  - Four electronic dosing pumps are provided for sodium hypochloride for pre-treatment and post treatment.
  - Recirculation arrangement in clarifier to static mixture cum flocculator for sludge recirculation.
  - Drainage arrangements.
  - Flow meter at the inlet line of system and flow control valve.
  - MCC panel and cabling works for motors, agitators, dosing systems, power cabling & earthing.
  - External and internal electrification.
- 2.12          **Laboratory equipments:**
  - Chlorine test kit, pH digital meter, turbidity digital meter, jar test.



- Chemical house cum dosing system room.
- Office cum lab room.
- Sanitary block with necessary water supply and drainage arrangement.
- All equipments and civil work including office cum lab, chemical house, clarified water tank, treated water tank, pump house and all foundations.

2.13 All RCC structures shall be constructed in M-30.

2.14 **Rates:**

2.14.1 These rates are applicable for seismic zones 2,3 and 4

2.14.2 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

2.15 **Rates for Un-Conventional Treatment Plants**

Sr. No.	Capacity in MLD	Unit	Rate (Rs in Lakhs)	
21.2.1	Fixed cost for 1 MLD	Job		61.97
21.2.2	Add for capacity above 1 MLD upto 2 MLD	Per MLD	27.89	
21.2.3	Cost of 2 MLD Treatment Plant	Job		89.86
21.2.4	Add for capacity above 2 MLD upto 5 MLD	Per MLD	23.71	
21.2.5	Cost of 5 MLD Treatment Plant	Job		160.99
21.2.6	Add for capacity above 5 MLD	Per MLD	20.14	
21.2.7	Cost of 10 MLD Treatment Plant	Job		261.69
21.2.8	Add for capacity above 10 MLD	Per MLD	17.13	

### 3. PACKAGE WATER TREATMENT PLANT

3.1 Designing (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.

3.2 Prefabricated Package Water Treatment Plant comprising following:-

- 3.3 **Rapid mixing channel** in M.S. sheets and M.S. baffle.
- 3.4 **Flocculator** not less than 10 minutes detention, in M.S. prefabricated box, flocculation being achieved either by glass pebbles of graded size or PVC tetrapod or equivalent arrangement to ensure good floc formation.
- 3.5 **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.
- 3.6 **Rapid sand gravity filter** in M. S. prefabricated box with filter sand not less than 500 mm thick, supported on false floor below with polypropylene nozzles spaced at not more than 500 mm centres in either direction
- 3.7 **Backwashing, inlet facilities** only shall be provided. Department shall provide either ESR giving 8 to 10 M head at filter nozzles or backwash pump, having flow rate of 0.6 Cum per minute per square metre of filter bed. (Limit upto 5.0 M. from W.T.P. face)
- 3.8 **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.
- 3.9 **Bypass in the form of pipes or M.S. channels:** included in the design, effecting bypass of such new tank and filter individually or both. (Limit upto 5.0 M. from W.T.P. face) The entire
- 3.10 **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 not be less than 6 mm
- 3.11 **Alum dosing and mixing arrangements** 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 of 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 (5 mm thick) inside and epoxy paint two coats with one coat of primer on outside.
- 3.12 **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.
- 3.13 **Flow ratings** to conform following parameters: Velocities in channels not to exceed 0.6 M./Second. Velocities in filter outlet pipes and valves not to exceed 1 M./Second. Velocities in interconnecting pipe and controls not to exceed 1 M./Second. Backwash with air Not required.
- 3.14 **Backwash with water:** Not less than 0.6 M./Sqm. of filter bed area in filter box.
- 3.15 Free board for all units not less than 300 mm
- 3.16 Depending upon the capacity required for the scheme, one of the above capacity should be considered
- 3.17 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

### 3.18 Rates for Un-Conventional Treatment Plants

Sr. No.	Capacity in Mld	Unit	Rate (Rs in Lakhs)
21.3.1	21 Cum / Hr. (0.50 MLD)	Each	29.67
21.3.2	34 Cum / Hr. (0.80 MLD)	Each	36.42
21.3.3	42 Cum / Hr. (1.00 MLD)	Each	40.89
21.3.4	63 Cum / Hr. (1.50 MLD)	Each	51.39
21.3.5	83 Cum / Hr. (2.00 MLD)	Each	60.78
21.3.6	125 Cum / Hr. (3.00 MLD)	Each	78.37

#### 4.

##### **Note:**

The rates computed in the analysis of water treatment plant and sewage treatment plant do not include the cost of (i) Out sourcing for consultancy (ii) detailed survey, (iii) soil investigation, (iv) detailed hydraulic, (v) structural designing, (vi) Lab articles, glass wares and equipments, (vii) other specifically required articles to construct the plants. (viii) disposal of sludge up to nearest natural drainage system (ix) external development like external and internal electrification, (x) cost of chemicals, man powers etc during trial run of 3 months, and (xi) cost of O & M for subsequent another 9 months, (xii) If required, suitable provision for PLC-SCADA system may

also be included. Since, the above said charges has to be either owned by the agency or by the department therefore, it is necessary to include cost of these charges in the preparation of estimate. The tentative provisions for above said items may be considered as under:-

<b>Sr. No.</b>	<b>Description of items</b>	<b>Unit</b>	<b>Upto 5 MLD</b>	<b>Above 5 and upto10 MLD</b>	<b>Above 10 and up to25 MLD</b>
1	Out sourcing for consultancy	LS	0.30%	0.20%	0.10%
2	Detailed survey,	LS	0.30%	0.20%	0.10%
3	Soil investigation,	LS	0.30%	0.20%	0.10%
4	Detailed hydraulic design	LS	0.60%	0.40%	0.20%
5	Structural designing,	LS	0.90%	0.60%	0.30%
6	Lab articles, glass wares and equipments,	LS	3.00%	2.00%	1.00%
7	Other specifically required articles to construct the plants.	LS	0.30%	0.20%	0.10%
8	Disposal of sludge up to nearest natural drainage system	LS	4.50%	2.50%	1.50%
9	External development like external and internal electrification,	LS	1.50%	1.00%	0.50%
10	Cost of chemicals, man powers etc. during trial run of 3 months,	LS	1.50%	1.00%	0.50%
11	Cost of O &M for subsequent another 9 months,	LS	6.00%	3.20%	2.00%
12	If required, suitable provision for PLC-SCADA	LS	4.50%	3.00%	1.50%

**CHAPTER- XXII**

**SEWAGE TREATMENT**

**PLANTS**

## CHAPTER-XXII

### SEWAGE TREATMENT PLANT

#### **General Notes:-**

#### **1.0 SEWAGE TREATMENT PLANT**

- 1.1 Designing (aesthetically), providing, and constructing and giving satisfactory trials of **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.
- 1.2 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

#### **1.3 Rates for Sewage Treatment Plants**

<b>Sr. No.</b>	<b>Capacity in MLD</b>	<b>Unit</b>	<b>Rate (Rs in Lakhs)</b>	
22.1.1	Per MLD cost and upto 10 MLD	Per MLD	58.99	
22.1.2	Cost of 10 MLD Plant	Job		589.90
22.1.3	Add for capacity above 10 MLD upto 20 MLD	Per MLD	51.61	
22.1.4	Cost of 20 MLD Plant	Job		1106.05
22.1.5	Add for capacity above 20 MLD	Per MLD	44.24	

#### **2.0 MODERNISED SEWAGE TREATMENT PLANT**

- 2.1 Designing (Aesthetically) Providing and constructing, hydraulic testing commissioning and giving satisfactory trials of modernised sewage treatment plant consisting of inlet chamber, screen chamber, Detritus tanks, Parshall flume, primary settling tanks, Aeration tanks, Secondary settling tanks, Sludge Sump and Pump House ,Sludge Thickner, Primary digester , Secondary digester, SST Sump and Pump house, Chlorine contact tank, Chlorinators, Chlorinator room, sump cum blending tank, 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 turnkey 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 etc. complete.

**2.2 Inlet Chamber:**

Designing, providing and constructing R.C.C. (M:30) Inlet chamber designed for the peak flow 2 DWF including necessary excavation in all types of 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

**2.3 Screen Chambers:**

Designing, providing and constructing and testing commissioning screen chamber, designed for average 1 DWF & 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 1.2M wide with G.I. Pipe railing. RCC stair case of 1.2 m width from G.L. to screen chamber.

**2.4 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 0.30 m, 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.

**2.5 Parshall Flume:**

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 0.3m per second to Distribution Box (DB-1)

The unit shall be provided with walkway & RCC staircase having width of 1.20 m 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 a standby of float operated ROF meter. All arrangements as per specifications.

2.6

#### **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 1.20m wide clear peripheral and approach walkway interconnecting C.I. double flanged pipes from feed chamber of the clarifier distribution well grouting wherever necessary, including foundation etc. as per specifications water depth at outer side shall be minimum 3.0 meters, weir loading shall not be greater than 125 cum DMF for average flow Bottom slope shall be 1:12

The floor of clarifier shall have 40 mm thick (min.) screed course of cement grout of mix in 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 8 mm thick, anti-corrosive 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 device, scum chamber, connecting channel from PST outlet chamber to DB-2 as per detailed specifications.

2.7

#### **Aeration Tank:**

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 1.20m wide clear peripheral and approach walk ways, expansion joints wherever necessary, including foundation etc. as per specifications. Peak factor shall be 2, F/M ratio shall be 0.40, low speed aerator speed between 20 to 100 RPM recirculation flow @ 50% and free board 0.60 m Depth, (SWD) 3.50 m minimum D.O. level at A.T. 2 Mg/Lit, MLVSS concentration shall be 2500 Mg/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 20 mg/lit with input to aerator 0.15 to 0.30 Kwh/1000 cum. of Aeration tank. All related works shall be as per detailed specifications.

2.8

#### **Secondary Settling Tanks with Equipments:**

Designing, providing & 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 & SS from the secondary clarifier shall not be more than 20 Mg/lit and 30 mg/lit respectively. It should be hydraulically tested, bottom floor slope of 1:12 and free board of 0.60 m minimum Dispersion box shall be made of Mild Steel plate not less than 8 mm 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 completed with end drive half rotating bridge, structural steel rake, over flow weir, walkway diffuser, over load alarms, having push buttons, 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%, slorotating sludge scrapper mechanism fitted with squeezes including providing and making necessary arrangement to connect the flow to outlet chamber (DB-4) then the gravity mains for final diaposal and as per detailed specifications and obligatory provision. All other arrangements shall be as per detailed specifications

#### 2.9 **Sludge Thickner with Equipments**

Designing providing and constructing water tight of Sludge Thickner (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 1.20 m width G.I. pipe railing interconnecting CI pipes all complete as per specifications Detention time 24 hours. SWD shall be 4.25 metre with necessary fixed bridge scraper arrangement as per detailed specifications and necessary inlet and outlet arrangement. All other arrangement as per detailed specifications.

#### 2.10 **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-300, domes in stucutural concrete including providing burners and civil works for gas collection, grouting wherever necessary etc. complete as per specifications. It should be designed for min 90 C and max. 450C. and minimum detention time of 30 days, water depth shall not be more than 8.5m free board shall be 0.6m with inlet and outlet arrangement of D.I. flanged pipes including giving hydraulic testing and air tightness testing. The item includes providing works for collecting Gas and Gasburner as per specification.

#### 2.11 **Secondary Digester with equipment (Fixed cover)**

Designing, providing and constructing including foudation unit of watertight and gastight 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 specifications and obligatory provision All other arrangements as per detailed specifications.

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

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

**2.13 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% coliform reduction. Chlorine dose shall be maintained as per standard provisions including provisions including designing, providing and constructing water supply arrangement for chlorination, including providing dewatering and by-pass arrangements jointing to final effluent main and outlet weir etc complete. The effluent quality should match with the standards laid down by Maharashtra Water pollution Control Board and as per the obligatory provision and detailed specifications and as directed by Engineer-in-charge.

**2.14 Chlorinator and Chlorinator Room/ Tonner Room:**

Designing, providing and constructing chlorinators vacuum type 2 Nos each having capacity of 10 Kg/Hr as per obligatory provisions and detailed specifications with necessary provision of chlorinator room having floor area not less than 30 Sqmt.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 (PartII) 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 arrangements 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 specifications.

**2.15 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 center as per detailed specifications and obligatory requirements.

- 2.16      **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 D.I. piping etc. complete as per detailed specifications.
- 2.17      **Sludge Centrifuge Room with Centrifuges:**  
Designing, providing 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 specifications. Sludge centrifuge with all necessary arrangements as per detailed specifications mentioned in Volume -II and Volume -III of tender and obligatory provisions, be provided with satisfactory functioning.
- 2.18      **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-300 having appropriate diameter as per detailed specifications and obligatory provisions. The floating dome shall be of 8mm thick M.S. Plate minimum and shall be provided with two coats of anticorrosive epoxy coating from both faces.
- 2.19      **Outfall Sewer:**  
Designing providing and constructing appropriate Outfall Sewer of R.C.C. NP-2 pipe, to discharge treated effluent, untreated effluent from outlet chamber (after secondary clarifier) to the local nallah 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 nallah bed level, pitching and energy dissipation chamber in the nallah portion etc. complete.
- 2.20      **Piping work in D.I.- including Sluice Valve, Reflux Valve, M. S. Gate:**  
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 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 specifications.
- 2.21      All the structural steel work / fabrications are to be provided with application of Hot Dip Zinc coating according to specifications as per IS 4759 :1996 (Reaffirmed 2006)
- 2.22      **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-250 framed structure B. B. masonry (II-Class in C. M. 1:6) 20 mm cement plaster in C. M. 1:3 inside and outside painting. Aluminum 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 unit but should have complete control of every unit as per Laboratory Equipment, beautification, telephone and intercom arrangement and Wireless system etc. complete.

2.23 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

2.24 **Rate for Primary and secondary treatment-with digesters, sludge drying beds etc. complete:**

Sr. No.	Capacity of Plant	Unit	Rate (Rs in Lakhs)	
22.2.1	Upto 10 MLD	MLD	70.79	
22.2.2	Cost of 10 MLD Plant	Job	707.90	707.90
22.2.3	Add for capacity above 10 MLD upto 20 MLD	MLD	61.94	
22.2.4	Cost of 20 MLD Plant	Job	1327.30	1327.30
22.2.5	Add for capacity above 20 MLD	MLD	53.09	

### 3. **Note:**

The rates computed in the analysis of water treatment plant and sewage treatment plant do not include the cost of (i) Out sourcing for consultancy (ii) detailed survey, (iii) soil investigation, (iv) detailed hydraulic, (v) structural designing, (vi) Lab articles, glass wares and equipments, (vii) other specifically required articles to construct the plants. (viii) disposal of sludge up to nearest natural drainage system (ix) external development like external and internal electrification, (x) cost of chemicals, man powers etc during trial run of 3 months, and (xi) cost of O & M for subsequent another 9 months, (xii) If required, suitable provision for PLC-SCADA system may also be included. Since, the above said charges has to be either owned by the agency

or by the department therefore, it is necessary to include cost of these charges in the preparation of estimate. The tentative provisions for above said items may be considered as under:-

<b>Sr. No.</b>	<b>Description of items</b>	<b>Unit</b>	<b>Upto 5 MLD</b>	<b>Above 5 and up to 10 MLD</b>	<b>Above 10 and up to 25 MLD</b>
1	Out sourcing for consultancy	LS	0.30%	0.20%	0.10%
2	Detailed survey,	LS	0.30%	0.20%	0.10%
3	Soil investigation,	LS	0.30%	0.20%	0.10%
4	Detailed hydraulic design	LS	0.60%	0.40%	0.20%
5	Structural designing,	LS	0.90%	0.60%	0.30%
6	Lab articles, glass wares and equipments,	LS	3.00%	2.00%	1.00%
7	Other specifically required articles to construct the plants.	LS	0.30%	0.20%	0.10%
8	Disposal of sludge up to nearest natural drainage system	LS	4.50%	2.50%	1.50%
9	External development like external and internal electrification,	LS	1.50%	1.00%	0.50%
10	Cost of chemicals, man powers etc. during trial run of 3 months,	LS	1.50%	1.00%	0.50%
11	Cost of O &M for subsequent another 9 months,	LS	6.00%	3.20%	2.00%
12	If required, suitable provision for PLC-SCADA	LS	4.50%	3.00%	1.50%

## **CHAPTER- XXIII**

### **R.C.C. ELEVATED SERVICE RESERVOIRS**

## CHAPTER-XXIII

### R.C.C. ELEVATED SERVICE RESERVOIR

#### 1 SCOPE OF WORK

2 The Specification covers guidelines for layout for overhead water tanks and  
Criteria for analysis for RCC staging both for steel and concrete tanks.

#### 3 **Applicable Codes**

- IS: 11682 -1985 (Reaffirmed in 1991): Specification for Criteria for Design of RCC
- IS: 3370 (Part I, II and 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
- Earth work shall be done as per IS 1200 (Part-1) : 1992
- Excavation shall be done as per IS 3764: 1999
- Concrete work shall be done as per IS: 456-2000

#### 4 **Cement:-**

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

- 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.
- 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.
- 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.

#### 5 **Sand:-**

- 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.
- Sand should be free from clay, dust or silt. The permissible limit for the same is 5% by weight.
- Sand should be free from organic impurities as determined is in accordance with IS : 2386 (Part-II)

- For plaster sand used should Conform to IS : 1542/1960
- For masonry work sand used should Conform to is : 166/1965
- Other I.S. Codes not specifically mentioned here but pertaining to the use of Electrically Welded Steel pipes shall form part of these Specifications.

6

#### **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.

7

#### **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.
- 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.
- The staging height of 12 mtr. has been considered for the computation of the rates of ESR

8

#### **Shape and Size:-**

Generally the shape and size of elevated concrete tanks for economical design depends upon the functional requirements such as : (i) Maximum depth for water, and (ii) Height of staging.

9

#### **Water Depth:-**

Water depth in tank shall be difference of level between lowest supply level and full supply level of the tank.

10

#### **Seismic Forces:-**

- When seismic loading is considered, following two cases may be considered: (i) Tank Empty and (ii) Tank full condition.
- The seismic force acting on the support for the tank and its analysis shall be in accordance with IS : 1893 – 1975

11

Allowable bearing capacity of foundation strata and type of suitable foundation depends on (i) Capacity of tank, and (ii) Other site conditions.

12

#### **Measurement:-**

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

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 for separately.



- 14                    **REINFORCED CEMENT CONCRETE ELEVATED SERVICE RESERVOIRS**
- 14.1                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 Aluminum Ladder, C.I. manhole frame and covers water level indicators, lightening conductor, G.I. pipe railing around walk way and top slab, providing RCC staircase from ground level to balcony level along with columns and from balcony level roof top level along with container wall, M.S. grill gate of 2 mtr. height with locking arrangement of approved design RCC chambers for all valves, ventilating shafts, providing and applying three coats of weather coat paints 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.
- 14.2                The cost may change as per site condition looking to the uplift and type of strata.
- 14.3                The design of the structure be in accordance with relevant (I.S. 3370 - 1965 or revised)
- 14.4                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.
- 14.5                For design having more than 6 columns, provision of internal bracing is obligatory. External bracing is also obligatory.
- 14.6                The entire structure shall be in stage M-25, container M-30 mix only
- 14.7                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.

- 14.8 Irrespective of the type of foundation proposed in the design, one set of bracing be provided at the ground level.
- 14.9 These rates includes providing RCC staircase from ground level to balcony level along with columns and from balcony level roof top level along with container wall, including railings.
- 14.10 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.
- 14.11 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.
- 14.12 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.
- 14.13 **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 up to 5 m beyond outer face of outermost column.
- 14.14 For ESR C.I. (Horizontal cast spun) pipes with class A, pipes of required dia shall be provided and C.I. specials shall be used.
- 14.15 Below mentioned rates are for foundations, with individual footing with bearing capacity of 20 t/sqm. However, for raft foundations, these rates shall be increased by:-  
 (i) 10 % where safe bearing capacity (SBC) is less than or up to 5 t./sqm,  
 (ii) 7.5 % where SBC is more that 5 t/sqm and up to 10 t/sqm,  
 (iii) 5 % where SBC is more than 10 t/sqm. and up to 15 t/sqm,  
 (iv) 2.5 % where SBC is more than 15 t/sqm and less than 20 t/sqm.  
 This 10 % to 2.5% is applicable for estimation of amount of ESR
- 14.16 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.

14.17 **The rates are applicable for staging height of 12 m.** These rates shall be increased or decreased for per metre variation in this staging height as below:-

- (i) Less than 12 m to 10 m staging -minus 2% per metre
- (ii) More than 12 m to 15 m staging - 2 % per metre
- (iii) More than 15 m to 20 m staging - 3 % per metre
- (iv) More than 20 m staging - 4 % per metre

14.18 Following rates are for seismic Zone – III. For Zone IV, these rates shall be increased by 5%. Concerned Executive Engineer shall confirm 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.)

14.19 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

14.20 **Rate for Elevated Service Reservoirs up to 12m staging**

S.No.	Capacity in Litres	Unit	For Seismic Zone-III Rate (in Rs.)
23.1	Upto 25000 lit	Litre	26.12
<b>23.2</b>	<b>Cost of 25000 lit capacity</b>	<b>Job</b>	<b>653054</b>
23.3	Add for capacity above 25000 to 50000 lit	Litre	13.83
<b>23.4</b>	<b>Cost of 50000 lit capacity</b>	<b>Job</b>	<b>998902</b>
23.5	Add for capacity above 50000 to 75000 lit	Litre	10.38
<b>23.6</b>	<b>Cost of 75000 lit capacity</b>	<b>Job</b>	<b>1258286</b>
23.7	Add for capacity above 75000 to 100000lit	Litre	9.22
<b>23.8</b>	<b>Cost of 100000 lit capacity</b>	<b>Job</b>	<b>1488851</b>
23.9	Add for capacity above 100000 to 150000lit	Litre	8.07
<b>23.10</b>	<b>Cost of 150000 lit capacity</b>	<b>Job</b>	<b>1892340</b>
23.11	Add for capacity above 150000 to 200000lit	Litre	6.92
<b>23.12</b>	<b>Cost of 200000 lit capacity</b>	<b>Job</b>	<b>2238188</b>
23.13	Add for capacity above 200000 to 250000lit	Litre	5.76
<b>23.14</b>	<b>Cost of 250000 lit capacity</b>	<b>Job</b>	<b>2526394</b>
23.15	Add for capacity above 250000 to 300000lit	Litre	5.76

<b>23.16</b>	<b>Cost of 300000 lit capacity</b>	<b>Job</b>	<b>2814600</b>
23.17	Add for capacity above 300000 to 400000lit	Litre	5.76
<b>23.18</b>	<b>Cost of 400000 lit capacity</b>	<b>Job</b>	<b>3391012</b>
23.19	Add for capacity above 400000 to 500000lit	Litre	4.61
<b>23.20</b>	<b>Cost of 500000 lit capacity</b>	<b>Job</b>	<b>3852141</b>
23.21	Add for capacity above 500000 to 750000lit	Litre	4.61
<b>23.22</b>	<b>Cost of 750000 lit capacity</b>	<b>Job</b>	<b>5004966</b>
23.23	Add for capacity above 750000 to 1000000 lit	Litre	4.61
<b>23.24</b>	<b>Cost of 1000000 lit capacity</b>	<b>Job</b>	<b>6157790</b>
23.25	Add for capacity above 1000000 to 1500000 lit	Litre	4.61
<b>23.26</b>	<b>Cost of 1500000 lit capacity</b>	<b>Job</b>	<b>8463439</b>
23.27	Add for capacity above 1500000 to 2000000 lit	Litre	3.46
<b>23.28</b>	<b>Cost of 2000000 lit capacity</b>	<b>Job</b>	<b>10192675</b>

**CHAPTER- XXIV**

**GROUND SERVICE RESERVOIRS**

**AND**

**SUMP WELLS**

## CHAPTER-XXIV

### GROUND SERVICE RESERVOIRS AND SUMP WELLS

1        **SCOPE OF WORK**

2        The Specification covers guidelines for layout for Ground water tanks and  
Criteria for analysis for RCC, Steel and Concrete tanks.

3        **Applicable Codes:-**

- IS: 15472 -2004: Guidelines for planning and design of low level for evacuating storage reservoirs.
- IS: 5477 (Part I, II, III and IV)- Fixing the capacities of reservoirs.
- IS: 6939-1992 Methods for determination of evaporations from reservoirs.
- IS: 7323-1994 Operations of reservoirs –Guidelines.
- 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
- Earth work shall be done as per IS 1200 (Part-1) : 1992
- Excavation shall be done as per IS 3764: 1999
- Concrete work shall be done as per IS: 456-2000

4        **Cement:-**

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

- 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.
- 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.
- 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.

5        **Sand:-**

Fine aggregates shall be used as per IS standard given below:-

- 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.

- Sand should be free from clay, dust or silt. The permissible limit for the same is 5% by weight. All fine aggregates shall confirm to IS: 383.
- Sand should be free from organic impurities as determined is in accordance with IS : 2386 (Part-II)
- For plaster sand used should Conform to IS : 1542-1960
- For masonry work sand used should Conform to is : 166-1965
- Other I.S. Codes not specifically mentioned here but pertaining to the use of Electrically Welded Steel pipes shall form part of these Specifications.

6

**Coarse Aggregate:**

Coarse Aggregates shall be used as per IS standard given below:-

- 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.
- All coarse aggregate shall conform to IS: 383 and 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%.

7

**Mortar:**

- 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.

8

**Curing:**

- 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

9

**Capacity:**

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 upot 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.

10

**Shape and Size:-**

Generally the shape and size of Ground water concrete tanks for economical design depends upon the functional requirements such as: (i) Maximum depth for water, and (ii) submergence due to ground water table.

11

**Seismic Forces:-**

- When seismic loading is considered, following two cases may be considered: (i) Tank Empty and (ii) Tank full condition.
  - The seismic force acting on the support for the tank and its analysis shall be in accordance with IS: 1893 – 1975
- 11.1 Allowable bearing capacity of foundation strata and type of suitable foundation depends on (i) Capacity of tank, and (ii) Other site conditions.
- 12 **Measurement:-**  
All the measurement shall be recorded under the relevant item of the finished work.
- 13 **Location of Reservoir:-**  
It is decided on following considerations:-
- Location of reservoir in central point with respect to distribution area.
  - Location near the beginning of the system.
  - Location the reservoir site depends on the availability of land at suitable altitudes.
- 14 **Rates:-**
- 14.1 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.
- 14.2 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.
- 14.3 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
- 14.4 Following rates are for seismic Zone – III. For Zone IV, these rates shall be increased by 5%. Concerned Executive Engineer shall confirm 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 USOR)
- 14.5 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**



**Rate for Ground Service Reservoirs and Sump Wells are follows:-**

<b>S.No.</b>	<b>Capacity in Litres</b>	<b>Unit</b>	<b>For Seismic Zone-III Rate (in Rs.)</b>
24.1	Upto 25000 lit	Litre	13.84
<b>24.2</b>	<b>Cost of 25000 lit capacity</b>	<b>Job</b>	<b>346007</b>
24.3	Add for capacity above 25000 to 50000 lit	Litre	7.26
<b>24.4</b>	<b>Cost of 50000 lit capacity</b>	<b>Job</b>	<b>527552</b>
24.5	Add for capacity above 50000 to 75000 lit	Litre	6.42
<b>24.6</b>	<b>Cost of 75000 lit capacity</b>	<b>Job</b>	<b>688149</b>
24.7	Add for capacity above 75000 to 100000lit	Litre	6.14
<b>24.8</b>	<b>Cost of 100000 lit capacity</b>	<b>Job</b>	<b>841764</b>
24.9	Add for capacity above 100000 to 150000lit	Litre	5.70
<b>24.10</b>	<b>Cost of 150000 lit capacity</b>	<b>Job</b>	<b>1127026</b>
24.11	Add for capacity above 150000 to 200000lit	Litre	4.64
<b>24.12</b>	<b>Cost of 200000 lit capacity</b>	<b>Job</b>	<b>1358845</b>
24.13	Add for capacity above 200000 to 250000lit	Litre	4.02
<b>24.14</b>	<b>Cost of 250000 lit capacity</b>	<b>Job</b>	<b>159941</b>
24.15	Add for capacity above 250000 to 500000lit	Litre	3.45
<b>24.16</b>	<b>Cost of 500000 lit capacity</b>	<b>Job</b>	<b>2422441</b>
24.17	Add for capacity above 500000 to 1000000 lit	Litre	2.93
<b>24.18</b>	<b>Cost of 1000000 lit capacity</b>	<b>Job</b>	<b>3887441</b>
24.19	Add for capacity above 1000000 to 1500000 lit	Litre	2.57
<b>24.20</b>	<b>Cost of 1500000 lit capacity</b>	<b>Job</b>	<b>5172441</b>
24.21	Add for capacity above 1500000	Litre	1.96

## **CHAPTER- XXV**

### **WATER METER**

## CHAPTER – XXV

### WATER METER (MECHANICAL / ELECTROMAGNETIC)

#### Scope:

- 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. It should have following performance characteristics.
  - Rugged, light and intelligently conceived
  - Extra dry dial counter
  - Model with pulse output ex factory with pulse values 1/10/100/1000 l/imp
  - Approx 25% less weight than WVG brass bodies
  - Comprehensive manipulation protection by standard
  - 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:
  - Modular Design.
  - Flange connections to PN, DIN, ANSI, AWWA
  - Liner - Hard rubber/ Polyurethane
  - Precise calibration
  - Fully welded sensor housing complying to IP 67/ IP 68
  - Microprocessor base signal converter with self-diagnostic features, self-prompting Manor Driven configuration from front fascia.
  - High speed signal processing system
  - 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
(e)	Flange Rating	PN 40 - from Size 25mm to size 80 mm
		PN 16 - from Size 100mm to size 150 mm

(f)	Earthing	Grounding Rings in SS 304 (Gr Electrodes are not acceptable).
(g)	Marking	Direction of flow with arrow, size, Sr. No. make

7

### 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

8

### Rates

8.1

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

8.2

**This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. However, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

9

### Rates of Water Meter - (Mechanical / Electromagnetic)

Sr. No.	Description of items	Unit	Rates in Rs
25.1	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	1344
	20 mm	Each	2206
	25 mm	Each	4276
	40mm	Each	7762
25.2	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 structure:-		
	50mm	Each	10788
	65mm	Each	11450
	80mm	Each	13950
	100 mm	Each	17894
	125 mm	Each	23554
	150mm	Each	29213
	200 mm	Each	32894
	250 mm	Each	81776
	300 mm	Each	171065
	400mm	Each	256584
	500 mm	Each	302642
25.3	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 data logger measuring between every 2 pulses and having a 10 year battery life:-		
	25 mm	Each	221871
	40 mm	Each	223144
	50 mm	Each	223992
	65mm	Each	228150
	80mm	Each	228658
	100 mm	Each	241810
	125 mm	Each	245204
	150mm	Each	255385
	200mm	Each	276173
	250mm	Each	317322
	300mm	Each	400047
25.4	Supply of Dirt Box with S.S. Strainer as per specifications (Dia in mm)		
	50 mm	Each	3575
	65 mm	Each	4057
	80 mm	Each	5187
	100 mm	Each	6481
	125 mm	Each	10725
	150 mm	Each	14969
	200 mm	Each	20525

	250 mm	Each	33951
	300 mm	Each	49538
	400 mm	Each	82895
25.5	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: Micro- processor 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.		
	50mm	Each	116313
	65mm	Each	118649
	80mm	Each	123515
	100 mm	Each	137239
	150mm	Each	149990
	200 mm	Each	191746
	250 mm	Each	224742
	300 mm	Each	248685
	400 mm	Each	422230
	450 mm	Each	483355
	500 mm	Each	583900
	600 mm	Each	949775
	700 mm	Each	1245194
	900 mm	Each	1861896
	1000 mm	Each	2037652
	1200 mm	Each	2654354
	1400 mm	Each	3271055
	2000 mm	Each	4975635

**CHAPTER-XXVI**  
**ANCILLARY ITEMS**

## **CHAPTER-XXVI**

### **ANCILLARY ITEMS**

Notes:-

- 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 confirm 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:-**
  - Copper - Solid or flat copper strip of at least 98% conductivity conforming to relevant IS : specifications shall be used.
  - Aluminium - Aluminium 99% pure, and with sufficient mechanical strength, and protected against corrosion shall be used.
  - Aluminium should not be used underground, or in direct contact with walls.
  
- 5       **General requirement of Installation:-**
  - The entire lightning protective system should be mechanically strong to withstand the mechanical forces produced in the event of a lightning strike.
  - 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.
  - The lightning conductors shall be secured not more than 1.2m apart for horizontal run, and 1m for vertical run.
  
- 6       **Joints:-**
  - A lightning protective system should have as few joints as possible.
  - Joints should be mechanically and electrically effective, for example, clamped, screwed, bolted, crimped, riveted or welded.
  - With overlapping joints, the length of the overlap should not be less



than 20mm for all types of conductors.

- Contact surfaces should first be cleaned then inhibited from oxidation with a suitable non-corrosive compound.
- 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:-**

- Bonds have to join a variety of metallic part of different shape and composition and cannot therefore be of a standard form.
- 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.
- The bond must be mechanically and electrically effective, and protected from corrosion in, and erosion by the operating environment.
- 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:-**

.9.1

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.

9.2

**This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**

## CHAPTER-XXVI ANCILLARY ITEMS

Item No.	Items	Unit	Rate in Rs.
26.1	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, <b>copper tape conductor</b> 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.		
26.1.1	For Tape of 10M length	Each	10177
26.1.2	Rebate / Extra rate per metre length or part there of over and above initial length of 10M	Mtr.	347
26.2	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, <b>Aluminium tape conductor</b> 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		
26.2.1	For tape of 10 M length	Each	7954
26.2.2	Rebate / Extra rate per metre length or part thereof over and above initial length of 10M	Mtr.	125
26.3	Providing, hoisting and fixing in position	Each	1321

Item No.	Items	Unit	Rate in Rs.
	inverted “J” type 100 mm dia. C.I. Cowl type ventilators with mosquito proof 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		
26.4	Providing, hoisting and fixing in position C.I. manhole, frame and cover of best quality and of required size and shape with locking arrangements including applying 2 coats and anti-corrosive paint, etc. complete.		
26.4.1	90 x 60 cm size and weight 35 kg	Each	2938
26.5	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	3277
26.6	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.		
26.6.1	For new surfaces -Two coats	Sq.m	56
26.6.2	For old surfaces -Two coats	Sq.m	61
26.7	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	Rmt.	6759

Item No.	Items	Unit	Rate in Rs.
	foundation, its excavation, refilling and cleaning the site, the complete as per type design, with 3 coats of cement paint.		
26.8	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.		
26.8.1	0.9 M dia x 1.35 M height	Each	7251
26.8.2	1.2 M dia x 1.80 M height	Each	9217
26.8.3	1.5 M dia x 2.25 M height	Each	14747
<b>Electro Chlorination System</b>			
26.9	<p>Providing, erecting, commissioning and giving test &amp; 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 process and capable of providing 8 hrs storage of hypochlorite in case of power failure. The electro chlorinator shall comprise of following:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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.</li> <li>• Control panel for the electro chlorinator consisting of DC voltage and current display</li> </ul>		

Item No.	Items	Unit	Rate in Rs.
	income phase status unit on-off switches fuses etc. <ul style="list-style-type: none"> <li>• Dosing tank of suitable capacity made from PVC/FRP.</li> <li>• Dosing pumps of specials quality (1W+1S) suitable to handle hypo chlorite solution.</li> <li>• Entire chlorine solution pipeline shall be of PVC.</li> <li>• Chlorine test kit suitable to measure residual chlorine up to 5 ppm.</li> </ul>		
26.9.1	25 gms/hr	Each	280960
26.9.2	50 gms/hr	Each	342797
26.9.3	100 gms/hr	Each	454436
26.9.4	150 gms/hr	Each	499414
26.9.5	250 gms/hr	Each	702402
26.9.6	350 gms/hr	Each	847066
26.9.7	500 gms/hr	Each	1134004
26.9.8	750 gms/hr	Each	1454121
26.9.9	1000 gms/hr	Each	1828485
26.9.10	1500 gms/hr	Each	2404603
26.9.11	2000 gms/hr	Each	2824551
26.9.12	3000 gms/hr	Each	3902063
26.10	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. Instruction 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.		
26.10.1	For WTP upto 5 MLD	Each	119957

Item No.	Items	Unit	Rate in Rs.
26.10.2	Add / deduct per MLD or part	MLD	5998
26.11	Providing and fixing water level indicator upto 5 mtr ht. MS enable gauge plate 300mm 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	6911
26.12	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	5204
26.13	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	642
26.14	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 relevent I.S. codes.		
26.14.1	For new surfaces - Two coats.	Sqm.	247
26.14.2	For old surfaces - Two coats	Sqm.	264
26.15	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		
26.15.1	On steel work	Sqm.	116
26.15.2	On concrete work	Sqm.	118
26.16	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.	Sqm.	7

<b>Item No.</b>	<b>Items</b>	<b>Unit</b>	<b>Rate in Rs.</b>
	complete.		
26.17	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	54

**PART (C)**

**ELECTRICAL**  
**&**  
**MECHANICAL WORKS**



**PART (C)**

**ELECTRICAL**  
**&**  
**MECHANICAL WORKS**

**CHAPTER - XXVII**

**TECHNCAL NOTE FOR  
CONSTRUCTION OF TUBEWELL  
AND ALLIED WORKS**

## **CHAPTER- XXVII**

### **TECHNCALL NOTES**

#### **CONSTRUCTION OF TUBEWELL AND ALLIED WORKS**

- 27.1 The rates for various items of drilling works given in this unified schedule of rates are based on average rates for whole of the Madhya Pradesh State. The market rates may vary from place to place in the state depending upon the local conditions. No contract shall, therefore be awarded directly at the rates given in this unified schedule of rates without inviting tenders as perrules.
- 27.2 Tube wells drilled shall be perfectly vertical. The rates for drilling are inclusive of the verticality test required to be conducted. All the relevant Indian standards specifications of the B.I.S. shall also beapplicable.
- 27.3 For locating the proper site for tube well construction within the selected habitation, if resistivity survey is required then the resistivity survey shall be carried out by a well qualified and experienced geohydrologist using his own suitable resistivitymeter.
- 27.4 In the ordinary tube wells the casing pipe of specified diameter shall be lowered up to a minimum depth of 9 meters below ground level. If the collapsible strata in overburden continues beyond 9 meters depth then the casing pipe shall be lowered up to rock level and embedded in rock in adepth of 0.15 meter. The casing pipe shall also be extended above ground level in a height of about 0.3meter.
- 27.5 The diameter of ordinary tube wells constructed for installation of hand pumps shall be 125 mm up to bottom level of the casing pipe and 115 mm in the rock below the casing. Such tube wells shall be designated as 125/115 mm dia ordinary tubewells.
- 27.6 The ordinary tube wells constructed for installation of hand pumps in the basaltic rock area where intertrappean formation (collapsible strata between the rocks) is present. The nominal diameter of the tube well up to the level of intertrappean formation shall be 150 mm. The intertrappean formation shall be cased by 125 mm dia G.I. casing pipe. Therefore, the finished nominal diameter of tube well in the intertrappean formation shall be 125mm but in the rock below the intertrappean formation, the nominal diameter of tube well shall be 115 mm. Such tube wells shall be designated as 150/125/115 mm dia ordinary tubewells.

- 27.7 The nominal diameter of ordinary tube wells constructed for installation of power pumps shall be 150 mm or 200 mm for the entire depth depending upon the type and size of pump to be installed in the tube well. Such tube wells shall be designated as 150 mm dia ordinary tube well & 200 mm dia ordinary tubewells.
- 27.8 The gravel packed tube wells shall be constructed in alluvial formations, suitable for such tube wells, in which the fine and uniform sand is present in the water bearing aquifer. Such tube wells shall be constructed by direct circulation rotary drilling method or reverse circulation rotary drillingmethod using suitable rotary drillingmachine.
- 27.9 The diameters of boreholes for construction of 100 mm, 150 mm & 200 mm finished nominal diameter gravel packed tube wells shall be 300 mm, 350 mm and 400 mm respectively exclusive of pipe wall thickness. The thickness of the gravel shroud around the screen shall generally be not less than 10 cm. Such tube wells shall be designated as 300(100) mm dia, 350(150) mm dia, 400(200) mm dia gravel packed tubewells.
- 27.10 The gravel packed tube wells shall be constructed only after obtaining the technical clearance of drawing & design of gravel packed tube well from the concerned Chief Engineer.
- 27.11 The rates are inclusive of the preparation and submission of strata chart ofthe tube well constructed in the prescribedproforma.
- 27.12 It shall be the responsibility of the contractor to collect the water samplefrom completed tube well and send it to departmental laboratory for chemical and bacteriological analysis. The water sample for chemical analysis shall be collected in 2 liters plastic bottle and samples for bacteriological analysis shall be collected in 300 ml sterilized bottle as per the direction of Engineer in charge. Only testing charges will be borne by thedepartment.
- 27.13 All risks of accidents and Jamming and breaking of drilling tools etc. shall be contractor's liability. No extra charges shall be payable to the contractor on thisaccount.
- 27.14 Contractor shall also make arrangements of first aid facilities for anyaccident. All care and precautions shall be taken and it shall be ensured that there shall be no accidents while drilling the borehole. Proper dress and equipments like gumboots, helmets etc. shall be provided by the contractor to the workmen atsite.

- 27.15 During any operation carried out for construction of tube well, if any tool, pipe etc. falls down in the tube well then the contractor shall carry out the necessary fishing operation at his own cost. The contractor shall use his own equipment for such operation. If the tube well becomes useless due to any reason, it shall be treated as abandoned tube well and no payment shall be made for such abandoned tube well.

The contractor shall be fully responsible to fill up the abandoned bore hole with hard soil including compaction and watering so as to make top surface as good as original soil immediately and before shifting the drilling machine to prevent any accident. No payment would be made to the contractor on account of this.

- 27.16 If a tube well is found dry or with less yield and if it is not to be used for water supply due to any reason, the tube well shall be fitted with MS cap securely and a concrete block of 0.45m X 0.45m X 0.45m with M15 cement concrete would be constructed on it to prevent any accident or damage to the tube well and also to use the bore at any later stage for recharging or for any other purpose.
- 27.17 The Lowering and fixing of casing pipe in ordinary tube well and lowering of casing assembly in the gravel packed tube wells shall be done in the presence of authorised representative of the Engineer in Charge of work. The G.I. casing pipe to be lowered and fixed in intertrappean formation shall be jointed by welding only. In the case of gravel packed tube well it shall be ensured by the contractor that the slotted pipes or screened pipes shall be lowered in the tube well at the locations of water bearing aquifers as per design. The contractor shall also ensure that joints of the pipes in casing assembly are rigid and water tight and a bail plug is properly fixed in the bottom of casing assembly.
- 27.18 All the gravel to be used, as pack in gravel packed tube wells shall be as specified in IS 4097: 1988 (Reaffirmed -1993).
- 27.19 The development of tube well shall be continued during drilling operation. At the time of flushing by compressor the discharge from tube well during the development process shall also be measured by 'V' notch for yield and shall be recorded on regular intervals for which no separate payment shall be made. In case of gravel packed tube wells, development by compressor for minimum eight hours after completion of drilling of tube well shall be done and paid as per item number 4 of chapter 5. The development of ordinary tubewells (other than gravel packed tubewells)

shall be done by the drilling machines during the drilling operations and no separate payment for development of such ordinary tubewells shall be made. The development of all type of the tubewells shall be done as per IS specifications (IS:11189-1985)

- 27.20 In case of ordinary tubewells (other than gravel packed tubewells) where power pump is to be installed, the yield test of tube well shall be conducted by suitable capacity single phase or three phase submersible pumping set to be operated by generator set or by taking temporary electric connection at site. It shall be the responsibility of the contractor to arrange for suitable capacity submersible pumping set, generator set, or temporary electrical connection, suitable measuring equipments for measuring the discharge and draw down of the tube well. The rates for item of yield test given in this unified schedule of rates include all such arrangements. The maximum duration of yield test shall be eight hours.
- 27.21 The tube well shall be disinfected after completion of yield test using bleaching powder solution as per the direction of Engineer in charge, and paid as per provision in the USoR.
- 27.22 The installation of hand pump over the tube well shall be carried out as per IS specifications (IS:15500 Part 1 to 8– 2004). All the exterior parts of pump coming in contact with the water shall be thoroughly cleaned and dusted with bleaching powder. The hand pump after installation shall be tested for its proper installation by operating it continuously at least for four hour and measuring the rate of discharge from hand pump. The rates for the item of installation of hand pump and yield test by hand pump given in this unified schedule of rates shall be applicable.
- 27.23 For construction of platform and drain for the hand pump, the contractor shall use only steel plate frame shuttering designed as per the dimensional requirement of platform and drain. This shuttering shall be got approved from the Engineer-in-Charge. In case of construction of platforms in areas having black cotton soil, the top thirty centimeters of the black cotton soil shall be excavated and replaced with morrum boulder, duly rammed and watered in layers, prior to the construction of such platforms including drain, pedestal and washing platform. Rates for these works have been provided for in the USOR.
- 27.24 All contracts based on this unified schedule of rates shall be governed by the directions and other notes and conditions given in this unified schedule of rates, in addition to all the other conditions of the agreement. As the rates in this unified schedule of rates are linked to these conditions and

directions, it shall not be necessary to attach the copies of these conditions to the contract agreement.

- 27.25 In the interpretation of description of items or rates of this unified schedule of rates and specifications, the decision of the Engineer-in-Chief shall be final.
- 27.26 The issue rates of casing pipes, hand pumps and other material given in Annexure-1 of this unified schedule rates are only for the purpose of preparing realistic estimates. These rates are not given for making purchases or for entering into any contracts.
- 27.27 The rates for various items of works given in this unified schedule of rates includes for 1% overhead, 3 % sundry and 10% contractor's profit. If the work is carried out departmentally then the rates applicable for departmental works shall be at-least 9.56%  $[(100 \times 11) / 115]$  less than the rates of various items given in this unified schedule of rates.
- 27.28 The following Indian standard shall be referred to:-
- 27.28.1 I.S:2800 (Part-I):1991 (Reaffirmed 2001)-Code of practice for construction & testing of tube wells/Borewells.
  - 27.28.2 I.S:2800(Part-II):1979 (Reaffirmed 1999)-Code of practice for construction & testing of tube wells/Borewells.
  - 27.28.3 I.S: 4097-1988(Reaffirmed 1999): Specification for Gravel for use as pack in tubewells
  - 27.28.4 I.S:11189-1985(Reaffirmed 1999): Methods of tube well development
  - 27.28.5 I.S:1239 (Part-I) 1990 Mild steel tubes, tubular & other wrought steel fittings-specifications.
  - 27.28.6 I.S:12818: 1992 Unplasticized PVC screen and casing pipes for bore/tube well-specification.
  - 27.28.7 I.S:15500 (Parts 1 to 8) Deep well hand pumps, components and special tools-specifications.
  - 27.28.8 The issue rates for various items like Hand pump, Casing pipes etc. has been arrived after adding 3% storage and handling charges and these rates are to be considered for preparation of estimates only and no payment of material shall be made on the basis of these issue rates.
  - 27.28.9 Rate for hand pump is taken as per CSIDC rate contract Ref. No. CSIDC/MKD/2019-20/05/52317/DWHP/AI/0464 dtd 01/10/2019, GST extra as applicable and Inspection charges @0.60% and GST extra as applicable.

- 27.28.10 Rate for G.I. Pipe medium class is taken as per CSIDC rate contract Ref. No. CSIDC/MKD/2019-20/02/52350/GSP&T/ATPL/0361 dtd 01/10/2019, and GST extra as applicable and Inspection charges @0.60% and GST extra as applicable.
- 27.28.11 Rates for UPVC casing pipe are taken as per CSIDC rate contract Ref. No. CSIDC/MKD/2019-20/04/52395/UPVS & CP/GPI/0366 dtd 01/10/2019, and GST extra as applicable and Inspection charges @0.60% and GST extra as applicable.
- 27.29 The rates for drilling provided in the Unified Schedule of Rates are inclusive of depreciation charges of all the machinery, tools & plants required for drilling operation, transportation of drilling machine, erection of machine at site, removal of machine from site after completion, cost of water, cost of drilling mud, fuel, labour and all other unforeseen items for drilling work and clearance of site after completion of work.
- 27.30 **This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.**



**CHAPTER –XXVIII**  
**RESISTIVITY SURVEY**

## CHAPTER- XVIII

### RESISTIVITY SURVEY

S.No.	Item	Unit	Rate in Rs.
28.1	Carrying out the resistivity survey by VES method using Schlumberger configuration for locating the proper spot with three soundings for drilling of tube well within the selected Habitation, including photography, interpretation of resistivity data and submission of report in the desired format along with resistivity readings, necessary graph and photographs.	Per successful point	1633
28.2	Geophysical & Hydrological Survey for lineament marking in field unconfined aquifer analysis, analyzing ground water movement, estimation of SWI yield finalizing of recharging structure, inclusive of preparation of requisite map and final report as per hydro-geological specification for recharging shaft along with all activities.	1 Job	6060

## **CHAPTER - XXIX**

### **CONSTRUCTION OF ORDINARY TUBE WELL**

## CHAPTER- XIX

### CONSTRUCTION OF ORDINARY TUBE WELL

S.No.	Item	Unit	Rate in Rs.
29.1	Drilling of perfectly vertical bore hole of a diameter to receive 125 mm nominal diameter casing pipe upto desired depth below ground level inclusive of the labour charges for transporting, lowering and fixing of 125 mm nominal diameter M.S /GI /UPVC casing pipe inside the bore hole including all works pertaining to drilling such as transportation, installation and removal of drilling machine etc.complete.		
(a)	In all type of collapsible strata consisting of soils, clays, sand , moorum, gravel, blouders etc	Meter	507
(b)	In all types of rocks.	Meter	591
29.2	Drilling of perfectly vertical bore hole of 115 m.m. diameter up to desired depth below ground level in alltypes of rocks including all works pertaining to drilling such as transportation, installation and removal of drilling machine etc.complete.	Meter	557
29.3	Drilling of perfectly vertical bore hole of a diameter suitable to receive 150 mm nominal diameter casing pipe upto desired depth below ground level inclusive of the labour charges for transporting, lowering and fixing of 150 mm nominal diameter and fixing of 150 mm nominal diameter M.S./ G.I. / U.P.V.C. casing pipe inside the bore hole including all works pertaining to drilling such as transportation, installation and removal of drilling machine etc.complete.		
(a)	In all type of collapsible strata consisting of soils, clays, sand , moorum, gravel, boulders etc.	Meter	527
(b)	In all types of rocks.	Meter	639
29.4	Drilling of perfectly vertical bore hole of 150 m.m. diameter up to desired depth below ground level in alltypes of rock including all works pertaining to drilling such as transportation, installation and removal of drillingmachine etc. complete.	Meter	609
29.5	Drilling of perfectly vertical bore hole of 165 m.m. diameter up to desired depth below ground level in alltypes of rock including all works pertaining to drilling such as transportation, installation and removal of drilling machine etc.complete.	Meter	613

S.No.	Item	Unit	Rate in Rs.
29.6	Drilling of perfectly vertical bore hole of a diameter suitable to receive 200 mm nominal diameter casing pipe upto desired depth below ground level inclusive of the labour charges for transporting, lowering and fixing of 200 mm nominal diameter M.S./ G.I. / U.P.V.C. casing pipe inside the bore hole including all works pertaining to drilling such as transportation, installation and removal of drilling machine etc.complete.		
(a)	In all type of collapsible strata consisting of soils, clays, sand , moorum, gravel, boulders etc.	Meter	545
(b)	In all types of rocks.	Meter	719
29.7	Drilling of perfectly vertical bore hole of 200 m.m. diameter up to desired depth below ground level including all works pertaining to drillings such as transportation, installation and removal of drilling machine etc. complete.		
(a)	In all type of collapsible strata (intertrappean formation ) including charges for transportation , lowering and fixing of 150 mm nominal diameter GI casing pipe, welded joints only .	Meter	621
(b)	In all types of rocks.	Meter	776
29.8	Drilling of perfectly vertical bore hole of 150 mm diameter up to desired depth below ground level under all types of strata including all works pertaining to drilling such as transportation installation and removal of drilling machine etc. complete in intertrappean formations (collapsible strata between rocks) including charges for transportation and making all necessary arrangements' etc, including lowering and fixing of 125mm or 100mm nominal diameter (G.I. or U.P.V.C.casing pipe .	Meter	625
29.9	Providing and fixing of well cap on top of the tube well for protection		
	M. S. Caps -		
(a)	100 mm dia.	each	275
(b)	125 mm dia.	each	310
(c)	150 mm dia.	each	376
(d)	200 mm dia.	each	407
20.10	Construction of concrete block over dry tube wells for protection of size 0.45m x 0.45m x 0.45m in M-15 cement concrete mix complete work.	each	629

## **CHAPTER-XXX**

### **CONSTRUCTION OF GRAVEL PACKED TUBEWELL**

## CHAPTER-XXX

### CONSTRUCTION OF GRAVEL PACKED TUBEWELL

S.No.	Item	Unit	Rate in Rs.
30.1	Drilling of perfectly vertical bore hole of following diameters for construction of Gravel Packed tube well up to desired depth in alluvial formation consisting of Soils, Clays, Sand, Gravel, Moorum, Boulders etc. and retaining the bore hole by using suitable drilling mud or foam or temporary housing pipe including all works pertaining to drilling such as transportation, installation and removal of drilling machine etc. complete.		
(a)	300 m.m diameter	Meter	850
(b)	350 m.m diameter	Meter	893
(c)	400 m.m diameter	Meter	932
30.2	Labour charges for assembling, centering and lowering of properly designed casing pipe assembly inside the bore hole drilled for construction of Gravel Packed tube well including the cost of providing and fixing of centraliser, and transportation of casing assembly etc. complete .		
(a)	Casing assembly composed of 100 m.m. diameter blank and slotted G.I. Casing pipes.	Meter	45
(b)	Casing assembly composed of 150 m.m. diameter blank and slotted G.I. Casing pipes.	Meter	58
(c)	Casing assembly composed of 200 m.m. diameter blank and slotted G.I. Casing pipes.	Meter	71
(d)	Casing assembly composed of 100 m.m. dia. UPVC blank and screened pipes.	Meter	31
(e)	Casing assembly composed of 150 m.m. dia. UPVC blank and screened pipes.	Meter	42
(f)	Casing assembly composed of 200 m.m. dia. UPVC blank and screened pipes.	Meter	54
30.3	Providing and fixing of M.S. bail plug as per I.S. 2800 ( PART-I) 1991 in the bottom of casing assembly		
(a)	100 m.m diameter	each	539
(b)	150 m.m diameter	each	615
(c)	200 m.m diameter	each	702

S.No.	Item	Unit	Rate in Rs.
30.4	Providing gravel packing with uniformly graded gravel as per I.S.4097 of 1967 ( revised up to date ) in the annular space between outer wall of casing pipe assembly and inner wall of bore hole including cost of gravel , transportation, stacking, washing and packing in layers of suitable thickness including all lead and lifts complete .	Cu.m	4282
30.5	Providing gravel with uniformly graded gravel as per I.S.4097 of 1967 (revised up to date) for gravel packing.	Cu.m	3864
30.6	Providing and fixing of well cap on top of the tube well for protection		
	<b>M. S. Caps -</b>		
(a)	100 mm dia.	each	275
(b)	125 mm dia.	each	310
(c)	150 mm dia.	each	376
(d)	200 mm dia.	each	407
30.7	Construction of concrete block over dry tube wells for protection of size 0.45m x 0.45m x 0.45 m in M-15 cement concrete mix complete work.	each	629



## **CHAPTER-XXXI**

### **INSTALLATION OF HAND PUMP AND CONSTRUCTION OF PLATFORM DRAIN AND SOKAGE PIT**

**CHAPTER-XXXI**  
**INSTALLATION OF HAND PUMP AND CONSTRUCTION OF**  
**PLATFORM DRAIN AND SOKAGE PIT**

S.No.	Item	Unit	Rate in Rs.
31.1	Labour charges for installation of India Mark II Hand Pump with 30 meter long 32 mm dia. Riser pipe assembly and all other accessories including transportation of Hnad Pump from specified departmental stores to site.	Each	1048
31.2	Add to item No. 1 above for fixing the extra length of riser pipe assembly beyond 30 meters.	meter	20
31.3	Construction of 76 cm x 76 cm x 40 cm foundation block in 1:2:4 cement concrete for fixing the pedestal of Hand Pump including excavation, cost of material and labours etc. complete.	Each	957
31.4	Construction of cement concrete platform as per design around the hand pump in 1:2:4 cement concrete including excavation, centering, shuttering, cost of all the materials and labours and curing etc. complete.	Each	4190
31.5	Construction of cement concrete platform as per design around the hand pump in 1:2:4 cement concrete including excavation, centering, shuttering, cost of all the materials and labour and curing etc. complete. Including filling in 30 cm depth after removing Black cotton soil including ramming, watering etc. complete in areas of Black cotton soils.	Each	4557
31.6	Construction of cement concrete drain as per design in 1:2:4 cement concrete including excavation, centering, shuttering, cost of all the materials and labour and curing etc.complete.	meter	328
31.7	Construction of cement concrete drain as per design in 1:2:4 cement concrete including excavation, centering, shuttering, cost of all the materials and labourandcuringetc.complete.Includingfillingin 30 cm depth after removing Black cotton soil including ramming, watering etc.complete in areas of Black cotton soils.	meter	458

<b>S.No.</b>	<b>Item</b>	<b>Unit</b>	<b>Rate in Rs.</b>
31.8	Construction of 1.20 m x 1.20 m x 0.20 m cement concrete washing platform in cement concrete 1:2:4 including excavation, centering, shuttering, cost of all the materials and labour and curing etc. complete.	Each	1311
31.9	Construction of 1.20 m x 1.20 m x 0.20 m cement concrete washing platform in cement concrete 1:2:4 including excavation, centering, shuttering, cost of all the materials and labour and curing etc. complete. Including filling in 30 cm depth after removing Black cotton soil including ramming, watering etc. complete in areas of Black cotton soils.	Each	1480
31.10	Construction of soakage pit of 70 cm dia. and 1.0 m deep including excavation, brick lining at top in 1:4 cement mortar, filling broken bricks etc. and cost of all the materials and labour and curing etc. complete.	Each	965

## **CHAPTER- XXXII**

### **DEVELOPMENT, YIELD TEST AND DISINFECTION OF TUBE WELL**

**CHAPTER- XXXII**  
**DEVELOPMENT, YIELD TEST AND**  
**DISINFECTION OF TUBE WELL**

<b>S.No.</b>	<b>Item</b>	<b>Unit</b>	<b>Rate in Rs.</b>
32.1	Conducting the yield test of tubewell by operating the pumping set continuously for a desired time period and measuring the discharge and drawdown of tubewell at a suitable time interval as per the direction of Engineer in Charge including cost of energy, cost of installation of suitable measuring device and hire charges of pumping set etc.complete.		
(a)	Submersible pumping set up to 1 to 3 H.P.	Per hour	642
(b)	Submersible pumping set above 3 to 7.5 H.P.	Per hour	688
(c)	Submersible pumping set above 7.5 H.P.	Per hour	779
32.2	Development of gravel packed tube well by Air Compressor of suitable capacity including hire charges for all the required tools and plants etc. complete, for maximum duration of eight hours.	Per hour	958
32.3	Measurement of yield of tube well by operating hand pump continuously for four hours manually.	Each	700
32.4	Disinfection of tube well using bleaching powder solution as per the direction of the Engineer in Charge including the cost of bleaching powder and labour etc. complete.	Each	61

## **CHAPTER- XXXIII**

### **ODEX TYPE OF TUBEWELL**

**CHAPTER- XXXIII**  
**ODEX TYPE OF TUBEWELL**

S.No.	Item	Unit	Rate in Rs.
33.1	Drilling of perfectly vertical bore hole by odex method of a diameter to receive 125 mm nominal diameter casing pipe up to desired depth below ground level inclusive of the labour charges for transporting, lowering and fixing of 125 mm nominal diameter suitable for odex drilling M.S./G.I./ Seamless casing pipe inside the bore hole BY welding joint including all works pertaining to drilling such as transportation , installationand removal of drilling machine etc. complete.		
(a)	In all type of collapsible strata consisting of soils, clays, sand , moorum, gravel, boulders etc.	Meter	755
(b)	In all types of rocks.	Meter	879
33.2	After completion of bore hole by odex method making of slots cutting on casing pipe at the aquifers level . The size of slots is 2mm wide x 7.5mm long in set of 4 slots around the length wise in casing pipe (G.I./MS/Seamless) . Each meter length of casing should have 140 slots on total cylindrical portion of casing pipe .	Meter	463
33.3	Cost of casing shoe ( Guide Bush ) for odex drilling	Each	5145
33.4	Drilling of perfectly vertical bore hole by odex method of a diameter to receive 150 mm nominal diameter casing pipe upto desired depth below ground level inclusive of the labour charges fortransporting, lowering and fixing of 125 mm nominal diameter suitable for odex drilling M.S./G.I./ Seamless casing pipe indise the bore hole BY welding joint including all works pertaining to drilling such as transportation, installationandremoval of drilling machine etc. complete.		
(a)	In all type of collapsible strata consisting of soils, clays, sand , moorum, gravel, blouders etc.	Meter	817
(b)	In all types of rocks.	Meter	991

<b>S.No.</b>	<b>Item</b>	<b>Unit</b>	<b>Rate in Rs.</b>
33.5	After completion of bore hole by odex method making of slots cutting on casing pipe at the aquifers level . The size of slots is 2mm wide x 7.5mm long in set of 4 slots around the length wise in casing pipe (G.I./MS/Seamless). Each meter length of casing should have 172 slots on total cylindrical portion of casing pipe .	Meter	534
33.6	Cost of casing shoe ( Guide Bush ) for odex drilling	Each	5948



## **CHAPTER- XXXIV**

### **MISCELLANEOUS ITEMS OF TUBEWELL**

**CHAPTER- XXXIV**  
**MISCELLANEOUS ITEMS OF TUBEWELL**

S.No.	Item	Unit	Rate in Rs.
<b>HYDROFRACTURING AND CLEANING OF TUBEWELL</b>			
34.1	Hydro fracturing of perfectly vertical bore hole for 200/150/115 mm diameter bore hole up to 90 m depth below ground level including yield testing before and after Hydro fracture, transportation, installation and removing of Hydro fracturing unit.	1 Job	13689
34.2	Cleaning of perfectly vertical bore hole for 200/150/115 mm diameter bore hole up to 60 mtrs depth below ground level including transportation, installation and removing of Drilling machine.	1 Job	12853
34.3	Add to item no. 24.2 above cleaning beyond 60 m depth.	Per meter	134
34.4	Survey work dry/ low yield tube well hydro fracturing of tube well for detection of fracture zones in tube well by using the hole camera with monitor including transportation and providing C.D. & photographs.	Each	1508
34.5	Labour charges for taking out assembly from the tube well of India Mark II hand pump with 30 meters long 32mm dia riser pipe assembly and all other accessories.	Each	885
34.6	Add to item No. 24.5 above for fixing extra length of pipe beyond 30 meters.	Per Mtr.	29
34.7	Labour charges for lowering the assembly with complete fittings of India Mark II Hand pump from the tube well with 32mm dia 30 Meters long riser pipe assembly and other accessories	Each	740
34.8	Add to above item No. 24.7 for fixing extra length of riser pipe assembly beyond 30 meters.	Per Mtr	24
<b>CONSTRUCTION OF RECHARGING PIT IN SUBMERGENCE AREA</b>			
34.9	Construction of recharging pit of internal size 2.00 X 2.00X1.35 mtr. near Existing tube well , in submergence area of pond/ reservoir including excavation, base concrete, brick masonry work and providing and filling filter media like boulders, gravels, sand and synthetic membrane below sand as per specifications, and drawing no.19 complete.	1 Job	41814

S.No.	Item	Unit	Rate in Rs.
	<b>CONSTRUCTION OF RECHARGING PIT AROUND EXISTING TUBE WELL GIVING LESS YIELD WITH STEINING AND CATCH DRAIN</b>		
34.10	Construction of recharging circular pit of 3.00 m outer dia and 2.00 mtrs depth around the existing tube well giving less yield perforation work in casing pipe and providing and fixing of nariyal rope around perforated area in full length, steening work and surrounding catch drain work with M-20 RCC , making 90 mm dia circular holes by fixing pieces of 90 mm dia PVC pipes @ 300 mm c/c before concreting of steining work of recharge pit just below G.L. to permit rain water to enter in to the pit from catch drain, providing and filling of recharge pit by filter media like boulders, gravels sand and synthetic membrane below sand as per specifications and drawing no.20 complete.	1 Job	55188
	<b>CONSTRUCTION OF RECHARGING PIT AROUND TUBE WELL GIVING LESS YIELD</b>		
34.11	Construction of recharging circular pit of 3.00 m dia and 2.00m depth around the dry tube well, perforation work in casing pipe and providing and fixing of nariyal rope around perforated area in full length, providing and filling of recharge pit by boulders, gravels sand as filter media, synthetic membrane below sand and making ground slope towards the constructed pit to divert the rain water (in soft/hard rock area) as per specifications and drawing no. 21 complete.	1 Job	16795
	<b>REPAIRING OF HAND PUMP</b>		
34.12	Labour only for minor repairing work of India Mark II hand pump including replacement of unserviceable parts ie chain, handle, axle either one or more parts as the case may be along with overhauling of hand pump set and transportation etc as per approved specifications inclusive of the free services of departmental technician (Material will be supplied by the department).	1 Job	465
34.13	Labour only for major repairing work of India Mark II hand pump including replacement of unserviceable parts such as washer, cylinder, riser pipe, link rod either one or more parts as the case may be along with overhauling, minor repairing work and transportation	1 Job	1076

S.No.	Item	Unit	Rate in Rs.
	etc as per approved specification inclusive of free services of departmental technician (Material will be supplied by the department).		
34.14	Labour only for minor repairing work of India Mark II hand pump including replacement of unserviceable parts i.e chain, handle, axle either one or more parts as the case may be along with overhauling of hand pump set and transportation etc as per approved specifications (Material will be supplied by the department).	1 Job	595
34.15	Labour only for major repairing work of India Mark II hand pump including replacement of unserviceable parts such as washer, cylinder, riser pipe, link rod either one or more parts as the case may be along with overhauling, minor repairing work and transportation etc as per approved specification (Material will be supplied by the department).	1 Job	1128
	<b>TAKING OUT FALLEN HAND PUMP PIPE LINE ASSEMBLY FROM TUBE WELL</b>		0
34.16	Labour only for taking out of fallen hand pump pipe line assembly from tube well using special T&P required for the same i/c depositing all the obtained material in departmental store complete item .-Depth up to 150 mtr.	1 Job	2514
34.16.1	Removal of ordinarily Fallen Pipe Line of Hand Pump from Tube well i/c arrangement of labour, skilled person & arrangement of all tools and plant required for the job i/c all safety measures and transportation of recovered material from village to the departmental store or transportation of material required for hand pump installation from store to village, installation of Handpump i/c loading, unloading etc. complete.	1 Job	6229
34.16.2	Removal of choked fallen pipe line of Hand Pump from TW i/c arrangement of additional labour skilled person, arrangement of all special type tools and plant required for the job, i/c all safety measures etc. all complete. (This item will be paid in addition to item No.24.16.1 if fallen pipe line is choked)	1 Job	2263
	<b>REMOVING OF UNSERVICEABLE</b>		

S.No.	Item	Unit	Rate in Rs.
	<b>HANDPUMP</b>		
34.17	Removing of unserviceable hand pump along with assembly from existing tube well i/c excavation, cutting of casing pipe if necessary, dismantling CC around pedestal, capping of tube well i/c making of cement concrete block M-15 size 0.45x0.45x0.45 cm and depositing all the obtained material in departmental store .	1 Job	2084
34.18	<b>LOWERING &amp; TAKING OUT OF SUBMERSIBLE PUMP SET</b>		
34.18.1	Labour only for taking out of single phase submersible pumping set of capacity 1 to 3 HP from the tube well with flexible/ rigid pipe line assembly, electrical cable, nylon rope, testing etc. complete including disconnecting the electrical cable from pump & starter -Depth up to 150 mtr..	1 Job	1575
34.18.2	Labour only for lowering of single phase submersible pumping set of capacity 1 to 3 HP in the tube well with flexible/ rigid pipe line assembly, electrical cable, nylon rope, testing etc. complete including connecting the electrical cable from pump & starter - Depth up to 150mtr.	1 Job	1730
34.18.3	Labour only for taking out of three phase submersible pumping set from the tube well with pipe line assembly, electrical cable, testing etc. complete including disconnecting the electrical cable from pump & starter.		
(i)	3 HP to 7.5 HP - Depth up to 150 mtr.	1 Job	2038
(ii)	Above 7.5 HP to 12.5 HP - Depth up to 150 mtr.	1 Job	2347
(iii)	Above 12.5 HP - Depth up to 150 mtr.	1 Job	2655
24.18.4	Labour only for lowering of three phase submersible pumping set in the tube well with pipe line assembly, electrical cable, testing etc. complete including connecting the electrical cable from pump & starter.		0
(i)	3 HP to 7.5 HP - Depth up to 150 mtr.	1 Job	2192
(ii)	Above 7.5 HP to 12.5 HP - Depth up to 150 mtr.	1 Job	2501
(iii)	Above 12.5 HP - Depth up to 150 mtr.	1 Job	2809
	<b>TAKING OUT FALLEN SUBMERSIBLE PUMPING SET FROM TUBEWELL</b>		
34.19	Labour only for taking out of fallen submersible pumping set from the tube well with pipe line assembly, electrical cable etc. complete using special		

S.No.	Item	Unit	Rate in Rs.
	T&P required for the same i/c depositing all the obtained material in departmental store.		
(i)	1 to 3 HP - Depth up to 150 mtr.	1 Job	2804
(ii)	3 to 7.5 HP - Depth up to 150 mtr.	1 Job	2982
(iii)	7.5 to 12.5 HP - Depth up to 150 mtr.	1 Job	3439
(iv)	Above 12.5 HP - Depth up to 150 mtr.	1 Job	3691
34.20	<b>REPAIRING OF SUBMERSIBLE MOTOR PUMP SET</b>		
34.20.1	Removing the old burn winding from stator & cleaning of slot then complete rewinding of submersible motor by using PVC insulated ISI marked quality copper conductor with suitable gauge including insulating material like bamboo, strip, fire proof papers, leave, cotton tape, PVC tape including cable jointing of motor.		
A	Single phase 100 mm dia		
	1 HP	1 Job	2008
	2 HP	1 Job	2517
	3 HP	1 Job	2705
B	Three Phase 100mm & 150 mm Dia.		
	3 HP (100mm dia.)	1 Job	2987
	4 HP (100mm dia.)	1 Job	3081
	5 HP (100mm dia.)	1 Job	3458
	3 HP (150mm dia.)	1 Job	3054
	4 HP (150mm dia.)	1 Job	3149
	5 HP (150mm dia.)	1 Job	3592
	6 HP (150mm dia.)	1 Job	3929
	Above 6.0 to 7.5 HP (150mm dia.)	1 Job	5622
	Above 7.5 to 10 HP (150mm dia.)	1 Job	6269
	Above 10.0 to 12.5 HP (150mm dia.)	1 Job	7210
	Above 12.5 to 15 HP (150mm dia.)	1 Job	7680
34.20.2	Providing & Fixing of non return valve body		
	1 HP to 5 HP / 100mm	1 Job	434
	3 HP to 15 HP / 150mm	1 Job	626
34.20.3	Providing & Fixing of Discharge outlet		
	1 HP to 5 HP / 100mm	1 Job	244
	3 HP to 15 HP / 150mm	1 Job	336
34.20.4	Providing & Fixing of Adjusting Cap		
	1 HP to 5 HP / 100mm	1 Job	67
	3 HP to 15 HP / 150mm	1 Job	72
34.20.5	Providing & Fixing of L N key BMM		
	1 HP to 5 HP / 100mm	1 Job	24
	3 HP to 15 HP / 150mm	1 Job	29

S.No.	Item	Unit	Rate in Rs.
34.20.6	Providing & Fixing of Bush for D O L		
	1 HP to 5 HP /100mm	1 Job	151.00
	3 HP to 15 HP / 150mm	1 Job	175.00
34.20.7	Providing & Fixing of Sleeve for D O L		
	1 HP to 5 HP /100mm	1 Job	132.00
	3 HP to 15 HP / 150mm	1 Job	146.00
34.20.8	Providing & Fixing of stage case CI	1 Job	
	3 HP to 15 HP / 150mm		333.00
34.20.9	Providing & Fixing of Bowl bushGM		
	3 HP to 15 HP / 150mm	1 Job	184.00
34.20.10	Providing & Fixing of Bowl bush Rubber		
	3 HP to 15 HP / 150mm	1 Job	108.00
34.20.11	Providing & Fixing of Neck Ring GM		
	3 HP to 15 HP / 150mm	1 Job	156.00
34.20.12	Providing & Fixing of Pump sleeveSS		
	3 HP to 15 HP / 150mm	1 Job	118.00
	1 HP to 5 HP /100mm	1 Job	382.00
	3 HP to 15 HP / 150mm	1 Job	472.00
34.20.14	Providing & Fixing of moter bush Rubber		
	1 HP to 5 HP /100mm	1 Job	264.00
	3 HP to 15 HP / 150mm	1 Job	312.00
34.20.15	Providing & Fixing of Impeller		
	1 HP to 5 HP /100mmPP	1 Job	62.00
	3 HP to 15 HP / 150mmGM	1 Job	406.00
34.20.16	Providing & Fixing of Diffuser GM		
	3 HP to 15 HP / 150mm	1 Job	257.00
34.20.17	Providing & Fixing of Diffuser PP		
	1 HP to 5 HP /100mm	1 Job	62.00
	3 HP to 15 HP / 150mm	1 Job	137.00
34.20.18	Providing & Fixing of sand guard		
	1 HP to 5 HP /100mm	1 Job	62.00
	3 HP to 15 HP / 150mm	1 Job	137.00
34.20.19	Providing & Fixing of Distance piece		
	1 HP to 5 HP /100mm	1 Job	45.00
	3 HP to 15 HP / 150mm	1 Job	108.00
34.20.20	Providing & Fixing of Oil seal		
	1 HP to 5 HP /100mm	1 Job	48.00
	3 HP to 15 HP / 150mm	1 Job	52.00
34.20.21	Providing & Fixing of Oil seal Sleeve		
	1 HP to 5 HP /100mm	1 Job	108.00
	3 HP to 15 HP / 150mm	1 Job	161.00
34.20.22	Providing & Fixing of Nylon Nut		
	1 HP to 5 HP /100mm	1 Job	10.00

S.No.	Item	Unit	Rate in Rs.
	3 HP to 15 HP / 150mm	1 Job	11.00
34.20.23	Providing & Fixing of Stud for Suction		
	1 HP to 5 HP /100mm	1 Job	20.00
	3 HP to 15 HP / 150mm	1 Job	26.00
34.20.24	Providing & Fixing of GM Washer		
	1 HP to 5 HP /100mm	1 Job	7.00
	3 HP to 15 HP / 150mm	1 Job	12.00
34.20.25	Providing & Fixing of Grub Screw		
	1 HP to 5 HP /100mm	1 Job	11.00
	3 HP to 15 HP / 150mm	1 Job	11.00
34.20.26	Providing & Fixing of Pump Shaft (SS) per Stage		
	3 HP to 15 HP / 150mm	1 Job	180.00
34.20.27	Providing & Fixing of Pump Shaft Key		
	1 HP to 5 HP /100mm	1 Job	52.00
	3 HP to 15 HP / 150mm	1 Job	62.00
34.20.28	Providing & Fixing of Suction Housing		
	1 HP to 5 HP /100mm	1 Job	236.00
	3 HP to 15 HP / 150mm	1 Job	339.00
34.20.29	Providing & Fixing of Pump Coupling & Motor Coupling		
	1 HP to 5 HP /100mm	1 Job	358.00
	3 HP to 15 HP / 150mm	1 Job	528.00
34.20.30	Providing & Fixing of Suction Housing Plate		
	3 HP to 15 HP / 150mm	1 Job	239.00
34.20.31	Providing & Fixing of Intermediate suction Case		
	3 HP to 15 HP / 150mm	1 Job	170.00
34.20.32	Providing & Fixing of Suction Housing Bush		
	3 HP to 15 HP / 150mm	1 Job	221.00
34.20.33	Providing & Fixing of Intermediate suction Bush		
	3 HP to 15 HP / 150mm	1 Job	221.00
34.20.34	Providing & Fixing of stud for Motor flange upper		
	1 HP to 5 HP /100mm	1 Job	17.00
	3 HP to 15 HP / 150mm	1 Job	21.00
34.20.35	Providing & Fixing of stud for Motor flange lower		
	1 HP to 5 HP /100mm	1 Job	26.00
	3 HP to 15 HP / 150mm	1 Job	33.00
34.20.36	Providing & Fixing of Bearing Housing upper		
	1 HP to 5 HP /100mm	1 Job	330.00
	3 HP to 15 HP / 150mm	1 Job	509.00
34.20.37	Providing & Fixing of Bearing Housing lower		
	1 HP to 5 HP /100mm	1 Job	330.00
	3 HP to 15 HP / 150mm	1 Job	509.00
34.20.38	Providing & Fixing of upper flange & lower flange		
	1 HP to 5 HP /100mm	1 Job	180.00



S.No.	Item	Unit	Rate in Rs.
	3 HP to 15 HP / 150mm	1 Job	225
34.20.39	Providing & Fixing of Motor base		
	1 HP to 5 HP /100mm	1 Job	413
	3 HP to 15 HP / 150mm	1 Job	537
34.20.40	Providing & Fixing of Thrust bearing plate complete		
	1 HP to 5 HP /100mm	1 Job	704
	3 HP to 15 HP / 150mm	1 Job	799
34.20.41	Providing & Fixing of Thrust bearing (Carben)		
	1 HP to 5 HP /100mm	1 Job	480
	3 HP to 15 HP / 150mm	1 Job	595
34.20.42	Providing & Fixing of Revolving disk		
	1 HP to 5 HP /100mm	1 Job	345
	3 HP to 15 HP / 150mm	1 Job	528
34.20.43	Providing & Fixing of Thrust bearing housing CI		
	1 HP to 5 HP /100mm	1 Job	134
	3 HP to 15 HP / 150mm	1 Job	206
34.20.44	Providing & Fixing of Rotor Sleeve		
	1 HP to 5 HP /100mm	1 Job	173
	3 HP to 15 HP / 150mm	1 Job	210
34.20.45	Providing & Fixing of Rubber Parts	1 Job	
	1 HP to 5 HP /100mm	1 Job	58
	3 HP to 15 HP / 150mm		76
34.20.46	Providing & Fixing of Intermediate coupling		
	1 HP to 5 HP /100mm	1 Job	288
	3 HP to 15 HP / 150mm	1 Job	317
34.20.47	Providing & Fixing of Flange locking		
	1 HP to 5 HP /100mm	1 Job	49
	3 HP to 15 HP / 150mm	1 Job	53
34.20.48	Providing & Fixing of Disk Locking		
	1 HP to 5 HP /100mm	1 Job	19
	3 HP to 15 HP / 150mm	1 Job	21
34.20.49	Providing & Fixing of Chuck Nut		
	1 HP to 5 HP /100mm	1 Job	37
	3 HP to 15 HP / 150mm	1 Job	49
34.20.50	Providing & Fixing of 8 mm Nut SS		
	3 HP to 15 HP / 150mm	1 Job	11
34.20.51	Providing & Fixing of 10 mm Nut SS		
	1 HP to 15 HP / 150mm	1 Job	15
34.20.52	Providing & Fixing of 12 mm Nut SS		
	1 HP to 15 HP / 150mm	1 Job	19
34.20.53	Providing & Fixing of Stud for Suction		
	1 HP to 15 HP / 150mm	1 Job	24
34.20.54	Providing & Fixing of Top Bush & Top Sleeve		
	1 HP to 5 HP /100mm	1 Job	268

S.No.	Item	Unit	Rate in Rs.
	3 HP to 15 HP / 150mm	1 Job	33
34.20.55	Providing & Fixing of Pump intermediate bush & sleeve		
	1 HP to 5 HP /100mm	1 Job	259
	3 HP to 15 HP / 150mm	1 Job	317
34.20.56	Providing & Fixing of Pump stainer		
	1 HP to 5 HP /100mm	1 Job	103
	3 HP to 15 HP / 150mm	1 Job	141
34.20.57	Providing & Fixing of center D O		
	1 HP to 5 HP /100mm	1 Job	164
	3 HP to 15 HP / 150mm	1 Job	336
34.20.58	Providing & Fixing of New rotor		
	1 HP (100 mm dia)	1 Job	4986
	2 HP ( 100 mm dia)	1 Job	5370
	3 HP (100 mm dia)	1 Job	6041
	4 HP ( 100 mm dia)	1 Job	6616
	5 HP (100 mm dia)	1 Job	7192
	3 HP ( 150 mm dia)	1 Job	8054
	4 HP ( 150 mm dia)	1 Job	8151
	5 HP ( 150 mm dia)	1 Job	8342
	6 HP (150 mm dia)	1 Job	8917
	Above 6.0 to7.5 HP (150 mm )	1 Job	10164
	Above 7.5 to 10 HP (150 mm )	1 Job	11218
	Above 10.0 to 12.5 HP (150 mm)	1 Job	15341
	Above 12.5 to 15 HP (150 mm )	1 Job	17259
34.20.59	Providing & Fixing of Adapter Piece		
	1 HP to 5 HP /100mm	1 Job	173
	3 HP to 15 HP / 150mm	1 Job	240
34.20.60	Providing & Fixing of Water drain plug		
	1 HP to 5 HP /100mm	1 Job	39
	3 HP to 15 HP / 150mm	1 Job	49
34.20.61	Providing & Fixing of Cable Guard		
	1 HP to 5 HP /100mm	1 Job	113
	3 HP to 15 HP / 150mm	1 Job	141
34.20.62	Labour only for stator servicing :-		
	1 HP - 5 HP / 100 mm	1 Job	480
	3 HP - 5 HP / 150mm	1 Job	498
	5 HP - 10 HP / 150mm	1 Job	623
	10 HP - 15 HP / 150mm	1 Job	720
34.20.63	Labour only for Rotor Balancing :-		
	1 HP - 5 HP / 100 mm	1 Job	767
	3 HP - 5 HP / 150mm	1 Job	863
	5 HP - 10 HP / 150mm	1 Job	1054
	10 HP - 15 HP / 150mm	1 Job	1342

<b>S.No.</b>	<b>Item</b>	<b>Unit</b>	<b>Rate in Rs.</b>
34.20.64	Labour only for Impeller Brass welding & Turning	1 Job	288
34.20.65	Labour only for Motor Rotor sleeve turning & grinding	1 Job	623
34.20.66	Labour only for Flange stud Welding	1 Job	39
34.20.67	Labour only for Motor opening, servicing, fitting & testing	1 Job	432
34.20.68	Labour only for Copper welding, Turning & Grinding to enduring of rotor	1 Job	767
34.20.69	Labour only for Welding Turning key way cutting of coupling side of rotor	1 Job	383
34.20.70	Labour only for Pump opening & fitting	1 Job	383
	<b>REPAIRING OF CONTROL PANEL</b>		
34.20.71	Providing & Fixing of Relay unit L&T Type	1 Job	570
34.20.72	Providing & Fixing of Relay unit BCH Type	1 Job	1290
34.20.73	Providing & Fixing of Contactor L&T Type - 16 Amp	1 Job	1098
34.20.74	Providing & Fixing of Contactor BCH Type - 16 Amp	1 Job	1577
34.20.75	Providing & Fixing of Contactor BCH Type - 25 Amp	1 Job	2057
34.20.76	Providing & Fixing of Kit Point Set L&T Type	1 Job	427
34.20.77	Providing & Fixing of Kit Point Set BCH Type -16 Amp	1 Job	810
34.20.78	Providing & Fixing of Kit Point Set BCH Type - 25 Amp	1 Job	618
34.20.79	Providing & Fixing of No Volt Coil L&T Type	1 Job	427
34.20.80	Providing & Fixing of No Volt Coil BCH Type	1 Job	427
34.20.81	Providing & Fixing of Timer Set L&T Type	1 Job	1290
34.20.82	Providing & Fixing of Timer Set BCH Type	1 Job	1577
34.20.83	Providing & Fixing of Auxillary Switch	1 Job	532
34.20.84	Providing & Fixing of Timer Coil	1 Job	398
34.20.85	Providing & Fixing of Amp meter (Round)	1 Job	125
34.20.86	Providing & Fixing of Volt Meter (Round)	1 Job	125
34.20.87	Providing & Fixing of Amp meter (Square)	1 Job	173
34.20.88	Providing & Fixing of Volt Meter (Square)	1 Job	173
34.20.89	Providing & Fixing of ON Switch	1 Job	86
34.20.90	Providing & Fixing of Off Switch	1 Job	86
34.20.91	Providing & Fixing of Terminal Plate	1 Job	139
34.20.92	Providing & Fixing of Indicator Lamp	1 Job	34
34.20.93	Providing & Fixing of MCB -Single Pole - 16 -25 Amp	1 Job	110

S.No.	Item	Unit	Rate in Rs.
34.20.94	Providing & Fixing of MCB -Three Pole - 32 Amp	1 Job	658
34.20.95	Providing & Fixing of MCB -Three Pole - 40 Amp	1 Job	618
34.20.96	Providing & Fixing of MCB -Three Pole - 63 Amp	1 Job	666
34.20.97	Providing & Fixing of Capacitor 36 MFD	1 Job	331
34.20.98	Providing & Fixing of Capacitor 50 MFD	1 Job	331
34.20.99	Providing & Fixing of Capacitor 120-150 MFD	1 Job	350
34.20.100	Providing & Fixing of Capacitor 200-250 MFD	1 Job	369
34.20.101	Providing and fixing of suitable rating ISI marked wired with lugs & sleeves in place of burnt wiring of control panel.		
	1 HP - 3 HP (Single Phase)	1 Job	413
	3 HP - 5 HP ( Three Phase)	1 Job	508
	5 HP - 10 HP ( Three Phase)	1 Job	701
	10 HP - 15 HP ( Three Phase)	1 Job	892
	<b>REPLACEMENT OF FLAT COPPER CABLE</b>		
34.20.102	<b>Providing and fixing of ISI marked PVC insulated three core flat copper cable.</b>		
	1.5 sq mm	1 Job	44
	2.5 sq mm	1 Job	67
	4.0 sq mm	1 Job	99
	6.0 sq mm	1 Job	144
	<b>HORIZONTAL / INCLINED / VERTICAL BORES INSIDE THE DUG WELL</b>		
34.20.103	Labour charges for lowering and taking out the drilling machine mast assembly, drill rods and drilling equipments etc. and installation of drilling machines mast inside the dug well Complete work.	Each	3518
34.20.104	Drilling of Horizontal / Inclined / Vertical bore hole of 115 mm diameter inside existing dug well up to desired depth with insertion of suitable perforated PVC/HDPE/ G.I. Pipe provided by department in all types of strata i.e. Soil, Rock, Hard Rock including all works pertaining to drilling such as transportation, installation and removal of drilling machine inside dug well etc. complete.	Per meter	923
	<b>SINGLE/ THREE PHASE SUBMERSIBLE/ CENTRIFUGAL MOTOR PUMP SET</b>		
34.20.105	Supplying & Installation of Energy efficient five star		

S.No.	Item	Unit	Rate in Rs.
	BEE rating ISI Marked required capacity single phase, 50 Hz, 220V, deep well submersible pump Stainless Steel body, suitable for 4"/6" tube well with Contral Panel Starter suitable for Submersible pump with dry run protection, connections, including clamps, bore cap etc. as required as per specifications but excluding pipe, SS/Nylon wire rope and connection cable.		
(i)	0.5 H.P. with 6 to 7 stages, Head Mt. 46-13 Discharge LPM 10-55	Each	20898
(ii)	1 H.P. with upto 5 stages, Head Mt. 35-15 Discharge LPM 40-125	Each	22081
(iii)	1 H.P. with 7 to 8 stages, Head Mt. 61-18 Discharge LPM 25-90	Each	22456
(iv)	1 H.P. with 10 to 11 stages, Head Mt. 74-21 Discharge LPM 15-55	Each	23263
(v)	1 H.P. with 12 to 14 stages, Head Mt. 91-28 Discharge LPM 10-45	Each	23984
(vi)	1.5 H.P. with up to 6 stages, Head Mt. 42-17 Discharge LPM 65-150	Each	26228
(vii)	1.5 H.P. with up to 7 to 8 stages, Head Mt. 56-21 Discharge LPM 40-125	Each	26949
(viii)	1.5 H.P. with to 10 to 11 stages, Head Mt. 84-26 Discharge LPM 25-90	Each	26488
(ix)	1.5 H.P. with 16 to 17 stages, Head Mt. 114-33 Discharge LPM 15-55	Each	26574
(x)	1.5 H.P. with 18 to 20 stages, Head Mt. 130-41 Discharge LPM 10-45	Each	28535
(xi)	2 H.P. with up to 7 to 8 stages, Head Mt. 56-16 Discharge LPM 65-205	Each	30000
(xii)	2 H.P. with to 10 to 11 stages, Head Mt. 77-30 Discharge LPM 40-125	Each	30260
(xiii)	2 H.P. with 14 to 15 stages, Head Mt. 114-36 Discharge LPM 25-90	Each	29049
(xiv)	2 H.P. with 20 to 22 stages, Head Mt. 147-42 Discharge LPM 15-55	Each	28617
(xv)	2 H.P. with 25 stages, Head Mt. 163-58 Discharge LPM 10-45	Each	33288
(xvi)	3 H.P. with 10 to 12 stages, Head Mt. 84-23 Discharge LPM 65-205	Each	32192
(xvii)	3 H.P. with 15 to 17 stages, Head Mt. 119-45 Discharge LPM 40-125	Each	33162
(xviii)	3 H.P. with 20 to 22 stages, Head Mt. 167-51 Discharge LPM 25-90	Each	31846

S.No.	Item	Unit	Rate in Rs.
34.20.106	Supplying & Installation of Energy efficient five star BEE rating ISI Marked required capacity of Three Phase, 50 Hz, 415V, deep well submersible pump Steel body, suitable for 6" tube well with Control Panel Starter suitable for Submersible pump with dry run protection, single phase preventer, connections, including clamps, bore cap etc. as required as per specifications but excluding pipe and connection cable.		
(i)	3 H.P. with up to 6 stages, Head Mt. 55-7 Discharge LPM 60-510	Each	36173
(ii)	5 H.P. with up to 5 stages, Head Mt. 55-13 Discharge LPM 120-510	Each	40584
(iii)	5 H.P. with 8 to 9 stages, Head Mt. 83-32 Discharge LPM 60-270	Each	43354
(iv)	5 H.P. with 10 to 11 stages, Head Mt. 101-40 Discharge LPM 60-270	Each	45776
(v)	7.5 H.P. with 8 to 10 stages, Head Mt. 117-31 Discharge LPM 60-420	Each	50682
(vi)	7.5 H.P. with 13 to 14 stages, Head Mt. 129-52 Discharge LPM 60-270	Each	57651
(vii)	7.5 H.P. with 15 stages, Head Mt. 138-60 Discharge LPM 60-270	Each	59872
(viii)	10 H.P. with 16 stages, Head Mt. 147-64 Discharge LPM 60-270	Each	63102
(ix)	10 H.P. with 20 stages, Head Mt. 184-80 Discharge LPM 60-270	Each	69563
34.20.107	Supplying and laying of submersible flat cable ISI marked 3 core copper wire of suitable size with proper clamping of approved make.		
(i)	2.5 Sq.mm. multi strand	Per Mtr	121
(ii)	4.0 Sq.mm. multi strand	Per Mtr	170
(iii)	6.0 Sq.mm. multi strand	Per Mtr	251
(iv)	10.0 Sq.mm. multi strand	Per Mtr	405
34.20.108	Supplying and laying of approved Make Nylon rope 12mm thick complete with binding for support of pump and motor	Per Mtr	61
34.20.109	Supplying and laying of approved make stainless steel wire rope 6 mm thick complete with binding for support of pump and motor	Per Mtr	139

S.No.	Item	Unit	Rate in Rs.
34.20.110	Supplying and Installation of approved Make required capacity single phase, 50 Hz, 220V, Centrifugal Mono-block pump self priming, with Starter, connections, base channel foundation etc. as required as per specifications but excluding Pipe and connection cable.		
(i)	1 H.P. Head Mt.6-30, Discharge LPH 2400-900	Each	12001
(ii)	1 H.P. Head Mt.21-45, Discharge LPH 1800-400 (Domestic Model)	Each	7453
34.20.111	Supplying & Installation of approved Make required capacity single phase, 50 Hz, 240V, Centrifugal Mono-block pump, with Starter, connections, base channel foundation etc. as required as per specifications but excluding Pipe and connection cable.		
(i)	1.0 H.P. Head Mt.3-24, Discharge LPH 27000-1500	Each	11505
(ii)	1.5 H.P. Head Mt.3-21, Discharge LPH 39600-6000	Each	13820
(iii)	2.0 H.P. Head Mt.3-18, Discharge LPH 48600-3000	Each	15341
34.20.112	Supplying & Installation of approved Make required capacity 3 phase, 50 Hz, 415V, Centrifugal Mono-block pump, with Starter, i/c single phase preventor, connections, base channel foundation etc. as required as per specifications but excluding Pipe and connection cable.		
(i)	3.0 H.P. Head Mt.6-15, Discharge LPM 740-465	Each	19396
(ii)	5.0 H.P. Head Mt.6-33, Discharge LPM 1380-450	Each	23762
(iii)	7.5 H.P. Head Mt.24-37, Discharge LPM 780-320	Each	30419
34.20.113	Supplying & Installation of Five star BEE rating ISI Marked required capacity of Three phase, 50 Hz, 415V, Open well Submersible pump, with Control Panel Starter with Dry Run Protection, single phase preventer, connections, etc. as required as per specifications but excluding pipe and connection cable.		
(i)	3.0 H.P. Head Mt.15-24, Discharge LPM 615-195	Each	22626
(ii)	5.0 H.P. Head Mt.15-24, Discharge LPM 930-420	Each	24319

# ANNEXURE-1

## ISSUE RATES OF ISI MARK HAND PUMPS. G.I. RISER, G.I. CASING & UPVC CASING PIPES FOR PREPARATION OF ESTIMATES ONLY

S.No.	Item	Unit	Rate in Rs.
1	ISI mark India mark-II deep well hand pump complete with 10 Nos. MS connecting rods. (12 mm x 3 M long) Normal stand assembly as per, Part-C, General Note: 27.28.9	Each	8132
2	ISI mark India mark-II deep well hand pump complete with 10 Nos. MS connecting rods. (12 mm x 3 M long) telescopic stand assembly, Part-C, General Note: 27.28.9	Each	8275
3	ISI Mark 32 mm dia. G.I. riser pipe in 3 meter length socketed on one end as per I.S. 1239 (Part I) 1990 up-to- date amendments and socket as per I.S. 2062/1990 up-to-date amendment, Part-C, General Note: 27.28.10	Meter	200
6	ISI marked G.I. casing pipe (Plain) medium class in 4 to 7 meters length one end fitted with socket as per I.S.: 1239 (Part-2) 1992 with IV th revision ( Up-to-date amendments), Part-C, General Note: 27.28.10		
	100 mmdia	Meter	802
	125 mmdia	Meter	1046
	150 mmdia	Meter	1251
7	ISI marked UPVC casing pipe Confirming to IS 12818/92 (with up-to-date amendments), Part-C, General Note: 27.28.11		
	CM casing pipes, 125 mm dia	Meter	463
	CM casing pipes, 150 mm dia	Meter	562
	CS casing pipes, 150 mm dia	Meter	482



**STRATA - CHART**

District ..... Block ..... Panchayat.....  
 Name of Revenue village..... Name of habitation .....  
 Name of Contractor ..... Registration no. of machine  
 Agreement No. .... Work Order No.....  
 Date of starting of Tube well construction.....  
 Date of completion of tube well construction .....  
 Name of Sub-Engineer in charge of work .....  
 Measurement Book Number.....  
 Exact location of drilling .....

Ground	Level	<u>Details</u>
Depth	Strata	1. Type of tube well----- 2. Diameter of tube well----- mm 3. Total depth of tube well ----- mt. 4. Details of casing pipe Type (G.I/ UPVC/ BLANK/SLOTTED) Diameter ..... mm Length ..... meter 5. Static water level in the tube well ----- mt. 6. Type of pump installed ----- 7. Length of riser pipe installed Type (G.I/UPVC)----- mt. 8. Yield of tube well ----- 9. Draw down at above yield ----- mt.

Signature of contractor

 Signature of  
 Sub-Engineer  
 Office .....

 Signature of  
 Assistant Engineer  
 Office.....

**GEOPHYSICAL RESISTIVITY SURVEY REPORT**

1. District ..... Block .....Panchayat.....
2. Name of village..... Name of habitation.....
3. Name of Hydrogeologist.....Registration no. & Date of Validity.....
4. Agreement No & Date. ....Work Order No.....No. of Survey allotted.....
5. Date of Survey: - .....
6. Name of PHED Person (Mechanic/SubEng./DC/BC):
7. Model No & Make of Resistivity meter used for sounding.....
8. Resistivity Survey Purpose:-..HP/PWSS
9. Toposheet No/HGM No.: --
10. Geomorphology of the area:- Valley/PLW/PLM/PLU/PPS
11. Geological Succession of the area under investigation :- Alluvium/Basalt/Granite/others
12. Hydrogeology of the area:- River system following & Static water table
13. Details of the Resistivity Survey : No. of VES- 03 (Interpretation by Schlumberger method)

Vertical Electric Sounding data	Latitude / Longitude of VES	App. Resistivity of layer in ohm (m)				Thickness of layer in (m)				Total depth (m)
		$\rho_1$ ( in Ohm-m)	$\rho_2$ ( in Ohm-m)	$\rho_3$ ( in Ohm-m)	$\rho_4$ ( in Ohm-m)	h1	h2	h3	h4	H
VES No. I										
VES No. II										
VES No. III										

Subsequently, the above interpretation on the layers identified are geologically Presented in the following sequence:

15. Recommended site :-

- i. Location of Site:----- Longitude E: ----- Latitude N: -----
- ii. Direction of site from Village.....

S.No	Characteristics:- Sub-Surface Strata (Litholog) expected.	Depth below Ground Level (m)		Aquifer ( I, II, III)	Shallow/Deeper Aquifer
		From	To		

- iii. Type of drilling machine :-D.T.H./combination bore/GravelPack
  - iv. Diameter of T/W:-
  - v. Depth of Tube well :-.....mt
  - vi. Expected Casing (Compact & Perforated) requirement : ----to----mt/ ---to--mt/ ---to --mt.
  - vii. Expected Yield :- ..... LPH (Liter Per Hour)
  - viii. Remarks:
  - ix. Suggestive Recharge Structure:-
16. Enclosures:-

- (i) Photocopy of Toposheet / HGM Map of area.
- (ii) Map (Not to scale) showing the location of Survey Point (to be attached separately) in A4 size sheet.
- (iii) Location site plan of three sounding sites
- (iv) Reading chart of Sounding
- (v) Depth probe graph/curves.
- (vi) Photograph of site with installed instrument
- (vii) Detail of Private Tube well nearby:

S. No.	Location of Tube well	Depth (m)	Yield (LPH)

Signature of AE/Sub Eng. / DC(Hydrologist) Signature of Geo-hydrologist & Seal

**YIELD TEST OF TUBE WELLS.**

District ..... Block .....Panchayat.....

Name of Revenue village..... Name of habitation.....

Name of contractor.....

Agreement No. .... Work order No.....

Date of yield test.....

Diameter of tube well ..... Depth of tube well.....

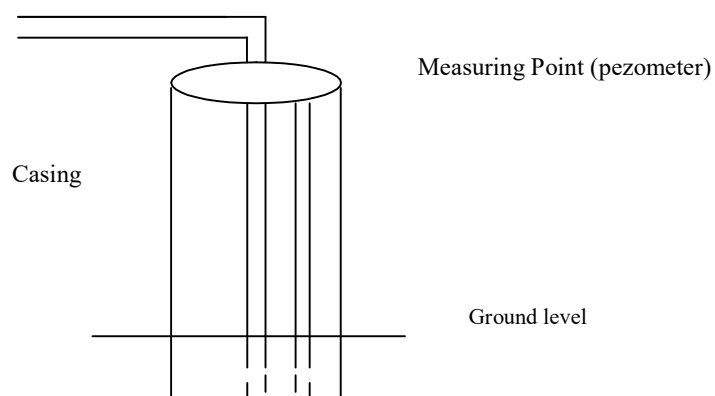
Static water level in tube well .....

Type and K.W. of pumping set used for yield test.....

Type of measuring device used for measurement of discharge.....

Depth at which the pumping set installed.....

Time at which the yield test started.....

Sketch of casing pipe  
with measuring point

### Pump Test Results

S. No.	Time	Step No.	Duration of step (hrs.)	Discharge (cu. mtr. / hr.)	Water level in the tube well measured from ground level at the end of each step in meters	Draw Down in meters = static water level (-) water level at the end of pumping at given time	Remark
1							
2							
3							
4							

**Note:-** Discharge at static water level shall be taken on dependable yield of Tube well.

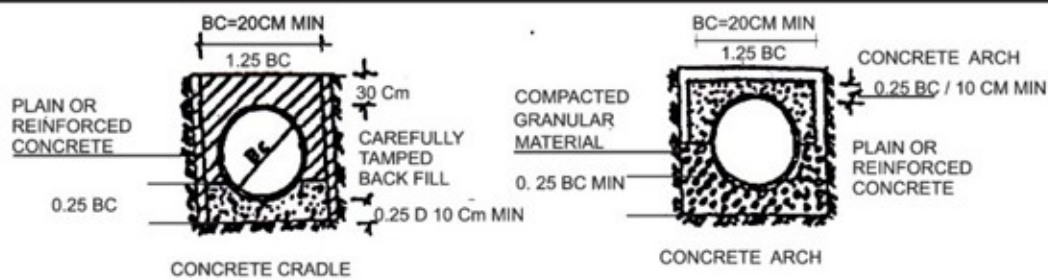
Signature of  
Contractor

Signature of  
Sub-Engineer

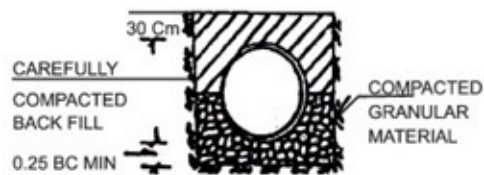
Signature of  
Assistant Engineer

# **PART (D)**

## **DRAWINGS**

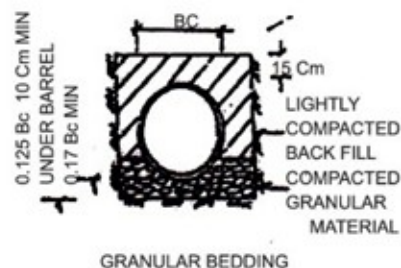


### CLASS A



### Compacted Granular Bedding

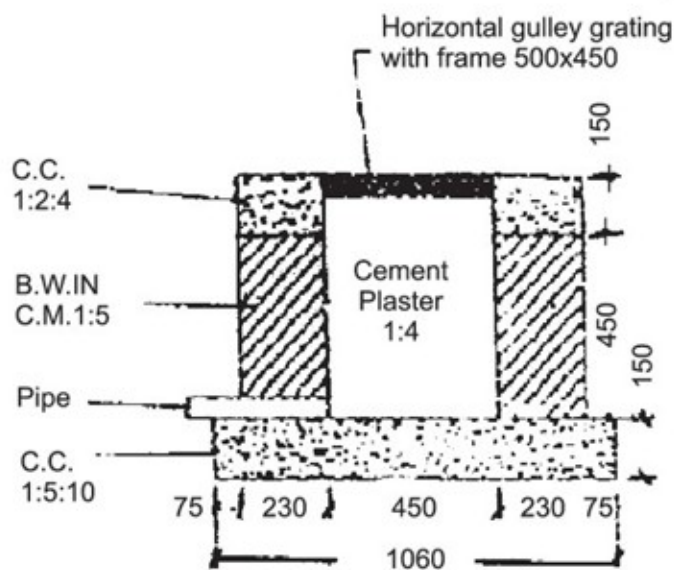
### CLASS B



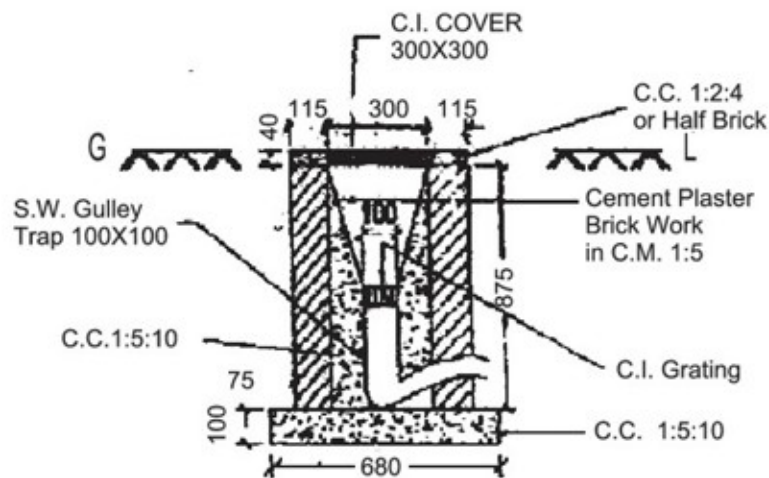
### CLASS C

FIG 1. CLASSES OF BEDDING FOR CONDUIT IN TRENCH

NOTE : IN ROCK, TRENCH IS EXCAVATED ATLEAST 15 Cm BELOW THE BELL OF THE EXCEPT WHERE CONCRETE CRADLE IS USED.

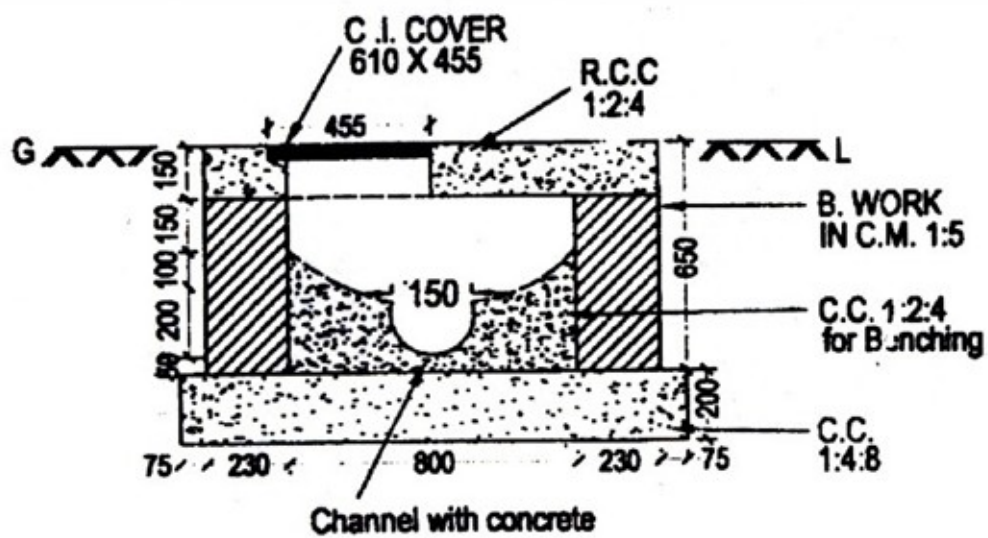


**ROAD GULLEY CHAMBER  
450X500 X600 (HORIZONTAL)  
FIGURE 2**

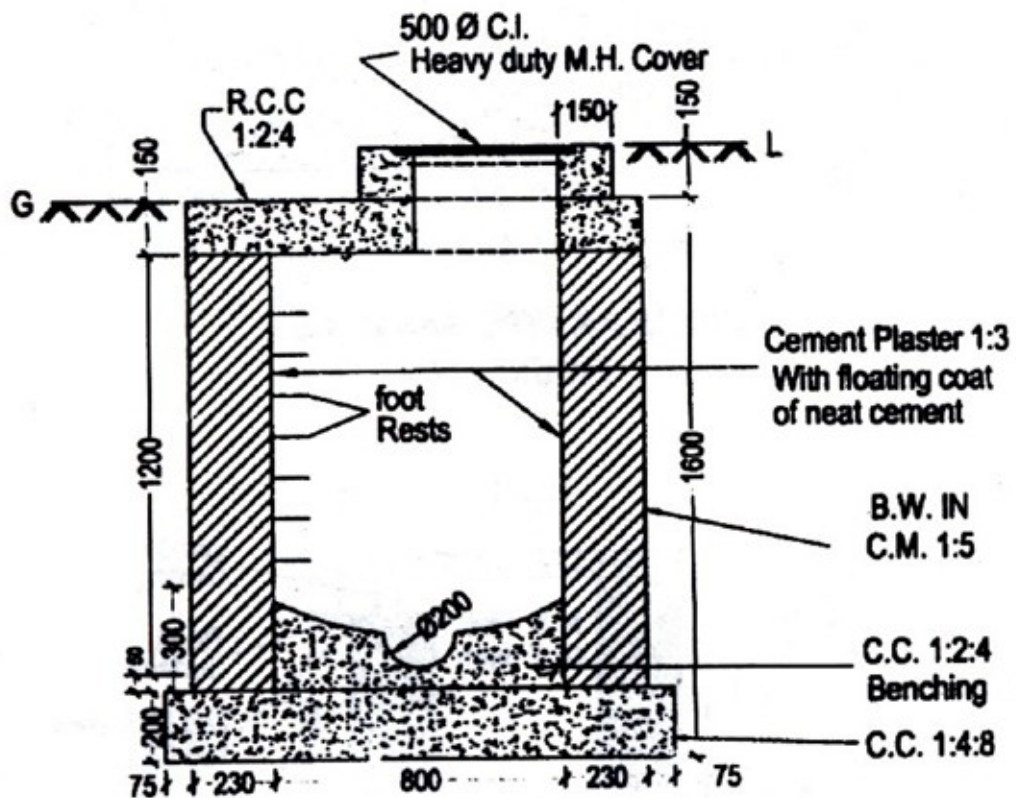


**GULLEY TRAP CHAMBER  
FOR 100X100 mm.  
GULLY TRAP  
FIGURE - 3**

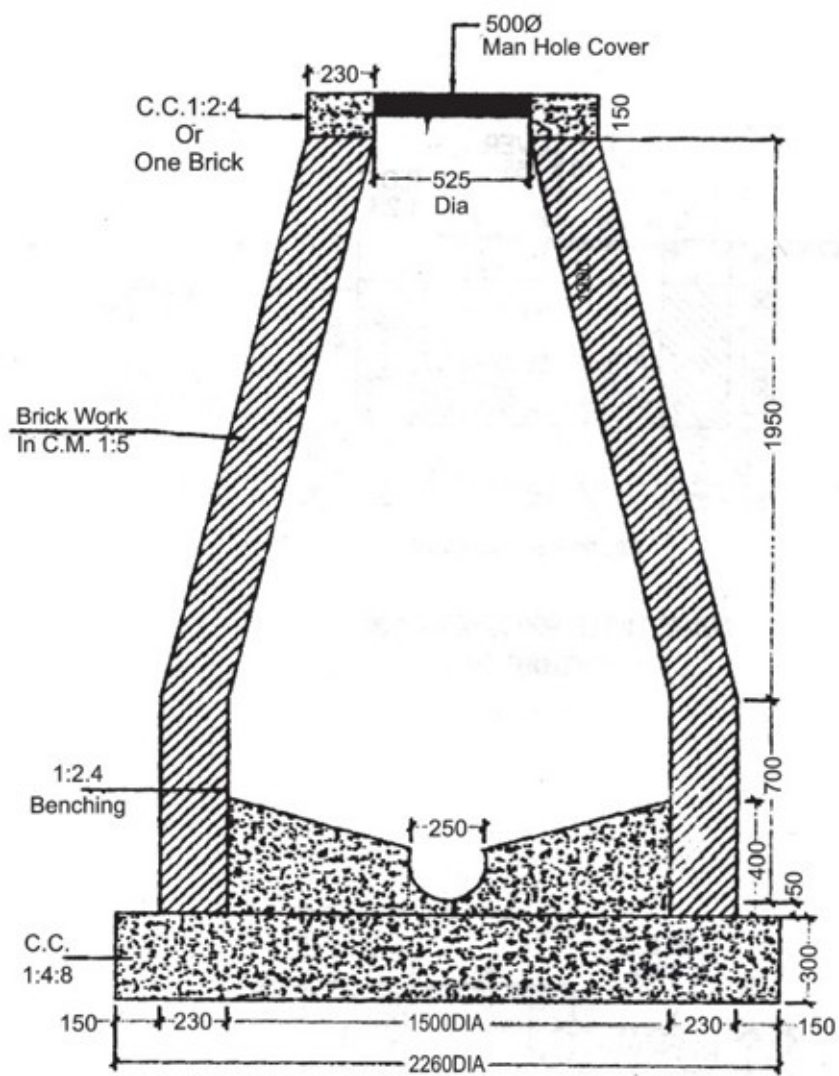




MAN HOLE 900X800X450  
FIGURE - 4

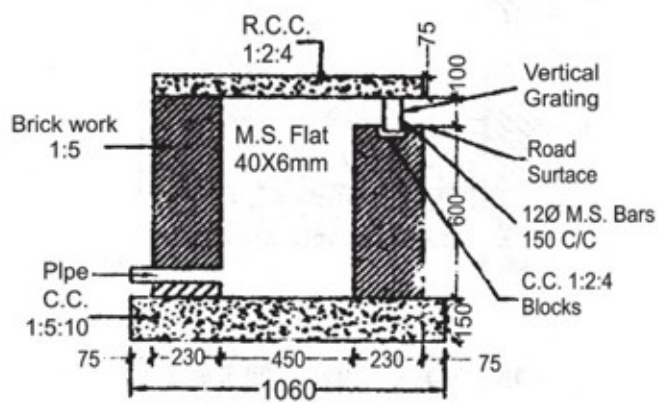


MAN HOLE 1200X800X800  
FIGURE - 5



CIRCULAR TYPE MAN HOLE

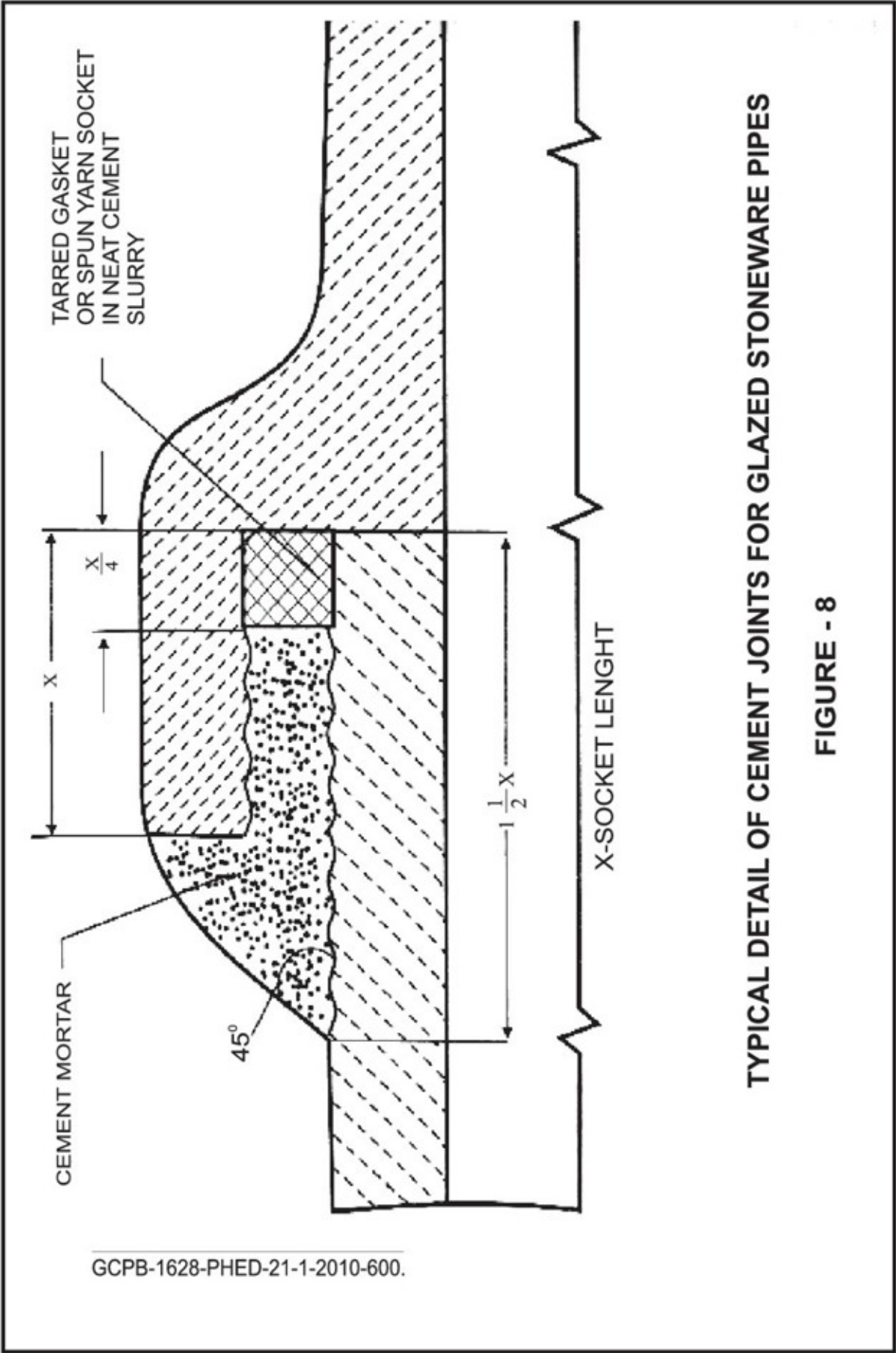
FIGURE -6



ROAD GULLEY CHAMBER

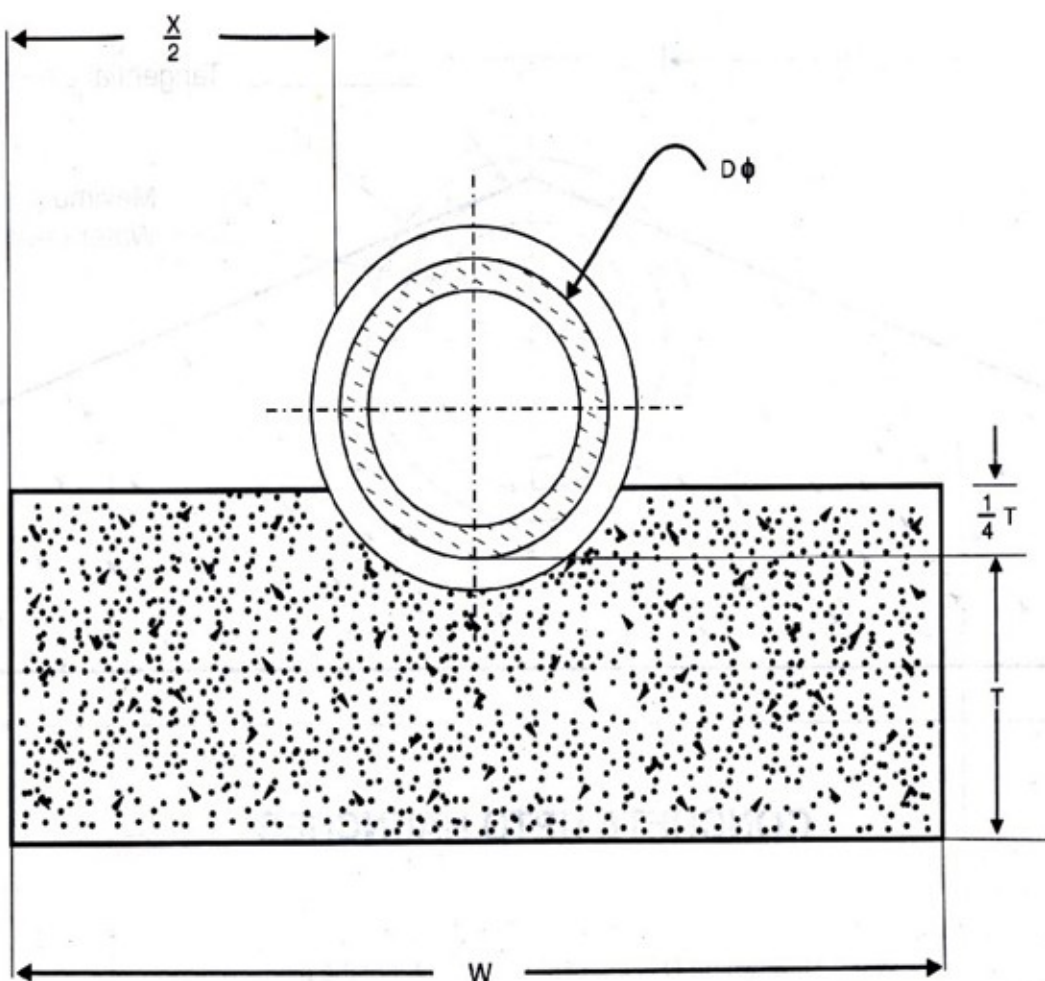
400X450X775 (VERTICAL GRATING)

FIGURE -7



TYPICAL DETAIL OF CEMENT JOINTS FOR GLAZED STONEWARE PIPES

FIGURE - 8



### BEDDING

$W = D + X$ , where  $D$  is the external diameter of the pipe.

$X = 300\text{mm}$  upto trench depth of  $1200\text{mm}$

$400\text{mm}$  for trench depth more than  $1200\text{mm}$

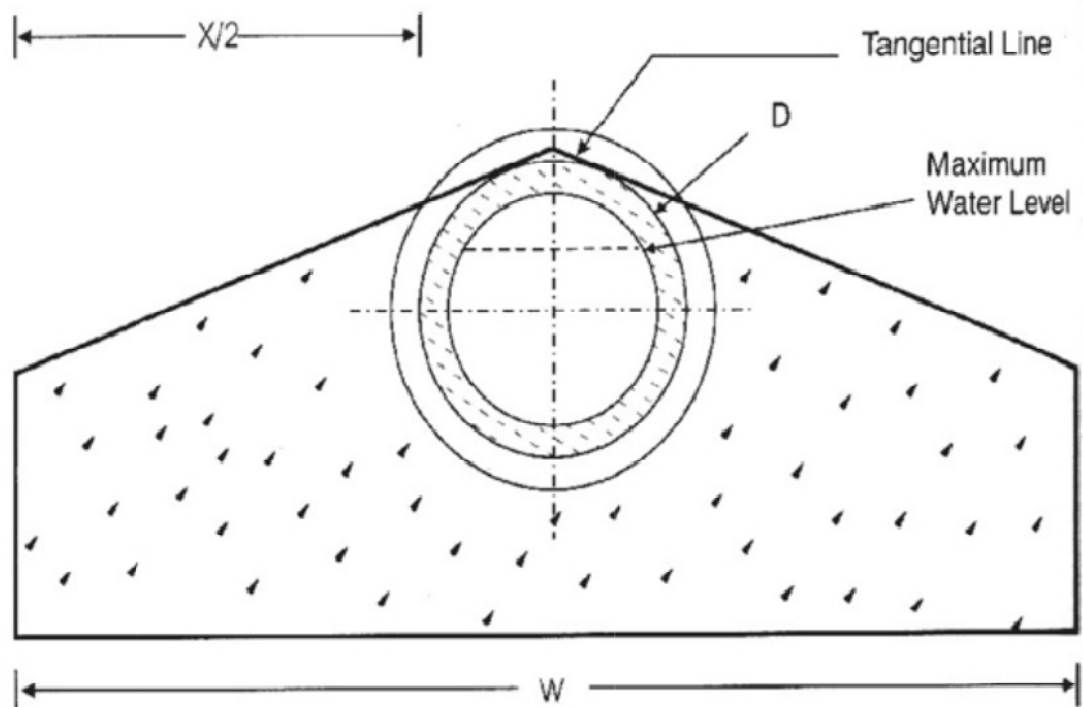
$T = 100\text{ mm}$  for pipes under  $150\text{mm}$

$\frac{1}{4}\text{th}$  internal dia. subject to a min. of  $150\text{mm}$  and max.

$300\text{ mm.}$  for pipes more than  $150\text{ mm}$  dia.

**FIGURE - 9**

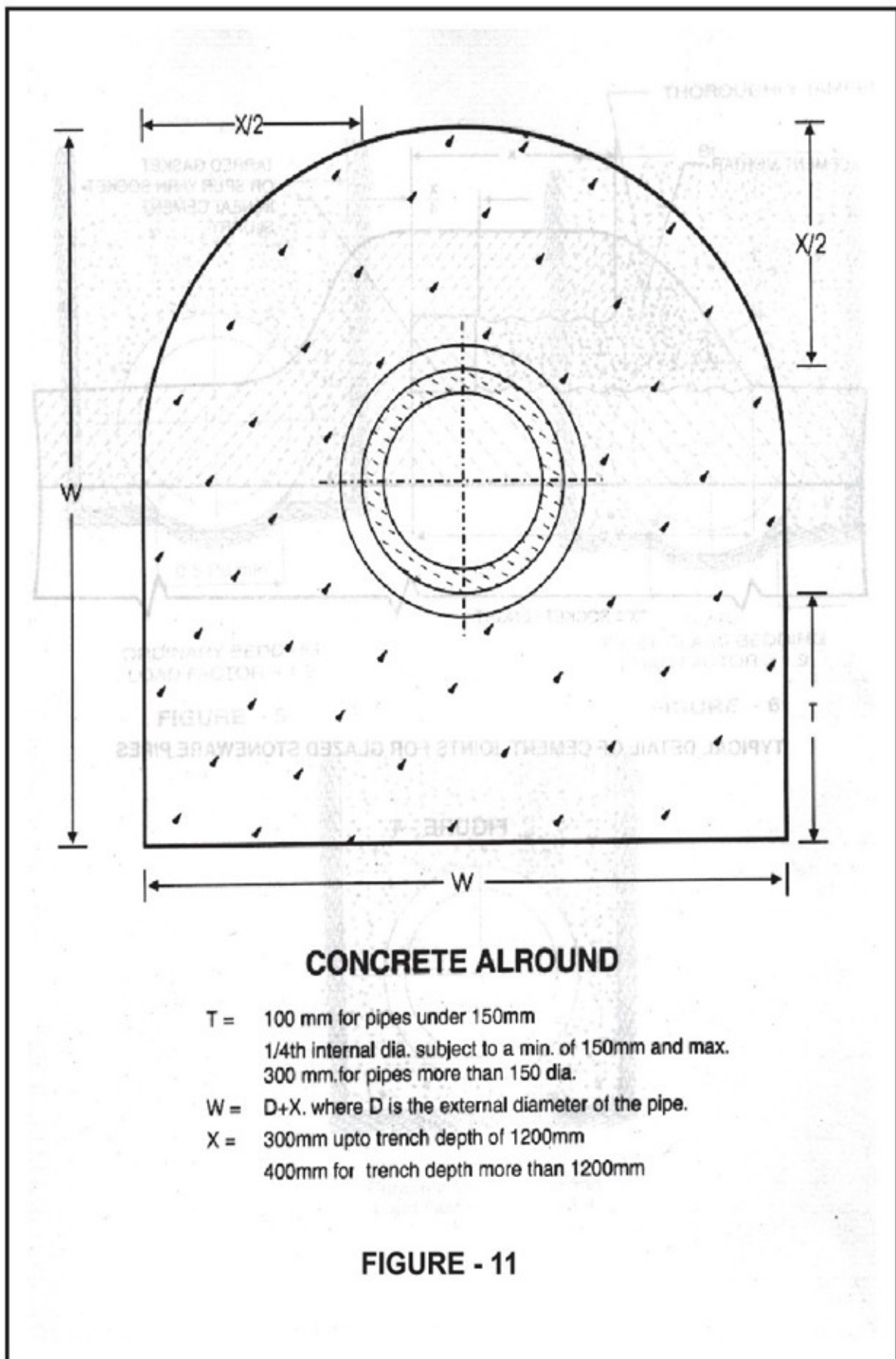


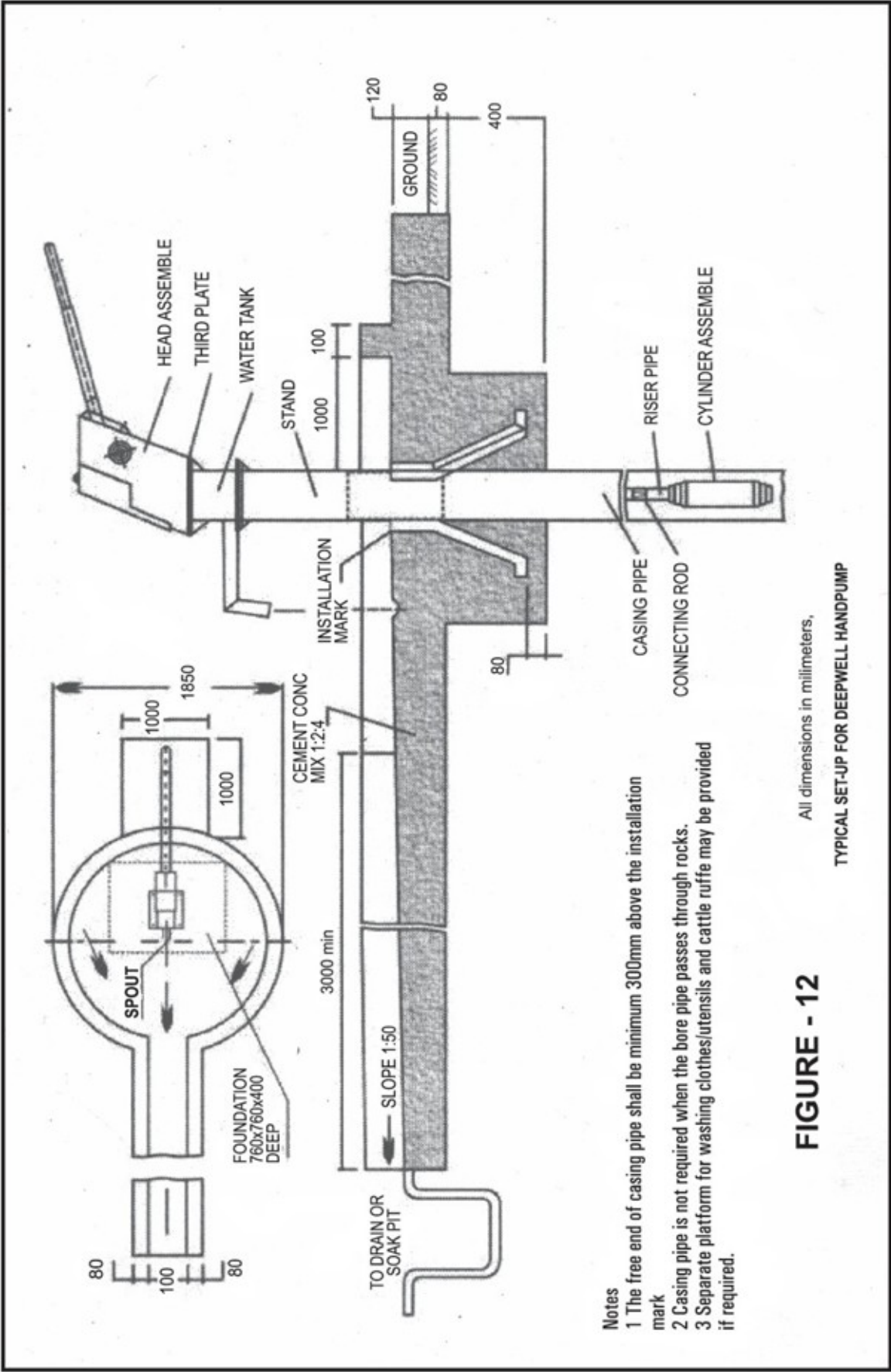


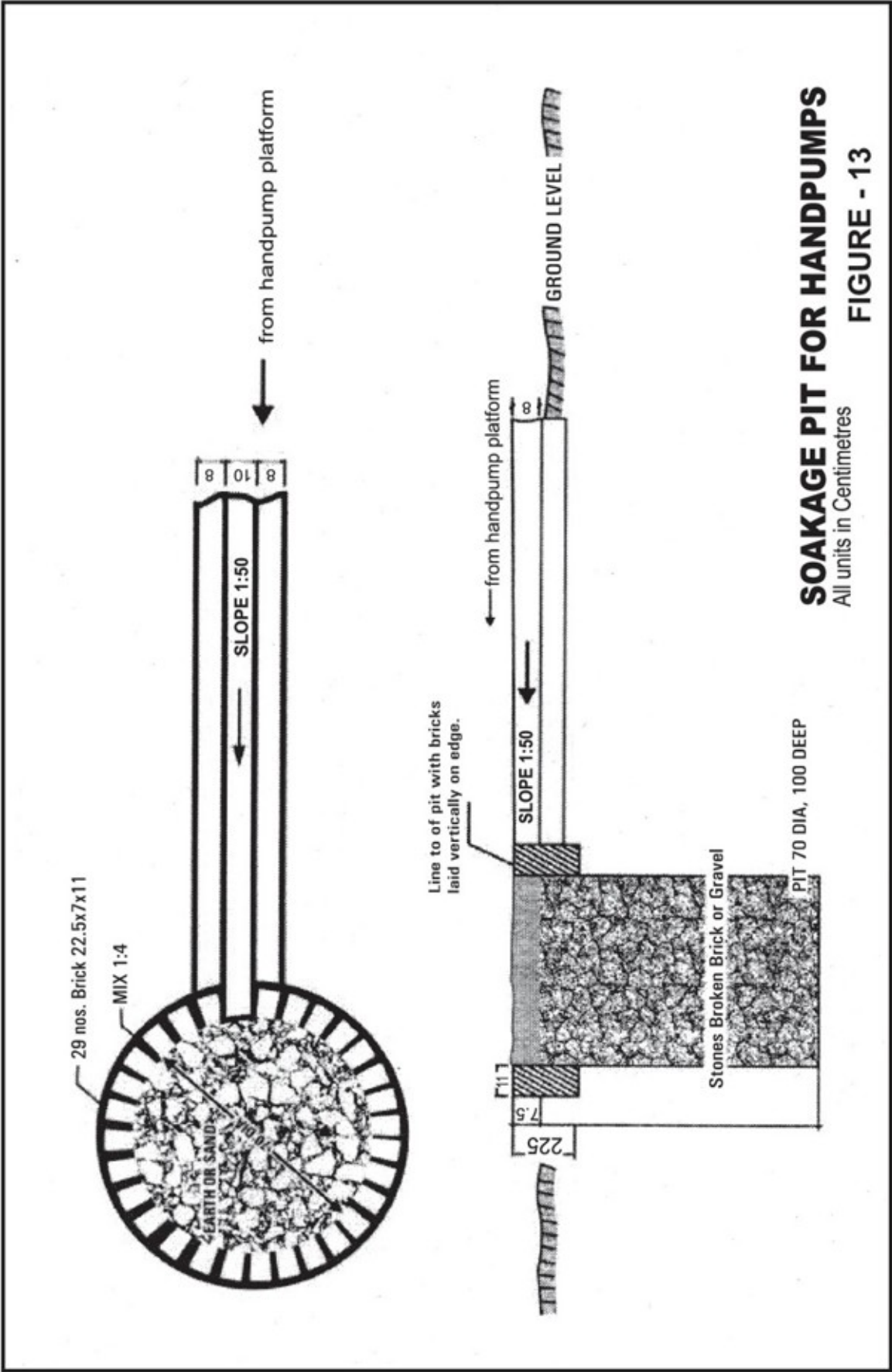
### CONCRETE UPTO HAUNCHES

- $W = D + X$ , where D is the external diameter of the pipe.  
 $X =$  300mm upto trench depth of 1200mm  
           400mm for trench depth more than 1200mm  
 $T =$  100 mm for pipes under 150mm  
           1/4th internal dia. subject to a min. of 150mm and max.  
           300 mm. for pipes more than 150 dia.

**FIGURE - 10**







**SOAKAGE PIT FOR HANDPUMPS**

All units in Centimetres

**FIGURE - 13**



## ORDINARY TUBEWELL

125 /115 mm.dia

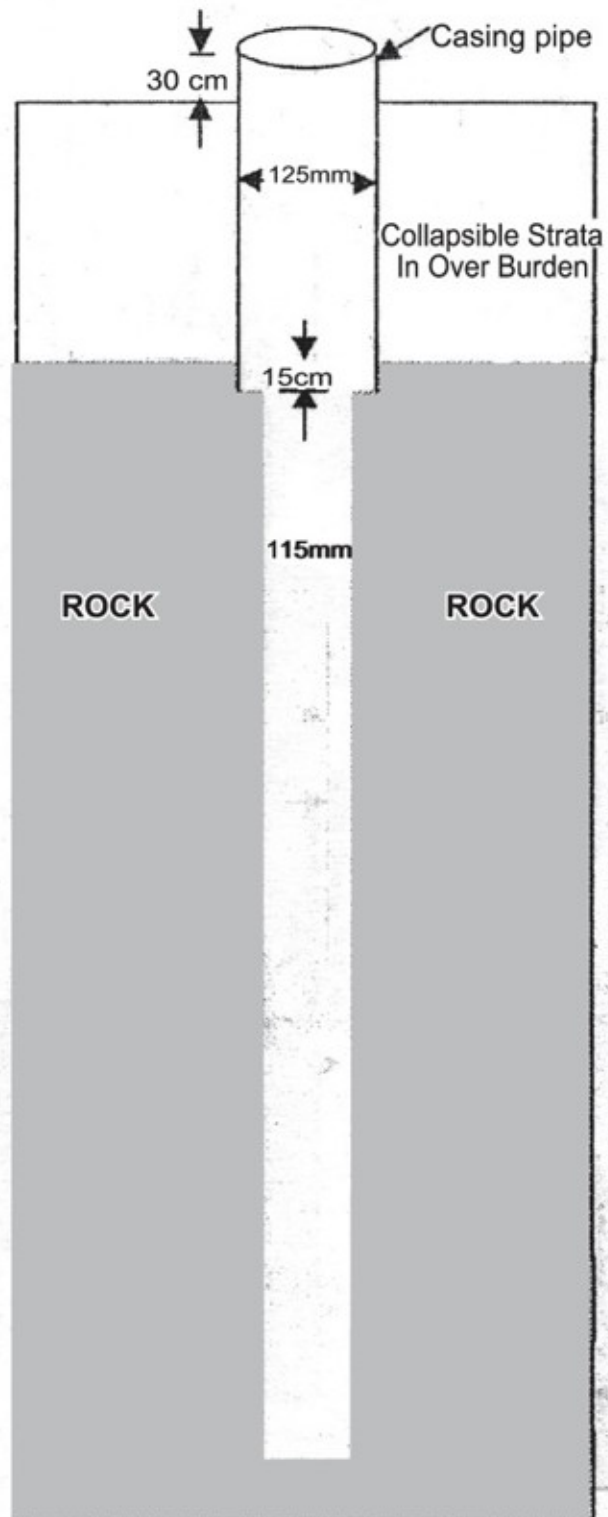


FIGURE - 14

## ORDINARY TUBEWELL

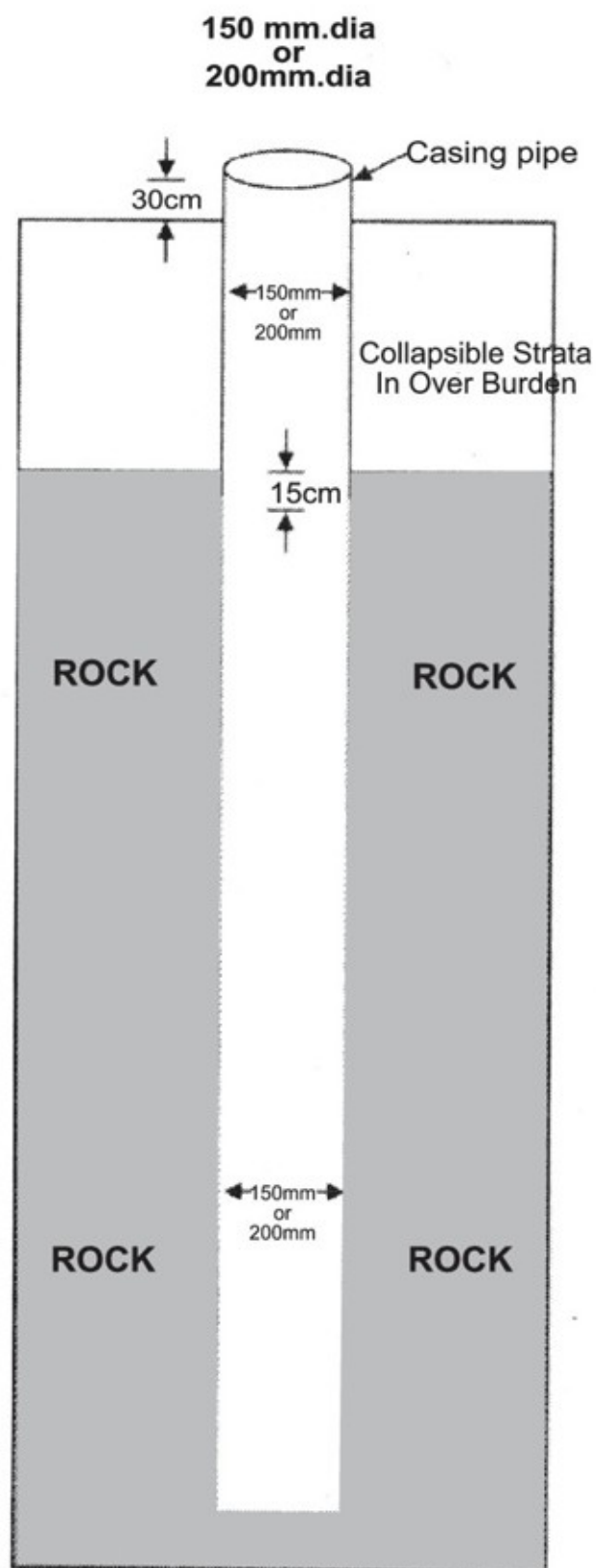


FIGURE - 15

200/150/125 mm dia. TUBEWELL

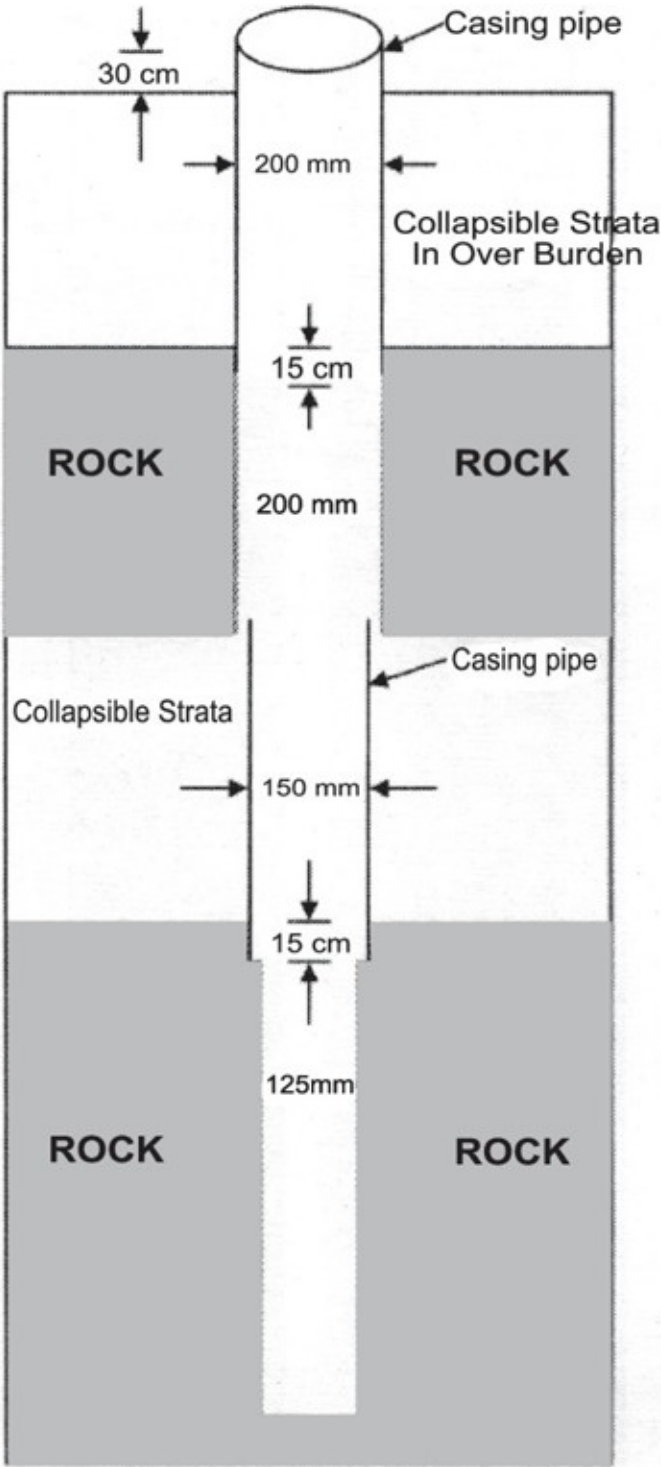


FIGURE - 16

150/125/115 mm dia. TUBEWELL

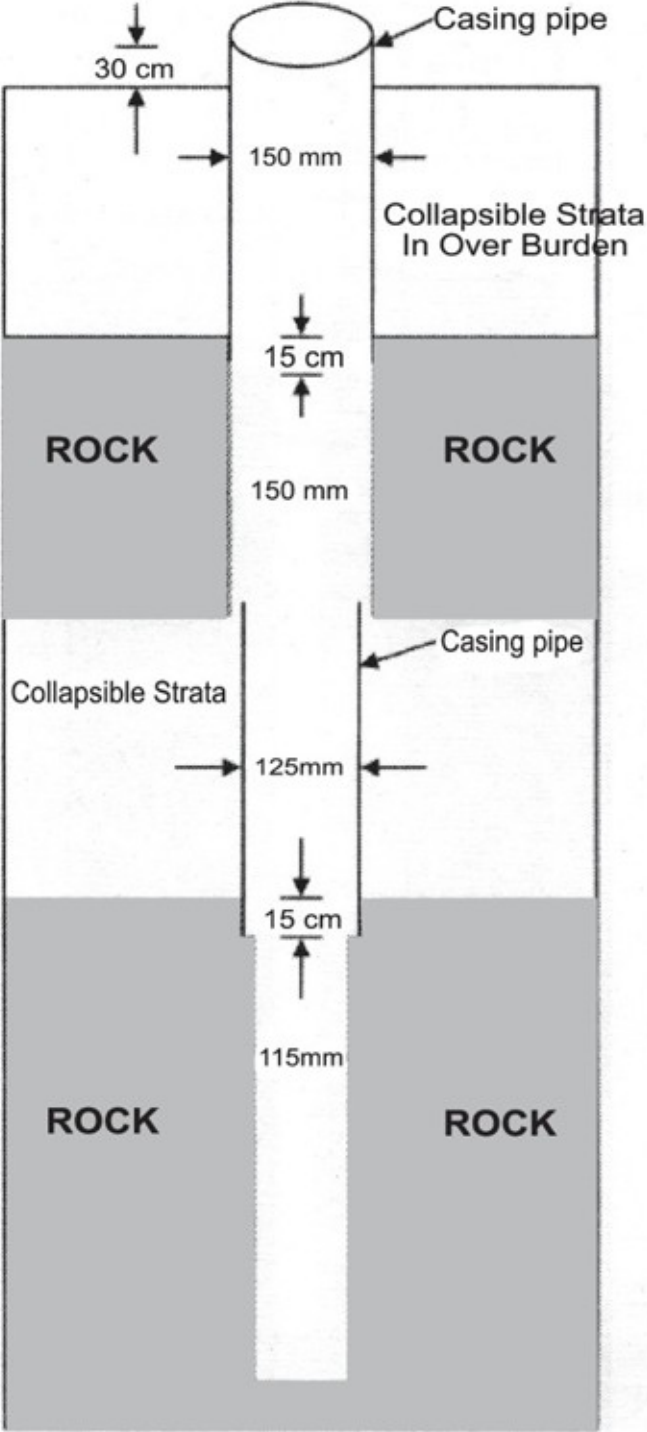
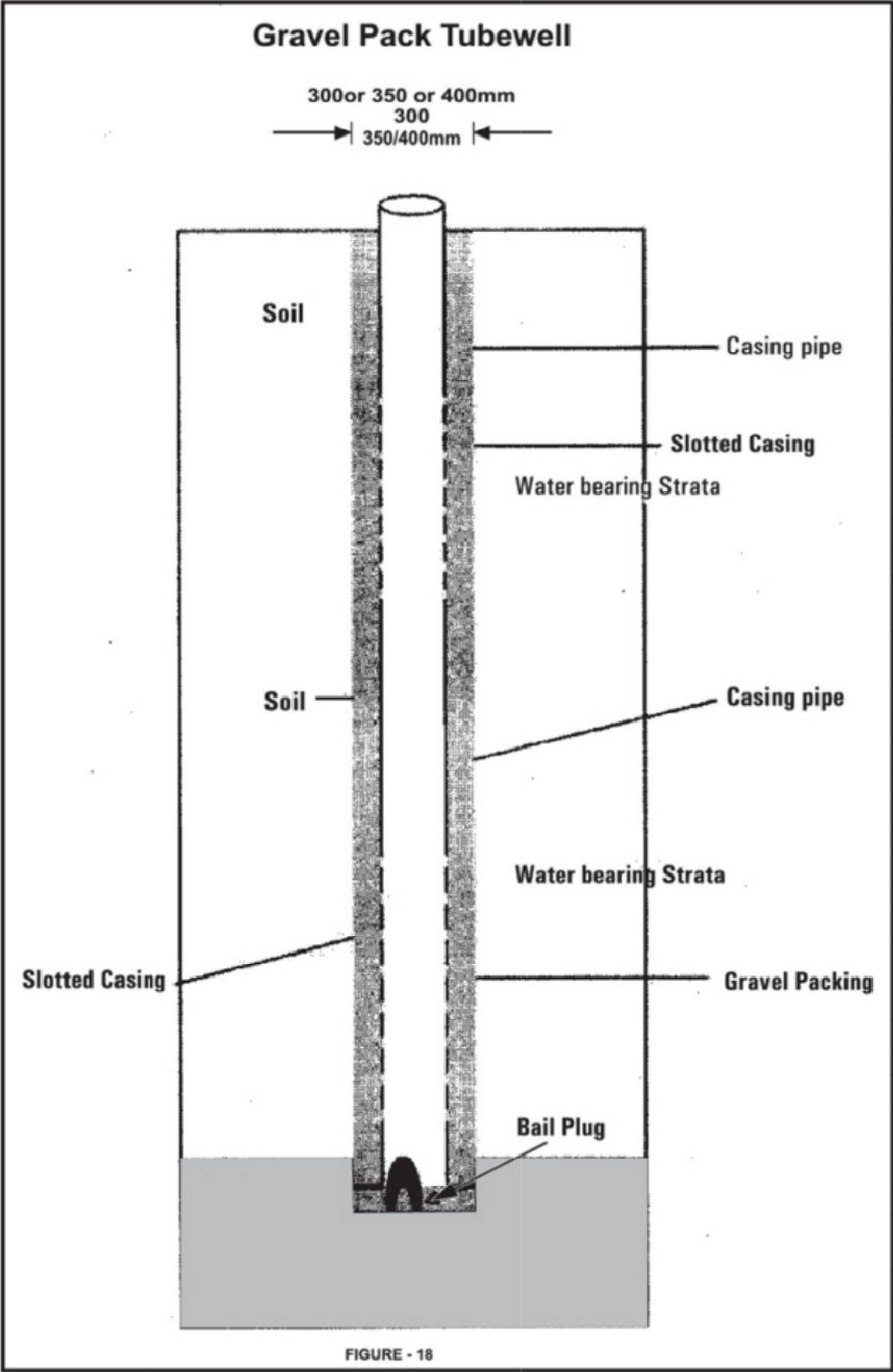
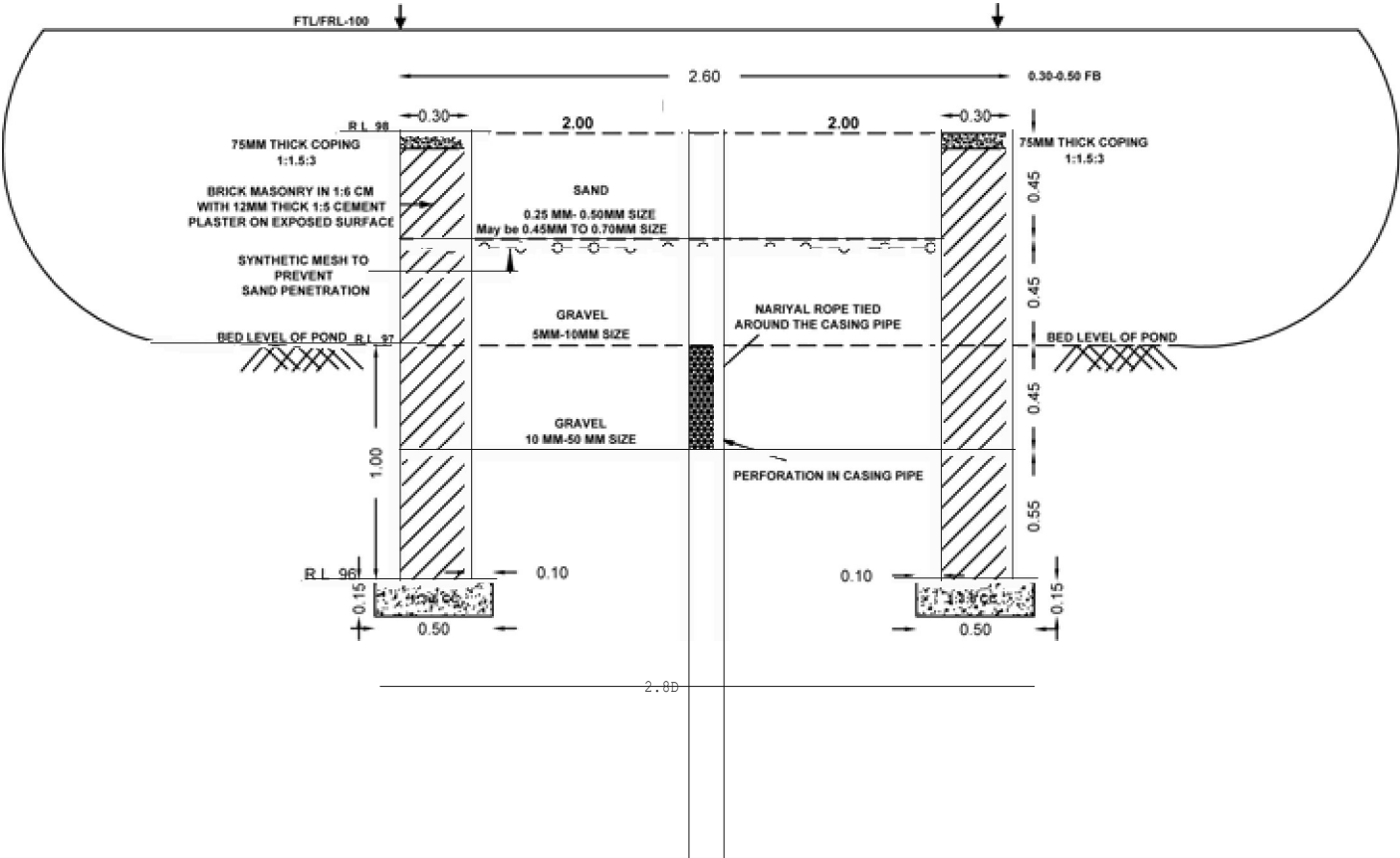


FIGURE - 17



DRAWING FOR CONSTCUTION OF RECHARGING PIT ONLY FOR  
CONSTRUCTION OF RECHARGING SHAFT IN SUBMERGENCE

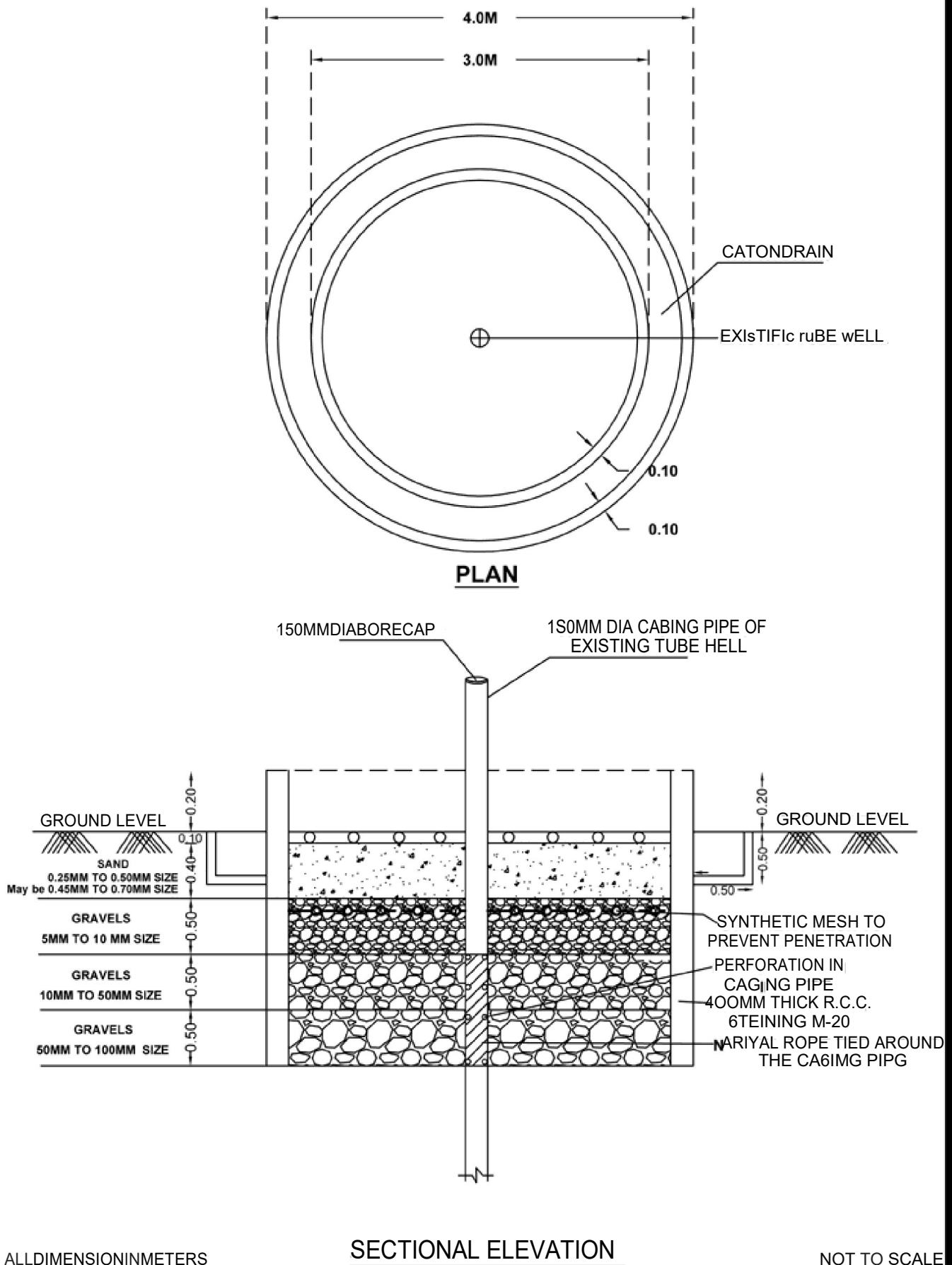


NDTE :-

4. ALL DIMENSION IN METERS
2. MINIMUM CASING IN RECHARGE SHAFT SHALL BE 9.60M OR UPTO HARD STRATA IT IS TO PREVENT ENTRY OF POLLUTED WATER IN AQUIFER
3. RECTANGULAR PITS SIZE = 2.60M.00 X 1.00M NOT TO SCALE

RECHARGE SHAFT WITH VERTICAL FILTER TO BE CONSTRUCTED IN  
THE SUBMERGENCE OF RESERVOIR

## DRAWING FOR CONSTCUTION OF RECHARGING PIT WITH STEINING AND CATCH DRAIN AROUND TUBE WELL

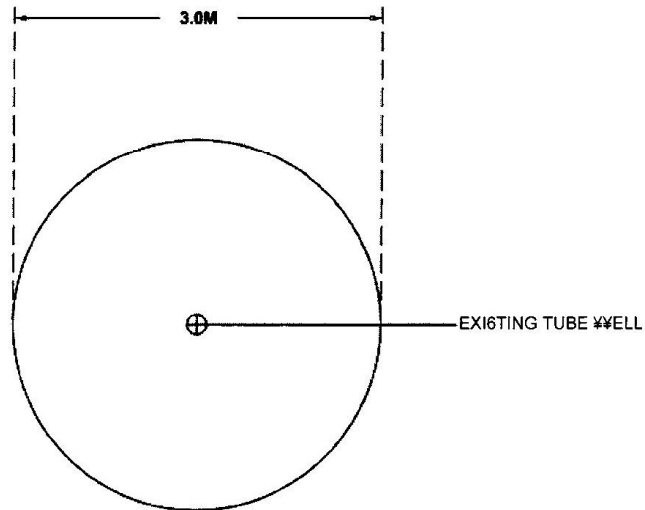


ALLDIMENSIONINMETERS

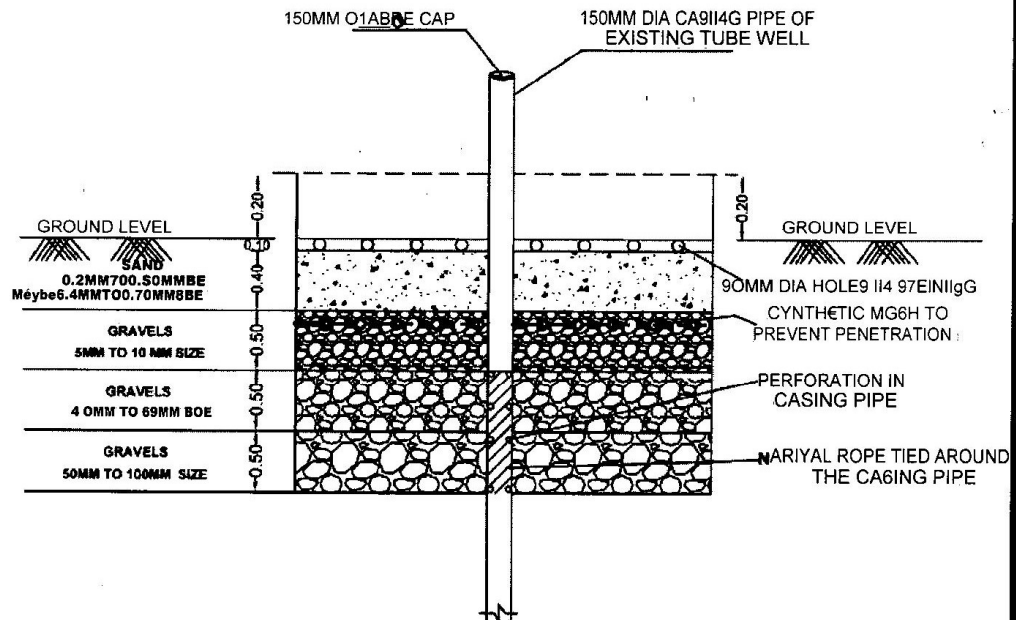
## SECTIONAL ELEVATION

NOT TO SCALE

**DRAWING FOR CONSTRUCTION OF RECHARGING PIT  
AROUND TUBE WELL, IN SOFT/HARD ROCK AREA**



**PLAN**

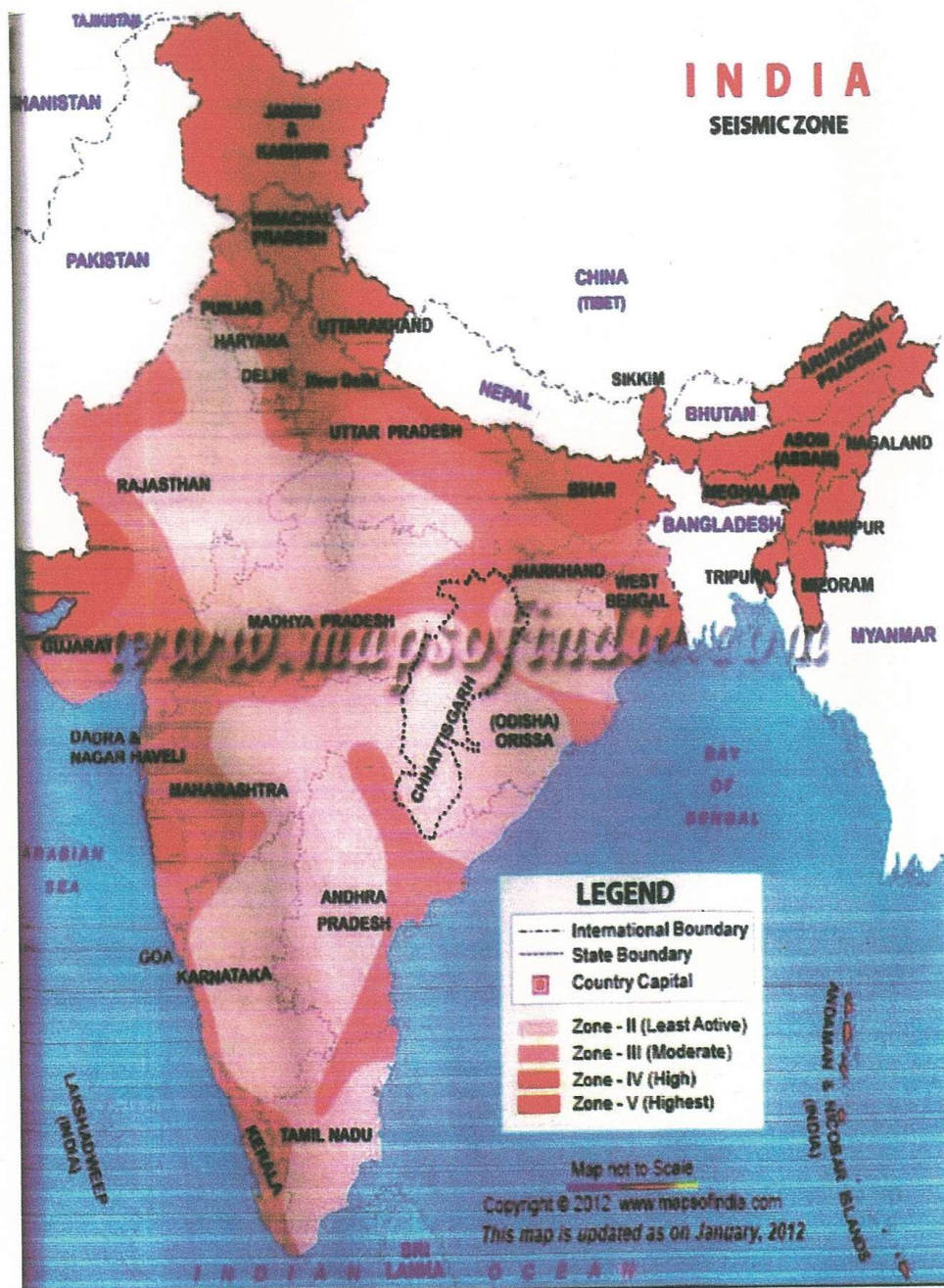


**SECTIONAL ELEVATION**

ALL DIMENSIONS IN METERS

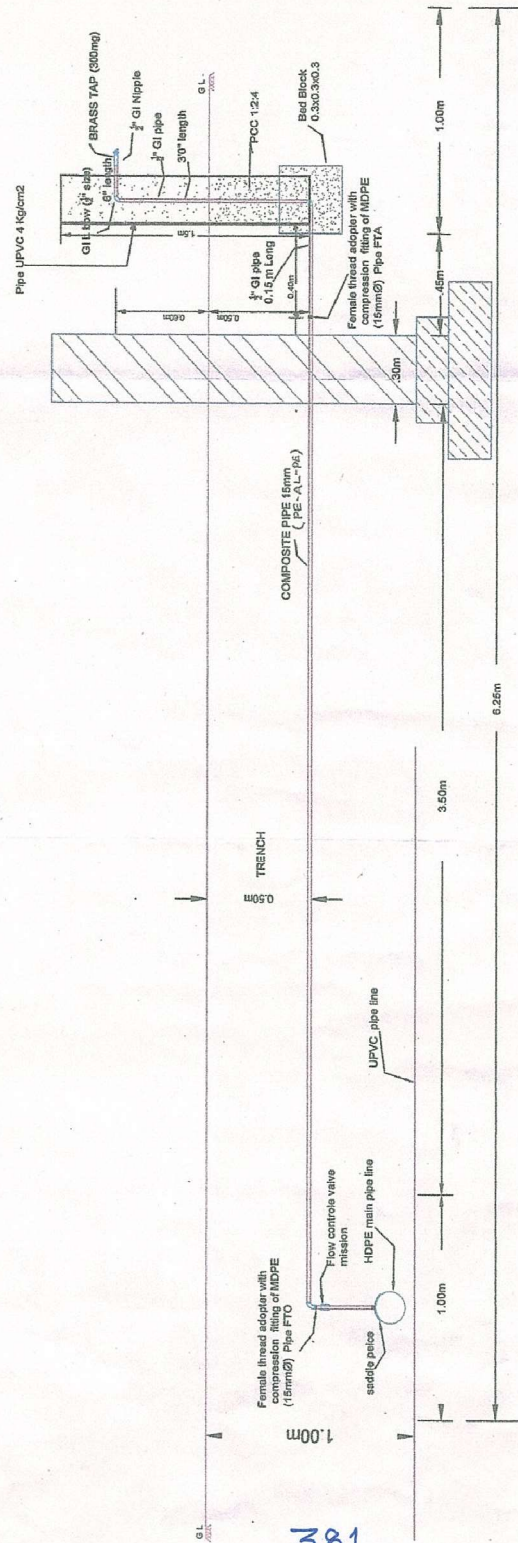
NOT TO SCALE





# FHTC UNDER JJM CHHATTISGARH

Layout of Pipe Line Network From Main Line To Service Connection For Household







लोक स्वास्थ्य यांत्रिकी विभाग छत्तीसगढ़  
ग्रामीण पेयजल शिकायत हेतु टोल फ्री नम्बर-18002330008