कार्यालय प्रमुख अभियंता
लोक स्वास्थ्य यांत्रिकी विभाग
तृतीय तल, ब्लाक–बी–4 इन्द्रावती भवन, नवा रायपुर, अटल नगर, छत्तीसगढ़

क्रमांक 102 /स्था.शा./प्र.अ./लो.स्वा.यां.वि./2022 नवा रायपुर, दिनांक 01/07/2022

Amendment No. 07/2022-23

यू.एस.ओ.आर. समिति की बैठक दिनांक 30.05.2022 में लिये गये निर्णय एवं अनुशंसा के आधार पर समिति द्वारा विभागीय यू.एस.ओ.आर. जारी दिनांक 01.06.2020 (अद्यतन समस्त संशोधन सहित) में निम्नलिखित चेप्टरों में संशोधन/नवीन आयटम शामिल किया जाता है :–

Chapter No.	PARTICULAR'S	Details of Items amended in the USOR	Details of Items added in the USOR
IV	Ductile Iron Pressure Pipes with (Tyton Joints) Valves and Specials	All Item's (no. 4.1 to 4.53) Amendments.	-
VII	P.V.C Pipes, O-Pvc Pipes & Fittings	All Item's (7.1 to 7.15) Amendment.	-
IX	HDPE Pipe, MDPE Pipe & Specials	All Item's (9.1 to 9.14.6.13) Amendment.	
XVIII	Survey And Allied Civil Works	All Item's Survey (18.1 to 18.12.6), Allied civil works (18.13 to 18.79) Amendment.	-
XIX	General Miscellaneous	General Miscellaneous Item no. (19.1 to 19.34) Amendment.	-
XX	Intakewell Works	All Item's (20.1 to 20.22) Amendment.	-
XXI	Water Treatment Plants	All Item's (21.1.1 to 21.3.6) Amendment.	-
XXII	Sewage Treatment Plants	All Item's (22.1.1 to 22.2.5) Amendment.	-
XXIII	RCC Elevated Service Reservoirs	All Item's (23.1 to 23.28) Amendment.	1 A. Elevated service reservoirs with RCC staging & Zinc alloy coated steel tank (Item no. 23.29 to 23.36), 1.B Elevated service reservoirs with RCC staging & Polyethylene (HDPE) slim tank (Item no. 23.37 to 23.44) capacity 20000 ltr to 35000 ltr.
XXIV	Ground Service Reservoirs	All Item's (24.1 to 24.21) Amendment.	-
XXV	Water Meters	All Item's (25.1 to 25.5) Amendment.	-
XXVI	Ancillary Items	All Item's (26.1 to 26.17) Amendment.	Online automatic chlorination systems (Item no. 26.18 to 26.19)

यह आदेश तत्काल प्रभावशील माना जावे।

01.7.2022

प्रमुख अभियंता
लोक स्वास्थ्य यांत्रिकी विभाग
छत्तीसगढ़, नवा रायपुर

पृ.क्रमांक 2719 त.शा./प्र.अ./लो.स्वा.यां.वि./2022 नवा रायपुर, दिनांक 01/07/2022

प्रतिलिपि :–

1) स्टॉफ ऑफिसर, अपर मुख्य सचिव, छत्तीसगढ़ शासन, लोक स्वास्थ्य यांत्रिकी विभाग, मंत्रालय, महानदी भवन, नवा रायपुर की ओर प्रेषित। कृपया अपर मुख्य सचिव महोदय को अवगत कराना चाहेंगे।

2) सचिव, छत्तीसगढ़ शासन, लोक स्वास्थ्य यांत्रिकी विभाग, मंत्रालय, महानदी भवन, नवा रायपुर की ओर सूचनार्थ।

3) मिशन संचालक, जल जीवन मिशन, नीर भवन, रायपुर की ओर सूचनार्थ।

4) प्रमुख अभियंता, जल संसाधन विभाग/लोक निर्माण विभाग, छत्तीसगढ़ की ओर सूचनार्थ।

5) महालेखाकार, छत्तीसगढ़, रायपुर की ओर सूचनार्थ।

6) मुख्य तकनीकी परीक्षक, छत्तीसगढ़, इंद्रावती भवन, नवा रायपुर की ओर सूचनार्थ।

7) मुख्य अभियंता, लोक स्वास्थ्य यांत्रिकी विभाग, परिक्षेत्र रायपुर/बिलासपुर/जगदलपुर की ओर सूचनार्थ एवं पालनार्थ प्रेषित।

8) अधीक्षण अभियंता,लो.स्वा.यां.वि.,मंडलरायपुर/दुर्ग/बिलासपुर/अंबिकापुर/जगदलपुर /कोण्डागांव एवं (वि./यां.) मंडल रायपुर की ओर सूचनार्थ एवं पालनार्थ प्रेषित।

9) कार्यपालन अभियंता, लोक स्वास्थ्य यांत्रिकी, खंड/परियोजना खंड/(वि./यां.) खंड ..... की ओर सूचनार्थ एवं पालनार्थ प्रेषित।

01.7.2022

प्रमुख अभियंता
लोक स्वास्थ्य यांत्रिकी विभाग
छत्तीसगढ़, नवा रायपुर

INDEX

Amendment No. 07/2022-23

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. 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

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

S.No.	Items	Unit	Rates in Rs.
4.1	**Providing, laying and jointing including testing following socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-7) conforming to IS: 8329/ 2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/2018**		
	100 mm Dia	Meter	1309
	150 mm Dia	Meter	1804
	200 mm Dia	Meter	2378
	250 mm Dia	Meter	3083
	300 mm Dia	Meter	3774
	350 mm Dia	Meter	4718
	400 mm Dia	Meter	5642
	450 mm Dia	Meter	6704
	500 mm Dia	Meter	7794
	600 mm Dia	Meter	10274
	700 mm Dia	Meter	13867
	750 mm Dia	Meter	16036
	800 mm dia	Meter	18281
	900 mm dia	Meter	22163
	1000 mm dia	Meter	26491
4.2	**Labour for laying in position including testing following socket & spigot Ductile Iron (K-7) pressure pipes**		
	100 mm Dia	Meter	26
	150 mm Dia	Meter	36
	200 mm Dia	Meter	56
	250 mm Dia	Meter	74
	300 mm Dia	Meter	92
	350 mm Dia	Meter	123
	400 mm Dia	Meter	147
	450 mm Dia	Meter	173
	500 mm Dia	Meter	203
	600 mm Dia	Meter	268
	700 mm Dia	Meter	339
	750 mm Dia	Meter	445
	800 mm dia	Meter	564
	900 mm dia	Meter	693
	1000 mm dia	Meter	837

S.No.	Items	Unit	Rates in Rs.
4.3	**Providing, laying and jointing including testing following socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-9) conforming to IS 8329 /2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/2018**		
	100 mm Dia	Meter	1555
	150 mm Dia	Meter	2037
	200 mm Dia	Meter	2749
	250 mm Dia	Meter	3688
	300 mm Dia	Meter	4552
	350 mm Dia	Meter	5612
	400 mm Dia	Meter	6737
	450 mm Dia	Meter	8175
	500 mm Dia	Meter	9497
	600 mm Dia	Meter	12405
	700 mm Dia	Meter	15958
	750 mm Dia	Meter	17994
	800 mm dia	Meter	19653
	900 mm dia	Meter	24010
	1000 mm dia	Meter	28980
4.4	**Labour for laying in position including testing following socket & spigot Ductile Iron (K-9) pressure pipes**		
	100 mm Dia	Meter	26
	150 mm Dia	Meter	36
	200 mm Dia	Meter	56
	250 mm Dia	Meter	74
	300 mm Dia	Meter	92
	350 mm Dia	Meter	123
	400 mm Dia	Meter	147
	450 mm Dia	Meter	173
	500 mm Dia	Meter	203
	600 mm Dia	Meter	268
	700 mm Dia	Meter	339
	750 mm Dia	Meter	445
	800 mm dia	Meter	564
	900 mm dia	Meter	693
	1000 mm dia	Meter	837
4.5	**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.)**		
	100 mm Dia	Each	117
	150 mm Dia	Each	148
	200 mm Dia	Each	242
	250 mm Dia	Each	289
	300 mm Dia	Each	370
	350 mm Dia	Each	425
	400 mm Dia	Each	705
	450 mm Dia	Each	812
	500 mm Dia	Each	827

S.No.	Items	Unit	Rates in Rs.
	600 mm Dia	Each	1025
	700 mm Dia	Each	1424
	750 mm Dia	Each	1564
	800 mm dia	Each	1656
	900 mm dia	Each	1986
	1000 mm dia	Each	2267
4.6	**Labour for providing including testing, Rubber Gasket (push on) joints to following D.I. Pipes class K-7 & K-9 including joints but excluding cost of Rubber Gasket.**		
	100 mm Dia	Each	74
	150 mm Dia	Each	82
	200 mm Dia	Each	86
	250 mm Dia	Each	104
	300 mm Dia	Each	111
	350 mm Dia	Each	130
	400 mm Dia	Each	167
	450 mm Dia	Each	185
	500 mm Dia	Each	198
	600 mm Dia	Each	241
	700 mm Dia	Each	282
	750 mm Dia	Each	294
	800 mm dia	Each	312
	900 mm dia	Each	367
	1000 mm dia	Each	393

DUCTILE IRON FITTING PN - 16

Note :- If PN-10 fitting is used than 90% of rate is payable for providing and fixing of fitting.

S.No.	Items	Unit	Rates in Rs.
4.7	**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.**		
	100 mm Dia	Each	1288
	150 mm Dia	Each	2005
	200 mm Dia	Each	3007
	250 mm Dia	Each	4010
	300 mm Dia	Each	5298
	350 mm Dia	Each	8239
	400 mm Dia	Each	10470
	450 mm Dia	Each	13044
	500 mm Dia	Each	16477
	600 mm Dia	Each	22633
	700 mm Dia	Each	35990
	750 mm Dia	Each	39458
	800 mm dia	Each	47914
	900 mm dia	Each	59621
	1000 mm dia	Each	77183

S.No.	Items	Unit	Rates in Rs.
4.8	**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.**		
	100 mm Dia	Each	24
	150 mm Dia	Each	39
	200 mm Dia	Each	56
	250 mm Dia	Each	75
	300 mm Dia	Each	99
	350 mm Dia	Each	128
	400 mm Dia	Each	163
	450 mm Dia	Each	203
	500 mm Dia	Each	257
	600 mm Dia	Each	329
	700 mm Dia	Each	444
	750 mm Dia	Each	486
	800 mm dia	Each	591
	900 mm dia	Each	736
	1000 mm dia	Each	953
4.9	**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.**		
	100 mm Dia	Each	1432
	150 mm Dia	Each	2291
	200 mm Dia	Each	3294
	250 mm Dia	Each	4582
	300 mm Dia	Each	6015
	350 mm Dia	Each	9611
	400 mm Dia	Each	12014
	450 mm Dia	Each	15104
	500 mm Dia	Each	18880
	600 mm Dia	Each	27290
	700 mm Dia	Each	42495
	750 mm Dia	Each	48131
	800 mm dia	Each	53768
	900 mm dia	Each	64392
	1000 mm dia	Each	80436
4.10	**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.**		
	100 mm Dia	Each	26
	150 mm Dia	Each	44
	200 mm Dia	Each	62

S.No.	Items	Unit	Rates in Rs.
	250 mm Dia	Each	86
	300 mm Dia	Each	112
	350 mm Dia	Each	150
	400 mm Dia	Each	187
	450 mm Dia	Each	236
	500 mm Dia	Each	294
	600 mm Dia	Each	425
	700 mm Dia	Each	525
	750 mm Dia	Each	594
	800 mm dia	Each	664
	900 mm dia	Each	796
	1000 mm dia	Each	993
4.11	**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.**		
	100 mm Dia	Each	2647
	150 mm Dia	Each	3896
	200 mm Dia	Each	5035
	250 mm Dia	Each	7592
	300 mm Dia	Each	8901
	350 mm Dia	Each	14142
	400 mm Dia	Each	17309
	450 mm Dia	Each	19791
	500 mm Dia	Each	23336
	600 mm Dia	Each	29619
	700 mm Dia	Each	55459
	750 mm Dia	Each	62016
	800 mm dia	Each	70441
	900 mm dia	Each	82865
	1000 mm dia	Each	106820
4.12	**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.**		
	100 mm Dia	Each	59
	150 mm Dia	Each	81
	200 mm Dia	Each	102
	250 mm Dia	Each	147
	300 mm Dia	Each	171
	350 mm Dia	Each	237
	400 mm Dia	Each	277
	450 mm Dia	Each	316
	500 mm Dia	Each	368
	600 mm Dia	Each	463
	700 mm Dia	Each	695
	750 mm Dia	Each	773
	800 mm dia	Each	874

S.No.	Items	Unit	Rates in Rs.
	900 mm dia	Each	1019
	1000 mm dia	Each	1273
4.13	**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.**		
	100 mm Dia	Each	1428
	150 mm Dia	Each	2595
	200 mm Dia	Each	4154
	250 mm Dia	Each	5972
	300 mm Dia	Each	8439
	350 mm Dia	Each	14350
	400 mm Dia	Each	18639
	450 mm Dia	Each	24247
	500 mm Dia	Each	30845
	600 mm Dia	Each	41750
	700 mm Dia	Each	63723
	750 mm Dia	Each	79126
	800 mm dia	Each	84864
	900 mm dia	Each	112419
	1000 mm dia	Each	139671
4.14	**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.**		
	100 mm Dia	Each	29
	150 mm Dia	Each	54
	200 mm Dia	Each	86
	250 mm Dia	Each	123
	300 mm Dia	Each	173
	350 mm Dia	Each	233
	400 mm Dia	Each	302
	450 mm Dia	Each	393
	500 mm Dia	Each	501
	600 mm Dia	Each	762
	700 mm Dia	Each	1075
	750 mm Dia	Each	1261
	800 mm dia	Each	1495
	900 mm dia	Each	1993
	1000 mm dia	Each	2579
4.15	**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.**		
	100 mm Dia	Each	1298
	125 mm Dia	Each	1687
	150 mm Dia	Each	2078
	200 mm Dia	Each	3376

S.No.	Items	Unit	Rates in Rs.
	250 mm Dia	Each	4673
	300 mm Dia	Each	6361
	350 mm Dia	Each	10722
	400 mm Dia	Each	13526
	450 mm Dia	Each	17649
	500 mm Dia	Each	22268
	600 mm Dia	Each	33649
	700 mm Dia	Each	57896
	750 mm dia	Each	66993
	800 mm dia	Each	79399
	900 mm dia	Each	104832
	1000 mm dia	Each	134907
4.16	**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.**		
	100 mm Dia	Each	26
	125 mm Dia	Each	34
	150 mm Dia	Each	44
	200 mm Dia	Each	70
	250 mm Dia	Each	96
	300 mm Dia	Each	131
	350 mm Dia	Each	173
	400 mm Dia	Each	220
	450 mm Dia	Each	287
	500 mm Dia	Each	362
	600 mm Dia	Each	545
	700 mm Dia	Each	750
	750 mm dia	Each	867
	800 mm dia	Each	1028
	900 mm dia	Each	1357
	1000 mm dia	Each	1742
4.17	**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.**		
	100 mm Dia	Each	1167
	125 mm Dia	Each	1558
	150 mm Dia	Each	1817
	200 mm Dia	Each	2856
	250 mm Dia	Each	4023
	300 mm Dia	Each	5322
	350 mm Dia	Each	8578
	400 mm Dia	Each	11051
	450 mm Dia	Each	14021
	500 mm Dia	Each	17649
	600 mm Dia	Each	25817
	700 mm Dia	Each	44248

S.No.	Items	Unit	Rates in Rs.
	750 mm dia	Each	50865
	800 mm dia	Each	60170
	900 mm dia	Each	77951
	1000 mm dia	Each	94700
4.18	**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.**		
	100 mm Dia	Each	24
	125 mm Dia	Each	31
	150 mm Dia	Each	39
	200 mm Dia	Each	59
	250 mm Dia	Each	82
	300 mm Dia	Each	110
	350 mm Dia	Each	140
	400 mm Dia	Each	178
	450 mm Dia	Each	227
	500 mm Dia	Each	287
	600 mm Dia	Each	420
	700 mm Dia	Each	574
	750 mm dia	Each	659
	800 mm dia	Each	778
	900 mm dia	Each	1008
	1000 mm dia	Each	1225
4.19	**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.**		
	100 mm Dia	Each	1167
	125 mm Dia	Each	1428
	150 mm Dia	Each	1687
	200 mm Dia	Each	2726
	250 mm Dia	Each	3634
	300 mm Dia	Each	4804
	350 mm Dia	Each	7587
	400 mm Dia	Each	9401
	450 mm Dia	Each	12040
	500 mm Dia	Each	15010
	600 mm Dia	Each	21937
	700 mm Dia	Each	36392
	750 mm dia	Each	41560
	800 mm dia	Each	50038
	900 mm dia	Each	66855
	1000 mm dia	Each	79399

S.No.	Items	Unit	Rates in Rs.
4.20	**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.**		
	100 mm Dia	Each	24
	125 mm Dia	Each	29
	150 mm Dia	Each	34
	200 mm Dia	Each	56
	250 mm Dia	Each	75
	300 mm Dia	Each	99
	350 mm Dia	Each	123
	400 mm Dia	Each	152
	450 mm Dia	Each	196
	500 mm Dia	Each	243
	600 mm Dia	Each	357
	700 mm Dia	Each	470
	750 mm dia	Each	538
	800 mm dia	Each	649
	900 mm dia	Each	827
	1000 mm dia	Each	1028
4.21	**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.**		
	100 mm x 80 mm	Each	1817
	100 mm x 100 mm	Each	1948
	150 mm x 80 mm	Each	2467
	150 mm x 100 mm	Each	2726
	150 mm x 150 mm	Each	3116
	200 mm x 80 mm	Each	3634
	200 mm x 100 mm	Each	3895
	200 mm x 150 mm	Each	4532
	200 mm x 200 mm	Each	5193
	250 mm x 80 mm	Each	4673
	250 mm x 100 mm	Each	4933
	250 mm x 150 mm	Each	5582
	250 mm x 250 mm	Each	7140
	300 mm x 100 mm	Each	6361
	300 mm x 200 mm	Each	8049
	300 mm x 300 mm	Each	9995
4.22	**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.**		
	100 mm x 80 mm	Each	39
	100 mm x 100 mm	Each	41
	150 mm x 80 mm	Each	51
	150 mm x 100 mm	Each	56

S.No.	Items	Unit	Rates in Rs.
	150 mm x 150 mm	Each	65
	200 mm x 80 mm	Each	75
	200 mm x 100 mm	Each	80
	200 mm x 150 mm	Each	91
	200 mm x 200 mm	Each	106
	250 mm x 80 mm	Each	96
	250 mm x 100 mm	Each	101
	250 mm x 150 mm	Each	116
	250 mm x 250 mm	Each	147
	300 mm x 100 mm	Each	131
	300 mm x 200 mm	Each	166
	300 mm x 300 mm	Each	206
4.23	**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.**		
	100 mm x 80 mm	Each	2148
	100 mm x 100 mm	Each	2291
	150 mm x 80 mm	Each	3007
	150 mm x 100 mm	Each	3150
	150 mm x 150 mm	Each	3866
	200 mm x 80 mm	Each	4153
	200 mm x 100 mm	Each	4440
	200 mm x 150 mm	Each	5155
	200 mm x 200 mm	Each	6015
	250 mm x 80 mm	Each	5298
	250 mm x 100 mm	Each	5585
	250 mm x 150 mm	Each	6443
	250 mm x 200 mm	Each	7304
	250 mm x 250 mm	Each	8449
	300 mm x 80 mm	Each	6888
	300 mm x 100 mm	Each	7160
	300 mm x 150 mm	Each	8162
	300 mm x 200 mm	Each	9164
	300 mm x 250 mm	Each	10453
	300 mm x 300 mm	Each	11885
	350 mm x 100 mm	Each	10298
	350 mm x 200 mm	Each	12872
	350 mm x 350 mm	Each	18536
	400 mm x 80 mm	Each	11673
	400 mm x 100 mm	Each	12359
	400 mm x 150 mm	Each	13903
	400 mm x 200 mm	Each	15232
	400 mm x 300 mm	Each	19051
	400 mm x 400 mm	Each	23858
	450 mm x 100 mm	Each	15276
	450 mm x 250 mm	Each	20598
	500 mm x 100 mm	Each	18365

S.No.	Items	Unit	Rates in Rs.
	500 mm x 200 mm	Each	22142
	500 mm x 400 mm	Each	31925
	500 mm x 500 mm	Each	38963
	600 mm x 200 mm	Each	30553
4.24	**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.**		
	100 mm x 80 mm	Each	41
	100 mm x 100 mm	Each	44
	150 mm x 80 mm	Each	56
	150 mm x 100 mm	Each	59
	150 mm x 150 mm	Each	72
	200 mm x 80 mm	Each	77
	200 mm x 100 mm	Each	82
	200 mm x 150 mm	Each	96
	200 mm x 200 mm	Each	112
	250 mm x 80 mm	Each	99
	250 mm x 100 mm	Each	104
	250 mm x 150 mm	Each	121
	250 mm x 200 mm	Each	137
	250 mm x 250 mm	Each	157
	300 mm x 80 mm	Each	128
	300 mm x 100 mm	Each	135
	300 mm x 150 mm	Each	152
	300 mm x 200 mm	Each	171
	300 mm x 250 mm	Each	196
	300 mm x 300 mm	Each	222
	350 mm x 100 mm	Each	161
	350 mm x 200 mm	Each	201
	350 mm x 350 mm	Each	289
	400 mm x 80 mm	Each	181
	400 mm x 100 mm	Each	193
	400 mm x 150 mm	Each	217
	400 mm x 200 mm	Each	238
	400 mm x 300 mm	Each	297
	400 mm x 400 mm	Each	372
	450 mm x 100 mm	Each	238
	450 mm x 250 mm	Each	321
	500 mm x 100 mm	Each	287
	500 mm x 200 mm	Each	345
	500 mm x 400 mm	Each	498
	500 mm x 500 mm	Each	607
	600 mm x 200 mm	Each	476

S.No.	Items	Unit	Rates in Rs.
4.25	**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.**		
	100 mm x 80 mm	Each	1044
	150 mm x 80 mm	Each	1690
	150 mm x 100 mm	Each	1687
	200 mm x 100 mm	Each	2590
	200 mm x 150 mm	Each	2474
	250 mm x 150 mm	Each	3505
	300 mm x 150 mm	Each	4789
	300 mm x 200 mm	Each	4928
	300 mm x 250 mm	Each	4556
	350 mm x 200 mm	Each	8082
	350 mm x 250 mm	Each	7755
	350 mm x 300 mm	Each	7442
	400 mm x 250 mm	Each	10228
	400 mm x 300 mm	Each	9737
	400 mm x 350 mm	Each	9105
	450 mm x 350 mm	Each	12045
	450 mm x 400 mm	Each	11418
	500 mm x 350 mm	Each	15543
	500 mm x 400 mm	Each	14796
	600 mm x 400 mm	Each	22970
	600 mm x 500 mm	Each	21442
4.26	**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**		
	100 mm x 80 mm	Each	26
	150 mm x 80 mm	Each	39
	150 mm x 100 mm	Each	34
	200 mm x 100 mm	Each	49
	200 mm x 150 mm	Each	59
	250 mm x 150 mm	Each	72
	300 mm x 150 mm	Each	86
	300 mm x 200 mm	Each	96
	300 mm x 250 mm	Each	106
	350 mm x 200 mm	Each	131
	350 mm x 250 mm	Each	128
	350 mm x 300 mm	Each	140
	400 mm x 250 mm	Each	168
	400 mm x 300 mm	Each	163
	400 mm x 350 mm	Each	178
	450 mm x 350 mm	Each	201
	450 mm x 400 mm	Each	222

S.No.	Items	Unit	Rates in Rs.
	500 mm x 350 mm	Each	289
	500 mm x 400 mm	Each	354
	600 mm x 400 mm	Each	414
	600 mm x 500 mm	Each	509
4.27	**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.**		
	100 mm Dia	Each	3864
	150 mm Dia	Each	5040
	200 mm Dia	Each	6638
	250 mm Dia	Each	8451
	300 mm Dia	Each	10304
	350 mm Dia	Each	12990
	400 mm Dia	Each	15859
	450 mm Dia	Each	21404
	500 mm Dia	Each	24039
	600 mm Dia	Each	31794
	700 mm Dia	Each	39673
	750 mm dia	Each	46136
	800 mm dia	Each	48677
	900 mm dia	Each	59659
	1000 mm dia	Each	71981
4.28	**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.**		
	100 mm Dia	Each	6999
	150 mm Dia	Each	9329
	200 mm Dia	Each	12422
	250 mm Dia	Each	16028
	300 mm Dia	Each	19433
	350 mm Dia	Each	24767
	400 mm Dia	Each	30120
	450 mm Dia	Each	40563
	500 mm Dia	Each	45384
	600 mm Dia	Each	60540
4.29	**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**		
	100 mm Dia	Each	10213
	150 mm Dia	Each	13700
	200 mm Dia	Each	18291
	250 mm Dia	Each	23689
	300 mm Dia	Each	28708
	350 mm Dia	Each	36634
	400 mm Dia	Each	44471

S.No.	Items	Unit	Rates in Rs.
	450 mm Dia	Each	59813
	500 mm Dia	Each	66825
	600 mm Dia	Each	89384
4.30	**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.**		
	100 mm Dia	Each	13429
	150 mm Dia	Each	18073
	200 mm Dia	Each	24160
	250 mm Dia	Each	31351
	300 mm Dia	Each	37983
	350 mm Dia	Each	48500
	400 mm Dia	Each	58823
	450 mm Dia	Each	79064
	500 mm Dia	Each	88267
	600 mm Dia	Each	118230
4.31	**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.**		
	100 mm Dia	Each	15035
	150 mm Dia	Each	20258
	200 mm Dia	Each	27118
	250 mm Dia	Each	35295
	300 mm Dia	Each	42467
	350 mm Dia	Each	54434
	400 mm Dia	Each	65999
	450 mm Dia	Each	88690
	500 mm Dia	Each	98987
	600 mm Dia	Each	132652
4.32	**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.**		
	100 mm Dia	Each	16643
	150 mm Dia	Each	22445
	200 mm Dia	Each	30029
	250 mm Dia	Each	39012
	300 mm Dia	Each	47259
	350 mm Dia	Each	60366
	400 mm Dia	Each	73174
	450 mm Dia	Each	98316
	500 mm Dia	Each	109707
	600 mm Dia	Each	147075

S.No.	Items	Unit	Rates in Rs.
4.33	**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**		
	100 mm Dia	Each	40545
	150 mm Dia	Each	48918
	200 mm Dia	Each	62740
	250 mm Dia	Each	76046
	300 mm Dia	Each	102166
	350 mm Dia	Each	113994
	400 mm Dia	Each	152846
	450 mm Dia	Each	40545
	500 mm Dia	Each	48918
	600 mm Dia	Each	62740
4.34	**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**		
	100 mm Dia	Each	67
	150 mm Dia	Each	106
	200 mm Dia	Each	145
	250 mm Dia	Each	193
	300 mm Dia	Each	246
	350 mm Dia	Each	302
	400 mm Dia	Each	362
	450 mm Dia	Each	423
	500 mm Dia	Each	495
	600 mm Dia	Each	661
4.35	**Labour only for Laying including testing welded double flanged centrifugal cast (spun) ductile Iron pressure pipes confirming to IS: 8329/2000 in the length of 2m. for class K-9 with inside cement mortar lining for the following sizes/dia pipes.**		
	100 mm Dia	Each	116
	150 mm Dia	Each	187
	200 mm Dia	Each	251
	250 mm Dia	Each	337
	300 mm Dia	Each	432
	350 mm Dia	Each	530
	400 mm Dia	Each	634
	450 mm Dia	Each	747
	500 mm Dia	Each	873
	600 mm Dia	Each	1159

S.No.	Items	Unit	Rates in Rs.
4.36	**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.**		
	100 mm Dia	Each	163
	150 mm Dia	Each	268
	200 mm Dia	Each	359
	250 mm Dia	Each	481
	300 mm Dia	Each	677
	350 mm Dia	Each	757
	400 mm Dia	Each	907
	450 mm Dia	Each	1070
	500 mm Dia	Each	1250
	600 mm Dia	Each	1656
4.37	**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.**		
	100 mm Dia	Each	212
	150 mm Dia	Each	348
	200 mm Dia	Each	465
	250 mm Dia	Each	626
	300 mm Dia	Each	923
	350 mm Dia	Each	984
	400 mm Dia	Each	1181
	450 mm Dia	Each	1393
	500 mm Dia	Each	1628
	600 mm Dia	Each	2155
4.38	**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.**		
	100 mm Dia	Each	236
	150 mm Dia	Each	388
	200 mm Dia	Each	519
	250 mm Dia	Each	698
	300 mm Dia	Each	893
	350 mm Dia	Each	1099
	400 mm Dia	Each	1316
	450 mm Dia	Each	1557
	500 mm Dia	Each	1816
	600 mm Dia	Each	2403

S.No.	Items	Unit	Rates in Rs.
4.39	**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.**		
	100 mm Dia	Each	259
	150 mm Dia	Each	429
	200 mm Dia	Each	574
	250 mm Dia	Each	771
	300 mm Dia	Each	1169
	350 mm Dia	Each	1212
	400 mm Dia	Each	1453
	450 mm Dia	Each	1719
	500 mm Dia	Each	2004
	600 mm Dia	Each	2652
4.40	**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.**		
	100 mm Dia	Each	269
	150 mm Dia	Each	444
	200 mm Dia	Each	594
	250 mm Dia	Each	799
	300 mm Dia	Each	1023
	350 mm Dia	Each	1258
	400 mm Dia	Each	1508
	450 mm Dia	Each	1783
	500 mm Dia	Each	2080
	600 mm Dia	Each	2751

DUCTILE IRON VALVES

S.No.	Item	Unit	Rates in Rs.	
4.41	**Providing & fixing of following Ductile iron double flanged sluice valves as per IS 14846:2000 fitted with cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete**		**CLASS PN-10**	**CLASS PN-16**
	80 mm dia	Each	8225	8622
	100 mm dia	Each	11054	11585
	150 mm dia	Each	16861	15200
	200 mm dia	Each	27448	27850
	250 mm dia	Each	39209	52154
	300 mm dia	Each	61549	68739
	350 mm dia	Each	90367	107902
	400 mm dia	Each	136247	136247
	450 mm dia	Each	191693	191693
	500 mm dia	Each	256125	256125

S.No.	Item	Unit	Rates in Rs.	
4.42	**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 deptt. free of cost.**		**CLASS PN-10/PN-16**	
	80 mm Dia	Each	286	
	100 mm Dia	Each	446	
	150 mm Dia	Each	649	
	200 mm Dia	Each	895	
	250 mm Dia	Each	1447	
	300 mm Dia	Each	1636	
	350 mm Dia	Each	2699	
	400 mm Dia	Each	4143	
	450 mm Dia	Each	5012	
	500 mm Dia	Each	6328	
4.43	**Labour for laying and fixing of following ductile iron double flanged sluice valves (vide item no.1) including jointing andtesting but without cost of Jointing materials.**		**CLASS PN-10/PN-16**	
	80 mm Dia	Each	136	
	100 mm Dia	Each	187	
	150 mm Dia	Each	274	
	200 mm Dia	Each	409	
	250 mm Dia	Each	589	
	300 mm Dia	Each	760	
	350 mm Dia	Each	1327	
	400 mm Dia	Each	1569	
	450 mm Dia	Each	1876	
	500 mm Dia	Each	2270	
4.44	**Providing & fixing following ductile iron double flanged check valvewithout damper (non-returnvalve) including jointing &testing with cost of jointing material such asbolts,nuts and rubber insertion all complete as per IS: 5312 (Part II)**		**CLASS PN-10**	**CLASS PN- 16**
	200 mm Dia	Each	27241	27642
	250 mm Dia	Each	38739	51683
	300 mm Dia	Each	61463	73445
	350 mm Dia	Each	89937	107470
	400 mm Dia	Each	135520	135520
	500 mm Dia	Each	256257	256257
	600 mm Dia	Each	399716	399716
4.45	**Labour for laying and fixing of following ductile iron double flanged check valve without damper (non-return valve) including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS : 5312 (Part II)**		**CLASS PN-10/ PN- 16**	
	200 mm Dia	Each	687	
	250 mm Dia	Each	977	
	300 mm Dia	Each	1550	
	350 mm Dia	Each	2267	
	400 mm Dia	Each	3416	

S.No.	Item	Unit	Rates in Rs.	
	500 mm Dia	Each	6460	
	600 mm Dia	Each	10076	
4.46	**Labour for laying and fixing of following ductile iron double flanged check valve without damper (non-return valve)excluding jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 5312 (Part II)**		**CLASS PN-10/ PN- 16**	
	200 mm Dia	Each	261	
	250 mm Dia	Each	428	
	300 mm Dia	Each	543	
	350 mm Dia	Each	833	
	400 mm Dia	Each	1085	
	500 mm Dia	Each	1525	
	600 mm Dia	Each	2320	
4.47	**Providing & fixing following ductile iron butterfly valves including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 13095-1991.**		**CLASS PN-10**	**CLASS PN-16**
	100 mm Dia	Each	7990	10069
	150 mm Dia	Each	9359	11779
	200 mm Dia	Each	12653	15924
	250 mm Dia	Each	18653	25790
	300 mm Dia	Each	22382	33293
	350 mm Dia	Each	62956	79222
	400 mm Dia	Each	75093	94499
	450 mm Dia	Each	88697	111722
	500 mm Dia	Each	122655	154336
4.48	**Labour for laying and fixing of following ductile iron butterfly valves including jointing & testing but without cost of jointing materials.**		**CLASS PN-10/PN- 16**	
	100 mm Dia	Each	150	
	150 mm Dia	Each	172	
	200 mm Dia	Each	211	
	250 mm Dia	Each	261	
	300 mm Dia	Each	428	
	350 mm Dia	Each	614	
	400 mm Dia	Each	732	
	450 mm Dia	Each	864	
	500 mm Dia	Each	1196	
4.49	**Labour for laying and fixing of following Ductile Iron butterfly valves including jointing & testing but with cost of jointing materials.**		**CLASS PN-10/PN- 16**	
	100 mm Dia	Each	202	
	150 mm Dia	Each	236	
	200 mm Dia	Each	319	
	250 mm Dia	Each	470	

S.No.	Item	Unit	Rates in Rs.	
	300 mm Dia	Each	564	
	350 mm Dia	Each	1588	
	400 mm Dia	Each	1893	
	450 mm Dia	Each	2236	
	500 mm Dia	Each	3092	
4.50	**Providing & fixing following ductile iron single chamber triple function temper proof air valves, small orifice with screwed end as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991**		**CLASS PN-10**	**CLASS PN-16**
	50 mm Dia	Each	7783	8162
	80 mm Dia	Each	8145	8542
	100 mm Dia	Each	10883	11413
	150 mm Dia	Each	14928	14928
4.51	**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 & testing but without cost of jointing material.**		**CLASS PN-10/PN-16**	
	50 mm Dia	Each	76	
	80 mm Dia	Each	109	
	100 mm Dia	Each	150	
	150 mm Dia	Each	172	
4.52	**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 & testing but with cost of jointing material.**		**CLASS PN-10/PN-16**	
	50 mm Dia	Each	197	
	80 mm Dia	Each	206	
	100 mm Dia	Each	274	
	150 mm Dia	Each	377	

DUCTILE IRON SOFT SEATED VALVES

S.No.	Items	Unit	Rates in Rs.	S.No.
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 compitable for buried applications without valve chambers. The valve should be vaccum		**CLASS PN-10**	**CLASS PN-16**

S.No.	Items	Unit	Rates in Rs.	S.No.
	tight and 100% leak proof 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 coatilng both inside and outside (thickness 250 micron)with pocket less strailght thro body passage including jointing and testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete.			
	100 mm dia	Each	14943	14943
	150 mm dia	Each	21835	21835
	200 mm dia	Each	34570	34570
	250 mm dia	Each	69626	69626
	300 mm dia	Each	95713	95713
	350 mm dia	Each	167269	208436
	400 mm dia	Each	212187	264690
	450 mm dia	Each	261545	326991
	500 mm dia	Each	328757	410314
	600 mm dia	Each	486909	608166

Chapter – VII

P.V.C PIPES & FITTINGS ORIENTED P.V.C (O-PVC) PIPES& FITTINGS

NOTES:

1. The Un plasticized 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 installation 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 finished 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. **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

Item No.	Items	Unit	Rates in Rupees		
7.1	**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.**		**6kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 mm dia	R. mtr.	258	349	404
	110 mm dia	R. mtr.	331	470	545
	140 mm dia	R. mtr.	515	735	787
	160 mm dia	R. mtr.	570	855	1030
	180 mm dia	R. mtr.	727	1103	1469
	200 mm dia	R. mtr.	927	1432	1836
7.2	**Labour for laying in position including testing following PVC pipes of 6, 8 and 10Kg/Sqcm. pressure.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	R. mtr.	5	5	5
	110 m dia	R. mtr.	6	6	6
	140 m dia	R. mtr.	7	7	7
	160 m dia	R. mtr.	9	9	9
	180 m dia	R. mtr.	11	11	11
	200 m dia	R. mtr.	15	15	15

Item No.	Items	Unit	Rates in Rupees		
7.3	**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 & solvent cement)**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	30	30	30
	110 m dia	Each	34	34	34
	140 m dia	Each	42	42	42
	160 m dia	Each	50	50	50
	180 m dia	Each	54	54	54
	200 m dia	Each	74	74	74
7.4	**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)**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each joint	24	24	24
	110 m dia	Each joint	25	25	25
	140 m dia	Each joint	27	27	27
	160 m dia	Each joint	30	30	30
	180 m dia	Each joint	32	32	32
	200 m dia	Each joint	41	41	41
7.5	**Providing and laying in position including testing following PVC bends suitable for 6, 8 and 10 Kg/Sq. cm. pressure pipes.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	195	256	317
	110 m dia	Each	314	427	505
	140 m dia	Each	751	1033	1195
	160 m dia	Each	999	1408	1676
	180 m dia	Each	1509	1918	2302
	200 m dia	Each	1865	2464	2977
7.6	**Providing and laying in position including testing following PVC Tees, suitable for 6, 8 and 10 Kg/Sqm. Pressure pipes**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	116	142	161
	110 m dia	Each	152	267	318
	140 m dia	Each	398	420	442
	160 m dia	Each	661	693	846
	180 m dia	Each	818	998	1252
	200 m dia	Each	1104	1453	1917
7.7	**Providing and laying in position including testing following PVC flanged tail pieces suitable for 6, 8 and 10 Kg./Sq. cm. Pressure pipes.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	82	87	94
	110 m dia	Each	162	173	185
	140 m dia	Each	258	277	296

Item No.	Items	Unit	Rates in Rupees		
	160 m dia	Each	444	474	509
	180 m dia	Each	595	635	681
	200 m dia	Each	787	842	904
7.8	**Providing and laying in position including testing following PVC end Cap (plugs) suitable for 6, 8 and 10 Kg/Sq cm. Pressure pipes.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	47	56	74
	110 m dia	Each	67	80	106
	140 m dia	Each	105	128	171
	160 m dia	Each	173	212	287
	180 m dia	Each	232	284	385
	200 m dia	Each	281	345	468
7.9	**Providing and laying in position including testing PVC coupler suitable for 6, 8 and 10 Kg/Sq. cm. Pressure pipes.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	64	76	107
	110 m dia	Each	100	120	168
	140 m dia	Each	187	226	352
	160 m dia	Each	329	399	451
	180 m dia	Each	461	549	565
	200 m dia	Each	595	645	680
7.10	**Providing and laying in position including testing of following PVC Reducers suitable for 6, 8 and 10 Kg/Sq cm. Pressure pipes.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	110 x 90 mm dia	Each	89	105	126
	140 x 90 mm dia	Each	141	165	178
	160 x 90 mm dia	Each	178	212	308
	180 x 90 mm dia	Each	186	221	327
	140 x 110 mm dia	Each	145	171	201
	160 x 110 mm dia	Each	178	212	311
	180 x 110 mm dia	Each	251	299	335
	200 x 110 mm dia	Each	322	383	445
	160 x 140 mm dia	Each	185	220	262
	180 x 140 mm dia	Each	262	312	363
	200 x 140 mm dia	Each	434	518	600
	180 x 160 mm dia	Each	284	337	392
	200 x 160 mm dia	Each	456	545	632
	200 x 180 mm dia	Each	471	562	654

Item No.	Items	Unit	Rates in Rupees		
7.11	**Labour for laying in position including testing all types of PVC fittings such as bends, tees, plugs etc. for following PVC pipes.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	9	9	9
	110 m dia	Each	10	10	10
	140 m dia	Each	12	12	12
	160 m dia	Each	15	15	15
	180 m dia	Each	15	15	15
	200 m dia	Each	17	17	17
7.12	**Providing and fixing PVC Djoint (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.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	140	140	140
	110 m dia	Each	157	157	157
	140 m dia	Each	211	211	211
	160 m dia	Each	244	244	244
	180 m dia	Each	289	289	289
	200 m dia	Each	420	420	420
7.13	**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.**		**6Kg/Cm^2**	**8Kg/Cm^2**	**10Kg/Cm^2**
	90 m dia	Each	22	22	22
	110 m dia	Each	25	25	25
	140 m dia	Each	32	32	32
	160 m dia	Each	40	40	40
	180 m dia	Each	46	46	46
	200 m dia	Each	67	67	67

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 form 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. 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.**

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

S.No.	Item	Unit	Rate In Rs.
7.14	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. Pressure Rating as per IS Code – IS: 16647:2017, PN-16		
	110 mm dia	Meter	761
	160 mm dia	Meter	1248
	200 mm dia	Meter	1538
	250 mm dia	Meter	2256
	315 mm dia	Meter	2972
	400 mm dia	Meter	4476
7.15	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		
	110 mm dia	Meter	902
	160 mm dia	Meter	1429
	200 mm dia	Meter	1861
	250 mm dia	Meter	2754
	315 mm dia	Meter	4105
	400 mm dia	Meter	6422

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. **Colour**
   The colour 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 Materials**
   (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 our 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 80OC 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 shallconform 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 wit 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 harm less 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 coextrusion 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 Electrofusion 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, Bracnh 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 11rating.
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 Fittings**

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 7.1of ISO 14236 Performed.

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

Effects on Quality of WaterThe 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. 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.

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

S.No.	Items	Unit	Rates in Rs.		
9.1	**Providing, Laying, Jointing & 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 & leak proof joint by thermosetting process. It may be required to be done with Jack/ Hydraulic Jacks/ Butt fusion machine. (50 mm & above fusion jointed & below 50mm mechanical jointed)**				
	Pressure		**6Kg/ sq.cm**	**8Kg/ sq.cm**	**10Kg/ sq.cm**
	63 mm dia	Meter	145	177	220
	75 mm dia	Meter	208	254	312
	90 mm dia	Meter	294	358	448
	110 mm dia	Meter	493	540	657
	125 mm dia	Meter	572	692	847
	140 mm dia	Meter	713	871	1061
	160 mm dia	Meter	955	1141	1391
	180 mm dia	Meter	1180	1432	1761
	200 mm dia	Meter	1459	1769	2166
	225 mm dia	Meter	1846	2239	2753
	250 mm dia	Meter	2276	2755	3384
	280 mm dia	Meter	2841	3463	4247

S.No.	Items	Unit	Rates in Rs.		
	315 mm dia	Meter	3582	4388	5374
9.2	**Providing and laying including testing Bend 90 confirming to specification.**				
	Pressure		**6Kg/ sq.cm**	**8Kg/ sq.cm**	**10Kg/ sq.cm**
	63 mm dia	Each	105	112	157
	75 mm dia	Each	163	168	202
	90 mm dia	Each	252	271	323
	110 mm dia	Each	334	390	438
	125 mm dia	Each	480	580	735
	140 mm dia	Each	652	813	1004
	160 mm dia	Each	934	1175	1460
	180 mm dia	Each	1291	1634	2047
	200 mm dia	Each	1730	2198	2765
9.3	**Providing and laying including testing Bend 45^0 confirming to specification.**				
	Pressure		**6Kg/ sq.cm PN 6**	**8Kg/ sq.cmPN 8**	**10Kg/ sq.cmP N 10**
	63 mm dia	Each	122	122	160
	75 mm dia	Each	185	185	244
	90 mm dia	Each	267	267	362
	110 mm dia	Each	395	455	574
	125 mm dia	Each	550	667	843
	140 mm dia	Each	803	935	1206
	160 mm dia	Each	1157	1423	1732
	180 mm dia	Each	1566	1730	2375
	200 mm dia	Each	2063	2230	3148
9.4	**Providing and laying including testing Equal Tee confirming to IS specification.**				
	Pressure		**6Kg/ sq.cm PN 6**	**8Kg/ sq.cmPN 8**	**10Kg/ sq.cmP N 10**
	63 mm dia	Each	130	143	158
	75 mm dia	Each	215	223	274
	90 mm dia	Each	380	387	468
	110 mm dia	Each	556	575	672
	125 mm dia	Each	615	770	910
	140 mm dia	Each	841	1053	1248
	160 mm dia	Each	1214	1530	1825
	180 mm dia	Each	1686	2138	2567
	200 mm dia	Each	2271	2892	3482
9.5	**Providing and laying including testing Pipe end confirming to IS specification**				
	Pressure		**6Kg/ sq.cm PN 6**	**8Kg/ sq.cmPN 8**	**10Kg/ sq.cmP N 10**
	63 mm dia	Each	94	96	99
	75 mm dia	Each	121	131	131
	90 mm dia	Each	175	197	197
	110 mm dia	Each	222	262	262

S.No.	Items	Unit	Rates in Rs.		
	125 mm dia	Each	345	390	390
	140 mm dia	Each	434	494	494
	160 mm dia	Each	442	519	519
	180 mm dia	Each	682	780	780
	200 mm dia	Each	727	806	833
9.6	**Providing and laying including testing Reducer: confirming to IS specifications.**				
	Pressure		**6Kg/ sq.cm PN 6**	**8Kg/ sq.cmPN 8**	**10Kg/ sq.cmPN 10**
	63 mm dia	Each	116	117	121
	75 mm dia	Each	147	150	157
	90 mm dia	Each	158	166	175
	110 mm dia	Each	161	195	207
	125 mm dia	Each	168	226	231
	140 mm dia	Each	201	248	256
	160 mm dia	Each	261	324	362
	180 mm dia	Each	307	414	460
	200 mm dia	Each	354	483	515
9.7	**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 & above fusion jointed & below 50 mm mechanical jointed) including testing**				
	63 mm dia	Each	133		
	75 mm dia	Each	167		
	90 mm dia	Each	185		
	110 mm dia	Each	205		
	125 mm dia	Each	246		
	140 mm dia	Each	261		
	160 mm dia	Each	283		
	180 mm dia	Each	298		
	200 mm dia	Each	317		
9.8	**Providing and laying including testing End Cap confirming to IS specifications.**				
	Pressure		**6Kg/ sq.cm**	**8Kg/ sq.cm**	**10Kg/ sq.cm**
	63 mm dia	Each	95	96	101
	75 mm dia	Each	118	125	130
	90 mm dia	Each	133	135	143
	110 mm dia	Each	140	140	147
	125 mm dia	Each	167	231	234
	140 mm dia	Each	241	274	282
	160 mm dia	Each	287	399	417
	180 mm dia	Each	412	480	501

S.No.	Items	Unit	Rates in Rs.		
	200 mm dia	Each	493	575	599
9.9	**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 /SPGNetc. 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.**				
	PN 16 (SDR 9)		**6Kg/ sq.cm**	**8Kg/ sq.cm**	**10Kg/ sq.cm**
	20 mm dia	Each	46		
	25 mm dia	Each	64		
	32 mm dia	Each	105		
	40 mm dia	Each	137		
	50 mm dia	Each	208		
9.10	**Providing & Supply of Electro Fusion Tapping Ferrule (Branch Tapping Saddle) female BSP Threaded with SS 304 insert fittings in accordance with BS EN 12201 : Part-3 suitable for drinking water with in black/ blue colour manufactured from compounded PE80/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** **Electo Fusion Tapping Ferrule Saddle**				
9.10.1	63 x 15 mm	Each	1267		
9.10.2	63 x 20 mm	Each	1267		
9.10.3	63 x 25 mm	Each	1267		
9.10.4	75 x 15 mm	Each	1267		
9.10.5	75 x 20 mm	Each	1267		
9.10.6	75 x 25 mm	Each	1267		
9.10.7	90 x 15 mm	Each	1267		
9.10.8	90 x 20 mm	Each	1267		
9.10.9	90 x 25 mm	Each	1267		
9.10.10	90 x 32 mm	Each	1644		
9.10.11	90 x 40 mm	Each	1644		
9.10.12	90 x 50 mm	Each	1644		
9.10.13	110 x 15 mm	Each	1267		
9.10.14	100 x 20 mm	Each	1267		
9.10.15	110 x 25 mm	Each	1267		
9.10.16	110 x 32 mm	Each	1644		
9.10.17	110 x 40 mm	Each	1644		
9.10.18	110 x 50 mm	Each	1644		
9.10.19	160 x 15 mm	Each	1267		
9.10.20	160 x 20 mm	Each	1267		

S.No.	Items	Unit	Rates in Rs.
9.10.21	160 x 25 mm	Each	1267
9.10.22	160 x 32 mm	Each	1796
9.10.23	160 x 40 mm	Each	1796
9.10.24	160 x 50 mm	Each	1796
9.10.25	200 x 15 mm	Each	1788
9.10.26	200 x 20 mm	Each	1788
9.10.27	200 x 25 mm	Each	1788
9.10.28	200 x 32 mm	Each	2587
9.10.29	200 x 40 mm	Each	2587
9.10.30	200 x 50 mm	Each	2587
9.11	**Providing & Supply of Compression fitting, PN 16 rated in conformation to ISO: 14236-2000 and shall be tested as per ISO: 3459, ISO: 3501 & ISO:3503, suitable for drinking water & approved by WRAS, UKIKIWA 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.**		
9.11.1.1	**Compression Fittings Metal inserted Compression Female Threaded Adapter with SS 304 Material**		
9.11.1.1	20 x 15 mm	Each	216
9.11.1.2	20 x 20 mm	Each	279
9.11.1.3	32 x 25 mm	Each	380
9.11.1.4	40 x 32 mm	Each	647
9.11.1.5	50 x 40 mm	Each	837
9.11.1.6	63 x 50 mm	Each	1141
9.11.2	**Metal inserted Compression Male Threaded Adaptor with SS 304Material**		
9.11.2.1	20 x 15 mm	Each	216
9.11.2.2	20 x 20 mm	Each	279
9.11.2.3	32 x 25 mm	Each	380
9.11.2.4	40 x 32 mm	Each	647
9.11.2.5	50 x 40 mm	Each	837
9.11.2.6	63 x 50 mm	Each	1141
9.11.3	**Compression 90Elbow threaded maleoff take in Metal**		
9.11.3.1	20 x 15 mm	Each	228
9.11.3.2	25 x 20 mm	Each	304
9.11.3.3	32 x 25 mm	Each	419
9.11.3.4	40 x 32 mm	Each	1458
9.11.3.5	50 x 40 mm	Each	1902
9.11.3.6	63 x 50 mm	Each	2790
9.11.4	**Compression 90 Elbow threaded Female off take inMetal**		
9.11.4.1	20 x 15 mm	Each	228
9.11.4.2	25 x 20 mm	Each	304
9.11.4.3	32 x 25 mm	Each	419

S.No.	Items	Unit	Rates in Rs.
9.11.4.4	40 x 32 mm	Each	1458
9.11.4.5	50 x 40 mm	Each	1902
9.11.4.6	63 x 50 mm	Each	2790
9.11.5	**Compression 90 Elbow**		
9.11.5.1	20 mm	Each	140
9.11.5.2	25 mm	Each	191
9.11.5.3	32 mm	Each	247
9.11.5.4	40 mm	Each	495
9.11.5.5	50 mm	Each	702
9.11.5.6	63 mm	Each	953
9.12	**Providing & Supply of PVC Ball Valves in PN16 rating with one end compression using Blue color compression nut in polypropylene 132 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	20 x 15 mm	Each	222
9.12.2	25 x 20 mm	Each	288
9.12.3	32 x 25 mm	Each	324
9.12.4	40 x 32 mm	Each	697
9.12.5	50 x 40 mm	Each	934
9.12.6	63 x 50 mm	Each	1437
9.13	**PVC Ball Valve with Compression & Female Threads.**		
	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 un identical 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		

S.No.	Items	Unit	Rates in Rs.
	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, 133 S.No. Items Unit Rates in Rs. inspection charges, transportation up to site, transit insurance, loading, unloading, stacking etc. complete.		
9.13.1	80 NB x 15mm, 20mm, 25mm	Each	1268
9.13.2	100 NB x 15mm, 20mm, 25mm	Each	1394
9.13.3	150 NB x 15mm, 20mm, 25mm	Each	1649
9.13.4	200 NB x 15mm, 20mm, 25mm	Each	1902
9.13.5	250 NB x 15mm, 20mm, 25mm	Each	2156
9.13.6	300 NB x 15mm, 20mm, 25mm	Each	2410
9.14	**Providing & Supply of Electro Fusion Fittings in accordance with BS EN12201 : Part-3 suitable for drinking water with in black/blue colour manufactured from compounded PE80/PE100 virgin polymer and compatible with PE80/PE100 pipes, in pressure rated 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.**		
9.14.1	**Electro Fusion Coupler**		
9.14.1.1	20 mm	Each	127
9.14.1.2	25 mm	Each	127
9.14.1.3	32 mm	Each	127
9.14.1.4	40 mm	Each	234
9.14.1.5	50 mm	Each	291
9.14.1.6	63 mm	Each	313
9.14.1.7	75 mm	Each	562
9.14.1.8	90 mm	Each	604
9.14.1.9	110 mm	Each	859
9.14.1.10	125 mm	Each	874
9.14.1.11	140 mm	Each	1875
9.14.1.12	160 mm	Each	2054
9.14.1.13	180 mm	Each	3068
9.14.1.14	200 mm	Each	4005
9.14.1.15	225 mm	Each	4754
9.14.1.16	250 mm	Each	5793
9.14.1.17	280 mm	Each	11608
9.14.1.18	315 mm	Each	11649
9.14.2	**Electro Fusion Equal Tee**		
9.14.2.1	20 mm	Each	317
9.14.2.2	25 mm	Each	317
9.14.2.3	32 mm	Each	317
9.14.2.4	40 mm	Each	1075
9.14.2.5	50 mm	Each	1195

S.No.	Items	Unit	Rates in Rs.
9.14.2.6	63 mm	Each	1332
9.14.2.7	75 mm	Each	1776
9.14.2.8	90 mm	Each	2206
9.14.2.9	110 mm	Each	2663
9.14.2.10	125 mm	Each	3298
9.14.2.11	140 mm	Each	7472
9.14.2.12	160 mm	Each	10906
9.14.2.13	180 mm	Each	13950
9.14.2.14	200 mm	Each	16485
9.14.2.15	225 mm	Each	24095
9.14.2.16	250 mm	Each	26631
9.14.2.17	280 mm	Each	29167
9.14.3	**Electro Fusion Elbow 90^0**		
9.14.3.1	20 mm	Each	241
9.14.3.2	25 mm	Each	241
9.14.3.3	32 mm	Each	241
9.14.3.4	40 mm	Each	634
9.14.3.5	50 mm	Each	634
9.14.3.6	63 mm	Each	634
9.14.3.7	75 mm	Each	1394
9.14.3.8	90 mm	Each	1902
9.14.3.9	110 mm	Each	2537
9.14.3.10	125 mm	Each	3043
9.14.3.11	140 mm	Each	6468
9.14.3.12	160 mm	Each	8370
9.14.3.13	180 mm	Each	10780
9.14.3.14	200 mm	Each	20291
9.14.3.15	225 mm	Each	22826
9.14.3.16	250 mm	Each	25363
9.14.3.17	280 mm	Each	27899
9.14.3.18	315 mm	Each	31704
9.14.4	**Electro Fusion Reducer**		
9.14.4.1	25 x 20 mm	Each	253
9.14.4.2	32 x 20 mm	Each	253
9.14.4.3	32 x 25 mm	Each	253
9.14.4.4	40 x 32 mm	Each	849
9.14.4.5	50 x 32 mm	Each	1065
9.14.4.6	50 x 40 mm	Each	1177
9.14.4.7	63 x 32 mm	Each	1256
9.14.4.8	63 x 40 mm	Each	1270
9.14.4.9	63 x 50 mm	Each	1470
9.14.4.10	90 x 63 mm	Each	2082
9.14.4.11	90 x 75 mm	Each	2663
9.14.4.12	110 x 75 mm	Each	3360
9.14.4.13	110 x 90 mm	Each	3830
9.14.4.14	125 x 90 mm	Each	4844
9.14.4.15	125 x 110 mm	Each	4844
9.14.4.16	140 x 90 mm	Each	5327
9.14.4.17	140 x 110 mm	Each	5327
9.14.4.18	140 x 125 mm	Each	5327

S.No.	Items	Unit	Rates in Rs.
9.14.4.19	160 x 110 mm	Each	6974
9.14.4.20	160 x 125 mm	Each	6974
9.14.4.21	160 x 140 mm	Each	6974
9.14.4.22	180 x 125 mm	Each	7862
9.14.4.23	180 x 140 mm	Each	7862
9.14.4.24	180 x 160 mm	Each	7862
9.14.4.25	200 x 160 mm	Each	9384
9.14.4.26	200 x 180 mm	Each	9384
9.14.4.27	225 x 160 mm	Each	11413
9.14.4.28	225 x 180 mm	Each	11413
9.14.4.29	225 x 200 mm	Each	11413
9.14.4.30	250 x 160 mm	Each	13950
9.14.4.31	250 x 200 mm	Each	13950
9.14.4.32	250 x 225 mm	Each	13950
9.14.5	**Electro Fusion End Cap**		
9.14.5.1	20 mm	Each	193
9.14.5.2	25 mm	Each	193
9.14.5.3	32 mm	Each	193
9.14.5.4	40 mm	Each	419
9.14.5.5	50 mm	Each	508
9.14.5.6	63 mm	Each	736
9.14.5.7	75 mm	Each	1104
9.14.5.8	90 mm	Each	1394
9.14.5.9	110 mm	Each	1776
9.14.5.10	125 mm	Each	2156
9.14.5.11	140 mm	Each	3170
9.14.5.12	160 mm	Each	4565
9.14.5.13	180 mm	Each	5580
9.14.5.14	200 mm	Each	6594
9.14.5.15	225 mm	Each	10780
9.14.5.16	250 mm	Each	12682
9.14.5.17	280 mm	Each	13950
9.14.5.18	315 mm	Each	15217
9.14.6	**Spigot Long Neck Pipe End (Stub End) for Electro Fusion Joint**		
9.14.6.1	63 mm	Each	454
9.14.6.2	75 mm	Each	511
9.14.6.3	90 mm	Each	640
9.14.6.4	110 mm	Each	977
9.14.6.5	125 mm	Each	1538
9.14.6.6	140 mm	Each	1750
9.14.6.7	160 mm	Each	2504
9.14.6.8	180 mm	Each	3377
9.14.6.9	200 mm	Each	3970
9.14.6.10	225 mm	Each	4762
9.14.6.11	250 mm	Each	5469
9.14.6.12	280 mm	Each	6123
9.14.6.13	315 mm	Each	7957

Chapter – XVIII

SURVEY & ALLIED CIVIL WORKS

1. SURVEY

1. Applicable Codes :

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

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

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

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

4. The labour strength of one survey party for chain and compass survey considered in (a) above is 12 maz doors (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**

S.No.	Particulars of Items	Unit	Rates (in Rs.)
18.1	Chain and compass survey	Km	1291
18.2	Chain and theodolite survey	Km	1291
18.3	Theodolite work involving fixing of stones at every tenth chain, tangent apex and vertex point of final alignment	Km	2583
18.4	Fly levelling for fixing temporary bench marks:		
18.4.1	Up to 15m interval	Km	1291
18.4.2	Above 15m interval	Km	646
18.5	Levelling Head works		
18.5.1	Below 5m interval (for basin survey and dam seat survey)	Km	2153
18.5.2	5 to 10 m interval	Km	1722
18.5.3	more than 10 but up to 15m interval	Km	1291
18.5.4	Above 15m interval	Km	861
18.6	Double levelling for transfer of bench marks:		
18.6.1	Up to 15 m interval	Km	5166
18.6.2	Above 15 m interval	Km	2583
18.7	**Total Station Survey** Detailed Geo referenced topographical mapping and development of graphic database for any selected area using digital state of art total station, automatic levels grid size 30 M x 30 M etc. as per site condition requirement and as		

S.No.	Particulars of Items	Unit	Rates (in Rs.)
	directed by the Engineer-inCharge 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.	1866
18.7.2	5 Hect. to 10 Hect.	Hect.	1245
18.7.3	10 Hect to 25 Hect	Hect.	933
18.7.4	Above 25 Hect.	Hect.	622
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.	249
18.7.5.2	Grid size 20mtr. x 20mtr.	Hect.	125
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	171
18.8.2	For 25 cm dia holes	Each	210
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	49
18.8.3.2	For 25 cm dia holes	Meter	60
18.9	**"Unmanned Areal Vehicle (UAV)" –** 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	1996
18.9.2	5 Hect. to 10 Hect	Hect	1372
18.9.3	10 Hect. to 25 Hect	Hect	1060
18.9.4	Above 25 Hect	Hect	873
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	499
18.10.2	Grid Size 50 CM x 50 CM	Hect	437
18.10.3	Grid Size 1M x 1M	Hect	374
18.10.4	Grid Size 5M x 5M	Hect	312
18.10.5	Grid Size 10M x 10M	Hect	249

S.No.	Particulars of Items	Unit	Rates (in Rs.)
18.10.6	Grid Size 20M x 20M	Hect	125
18.11	Survey and Levelling Head works by UAV - Detailed Geo Referenced topographical mapping (covering 15 m with on either side of centre 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/wastewater 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	14966
	5 Km to 10 Km	Km	11848
	10 Km to 25 Km	Km	10601
	Above 25 Km	Km	9354
18.12	Add extra in above for following levels in place of 15 m interval		
18.12.1	25 cm to 50 cm interval	Km	1996
18.12.2	50 cm to 1m interval	Km	1746
18.12.3	1m to 3m interval	Km	1497
18.12.4	3m to 5m interval	Km	1247
18.12.5	5m to 10m interval	Km	998
18.12.6	10m to 15m interval	Km	873

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 has already 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 217 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. 218

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. 219

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. Sheeting 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. Sheeting and bracing which have been ordered left in place should be removed for a distance of 90 cm. below the established street level or the existing surface of the street whichever is lower for which no extra payment shall be made.

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. Sheeting and bracing may be removed before filling the trench, but only in such manner as will ensure the adequate protection of the completed work and adjacent structures. 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 220 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 appropriaterate.

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 thetraffic.

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 orauthorised 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 incharge.

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 perrequirement.

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 Engineerincharge.

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
63 mm	100	--	--
40 mm	95-100	100	--
20 mm	30-70	95-100	100
12.5 mm	--	--	90-100
10 mm	10-35	25-55	40-85
4.75 mm	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 confirms 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 Engineerin-charge. Mixing shall be continue 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 toIS:1977-69.

(ii) Steel work riveted or bolted shall confirm to IS:1148-1968 andIS: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 toIS: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 socked in tank filled with water for minimum period one hour prior to being laid such socked bricks shall be stacked on a clean place where they are not contaminated with earth / direct.

(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 coursesshall be laid truly horizontal and vertical joints shall be trulyvertical.

(viii) In case of vertical or inclined joints proper bond between old and new masonry has to ensure 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 7days.

(h) 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. 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 plasters float and pressing the mortar so that packed joints are properly filled. The plaster shall there be finished off with a wooden straight edge reaching across the screeds. The straight edge shall be worked on the screeds with small upward and side ways motion 50mm to 75mm at a time. Finally, the surface shall be finished off with a plasters wooden float metal floats shall not be used. Curing shall be commenced as soon as mortar used for finishing has hardened sufficiently not be damaged during curing. It shall be kept wet fora period of at least 7days.

(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 confirm 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 direction.

(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.

ALLIED CIVIL WORKS

S.No.	Items	Unit	Rates in Rs.
	EXCAVATION		
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	1316
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	678
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	348
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	572
	HDPE pipe of any class-110 mm outer dia	Meter	624
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	201
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	266
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	384
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 unservicve able 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	465

S.No.	Items	Unit	Rates in Rs.
18.19.2	Hard rock (requiring blasting)	Cum	571
18.19.3	Hard rock requiring chiseling / where blasting is prohibited.	Cum	664
18.19.4	Extra for every additional lift of 1.5m or part there of		
18.19.5	All kind of soils (over item No. 18.15, 18.16 and 18.17)	Cum	67
18.19.6	Ordinary soft and Hard rock (over item No. 18.19.1, 18.19.2 and 18.19.3)	Cum	120
18.19.7	Extra for every additional lead up to 50 m or part thereof over item 18.15 to 18.19.3	Cum	70
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	206
18.20.2	3m to 6m depth	Cum	151
18.21	Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like.	KL	71
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	82
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	62
18.24	Supply & Filling moorum/river sand for pipe bedding or over the pipe (including supply)	Cum	864
18.25	Supply & Filling crusher stone dust for pipe bedding or over the pipe (including supply of crusher stone dust.)	Cum	1119
	DISMANTLING & DEMOLISHING		
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	798
18.27	Demolishing stone rubble masonary 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	449
18.28	Demolishing stone rubble masonary 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	952
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	945
18.29.2	Nominal concrete 1:4:8 or Leaner mix (i/c equivalent design mix)	Cum	582
18.29.3	Dismantling of Cement Concrete Pavment by mechanical	Cum	1227

S.No.	Items	Unit	Rates in Rs.
	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		
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	1378
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	17
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	104
18.33	Dismantling kharanja of any thickness in cement mortar of any mix	Cum	80
	REPAIRS TO BUILDING ROAD WORK		
18.34	Providing& Fixing of stone slab 30 mm thick in cement mortar 1:6 (1 cement 6 sand)	Sqm	187
18.35	Labour only for Fixing of stone slab 30 mm thick in cement mortar 1:6 (1 cement 6 sand)	Sqm	86
18.36	Providing & Fixing of Kharanja of any thickness in C.M. 1:6 (1 cement 6 sand)	Sqm	631
18.37	Labour only for fixing of Kharanja of any thickness.	Sqm	167
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	1326
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	2690
	CEMENT CONCRETE		
18.40	**Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate)**		
18.40.1	In foundation and plinth		
18.40.1.2	1:5:10 (M-5)	cum	4403
18.40.1.2	1:4:8 (M-7.5)	cum	4670
18.40.1.3	1:3:6 (M-10)	cum	5029
18.40.1.4	1:2:4 (M-15)	cum	5910
18.40.2	**In walls & Superstructure up to 4 mt. height above plinth (with 40mm nominal graded metal)**		0
18.40.2.1	1:3:6 (M-10)	cum	5121
18.40.2.2	1:2:4 (M-15)	cum	6002
18.41	**Providing & laying mechanically mixed cement concrete 20mm nominal size graded crushed stone excluding cost of centering& shuttering.**		

S.No.	Items	Unit	Rates in Rs.
18.41.1	**In Plinth & Foundation**		
18.41.1.1	1:3:6 (M-10)	cum	5216
18.41.1.2	1:3:4 (M-15)	cum	5954
18.41.1.3	$1:3^{1/2}$:3 (M-20)	cum	6545
18.40.1.4	1:1:2 (M-25)	cum	8097
18.41.2	**In walls and superstructure up to 4 mt. height above plinth (with 20mm nominal graded metal)**		
18.41.2.1	1:3:6 (M-10)	cum	5309
18.41.2.2	1:3:4 (M-15)	cum	6048
18.41.2.3	$1:3^{1/2}$:3 (M-20)	cum	6639
18.40.2.4	1:1:2 (M-25)	cum	8189
	REINFORCED CEMENT CONCRETE		
18.42	**Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in foundation/plinth (20mm graded metal)**		
18.42.1	$1:1^{1/2}$:3 (M-20)	cum	6025
18.42.2	1:1:2 (M-25)	cum	7575
18.42.3	1:0.75:1.5 (M-30)	cum	7982
18.43	**Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal)**		
18.43.1	$1:1^{1/2}$:3 (M-20)	cum	6070
18.43.2	1:1:2 (M-25)	cum	7622
18.43.3	1:0.75:1.5 (M-30)	cum	8028
	STEEL		
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	70
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 ofapproved steel primer all complete.	Kg	75
18.46	Structural steel work riveted, bolted or welded in builtup section trusses and framed work i/c cutting/hoisting /fixing in position and applying a priming coat ofapproved steel primer all complete.	Kg	96
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 usingstructural 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	100
18.47.2	In gratings, frames, guard bar, ladder ,railings, brackets, gates and similar works	Kg	112

S.No.	Items	Unit	Rates in Rs.
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	3668
	CEMENT MORTAR		
18.49	Cement Mortar 1:3 (1 Cement : 3 sand)	Cum	5923
18.50	Cement Mortar 1:4 (1 Cement : 4 sand)	Cum	4968
18.51	Cement Mortar 1:5 (1 Cement : 5 sand)	Cum	4376
18.52	Cement Mortar 1:6 (1 Cement : 6 sand)	Cum	4007
18.53	Cement Mortar 1:8 (1 Cement : 8 sand)	Cum	3884
	BRICK WORK		
18.54	Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm² and water absorption not more than 20 % in foundation & plinth i/c curing etc. complete.		
18.54.1	In Cement Mortar 1:3	Cum	7589
18.54.2	In Cement Mortar 1:4	Cum	7233
18.54.3	In Cement Mortar 1:5	Cum	7085
18.54.4	In Cement Mortar 1:6	Cum	6993
18.55	Brick work with well burnt chimney bricks having crushing strength not less than 25 kg/cm² 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	7589
18.55.2	In Cement Mortar 1:4	Cum	7233
18.55.3	In Cement Mortar 1:5	Cum	7085
18.55.4	In Cement Mortar 1:6	Cum	6993
18.56	Extra rate for Brick work in superstructure above floor two level for each additional floor or part thereof respective item.	Cum	202
18.57	Half brick masonary with well burnt chimney bricks crushing strength not less than 25kg/cm² and water absorption not more than 20% is superstructure above plinth level and up to floor two level.		
18.57.1	Cement Mortar 1:3	Sqm	954
18.57.2	Cement Mortar 1:4	Sqm	876
18.58	**Brick work with open Bhatta bricks having crushing strength not less than 20 kg/cm² and water absorption not more than 25% in foundation & plinth i/c curing etc.complete.**		
18.58.1	In Cement Mortar 1:3	Cum	7223
18.58.2	In Cement Mortar 1:4	Cum	6963
18.58.3	In Cement Mortar 1:5	Cum	6802
18.58.4	In Cement Mortar 1:6	Cum	6705

S.No.	Items	Unit	Rates in Rs.
18.59	**Brick work with open Bhatta bricks having crushing strength not less than 20 kg/cm² and water absorption not more than 25% in super structure above plinth level and up to floor two level i/c form work & curing etc. complete.**		
18.59.1	In Cement Mortar 1:3	Cum	8109
18.59.2	In Cement Mortar 1:4	Cum	7245
18.59.3	In Cement Mortar 1:5	Cum	7085
18.59.4	In Cement Mortar 1:6	Cum	6986
	PLASTER		
18.60	**12mm thick cement plaster in single coat including finishing even, smooth and curing complete.**		
18.60.1	1:3 (Cement 1: Sand 3)	Sqm	198
18.60.2	1:4 (Cement 1: Sand 4)	Sqm	185
18.60.3	1:5 (Cement 1: Sand 5)	Sqm	176
18.60.4	1:6 (Cement 1: Sand 6)	Sqm	171
18.61	**15mm thick cement plaster in single coat i/c finished even, smooth and curing complete**		
18.61.1	in CM 1:3	Sqm	215
18.61.2	in CM 1:4	Sqm	200
18.61.3	in CM 1:5	Sqm	187
18.61.4	in CM 1:6	Sqm	181
18.61.5	Neat cement punning	Sqm	34
18.62	**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 curing complete.**	Sqm	248
18.63	**20 mm thick cement plaster in single coat i/c finishing even, smooth and curing complete**		
18.63.1	in CM 1:3	Sqm	268
18.63.2	in CM 1:4	Sqm	246
18.63.3	in CM 1:5	Sqm	232
18.63.4	in CM 1:6	Sqm	224
	FORM WORK		
18.64	**Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for:**		
18.64.1	Foundation , footing, bases of columns ,etc for mass concrete	sqm	231
18.64.2	Wall (any thickness) including attached pilasters, buttresses, plinth and string courses etc	sqm	402
18.64.3	Suspended floors, roofs, landings, balconies and access plat form.	sqm	449

S.No.	Items	Unit	Rates in Rs.
18.64.4	Lintels, beams , plinth beams, girders, bressumers and cantilevers.	sqm	378
18.64.5	Columns, pillars, piers, Abutments, posts and Struts	sqm	515
18.64.6	Stairs, (excluding landings) except spiral- staircases	sqm	544
18.65	**Close timbering in trenches including strutting, shoring and packing cavities (wherever required) complete (Measurement to be taken of the face area timbered)**		
18.65.1	Depth not exceeding 1.5 mtr.	sqm	213
18.65.2	Depth exceeding 1.5 mtr. but not exceeding 3.0 mtr.	sqm	220
18.65.3	Depth exceeding 3.0 mtr. but not exceeding 4.5 mtr.	sqm	226
18.65.4	Depth exceeding 4.5 mtr. but not exceeding 6.0 mtr.	sqm	232
18.65.5	Depth exceeding 6.0 mtr. but not exceeding 7.5 mtr.	sqm	238
18.65.6	Depth exceeding 7.5 mtr. but not exceeding 9.0 mtr.	sqm	244
18.66	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)		
18.66.1	Depth not exceeding 1.5 mtr.	sqm	217
18.66.2	Depth exceeding 1.5 mtr. but not exceeding 3.0 mtr.	sqm	229
18.66.3	Depth exceeding 3.0 mtr. but not exceeding 4.5 mtr.	sqm	243
18.66.4	Depth exceeding 4.5 mtr. but not exceeding 6.0 mtr.	sqm	256
18.66.5	Depth exceeding 6.0 mtr. but not exceeding 7.5 mtr.	sqm	269
18.66.6	Depth exceeding 7.5 mtr. but not exceeding 9.0 mtr.	sqm	282
	STONE WORK		
18.67	Coursed rubble masonry (first sort) with hard stone in foundation and plinth cement mortar 1:6	cum	5505
18.68	Coursed rubble masonry (Second sort) with hard stone in foundation and plinth Cement mortar 1:6	cum	5132
18.69	**Coursed rubble masonry with hard stone (first or Second sort) in Superstructure above plinth level and up to floor two level.**		
18.69.1	Masonry work (first sort) in Cement mortar 1:6	cum	6303
18.69.2	Masonry work (Second sort) in Cement mortar 1:6	cum	5932
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	140
18.71	**Extra Coursed rubble masonry with hard stone (first or Second sort)in**		
18.71.1	Square or rectangular pillars	cum	464
18.71.2	Circular pillars	cum	1558
18.72	**Pointing on stone work with cement mortar 1:3 (1 cement : 3 fine sand)**		
18.72.1	Flush / ruled point in	sqm	161
18.72.2	Raised and cut pointing	sqm	294
	FINISHING WORK		
18.73	White washing with lime to give an even shade : New work (three or more coats)		19
18.74	White washing with lime to give an even shade :		
18.74.1	Old work (two or more coats)		11

S.No.	Items	Unit	Rates in Rs.
18.74.2	Old work (One or more coats)		6
18.75	Finishing walls with water proofing cement paint of required shade : New work (two or more coats applied @ 3.84 kg/10 sqm)		67
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	116
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	86
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	57
	CONSTRUCTION OF BRICK MASONARY VALVE CHAMBER		
18.79	Construction of Brick masonary 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.	7886

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 thework.

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 liftetc.

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 then 15 CM on each side of the trench. Wherever in the opinion of the Engineer in charge existing conditions make it necessary or advisable to remove additional pavement, it shall be removed as directed by the Engineer in charge.

8. 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 pavement shall be restored unless and until, in the opinion of the Engineer in charge the condition of the backfill is such as to properly support the pavement.

10. All construction material, and all tools and temporary structures shall be removed form the site as directed by the Engineer in charge. All dirt, rubbish and excess earth form the excavation shall be taken off to a specified dumping site as directed by Engineer in Charge and the construction site shall be kept clean to the satisfaction of the Engineer-in-charge.

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.**

GENERAL MISCELLANEOUS

S.No.	Item	Unit	Rates in Rs.
19.1	Labour for cutting following cast iron pipes of any type and class.		
	80 mm dia	Per Cut	61
	100 mm dia	Per Cut	82
	150 mm dia	Per Cut	153
	200 mm dia	Per Cut	206
	250 mm dia	Per Cut	254
	300 mm dia	Per Cut	306
	350 mm dia	Per Cut	355
	400 mm dia	Per Cut	405
	450 mm dia	Per Cut	455
	500 mm dia	Per Cut	508
	600 mm dia	Per Cut	602
	700 mm dia	Per Cut	652
	750 mm dia	Per Cut	701
	800 mm dia	Per Cut	752
	900 mm dia	Per Cut	803
19.2	Labour for cutting following Asbestos Cement Pressure Pipes of any type and class.		
	80 mm dia	Per Cut	30
	100 mm dia	Per Cut	42
	150 mm dia	Per Cut	77
	200 mm dia	Per Cut	102
	250 mm dia	Per Cut	127
	300 mm dia	Per Cut	141
	350 mm dia	Per Cut	162
19.3	Labour for cutting following P. V. C. Pipes of any type and class.		
	80 mm dia	Per Cut	15
	100 mm dia	Per Cut	20
	150 mm dia	Per Cut	39
	200 mm dia	Per Cut	52
19.4	Labour only for cutting following Ductile Iron pipes of any type and class.		
	80 mm dia	Per Cut	54
	100 mm dia	Per Cut	72
	150 mm dia	Per Cut	135
	200 mm dia	Per Cut	180
	250 mm dia	Per Cut	224
	300 mm dia	Per Cut	269
	350 mm dia	Per Cut	312
	400 mm dia	Per Cut	357
	450 mm dia	Per Cut	400
	500 mm dia	Per Cut	446
	600 mm dia	Per Cut	530
	700 mm dia	Per Cut	574
	750 mm dia	Per Cut	617
	800 mm dia	Per Cut	662
	900 mm dia	Per Cut	706

S.No.	Item	Unit	Rates in Rs.		
19.5	Labour for cutting following Galvanised Iron (MS) Pipes of any type and class.				
	15 mm dia	Per Cut	5		
	20 mm dia	Per Cut	9		
	25 mm dia	Per Cut	12		
	32 mm dia	Per Cut	19		
	40 mm dia	Per Cut	25		
	50 mm dia	Per Cut	30		
	65 mm dia	Per Cut	36		
	80 mm dia	Per Cut	47		
	100 mm dia	Per Cut	50		
	125 mm dia	Per Cut	57		
	150 mm dia	Per Cut	64		
19.6	Chamfering of CI/DI pipes of all type sand classes to make suitable for tyton joints.				
	Up to 150 mm dia	Each End	1079		
	200 mm dia	Each End	1343		
	250 mm dia	Each End	1480		
	300 mm dia	Each End	1681		
	400 mm dia	Each End	2018		
	450 mm dia	Each End	2194		
	500 mm dia	Each End	2355		
	600 mm dia	Each End	2691		
	700 mm dia	Each End	3027		
	750 mm dia	Each End	3364		
	800 mm dia	Each End	3700		
	900 mm dia	Each End	4036		
	1000 mm dia	Each End	3992		
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 60 mtrs.		**Class LA**	**Class A**	**Class B**
	80 mm dia	Per Cut	11	12	14
	100 mm dia	Per Cut	14	15	16
	125 mm dia	Per Cut	19	20	21
	150 mm dia	Per Cut	22	25	27
	200 mm dia	Per Cut	34	36	40
	250 mm dia	Per Cut	46	50	54
	300 mm dia	Per Cut	60	65	69
	350 mm dia	Per Cut	75	81	86
	400 mm dia	Per Cut	91	100	106
	450 mm dia	Per Cut	110	122	128
	500 mm dia	Per Cut	130	141	150
	600 mm dia	Per Cut	172	190	200
	700 mm dia	Per Cut	222	242	257
	750 mm dia	Per Cut	247	271	289
	800 mm dia	Per Cut	349	383	418
	900 mm dia	Per Cut	425	468	511
	1000 mm dia	Per Cut	511	562	612

S.No.	Item	Unit	Rates in Rs.	
19.8	**Unloading from railway wagon, pipes and machinery**			
(a)	Pipes upto 500 mm dia and machinery below 1.00 tonne	Tonne	571	
(b)	Pipes 500 mm dia and above heavy Machinery weighing more than one tonne require use of crane etc.	Tonne	2587	
19.9	Stacking of pipe and machinery at station Yard.	Tonne	736	
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	115
	2. Distance	2 Km	Cum	131
	3. Distance	3 Km	Cum	147
	4. Distance	4 Km	Cum	162
	5. Distance	5 Km	Cum	177
	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	9
19.10.2	**Earth &Moorum**			
	1. Distance	1 Km	Cum	143
	2. Distance	2 Km	Cum	163
	3. Distance	3 Km	Cum	183
	4. Distance	4 Km	Cum	203
	5. Distance	5 Km	Cum	222
	6. Beyond 5km upto 10km. add per km		Cum	15
	7. Beyond 10km upto 20km. add per km		Cum	12
	8. Beyond 20km add per km		Cum	10
19.10.3 (a)	**G.I.,C.I.,ACP Pipes below 100mm dia and other heavy material and machinery**			
	1. Distance	1 Km	Per Tone	101
	2. Distance	2 Km	Per Tone	117
	3. Distance	3 Km	Per Tone	131
	4. Distance	4 Km	Per Tone	145
	5. Distance	5 Km	Per Tone	157
	6. Beyond 5km upto 10km. add per km		Per Tone	11
	7. Beyond 10km upto 20km. add per km		Per Tone	9
	8. Beyond 20km add per additional		Per Tone	7
19.10.3 (b)	**PVC pipes- 90,110,140,160,180,200 mm dia pipes**			
	1. Distance	1 Km	Per Tone	258
	2. Distance	2 Km	Per Tone	293
	3. Distance	3 Km	Per Tone	329
	4. Distance	4 Km	Per Tone	362
	5. Distance	5 Km	Per Tone	395
	6. Beyond 5km upto 10km. add per km		Per Tone	29
	7. Beyond 10km upto 20km. add per km		Per Tone	24
	8. Beyond 20km add per additional		Per Tone	20

S.No.	Item	Unit	Rates in Rs.	
19.10.4	**Steel (All Types)**			
	1. Distance	1 Km	Per Tone	101
	2. Distance	2 Km	Per Tone	117
	3. Distance	3 Km	Per Tone	131
	4. Distance	4 Km	Per Tone	145
	5. Distance	5 Km	Per Tone	157
	6. Beyond 5km upto 10km. add per km		Per Tone	11
	7. Beyond 10km upto 20km. add per km		Per Tone	9
	8. Beyond 20km add per additional km		Per Tone	7
19.10.5	R.C.C. Pipes, Steel Pipes, ACP pipes CI & DI Pipes			
19.10.5.1	**100, 150, 200, 250 & 300 mm dia**			
	1. Distance	1 Km	Per Tone	233
	2. Distance	2 Km	Per Tone	266
	3. Distance	3 Km	Per Tone	296
	4. Distance	4 Km	Per Tone	324
	5. Distance	5 Km	Per Tone	354
	6. Beyond 5km upto 10km. add per km		Per Tone	25
	7. Beyond 10km upto 20km. add per km		Per Tone	21
	8. Beyond 20km add per additional km		Per Tone	16
19.10.5.2	**350, 100, 450 & 500 mm dia**			
	1. Distance	1 Km	Per Tone	1558
	2. Distance	2 Km	Per Tone	1764
	3. Distance	3 Km	Per Tone	1969
	4. Distance	4 Km	Per Tone	2166
	5. Distance	5 Km	Per Tone	2357
	6. Beyond 5km upto 10km. add per km		Per Tone	171
	7. Beyond 10km upto 20km. add per km		Per Tone	140
	8. Beyond 20km add per additional km		Per Tone	115
19.10.5.3	**600, 700, 750, 800 & 900 mm dia**			
	1. Distance	1 Km	Per Tone	3894
	2. Distance	2 Km	Per Tone	4410
	3. Distance	3 Km	Per Tone	4923
	4. Distance	4 Km	Per Tone	5414
	5. Distance	5 Km	Per Tone	5893
	6. Beyond 5km upto 10km. add per km		Per Tone	427
	7. Beyond 10km upto 20km. add per km		Per Tone	350
	8. Beyond 20km add per additional km		Per Tone	284
19.10.5.4	**1000, 1100 and 1200 mm dia**			
	1. Distance	1 Km	Per Tone	7785
	2. Distance	2 Km	Per Tone	8481
	3. Distance	3 Km	Per Tone	9844
	4. Distance	4 Km	Per Tone	10828
	5. Distance	5 Km	Per Tone	11785
	6. Beyond 5km upto 10km. add per km		Per Tone	853
	7. Beyond 10km upto 20km. add per km		Per Tone	698
	8. Beyond 20km add per additional km		Per Tone	569
19.11	Providing and installation of automatic water level indicator for supervisory control cum auto on/off of motor pump	1 Job		22826

S.No.	Item	Unit	Rates in Rs.	
	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)			
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 directed by Engineer in charge.	1 Job		31704
19.13	Providing and supply of Electro Fusion Tapping Ferrule (Branch Tapping saddle) Female BSP Threaded woth 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 with min PN 12.5 rated for water application with elecctro 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) / DVGM/ 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 in charge.	No.		2511

S.No.	Item	Unit	Rates in Rs.	
19.14	House hold connection with 15mm S.S. tap including earth work in excavation 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 directed by Engineer in charge	1 Job		2054
19.15	House hold connection with 15mm S.S. tap including earth work in excavation 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 specification and as directed by Engineer in charge	Job		2282
	RECTANGULAR CONCRETE BLOCK PAVEMENT			
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 base including testing.			
(i)	Concrete M30 grade for block, (0.600x0.450x0.200) with	Sqm		1611
	(Concrete M30 for edge block, (0.300x0.300x0.300))			
(ii)	Concrete M30 grade for block, (0.450x0.300x0.150) with	Sqm		1364
	(Concrete M30 for edge block, (0.300x0.300x0.300))			

S.No.	Item	Unit	Rates in Rs.	
	INTERLOCKING CONCRETE BLOCK PAVEMENT			
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		631
(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		546
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		17120
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. asper Job 2745 requirement of site i/c cost of labour etc. complete as per approved specification and as directed by Engineer in charge.	Job		3424
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		5707
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		9131
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, dewatering the trench, repairing the leakage laying & jointing of pipe and specials, back filling the trench	Job		

S.No.	Item	Unit	Rates in Rs.	
	i/c testing of joints cost of labour & specials such as Djoints couplers, solvent cement etc. complete Job work as per approved specification and as directed by Engineer in charge.			
	50 mm dia	Job		1712
	90 mm dia	Job		2282
	110 mm dia	Job		2854
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 dewatering 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.	Job		
	50/90 mm dia	Job		1997
	90/110 mm dia	Job		2568
	110/110 mm dia	Job		2854
	90/90 mm dia	Job		2282
19.24	Supply of Wolt man 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 cound of one Kilolitre including excavation at site, dewatering and reinstating the same after completion and as per specifications including all taxes.	Job		17120
19.25	Provision for Rewindidng 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		5707
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		2854

S.No.	Item	Unit	Rates in Rs.	
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		1369
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		1585
	BOUNDARY PILLAR			
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		596
	G.I. BARBED WIRE FENCING 1.2 M. HIGH			
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 strutted 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. Complete.	R.M.		453
	G.I. BARBED WIRE FENCING 1.8 M. HIGH			
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 cement concrete, 0.6 m below ground level, every 15th post, last but one end post and corner post shall be strutted 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.		637

S.No.	Item	Unit	Rates in Rs.	
	SIGN BOARD			
19.32	Providing and fixing of typical informatory 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 tube sposts duly embedded in cement concrete M-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 plate tube. AllM.S. will be stove enameled on both sides. Lettering and printing arrows, border etc. will be painted with ready mixed 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.	Job		15810
19.33	Construction of cement concrete information board in CC 1:2.5:5 (M15) with skin reinforcement of 8 mm diaHYSD 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-figring Logo and Slogen including writing of all information about the project etc. complete. As directed by the Engineer in charge.	Job		11606
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 hight 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 andother required details etc complete as directed by Engineer-in-charge.	Job		21604

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 HFLetc

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 reservoris, 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 / semi pervious materials on both side of B.C. soil (in gunny bags if required) including ramming, compacting to the satisfaction of Engineer-incharge, 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	866
	Note Pay line maximum- Top width payable shall be 2 mtr. And maximum payable side slopes shall be 1.5 Horizontal to 1 vertical, if the constructed top width of the side slopes are less, then the 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/ semi pervious 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	Kg	107

Sr. NO.	Item Description	Unit	Rate (In Rs.)
	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. of20 mm dia. cru shank 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 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	180
	Above 3.0m to 6.0 m depth	Cum	206
	Above 6 m depth	Cum	251
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	347
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	1093
20.6	Providing, and fixing 80 mm diaA.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.	RM	241
20.7	Providing and fixing M.S. chequer red 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 mm thick	Sqm	4622
	8 mm thick	Sqm	5859
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 mm dia	RM	4799
	600 mm dia	RM	7464

Sr. NO.	Item Description	Unit	Rate (In Rs.)
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 mm dia	RM	269
	600 mm dia	RM	358
20.10	Lowering, laying and jointing CI 'B' class connecting mains with rubber gaskets including transportation of pipes from stores to site of works, cost of jointing materials, cost of rubber gasket with all leads and lifts, etc. complete.		
	300 mm dia	RM	369
	350 mm dia	RM	450
	400 mm dia	RM	548
	450 mm dia	RM	579
	500 mm dia	RM	616
	600 mm dia	RM	859
	700 mm dia	RM	1126
	750 mm dia	RM	1276
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.		
	40 mm pebbles	Cum	1862
	12 mm to 20 mm pebbles	Cum	2254
	6 mm to 12 mm pebbles	Cum	2568
	Coarse Sand (from river sand at site)	Cum	1122
	Fine Sand (from river sand at site)	Cum	1247
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.	566
20.13	Providing and fixing M.S. sluice gates in position as per detailed drawing and specification including cost of all materials, abour, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint, etc. complete as directed by Engineer-in charge.	Kg	132
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	99
20.15	Providing and spreading around the well 1 mm thick polyethylene sheet complete as directed by Engineer-in-charge.	Per Sqm	30
20.16	Dewatering charges for estimation purpose for head works in river basin or dam		
	Approach channel	RM	7138

Sr. NO.	Item Description	Unit	Rate (In Rs.)
	Intakewell of 3 M dia	No.	95199
	Inspection well of 2 M dia	No.	61299
	Connecting main	RM	5721
	Jack well of 6 m dia	No.	285580
	Approach Bridge	RM	962
	Note : (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 mansoon and while paying masonary 25% amount shall be withheld and released only when excavation to the full depth is completed. (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% for 2 M depth which just above last 1M depth. 15% for 2 M depth which just above last 3M depth. 15% for the rest of depth from water table level (iii) The provisions made for dewatering in the tender being on lump-sum basis, the same shall have to be reduced/ increased proportion at elyas the length of approach channel, connecting main or approach bridge reduces/ increases during actual execution. Condition No. 1 and 2 shall appear in Tender document.		
20.17	Carrying out recuparation / Yield test for ascertaining the discharge of constructed well/ excavated profile as directed by Engineer - InCharge. 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. The test shall be carried out as per technical circular No. 2597 dt. 20.11.1997 and shall be carried out for 7days		
	a) Lps more than 25000	Day	3231
	b) Lps less than 25000	Day	2326
20.18	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 & placing in proper position on prepared bed on foundation/ embankment with welding the joints of sheet using hot sedge and extrusion welding techniques according to the liner manufacturers specifications at ambient temperatures of 50 C to 450 C including all taxes & labour for jointing and		

Sr. NO.	Item Description	Unit	Rate (In Rs.)
	placing etc. complete.		
	500 micron	Per Sqm	323
	250 micron	Per Sqm	223
20.19	Providing and fixing in position copper lightening conductor including copper rod of 20 mm dia as per upper terminal 1.5 M long with a knob at end and with 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 centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40 mm G.I pipe upto 3 M height from ground and 0.5 M belowground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in releventI.S. codes.		
	i. For Tape fo 10M length	No	14031
	ii. Rebate/Extra rate pre meter length or part there of	Mtr	367
20.20	Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-in-charge) to concrete surface of Intake well /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. code:		
	a) For new surfaces - Two coats.	Per Sqm	798
	b) For old surfaces - Two coats.	Per Sqm	899
20.21	Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- (i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department. (ii) Architecural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c detailes of cofferdam, approach bridge, Intake well, and different small element relevant to complete item of Intake well. (b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for	Job	5 % estimated cost

Sr. NO.	Item Description	Unit	Rate (In Rs.)
	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.		
20.22	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.	Job	5 % of estimated cost

Chapter – XXI

WATER TREATMENT PLANT

1. CONVENTIONAL WTP

1.1 Designing(aesthetically), providing and constructing and commissioning conventional Water Treatment Plant consisting of all Civil, works including cost of Providing and applying Epoxy paint to inside surface of water retaining structures in contact with chlorine and providing anti - termite treatment to entire structure below Ground level, ceramic tiles for flooring, Acrylicemulsion with silicon additives paint from outside, stainless steel railing, Mechanical and Electrical components of various sub-works as given below: including necessary hydraulic testing, structural testing equipment testing, trial run for a period of 3 months, etc. complete as directed 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 **Floc culator:**
Confirming to I.S. 7208 of 1974 (Type-C) with detention period of 30 minutes.

1.6 **Clarifier:**
Horizontal flow circular tank, detention period 2-5hours, overflow rate 30 cubic metre per square metre per day (to be specified), Weir loading not more than 300 cubic metre per metre per day, with mechanical sludge scraper conforming to I.S. No.10313 -1982 with necessary inlet arrangements.

1.7 **Rapid Sand Filters and Filter House**
Filter designed for filteration rate of 4800 liters per square metre per hour for normal run and it shall not exceed 6000 liters per square metre per hour when one bed is under maintenance, minimum 2 beds for plant upto 10 MLD, for larger plants as specified, filters to be located in filter house with 271 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 confirming 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 mansoon 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	Chlorine discharge per day in Kg		
^{0}C	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 ofT.P.
- By passing flash mixer, clariflocculator.
- By passing flash mixer, clariflocculator& filterunits
- 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)

1.21 **Sanitary blocks.**

Carpet area-15 square metre minimum upto 25Mld and 25 square metre above 25 Mld.

1.22 **Administrative block and internal road:**

To accommodate office room. chlorine room, laboratory room, panel board room, blower roometc. andWBM road to connect all units frommain gate of plot.

1.23 **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.

1.24 **RCC Structures**

All RCC structures shall be constructed in M-30

1.25 **Overloading Capacity:**

All pipesandconduitschannelwith25%overloading capacity.All the structural steel work / fabrications are tobe provided with application of Hot Dip Zinccoatingaccording tospecificationsasperIS: 4759:1996 (Reaffirmed 2006)

1.26 All the treatment units e.g. Cascade aerator, Flash mixture, Clariflocculator, 274 Filteration 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.

1.27 **Notes:**

1.27.1 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.

1.27.2 **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. 1.27 Rates for Conventional Treatment Plants**

1.28 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		71.95
21.1.2	Add for capacity above 1 MLDupto 5 MLD	Per MLD	40.63	
21.1.3	Cost of 5 MLD Treatment Plant	Job		234.49
21.1.4	Add for capacity above 5 MLDupto 10 MLD	Per MLD	35.21	
21.1.5	Cost of 10 MLD Treatment Plant	Job		410.54
21.1.6	Add for capacity above 10 MLDupto 20 MLD	Per MLD	24.64	
21.1.7	Cost of 20 MLD Treatment Plant	Job		657.02

Sr. No.	Capacity in MLD	Unit	Rate (Rs in Lakhs)	
21.1.8	Add for capacity above 20 MLDupto 50 MLD	Per MLD	20.95	
21.1.9	Cost of 50 MLD Treatment Plant	Job		1285.71
21.1.10	Add for capacity above 50 MLDupto 100 MLD	Per MLD	17.81	
21.1.11	Cost of 100 MLD Treatment Plant	Job		2176.08
21.1.12	Add for capacity above 100 MLD	Per MLD	10.50	
21.1.13	Cost of 150 MLD Treatment Plant	Job		2701.15

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 though 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 from 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 plats 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 276 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 houris provided to fed 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 ad 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 Kg/cm2 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 providedfor 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 tankwith agitator and a day tank in inlet line.
- Four electronic dosing pumps are provided for sodium hypo chloride 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. 277
- 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 2,3and 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. 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. 2.15 Rates for Un-Conventional Treatment Plants**

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

Sr.No.	Capacity in MLD	Unit	Rate (Rs in Lahs)	
21.2.1	Fixed cost for 1 MLD	Job		77.29
21.2.2	Add for capacity above 1 MLDupto 2 MLD	Per MLD	34.78	
21.2.3	Cost for 2 MLD Treatment Plant	Job		112.07
21.2.4	Add for capacity above 2 MLDupto 5 MLD	Per MLD	29.57	
21.2.5	Cost for 5 MLD Treatment Plant	Job		200.79
21.2.6	Add for capacity above 5 MLD	Per MLD	25.12	
21.2.7	Cost for 10 MLD Treatment Plant	Job		326.38
21.2.8	Add for capacity above 10 MLD	Per MLD	21.36	

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 achived 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 does of 20 ppm with 5%solution. The alum tanks provided with a dose insteps 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 0.6M./ Second. Velocities in filter outlet pipes and valves not to exceed 1 M./ Second. Velocities in interconnecting pipe and controls not to exceed 1M./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. 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.

3.18 **Rates for Un-Conventional Treatment Plant**

Sr.No.	Capacity In MLD	Unit	Rate (Rs in Lakhs)
21.3.1	21 Cum / Hr. (0.50 MLD	Each	34.51
21.3.2	34 Cum / Hr. (0.80 MLD	Each	45.42
21.3.3	42 Cum / Hr. (1.00 MLD	Each	51.00
21.3.4	63 Cum / Hr. (1.50 MLD	Each	64.09
21.3.5	83 Cum / Hr. (2.00 MLD	Each	75.80
21.3.6	125 Cum / Hr. (3.00 MLD	Each	97.74

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:-

Sr. No.	Description	Unit	Upto 5 MLD	Above 5 and upto 10 MLD	Above 10 and upto 25 MLD
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 equipment's	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 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. 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.

1.3 Rates for Sewage Treatment Plants

S.No.	Capacity in MLD	Unit	Rate (Rs in Lakhs)	
22.1.1	Per MLD cost and upto 10 MLD	Per MLD	73.57	
22.1.2	Cost of 10 MLD Plant	Job		735.72
22.1.3	Add for capacity above 10 MLD up to 20 MLD	Per MLD	64.37	
22.1.4	Cost of 20 MLD Plant	Job		1379.47
22.1.5	Add for capacity above 20 MLD	Per MLD	55.18	

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 Thickener, 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 phosper 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 1DWF & 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 asdirected.

2.5 **Parshall Flume:**

Designing, Providing and constructing ParshallFlume Channel in RCC(M-30) formeasuring 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 DWFcapacity with feed chamber sludge and effluent chamber, base adequately supported providing 1.20m wide clear peripheral and approach walkway interconnectingC.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 mixinC.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, anticorrosive

epoxy paint on both faces shall be provided Minimum free board of 0.50 m. be provided it includes inlet pipe from distribution chamber, central shaft inlet baffle outlet chamber, Scum remover, skimming 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 RPMrecirculation 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 0.15to0.30 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 clarrifier shall not be more then 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 then 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 bottons, starters for the clarifier, walkway and the suitable sludge withdrawing arrangement with flush valve capable of withdrawing moisture content not more then 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 structural 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 then 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 foundation 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 then 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 bypass 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 then 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 Housewith 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 satisfactoryfunctioning.

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 form 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 (Reaffirmed2006)

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. Aluminium door and window with glass panels, mosaic tile flooring and skirting and all other allied items, fixtures fastening electrification arrangement water supply arrangement etc. complete. The building will have laboratory on upper floor of administrative building and should be so centralised that it should not be attached with any 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. 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.**

2.24 **Rate for Primaryand secondarytreatment-with digesters, sludge drying beds etc.complete:**

S.No.	Capacity in MLD	Unit	Rate (Rs in Lakhs)	
22.2.1	Upto 10 MLD	MLD	88.29	
22.2.2	Cost of 10 MLD Plant	Job	882.89	882.89
22.2.3	Add for capacity above 10 MLD up to 20 MLD	MLD	77.25	
22.2.4	Cost of 20 MLD Plant	Job	1655.41	1655.41
22.2.5	Add for capacity above 20 MLD	MLD	66.21	

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:-

Sr. No.	Description	Unit	Upto 5 MLD	Above 5 and upto 10 MLD	Above 10 and upto 25 MLD
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 equipment's,	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 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): Specificatiion 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, over flow 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 ratesshall 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. 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.**

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

S.No.	Capacity of Liters	Unit	For Seismic Zone-III Rate (in Rs.)
23.1	Upto 25000 lit	Litre	40.31
23.2	Cost of 25000 lit capacity	Job	1007546
23.3	Add for capacity above 25000 to 50000 lit	Litre	16.64

S.No.	Capacity of Liters	Unit	For Seismic Zone-III Rate (in Rs.)
23.4	Cost of 50000 lit capacity	Job	1423842
23.5	Add for capacity above 50000 to 75000 lit	Litre	12.48
23.6	Cost of 75000 lit capacity	Job	1735837
23.7	Add for capacity above 75000 to 100000 lit	Litre	15.78
23.8	Cost of 100000 lit capacity	Job	2130438
23.9	Add for capacity above 100000 to 150000 lit	Litre	9.71
23.10	Cost of 150000 lit capacity	Job	2615766
23.11	Add for capacity above 150000 to 200000 lit	Litre	8.32
23.12	Cost of 200000 lit capacity	Job	3031762
23.13	Add for capacity above 200000 to 250000 lit	Litre	10.07
23.14	Cost of 250000 lit capacity	Job	3535359
23.15	Add for capacity above 250000 to 300000 lit	Litre	6.93
23.16	Cost of 300000 lit capacity	Job	3882021
23.17	Add for capacity above 300000 to 400000 lit	Litre	6.93
23.18	Cost of 400000 lit capacity	Job	4575347
23.19	Add for capacity above 400000 to 500000 lit	Litre	8.11
23.20	Cost of 500000 lit capacity	Job	5385052
23.21	Add for capacity above 500000 to 750000 lit	Litre	5.5
23.22	Cost of 750000 lit capacity	Job	6760597
23.23	Add for capacity above 750000 to 1000000 lit	Litre	6.57
23.24	Cost of 1000000 lit capacity	Job	8405315
23.25	Add for capacity above 1000000 to 1500000 lit	Litre	5.55
23.26	Cost of 1500000 lit capacity	Job	11178616
23.27	Add for capacity above 1500000 to 2000000 lit	Litre	4.17
23.28	Cost of 2000000 lit capacity	Job	13258591

S.No.	
1 A.	**ELEVATED SERVICE RESERVOIRS WITH RCC STAGING AND ZINC ALLOY COATED STEEL TANK** **Notes for Item No. 23.29 to Item No. 23.36** 1. **SCOPE OF WORK** 2. The Specification covers guidelines for layout for overhead water tanks and Criteria for analysis for RCC staging for Zinc Aluminium Alloy Steel tank. 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 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 • IS: 513 - Standard of Base metal (MS) • IS: 15961 - Standard of Coating • IS: 1367 - Standard of Coating (Nuts Bolt & Nozzles) • 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:- • Strength of concrete required is M-25 and 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 structure in contact with water as per I.S. code. In specific cases required 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 4.75mm IS sieve. • Sand should be free clay, dust or silt. The permissible limit for the same is 5% by weight. •

S.No.	
	• 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 used of Electrically Welded Steel pipes shall from part of these Specifications. 6. **Capacity :-** Capacity of 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 coating 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 : 456-2000. Increase in permissible stresses for column staging shall be as per IS: 456-2000 • The staging height of 12 mtr. has been considered for the computation of the rates of ESR. 8. **Shape and Size :-** The shape and size of elevated circular 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 rates 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.

S.No.	
	14. **ELEVATED SERVICE RESERVOIRS WITH RCC STAGING AND ZINC ALLOY COATED STEEL TANK** 14.1 Providing, designing, (structurally & aesthetically) constructing, installation, testing commissioning all complete of Zinc Aluminium Alloy elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically as per staging of the ESR and base slab, including excavation in all types of strata, foundation concrete, 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 C.I. Horizontal casting pipe assembly of inlet, outlet, scour, overflow and bypass arrangements as per departmental design, providing and fixing accessories such as Ladder water level indicators, lightening conductor, G.I. pipe railing around walk way providing RCC staircase from ground level to balcony level along with columns, M.S. grill gate of 2 mtr. height with locking arrangements of approved design RCC chambers for all valves, ventilating shafts, providing and applying three coats of weather coat paints to the staging structure including bottom slab anti termite treatment for underground parts of the structure. The tanks shall be of modular construction, pre-engineered, pre-fabricated, factory manufactured, supplied in knock-down condition and site-assembled. The material of construction shall be corrugated section Aluminium-Zinc Coated Steel sheets of the shell and multiple-layered PE/PVC sheet for the inner containment liner. All connections to the tanks shall be with flanged or threaded nozzles, placed to the client's specification. The roof shall be domed, with heavy-duty Hot-dip Galvanized truss frame for support, and shall be of Steel coated with Aluminium Zinc Alloy and be capable of supporting 4-5 persons for maintenance and cleaning. The tank shall have an access hatch with cover, on the roof, for operation and maintenance. Covers shall be firmly fixed to the top edge of the tank with galvanized bolts and nuts. Tanks shall be provided with internal and external ladders. 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.

S.No.	
	14.6 The entire structure shall be stage M-25. 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. 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. 14.13 **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 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.

S.No.	

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 the USOR)

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. 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.**

14.20 Rate for Elevated Service Reservoirs of RCC Staging and Zinc Aluminium Alloy Tank up to 12m staging

Item No.	Details of Item & Capacity in Litres	Unit	Rates in Rs.
	Providing, designing, (structurally & aesthetically) constructing, installation, testing commissioning all complete of Zinc Aluminium Alloy elevated service reservoirs of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically as per staging of the ESR and base slab, including excavation in all types of strata, foundation concrete, 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 C.I. Horizontal casting pipe assembly of inlet, outlet, scour, overflow and bypass arrangements as per departmental design, providing and fixing accessories such as Ladder water level indicators, lightening conductor, G.I. pipe railing around walk way providing RCC staircase from ground level to balcony level along with columns, M.S. grill gate of 2 mtr. height with locking arrangements of approved design RCC chambers for all valves, ventilating shafts, providing and applying three		

S.No.				
		coats of weather coat paints to the staging structure including bottom slab anti termite treatment for underground parts of the structure. The tanks shall be of modular construction, pre-engineered, pre-fabricated, factory manufactured, supplied in knock-down condition and site-assembled. The material of construction shall be corrugated section Aluminium-Zinc Coated Steel sheets of the shell and multiple-layered PE/PVC sheet for the inner containment liner. All connections to the tanks shall be with flanged or threaded nozzles, placed to the client's specification. The roof shall be domed, with heavy-duty Hot-dip Galvanized truss frame for support, and shall be of Steel coated with Aluminium Zinc Alloy and be capable of supporting 4-5 persons for maintenance and cleaning. The tank shall have an access hatch with cover, on the roof, for operation and maintenance. Covers shall be firmly fixed to the top edge of the tank with galvanized bolts and nuts. Tanks shall be provided with internal and external ladders.		
	23.29	Upto 20000 litre		37.50
	23.30	**Cost of 20000 litre capacity**	**Job**	**750107**
	23.31	Add for capacity above 20000 to 25000 litre	Litre	37.51
	23.32	**Cost of 25000 litre capacity**	**Job**	**937681**
	23.33	Add for capacity above 25000 to 30000 litre	Litre	15.47
	23.34	**Cost of 30000 litre capacity**	**Job**	**1015046**
	23.35	Add for capacity above 30000 to 35000 litre	Litre	16.52
	23.36	**Cost of 35000 litre capacity**	**Job**	**1097663**

S.No.	
1 B.	**ELEVATEDRCC SERVICE RESERVOIR WITH POLYETHYLENE (HDPE) SLIM TANK** **Notes for Item No. 23.37 to Item No. 23.44** 1. **SCOPE OF WORK** 2. The Specification covers guidelines for layout for overhead water tanks and Criteria for analysis for RCC staging for Polyethylene (HDPE) tank. 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 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 • IS: 513 - Standard of Base metal (MS) • IS: 15961 - Standard of Coating • IS: 1367 - Standard of Coating (Nuts Bolt & Nozzles) • 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:- • Strength of concrete required is M-25 and 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 structure in contact with water as per I.S. code. In specific cases required 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 4.75mm IS sieve. • Sand should be free clay, dust or silt. The permissible limit for the same is 5% by weight.

S.No.	
	• 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 used of Electrically Welded Steel pipes shall from part of these Specifications. 6. **Capacity :-** Capacity of 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 coating 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 : 456-2000. Increase in permissible stresses for column staging shall be as per IS: 456-2000 • The staging height of 12 mtr. has been considered for the computation of the rates of ESR. 8. **Shape and Size :-** The shape and size of elevated circular 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.

S.No.	
	13. **Rates :-** The rates 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. **ELEVATED SERVICE RESERVOIRS WITH RCC STAGING AND POLYETHYLENE SLIM TANK** 14.1 Providing, Designing (structurally & aesthetically) and constructing, installation, testing commissioning all complete elevated service reservoirs with Polyethylene Slim Tank &RCC staging consisting of columns, internal and external bracings spaced vertically as per staging of the ESR with RCC base slab including excavation in all types of strata, foundation concrete 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 C.I. Horizontally casted pipe assembly of inlet, outlet, scour, overflow and bypass arrangements as per departmental design, providing and fixing accessories such as Ladder water level indicators, lightening conductor, G.I. pipe railing around walk way providing RCC staircase from ground level to balcony level along with columns, M.S. grill gate of 2 mtr. height with locking arrangements of approved design RCC chambers for all valves, ventilating shafts, providing and applying three coats of weather coat paints to the staging structure including bottom slab anti termite treatment for underground parts of the structure. The tanks shall be of modular construction, pre-engineered, pre-fabricated, factory manufactured, supplied in knock-down condition and site-assembled. The material of construction shall be Polyethylene and multiple-layered for the inner containment liner. All connections to the tanks shall be with flanged or threaded nozzles, placed to the client's specification. The tank shall have an access on the roof, for operation and maintenance. Covers shall be firmly fixed to the top edge of the tank. Tanks shall be provided with external ladders. 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.

S.No.	
	14.6 The entire structure shall be stage M-25. 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. 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. 14.13 **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 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.

S.No.	

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 the USOR)

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. 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.**

14.20 Rate for Elevated Service Reservoirs of RCC Staging and HDPE Slim Tank up to 12m staging

Item No.	Details of Item & Capacity in Litres	Unit	Rates in Rs.
	Providing, Designing (structurally & aesthetically) and constructing, installation, testing commissioning all complete elevated service reservoirs with Polyethylene Slim Tank &RCC staging consisting of columns, internal and external bracings spaced vertically as per staging of the ESR with RCC base slab including excavation in all types of strata, foundation concrete 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 C.I. Horizontally casted pipe assembly of inlet, outlet, scour, overflow and bypass arrangements as per departmental design, providing and fixing accessories such as Ladder water level indicators, lightening conductor, G.I. pipe railing around walk way providing RCC staircase from ground level to balcony level along with columns, M.S. grill gate of 2 mtr. height with locking arrangements of approved design RCC chambers for all valves, ventilating shafts,		

S.No.				
		providing and applying three coats of weather coat paints to the staging structure including bottom slab anti termite treatment for underground parts of the structure. The tanks shall be of modular construction, pre-engineered, pre-fabricated, factory manufactured, supplied in knock-down condition and site-assembled. The material of construction shall be Polyethylene and multiple-layered for the inner containment liner. All connections to the tanks shall be with flanged or threaded nozzles, placed to the client's specification. The tank shall have an access on the roof, for operation and maintenance. Covers shall be firmly fixed to the top edge of the tank. Tanks shall be provided with external ladders.		
	23.37	Upto 20000 litre	Litre	34.65
	23.38	**Cost of 20000 litre capacity**	**Job**	**693100**
	23.39	Add for capacity above 20000 to 25000 litre	Litre	34.66
	23.40	**Cost of 25000 litre capacity**	**Job**	**866423**
	23.41	Add for capacity above 25000 to 30000 litre	Litre	22.81
	23.42	**Cost of 30000 litre capacity**	**Job**	**980498**
	23.43	Add for capacity above 30000 to 35000 litre	Litre	22.81
	23.44	**Cost of 35000 litre capacity**	**Job**	**1094573**

Chapter – XXIV

GROUND SERVICE RESERVOIR 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 port land 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 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 up to 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.**

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

S.No.	Capacity of Liters	Unit	For Seismic Zone-III Rate (in Rs.)
24.1	Upto 25000 lit	Litre	17.26
24.2	**Cost of 25000 lit capacity**	**Job**	431540
24.3	Add for capacity above 25000 to 50000 lit	Litre	9.05
24.4	**Cost of 50000 lit capacity**	**Job**	657963

S.No.	Capacity of Liters	Unit	For Seismic Zone-III Rate (in Rs.)
24.5	Add for capacity above 50000 to 75000 lit	Litre	8.01
24.6	**Cost of 75000 lit capacity**	**Job**	858259
24.7	Add for capacity above 75000 to 100000 lit	Litre	7.66
24.8	**Cost of 100000 lit capacity**	**Job**	1049848
24.9	Add for capacity above 100000 to 150000 lit	Litre	7.11
24.10	**Cost of 150000 lit capacity**	**Job**	1405627
24.11	Add for capacity above 150000 to 200000 lit	Litre	5.78
24.12	**Cost of 200000 lit capacity**	**Job**	1694751
24.13	Add for capacity above 200000 to 250000 lit	Litre	5.01
24.14	**Cost of 250000 lit capacity**	**Job**	1945439
24.15	Add for capacity above 250000 to 500000 lit	Litre	4.30
24.16	**Cost of 500000 lit capacity**	**Job**	3021268
24.17	Add for capacity above 500000 to 1000000 lit	Litre	3.65
24.18	**Cost of 1000000 lit capacity**	**Job**	4848416
24.19	Add for capacity above 1000000 to 1500000 lit	Litre	3.20
24.20	**Cost of 1500000 lit capacity**	**Job**	6451068
24.21	Add for capacity above 1500000	Litre	4.30

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/lmp
- 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, selfprompting 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 25 mm to size 80mm
		PN 16	- from Size 100 mm to size 150mm
(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. 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**.

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	1676
	20 mm	Each	2751
	25 mm	Each	5333
	40 mm	Each	9681
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		

Sr.No	Description of items	Unit	Rates in Rs
	register with 5 mm tempered mineral glass cover, AMR compatibility with 5 years warranty (f) Earthing Grounding Rings in SS 304 (Gr Electrodes are not acceptable). (g) Marking Direction of flow with arrow, size, Sr. No. make 305 complete and successful accuracy test certificate from FCRI, Palakkad with C.I. Body "T" Type structure:-		
	50 mm	Each	13455
	65 mm	Each	14280
	80 mm	Each	17398
	100 mm	Each	22317
	125 mm	Each	29377
	150 mm	Each	36434
	200 mm	Each	41025
	250 mm	Each	101991
	300 mm	Each	213352
	400 mm	Each	320012
	500 mm	Each	377455
25.3	Supply and Installation of Electromagnetic Type, Internal batteryoperated 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	276718
	40 mm	Each	278305
	50 mm	Each	279363
	65 mm	Each	284549
	80 mm	Each	285182
	100 mm	Each	301585
	125 mm	Each	305818
	150 mm	Each	318516
	200 mm	Each	344443
	250 mm	Each	395764
	300 mm	Each	498939
25.4	Supply of Dirt Box with S.S. Strainer as per specifications (Dia in mm)		
	50 mm	Each	4459
	65 mm	Each	5060
	80 mm	Each	6469
	100 mm	Each	8083
	125 mm	Each	13376
	150 mm	Each	18669
	200 mm	Each	25599
	250 mm	Each	42344

Sr.No	Description of items	Unit	Rates in Rs
	300 mm	Each	61784
	400 mm	Each	103387
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, sum totalizer, Perfection category : IP 65 Output : One current output (4-20 mA) one scalable pulse output.		
	50 mm	Each	145066
	65 mm	Each	147979
	80 mm	Each	154048
	100 mm	Each	171164
	150 mm	Each	187068
	200 mm	Each	239146
	250 mm	Each	280298
	300 mm	Each	310160
	400 mm	Each	526605
	450 mm	Each	602840
	500 mm	Each	728240
	600 mm	Each	1184559
	700 mm	Each	1553006
	900 mm	Each	2322157
	1000 mm	Each	2541360
	1200 mm	Each	3310510
	1400 mm	Each	4079660
	2000 mm	Each	6205612

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, copper tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in I.S. codes 3070.		
26.1.1	For Tape of 10M length	Each	12693
26.1.2	Rebate / Extra rate per metre length or part there of over and above initial length of 10M	Mtr.	433
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, Aluminium tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthling 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 10M length	Each	9920
26.2.2	Rebate / Extra rate per metre length or part there of over and above initial length of 10M	Mtr.	156
26.3	Providing, hoisting and fixing in position 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	Each	1648

Item No	Items	Unit	Rate in Rs.
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	3664
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	4087
26.6	Providing and applying epoxy paint of approved make (Shalimar, Ciba or Mahindra & Mahindra) to concrete surface of RCCESR&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	70
26.6.2	For old surfaces - Two coats	Sq.m	76
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 saffolding, centering, shuttering, curing finishing in CM 1:3 proportion including RCC M-15 footing foundation, its excavation, refilling and cleaning the site, the complete as per type design, with 3 coats of cement paint.	Rmt.	8430
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	9043
26.8.2	1.2 M dia x 1.80 M height	Each	11495
26.8.3	1.5 M dia x 2.25 M height	Each	18392

Electro Chlorination System

Item No.	Items	Unit	Rate in Rs.
26.9	Providing, erecting, commissioning and giving test & trial for a period of one month including one year free maintenance after commissioning of Electro chlorinator capable of generating chlorine from common salt by electrolysis using electrodes in form of sodium hypo chlorite solution containing 6-8 gms/lit of available chlorine in batch or continuous process and capable of providing 8 hrs storage of hypochlorite in case of power failure. The electro chlorinator shall comprise of following: • Electrolytic cell consisting dimensionally stable electrodes made from Gr I Titanium sheet with multi metal oxide coating. Electrolyzer tank made from PVC-FRP or Acrylic • Power pack consisting of transformer rectifier for generating suitable DC current from AC supply along with the control switch for dosing pumps etc. through MCB's contacts, relays and wiring. • Control panel for the electro chlorinator consisting of DC voltage and current display income phase status unit on-off switches fuses etc. • Dosing tank of suitable capacity made from PVC/FRP. • Dosing pumps of specials quality (1W+1S) suitable to handle hypo chlorite solution. • Entire chlorine solution pipeline shall be of PVC. • Chlorine test kit suitable to measure residual chlorine up to 5 ppm.		
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		

Item No.	Items	Unit	Rate in Rs.
	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 WTPupto 5 MLD	Each	149610
26.10.2	Add/deduct per MLD or part	MLD	7481
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	8619
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	6490
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	801
26.14	Providing and applying epoxy paint of approved make to concrete surface of RCCESR or GSR including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-incharge, necessary scaffolding, etc. complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per relevant I.S. codes.		
26.14.1	For new surfaces - Two coats	Sqm	308
26.14.2	For old surfaces - Two coats	Sqm	329
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	145
26.15.2	On concrete work	Sqm	147
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. complete	Sqm	9
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	67

Online Automatic Chlorination System

Supply and Installation, of Cartridge based Non-electric, Online, Automatic Water Chlorination System, for piped water supply schemes, using solid chlorination agent, and should be safe and simple to handle. The system should be approved/recommended for drinking water. The chemical should be approved for drinking water and should be certified/listed/approved to NSF ANSI 60 or equivalent. It should be completely soluble in water and shouldn't have any insoluble residues left after dissolving in water.

Principle of Chlorination System Operation

The Chlorination system should be able to be installed online during water distribution, and capable to generate upto 2 ppm of chlorination in running water. The operation shall be online and automatic, and should be able to operate without continuous intervention.

Chlorination System should have following features and capabilities:-

1. It should avoid leakage or seepage of solution.
2. System should be automatically driven, safe & easy to operate.
3. Should be compact and occupy less foot print
4. System should be able to work by water supply pressure upto 2 bar, in case of piped water supply for village communities.
5. System should be able to operate without electricity.
6. System should preferably have indication when chemical in the system is exhausted and refill might be required.
7. The cartridge should have a minimum life of 25 lakh liters at 1 ppm of chlorination.

Item No.	Items	Unit	Rate in Rs.
26.18	Supply and Installation, of Cartridge based Non-electric, Online, Automatic Water Chlorination System, for piped water supply schemes, using solid chlorination agent, and should be safe and simple to handle. Online Chlorination unit- 2500000 lit water Chlorination capacity of single cartridge at 1 ppm dosing price including transportation upto site with installation.	Each	68964
26.19	Supply and installation online Chlorination cartridge (for item no. 26.18)	Each	6479