SOR: 2019-20

G W S S B

Schedule of Rates

Part-1 Water Supply

Part-2 Drainage

Gujarat Water Supply & Sewerage Board

Gandhinagar

Subject: SOR for Year 2019-20

Preamble:-

Gujarat Water Supply & Sewerage is preparing the SOR for works of Water Supply & Drainage Projects, this SOR is followed by GWIL and WASMO also.

SOR for the Year 2014-15 was approved in 255th Board meeting held on 27/2/2015.

For the Year 2015-16, 2016-17, 2017-18 and 2018-19 same rates of SOR of year 2014-15 are considered and approved in 271st Board Meeting held on 28/2/2019

Draft of new SOR for the Year 2019-20 is prepared on the following considerations

Comparison of Basic Rates of R & B:

Sr.No	Details	2014-15	2019-20	Current Market
1	Cement	Rs 300/ Bag	Rs 238/ Bag	Rs 345/Bag
2	Reinforcement TMT-Fe-415	Rs 48/Kg	Rs 48/Kg	Rs 40/Kg
3	Reinforcement TMT-Fe-500	Rs 49/Kg	Rs 49/Kg	Rs 41/Kg
4	Reinforcement CRS-Fe-415	Rs 53/ Kg	Rs 52/ Kg	Rs 44/Kg
5	Reinforcement CRS-Fe-500	Rs 53/Kg	Rs 53/Kg	Rs 44.5/Kg
6	WPI-HR coil	106.3- March-13	113.9 Feb-19	7.15% increase
7	HR coil above 10 mm	Rs 39400/MT - 6/3/2013	Rs 42217/ MT-Feb-19	7.15% increase
8	HR coil less than 10 mm	Rs 38900/MT - 6/3/2013	Rs 41680/ MT-Feb-19	

Sr.No	Details	2014-15	2019-20	Current Market
9	WPI Pig Iron	147.8 (99.7) March-14	114.2 Feb-19	14.54% increase
10	PVC Resin	Rs 89550/MT	Rs 85081.24/MT	4.99% decrease
11	HDPE Resin	Rs 133315/MT-Feb-14	Rs 107159/MT-20/3/2019	19.62% decrease
12	Labor Skilled	Rs 282/day	Rs 329/ day	
13	Labor Un-skilled	Rs 268/day	Rs 312 / Day	

Proposal of New SOR 2019-20

Part-I- Drinking Water supply

Section-A-Material

Mild Steel Pipes:

Two items of the MS pipelines are proposed.

c. Rates of procurement of material only- At par with previous SOR
d. Rates for consideration of EPC work- 6% less than previous SOR

DI pipes:

Two items of the DI pipelines are proposed.

c. Rates of procurement of material only- 9% more than previous SOR
d. Rates for consideration of EPC work- 3% more than previous SOR

PVC pipes:

Two items of the PVC pipelines are proposed.

c. Rates of procurement of material only- 5% less than previous SOR
d. Rates for consideration of EPC work- 11% less than previous SOR

HDPE pipes:

Two items of the HDPE pipelines are proposed.

c. Rates of procurement of material only- 14% less than previous SOR
d. Rates for consideration of EPC work- 20% less than previous SOR

GI pipe: No change suggested

Stoneware pipes: Decrease of 10% than current SOR

Corrugated DWC pipes:- Reduction of 25% than current SOR

RCC pipes:- Reduction of 25% than current SOR

Sluice valve/ Butterfly valve/ NRV: 20% increase than previous SOR

Water hammer devises and temper proof air valve: No change suggested

Other material: No change suggested

Section-B: Labor: No change suggested

Section-C: RCC ESR/GSR, HGLR structures:- 5% increase in previous SOR

Section-D: Water Treatment Plant: Increase of 5% than previous SOR

Section- E: Miscellaneous completed Items: No change suggested

Section- F: Wells and galleries- No change suggested

Section-G: Maintenance and Repairs- No change suggested

Part-II- Urban Drainage

Section A-Sewerage Treatment Plants:- No change suggested

Section-B-Chambers and Manholes: No change suggested

Miscellaneous items: No change suggested

Section- **D-Labor** : No change suggested

Section-E- Miscellaneous completed item: No change suggested

Section-F-Maintenance and Repairs: No change suggested

Section-G-Mechanical: No change suggested

Section-H- Electrical: No change suggested

Existing provisions as below shall remain unchanged

Sr. No	Description	Enhancement except Material Section of SOR
1	Bet area with facility of Jetty	50%
2	Bet area without facility of Jetty	65%
3	Urban and R-Urban areas (within area of local body)	15%
4	District Dang, Dharampur and Kaprada taluka of District Valsad	10%
5	Other tribal areas	5%
6	DDP areas	2.5%
7	Open well in Kachchh District	5%
8	Open well in Kherbhrama and Vijayanagar talukas of Sabarkantha District	10%

Note: If urban area falls under Tribal area than enhancement of only 15% shall be made, similarly any one component of enhancement shall only be applicable if the work falls in combination of any above description.

Instruction to the user of SOR:

1. All rates are inclusive of all taxes, insurance , royalties , etc.
2. Material section includes items for Water Supply and Sewerage Projects

3. Duplicate labor items of Water Supply and Sewerage Projects are removed and included in single section
4. There is change in description of some items, hence while preparation of estimates and tender description of the item shall be as per SOR only.
5. It shall be noted that there is major change in description of item of WTP, RCC storage items
6. While drafting specifications of WTP, criteria as mentioned separately shall be included in Item specification of Tender Document
7. While drafting specification of items of flooring, tiles , electrification, etc, provisions mentioned separately in SOR shall be included in Item specification of Tender Document
8. For estimation of work with cost of pipeline , item of material for EPC shall be taken for estimation purpose
9. If only Pipes are required to be purchased through tenders , than rates of item for Material purchase shall be taken.
10. Excavation in Hard Rock following points shall be considered while estimation and execution
    a. Soil formation of open wells and exposed land near alignment or location of work shall be studied
    b. Trial pit or bore shall be done before deciding quantity of hard rock
    c. Opinion of Geologist shall be taken for Hard rock
    d. Petrographic Test for Mineralogy of rock shall be carried out from Government approved laboratory such as " GERI" and compressive strength, crushing strength, water absorption, durability and weather testing shall be done
    e. Classification of useable and un-useable surplus stuff of Hard rock shall be done
    f. Record for useable stock shall be kept and may be used for construction works such as masonry, soling, concrete aggregate , road metal etc
    g. Auction for surplus hard rock shall be made
    h. If auction is not made than the amount shall be deducted from running account bill or final bill of the contractor

i. Blasting material record shall be kept and procured as per provisions of rules of Government

j. If instructions as above are not followed than Hard rock shall be considered as Soft rock during payment.

Chief Engineer
Technical Cell-GWSSB

GUJARAT WATER SUPPLY AND SEWERGE BOARD
Gandhinagar – 382010

Schedule of Rates 2019-20

I N D E X

Schedule of Rates

Year-2019-20

Part-1 Water Supply

Material

Part 1 & 2 : Section:- A

MATERIAL SECTION :- 1A					
Item no.	**Size**		**Unit**	**Rate for 2019-20 (EPC Works)**	**Rate for 2019-20 (Material Only)**
1	**2**	**3**	**4**	**5**	**6**
Item No. 1.1	**MS Pipe**				
1.1.A	**Bare pipe**				
Manufacture, Supply & Delivery of Electric Resistance Welded (Up to 400mm)/Submerged Arc Welded(Above 400mm) M.S.Pipe having beveled ends plate or coil conforming to IS-3589-2001 or its latest revision/ ammendment for following thickness outside diameter at GWSSB store or site anywhere in Gujarat State including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading conveyance to Departmental stores, stacking etc. all complete. (Rate for MS Pipe based on the ex. works price of HR Coil as Rs.41680.00 per MT (Above 3.15 mm to 10 mm) & Rs. 42217.00 per MT (Above 10 mm) as on Febuaury-2019.**(WPI Index of H. R Coil of February-19 is 113.90)**					
	Pipe dia in OD (mm)	**Thickness (mm)**			
1	168.3	4.0	R. Mt	1,029	1,094
2	168.3	4.5	"	1,154	1,227
3	219.1	4.5	"	1,512	1,608
4	219.1	6.3	"	2,098	2,232
5	273	4.0	"	1,684	1,792
6	273	5.0	"	2,097	2,231
7	323.9	4.0	"	2,003	2,131
8	323.9	4.5	"	2,250	2,393
9	323.9	5.6	"	2,790	2,968
10	355.6	4.0	"	2,201	2,341
11	355.6	5.0	"	2,743	2,918
12	355.6	5.6	"	3,068	3,263
13	406.4	4.0	"	2,519	2,680
14	406.4	5.0	"	3,141	3,342
15	406.4	6.3	"	3,945	4,196
16	457	4.0	"	2,836	3,017
17	457	5.0	"	3,537	3,763
18	457	6.3	"	4,443	4,727
19	508	5.0	"	3,936	4,187
20	508	5.6	"	4,403	4,684
21	508	6.3	"	4,947	5,262
22	610	5.8	"	5,484	5,834
23	610	6.3	"	5,952	6,332
24	711	6.3	"	6,948	7,392
25	711	7.1	"	7,821	8,321
26	813	7.1	"	8,955	9,526
27	914	8.0	"	11,343	12,067
28	1016	8.8	"	13,871	14,756
29	1067	8.8		14,573	15,504
30	1219	10.0	"	19,112	20,332
31	1422	12.5	"	27,851	29,629
32	1626	14.2	"	36,180	38,489
33	1829	16.0	"	40,737	43,337
34	2032	16.0		50,989	54,244
35	2235	17.5	"	61,344	65,259
36	2540	20.0	"	79,671	84,756
1.1.B	**I/S epoxy Painting (100 Micron) & O/S Gunniting (25 mm Thick)**				
	Pipe dia in OD (mm)	**Thickness (mm)**			
1	168.3	4.0	R. Mt	1,327	1,411
2	168.3	4.5	"	1,452	1,544
3	219.1	4.5	"	1,893	2,013
4	219.1	6.3	"	2,477	2,635

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
5	273	4.0	"	2,153	2,291
6	273	5.0	"	2,567	2,730
7	323.9	4.0	"	2,555	2,718
8	323.9	4.5	"	2,802	2,981
9	323.9	5.6	"	3,340	3,553
10	355.6	4.0	"	2,805	2,984
11	355.6	5.0	"	3,348	3,561
12	355.6	5.6	"	3,670	3,904
13	406.4	4.0	"	3,207	3,411
14	406.4	5.0	"	3,829	4,073
15	406.4	6.3	"	4,630	4,926
16	457	4.0	"	3,603	3,833
17	457	5.0	"	4,302	4,577
18	457	6.3	"	5,209	5,541
19	508	5.0	"	4,784	5,089
20	508	5.6	"	5,251	5,586
21	508	6.3	"	5,795	6,165
22	610	5.8	"	6,499	6,913
23	610	6.3	"	6,967	7,412
24	711	6.3	"	8,127	8,646
25	711	7.1	"	9,000	9,575
26	813	7.1	"	10,300	10,957
27	914	8.0	"	12,853	13,673
28	1016	8.8	"	15,547	16,539
29	1067	8.8	"	16,332	17,375
30	1219	10.0	"	21,118	22,466
31	1422	12.5	"	30,187	32,113
32	1626	14.2	"	38,846	41,325
33	1829	14.2	"	43,731	46,522
34	2032	16.0	"	54,313	57,779
35	2235	17.5	"	64,998	69,146
36	2540	20.0	"	83,820	89,170
1.1.C	**I/S CML (9 mm thick up to 700 mm dia & 12 mm thick above 700 mm dia) & O/S Gunniting (25 mm thick)**				
	Pipe dia in OD (mm)	**Thickness (mm)**			
1	406.4	4.0	"	3,298	3,509
2	406.4	5.0	"	3,920	4,171
3	406.4	6.3	"	4,721	5,023
4	457	4.0	"	3,706	3,943
5	457	5.0	"	4,405	4,686
6	457	6.3	"	5,311	5,650
7	508	5.0	"	4,899	5,211
8	508	5.6	"	5,366	5,708
9	508	6.3	"	5,910	6,287
10	610	5.8	"	6,637	7,060
11	610	6.3	"	7,105	7,559
12	711	6.3	"	8,288	8,817
13	711	7.1	"	9,161	9,746
14	813	7.1	"	10,561	11,236
15	914	8.0	"	13,147	13,986
16	1016	8.8	"	15,874	16,887
17	1067	8.8	"	16,676	17,741

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
18	1219	10.0	"	21,511	22,884
19	1422	12.5	"	30,644	32,600
20	1626	14.2	"	39,369	41,882
21	1829	14.2	"	44,321	47,150
22	2032	16.0	"	54,967	58,476
23	2235	17.5	"	65,718	69,913
24	2540	20.0	"	84,638	90,041
1.1.D	I/S Bare & O/S Gunniting (25 mm thick)				
	Pipe dia in OD (mm)	Thickness (mm)			
1	168.3	4.0	R. Mt	1,241	1,320
2	168.3	4.5	"	1,366	1,453
3	219.1	4.5	"	1,779	1,893
4	219.1	6.3	"	2,366	2,517
5	273	4.0	"	2,011	2,139
6	273	5.0	"	2,424	2,579
7	323.9	4.0	"	2,385	2,537
8	323.9	4.5	"	2,632	2,800
9	323.9	5.6	"	3,172	3,374
10	355.6	4.0	"	2,618	2,785
11	355.6	5.0	"	3,160	3,362
12	355.6	5.6	"	3,485	3,707
13	406.4	4.0	"	2,992	3,183
14	406.4	5.0	"	3,614	3,845
15	406.4	6.3	"	4,417	4,699
16	457	4.0	"	3,361	3,575
17	457	5.0	"	4,062	4,321
18	457	6.3	"	4,968	5,285
19	508	5.0	"	4,516	4,804
20	508	5.6	"	4,983	5,301
21	508	6.3	"	5,527	5,880
22	610	5.8	"	6,176	6,570
23	610	6.3	"	6,644	7,068
24	711	6.3	"	7,751	8,246
25	711	7.1	"	8,624	9,175
26	813	7.1	"	9,869	10,499
27	914	8.0	"	12,368	13,158
28	1016	8.8	"	15,007	15,965
29	1067	8.8	"	15,765	16,772
30	1219	10.0	"	20,470	21,777
31	1422	12.5	"	29,433	31,311
32	1626	14.2	"	37,983	40,408
33	1829	14.2	"	42,759	45,488
34	2032	16	"	53,234	56,632
35	2235	17.5	"	63,811	67,884
36	2540	20	"	82,471	87,736
1.1.E	I/S Solvent free Liquid Epoxy Lining (406 micron) + O/S 3 LPE Coated M. S. Pipe				
	Pipe dia in OD (mm)	Thickness (mm)			
1	168.3	4.0	R. Mt	1,695	1,803
2	168.3	4.5	"	1,820	1,936
3	219.1	4.5	"	2,371	2,522
4	219	6.3	"	2,953	3,142

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
5	273	4.0	"	2,758	2,934
6	273	5.0	"	3,171	3,373
7	323.9	4.0	"	3,278	3,487
8	323.9	4.5	"	3,525	3,750
9	323.9	5.6	"	4,061	4,320
10	355.6	4.0	"	3,602	3,832
11	355.6	5.0	"	4,145	4,409
12	355.6	5.6	"	4,465	4,750
13	406.4	4.0	"	4,122	4,385
14	406.4	5.0	"	4,744	5,047
15	406.4	6.3	"	5,544	5,898
16	457	4.0	"	4,641	4,937
17	457	5.0	"	5,338	5,679
18	457	6.3	"	6,244	6,643
19	508	5.0	"	5,939	6,318
20	508	5.6	"	6,406	6,814
21	508	6.3	"	6,949	7,393
22	610	5.8	"	7,890	8,394
23	610	6.3	"	8,359	8,892
24	711	6.3	"	9,754	10,377
25	711	7.1	"	10,627	11,306
26	813	7.1	"	12,164	12,941
27	914	8.0	"	14,953	15,907
28	1016	8.8	"	17,884	19,025
29	1067	8.8	"	18,788	19,987
30	1219	10.0	"	23,928	25,455
31	1422	12.5	"	33,458	35,594
32	1626	14.2	"	42,590	45,308
33	1829	14.2	"	47,954	51,015
34	2032	16.0	"	59,006	62,772
35	2235	17.5	"	70,164	74,642
36	2540	20.0	"	89,694	95,419
1.1.F	**Group wise rates of Bare pipe per kg are as under. Rates of sizes other than above may be derived from following rates :**				
1	Up to 914 mm OD & Up to 10 mm thickness of Plate/Pipe		kg	64	68
2	Above 914 mm OD & Above 10 mm thickness of Plate/Pipe		kg	64	68
The mass (weight) per metre run of pipes can be worked out as under (ref : IS3589 : 2001) M = (OD - T) x T x 0.0246615 M = mass of the pipe kg/meter, OD = outside of tube diameter in mm, T = thickness of tube in mm					

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
Item No. 2.1	**DI Pipe**				
Providing and supplying D. I. K-9 grade pipes for following nominal bore diameter with internal cement mortar lining including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS 8329-2000). Rate for DI pipe based on Wholesale Price index of Pig Iron as 114.20 for the month of Febuaury-2019. **For sewerage project cement mortor lining shall be with sulphate resistance cement**					
2.1.A	**DI Pipe K-9**				
1	80	mm	RMT	848.0	897.0
2	100	mm	"	989.0	1,046.0
3	150	mm	"	1,454.0	1,539.0
4	200	mm	"	1,966.0	2,081.0
5	250	mm	"	2,632.0	2,785.0
6	300	mm	"	3,326.0	3,520.0
7	350	mm	"	4,118.0	4,358.0
8	400	mm	"	4,905.0	5,191.0
9	450	mm	"	5,859.0	6,200.0
10	500	mm	"	6,945.0	7,350.0
11	600	mm	"	9,051.0	9,578.0
12	700	mm	"	11,702.0	12,383.0
13	750	mm	"	13,059.0	13,820.0
14	800	mm	"	14,448.0	15,289.0
15	900	mm	"	17,654.0	18,683.0
16	1000	mm	"	21,052.0	22,279.0
17	1100	mm	"	26,009.0	27,093.0
18	1200	mm	"	28,535.0	29,724.0
2.1.B	**DI Pipe K-7**				
Providing and supplying D. I. K-7 grade pipes for following nominal bore diameter with internal cement mortar lining including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS 8329-2000). Rate for DI pipe based on Wholesale Price index of Pig Iron as 114.20 for the month of Febuaury-2019					
1	80	mm	RMT	723.0	765.0
2	100	mm	"	881.0	932.0
3	150	mm	"	1,297.0	1,372.0
4	200	mm	"	1,651.0	1,747.0
5	250	mm	"	2,166.0	2,292.0
6	300	mm	"	2,731.0	2,890.0
7	350	mm	"	3,388.0	3,585.0
8	400	mm	"	4,023.0	4,258.0
9	450	mm	"	4,758.0	5,035.0
10	500	mm	"	5,711.0	6,044.0
11	600	mm	"	7,449.0	7,883.0
12	700	mm	"	10,224.0	10,819.0
13	750	mm	"	11,570.0	12,244.0
14	800	mm	"	13,340.0	14,117.0
15	900	mm	"	16,314.0	17,265.0
16	1000	mm	"	19,461.0	20,594.0
17	1100	mm	"	26,009.0	27,093.0
18	1200	mm	"	28,535.0	29,724.0

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
2.1.C	**DI Pipe K-9 D/F**				
Providing and supplying D. I. K-9 grade pipes (total length 5 meter) for following nominal bore diameter with internal cement mortar lining including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS - 8329 / 2000)					
1	100	mm	RMT	1,861.0	1,970.0
2	150	mm	"	2,622.0	2,775.0
3	200	mm	"	3,422.0	3,621.0
4	250	mm	"	4,636.0	4,906.0
5	300	mm	"	5,747.0	6,082.0
6	350	mm	"	7,576.0	8,017.0
7	400	mm	"	9,366.0	9,911.0
8	450	mm	"	10,988.0	11,628.0
9	500	mm	"	13,075.0	13,836.0
10	600	mm	"	17,431.0	18,446.0
11	700	mm	"	23,472.0	24,839.0
12	750	mm	"	26,044.0	27,561.0
13	800	mm	"	28,614.0	30,281.0
14	900	mm	"	38,126.0	40,347.0
15	1000	mm	"	44,695.0	47,298.0
Item No. 3.1	**P. V. C. Pipes**				
Providing and supplying in standard length ISI mark rigid unplasticised PVC pipes suitable for potable water with ring fit joint including cost of rings, as per IS specification no. 4985/1988 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores and including cost of jointing meterial etc. complete.					
Note :					
1.One coupler / ring shall be provided with each full length pipe cost of which is included in rates below.					
2. 3% (Three) Discounted rate to be consider for Coupler jointed pipe					
3. Rate for **PVC Resin as Rs. 85081.24 (inclusive of GST @ 18.00%, freight & Sales Tax)** Dtd. 20-03-2019					
3.1.A	**Test Pressure 4 Kg/cm^2.**				
1	63	mm	RMT	44	47
2	75	mm	"	61	65
3	90	mm	"	85	91
4	110	mm	"	123	131
5	125	mm	"	160	171
6	140	mm	"	199	213
7	160	mm	"	260	277
8	180	mm	"	332	354
9	200	mm	"	402	429
10	225	mm	"	512	546
11	250	mm	"	619	661
12	280	mm	"	785	838
13	315	mm	"	992	1,058
3.1.B	**Test Pressure 6 Kg/cm^2.**				
1	63	mm	RMT	61	66
2	75	mm	"	85	91
3	90	mm	"	123	131
4	110	mm	"	176	188
5	125	mm	"	233	249

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
6	140	mm	"	289	309
7	160	mm	"	372	397
8	180	mm	"	476	508
9	200	mm	"	589	629
10	225	mm	"	741	790
11	250	mm	"	918	980
12	280	mm	"	1,151	1,228
13	315	mm	"	1,460	1,558
3.1.C	Test Pressure 8 Kg/cm^2.				
1	63	mm	RMT	77	82
2	75	mm	"	110	117
3	90	mm	"	153	163
4	110	mm	"	229	244
5	125	mm	"	297	317
6	140	mm	"	377	403
7	160	mm	"	491	524
8	180	mm	"	614	656
9	200	mm	"	761	812
10	225	mm	"	959	1,023
11	250	mm	"	1,194	1,274
12	280	mm	"	1,493	1,593
13	315	mm	"	1,880	2,006
3.1.D	Test Pressure 10 Kg/cm^2.				
1	63	mm	RMT	94	100
2	75	mm	"	134	143
3	90	mm	"	189	201
4	110	mm	"	284	303
5	125	mm	"	365	390
6	140	mm	"	455	486
7	160	mm	"	595	636
8	180	mm	"	751	802
9	200	mm	"	928	991
10	225	mm	"	1,177	1,256
11	250	mm	"	1,454	1,552
12	280	mm	"	1,821	1,944
13	315	mm	"	2,295	2,450
Item No. 4.1	H.D.P.E. Pipes				
Providing and supplying in standard length ISI mark high density Polyethylene H.D.P.E. Pipes suitable for potable water as per IS specification no. 4984/1995 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the dept. stores etc. comp.					
Note:-					
(1) Rate for HDPE (PE-100) Pipe based on the rate of HDPE Resin as Rs. 107159.00 **(inclu. of GST, freight & Sales Tax) Dtd. 20-03-2019**					
4.1.A	6.0 Kg/cm2				
1	50	mm	RMT	46	50
2	63	mm	"	72	77
3	75	mm	"	103	111
4	90	mm	"	145	156
5	110	mm	"	213	229
6	125	mm	"	276	297
7	140	mm	"	347	373

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
8	160	mm	"	451	485
9	180	mm	"	570	613
10	200	mm	"	702	755
11	225	mm	"	891	958
12	250	mm	"	1,095	1,177
13	280	mm	"	1,374	1,477
14	315	mm	"	1,738	1,869
15	355	mm	"	2,203	2,368
16	400	mm	"	2,849	3,063
17	450	mm	"	3,604	3,874
18	500	mm	"	4,456	4,790
19	560	mm	"	5,578	5,997
20	630	mm	"	7,062	7,591
21	710	mm	"	8,948	9,619
4.1.B	**10.0 Kg/cm2**				
1	50	mm	RMT	70	75
2	63	mm	"	111	120
3	75	mm	"	158	169
4	90	mm	"	226	243
5	110	mm	"	334	359
6	125	mm	"	430	462
7	140	mm	"	538	578
8	160	mm	"	702	754
9	180	mm	"	890	956
10	200	mm	"	1,098	1,180
11	225	mm	"	1,385	1,489
12	250	mm	"	1,706	1,834
13	280	mm	"	2,137	2,297
14	315	mm	"	2,707	2,910
15	355	mm	"	3,442	3,701
16	400	mm	"	4,460	4,795
17	450	mm	"	5,626	6,048
18	500	mm	"	6,950	7,472
19	560	mm	"	8,707	9,360
20	630	mm	"	11,028	11,855
21	710	mm	"	14,010	15,061
Item No. 4.2	**HDPE (PE-100) Pipes in standard length suitable for Sewage, Industrial Effluents & Rising main**				
Providing & Supplying of ISI Marked High Density Poly Ethylene (HDPE - PE-100) Pipes in standard length suitable for Sewage & Industrial Effluents as per IS Specification no. 14333-1996 or its latest revision / amendments including all local & central taxes & duties, freight charges, loading, unloading & conveyance to departmental stores etc. complete.					
4.2.A	**HDPE- 6kg/cm2**				
1	63	mm	Rmt	74	80
2	75	mm	Rmt	106	114
3	90	mm	Rmt	150	161
4	110	mm	Rmt	220	237
5	125	mm	Rmt	286	308
6	140	mm	Rmt	360	387
7	160	mm	Rmt	468	503
8	180	mm	Rmt	590	635
9	200	mm	Rmt	726	781
10	225	mm	Rmt	923	992
11	250	mm	Rmt	1,134	1,219

Item no.	Size		Unit	Rate for 2019-20 (EPC Works)	Rate for 2019-20 (Material Only)
1	2	3	4	5	6
12	280	mm	Rmt	1,422	1,528
13	315	mm	Rmt	1,800	1,935
14	355	mm	Rmt	2,282	2,453
15	400	mm	Rmt	2,950	3,172
16	450	mm	Rmt	3,825	4,112
17	500	mm	Rmt	4,729	5,084
18	560	mm	Rmt	5,920	6,364
19	630	mm	Rmt	7,494	8,056
4.2.B	**HDPE- 10kg/cm2**				
1	63	mm	Rmt	115	124
2	75	mm	Rmt	163	175
3	90	mm	Rmt	234	251
4	110	mm	Rmt	345	371
5	125	mm	Rmt	445	478
6	140	mm	Rmt	557	599
7	160	mm	Rmt	726	781
8	180	mm	Rmt	922	991
9	200	mm	Rmt	1,136	1,221
10	225	mm	Rmt	1,434	1,542
11	250	mm	Rmt	1,766	1,899
12	280	mm	Rmt	2,213	2,379
13	315	mm	Rmt	2,803	3,013
14	355	mm	Rmt	3,565	3,832
15	400	mm	Rmt	4,618	4,965
16	450	mm	Rmt	6,002	6,452
17	500	mm	Rmt	7,376	7,929
18	560	mm	Rmt	9,522	10,236
19	630	mm	Rmt	12,063	12,968

MATERIAL SECTION :- 1A				
Item no.	**Sr. No.**	**Size**	**Unit**	**Rate for 2019-20**
Item No. 5	**Corrugated DWC HDPE pipes (non-pressure pipes)**			
Providing and supplying of Class SN8 Structured Wall polyethelene Piping systems (Pipe with online/offline coupler and elastomeric sealing ring) with non-smooth External Annular Corrugated and Smooth Internal Surfaces (Double Wall) for non-pressure underground Sewerage & Drainage application as per EN:13476-3 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores etc. complete.(ID Dia)				
	Pipe dia. ID			
1	75	mm	Rmt	153.0
2	100	mm	Rmt	233.0
3	125	mm	Rmt	281.0
4	135	mm	Rmt	317.0
5	150	mm	Rmt	418.0
6	170	mm	Rmt	519.0
7	200	mm	Rmt	826.0
8	225	mm	Rmt	975.0
9	250	mm	Rmt	1,125.0
10	300	mm	Rmt	1,500.0
11	400	mm	Rmt	2,322.0
12	500	mm	Rmt	3,741.0
13	600	mm	Rmt	5,162.0
14	800	mm	Rmt	8,526.0
15	1000	mm	Rmt	12,148.0
16	1200	mm	Rmt	13,875.0
Item No. 6.1	**G. I. PIPE**			
Providing and supplying ISI mark G. I. pipes with Couplings of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS -1239) (Not for well/tube well column pipe)				
6.1.A	**Light Duty**			
1	15	mm	RMT	75
2	20	mm	"	103
3	25	mm	"	141
4	32	mm	"	178
5	40	mm	"	227
6	50	mm	"	281
7	65	mm	"	384
8	80	mm	"	449
9	100	mm	"	627
6.1.B	**Medium Duty**			
1	15	mm	RMT	89
2	20	mm	"	114
3	25	mm	"	163
4	32	mm	"	211
5	40	mm	"	244
6	50	mm	"	330
7	65	mm	"	411
8	80	mm	"	535
9	100	mm	"	773
10	125	mm	"	1,022
11	150	mm	"	1,212

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
6.1.C	**Heavy Duty**			
1	15	mm	RMT	102
2	20	mm	"	132
3	25	mm	"	189
4	32	mm	"	241
5	40	mm	"	287
6	50	mm	"	389
7	65	mm	"	503
8	80	mm	"	616
9	100	mm	"	887
10	125	mm	"	1,104
11	150	mm	"	1,315
7	**MS Specials**			
7.1.A	**M. S. Specials plain & socket ends**			
1	Up to 300 mm. dia.		Kg.	68
2	Above 300 mm. dia.		"	70
7.1.B	**M. S. Specials flanged ends**			
1	Up to 300 mm. dia.		Kg.	70
2	Above 300 mm. dia.		"	74
Item no. 8	**D.I. Specials**			
Manufacture, Supply & Delivery of Ductile Iron Flange socket spigot bends, tees, reducers or any other specials as per BS-EN-545/1995 Class-A series K12 suitable for use with D.I. Pipes manufactured as per IS:8329/1994delivery of specials is to be made to GWSSB store or site of works any where in Gujarat including all taxes, loading, unloading, carting, stacking, insurance, inspection charges, octroi etc. complete.				
With external bitumen & zinc coating & internal cement mortar lining				
8.2.A	**Socket & Spigot Type**			
1	80 to 300mm dia		Kg.	126
2	350 & Above		Kg.	128
8.2.B	**Flanged ended**			
1	80 to 300mm dia		Kg.	132
2	350 & Above		Kg.	134
9	**PVC fittings:** Providing and supplying at store or site of work incl. freight, loading, unloading, stacking, insaurance & all taxes etc. complete			
9.2.A	**P. V. C. Couplers 6 Kg/cm2 (Fabricated)**			
1	63	mm	No.	20
2	75	mm	"	29
3	90	mm	"	51
4	110	mm	"	87
5	140	mm	"	193
6	160	mm	"	287
7	200	mm	"	443
9.2.B	**P. V. C. Couplers 10 Kg/cm2 (Moulded)**			
1	63	mm	No.	34
2	75	mm	"	59
3	90	mm	"	87
4	110	mm	"	154
5	140	mm	"	313
6	160	mm	"	411

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
7	200	mm	"	748
9.2.C	**P. V. C. Tail Piece with P. V. C. Flange (ISI) Heavy duty (Moulded)**			
1	63	mm	No.	103
2	75	mm	"	122
3	90	mm	"	154
4	110	mm	"	209
5	140	mm	"	395
6	160	mm	"	530
9.2.D	**Service Saddle 25 mm (Moulded) heavy**			
1	63	mm	No.	75
2	75	mm	"	94
3	90	mm	"	109
4	110	mm	"	120
5	140	mm	"	245
6	160	mm	"	304
9.2.E	**P. V. C. Tee (Moulded)**			
1	63 x 63 mm		No.	82
2	75 x 63 mm		"	116
3	75 x 75 mm		"	130
4	90 x 63 mm		"	164
5	90 x 75 mm		"	194
6	90 x 90 mm		"	212
7	110 x 75 mm		"	221
8	110 x 90 mm		"	307
9	110 x110 mm		"	266
10	140 x 140 mm		"	444
11	160 x 110 mm		"	560
12	160 x 160 mm		"	622
9.2.F	**P. V. C. Elbow (Moulded)**			
1	63	mm	No.	50
2	75	mm	"	84
3	90	mm	"	141
4	110	mm	"	234
5	140	mm	"	352
6	160	mm	"	449
7	200	mm	"	1,025
9.2.G	**P. V. C. Reducer (Moulded)**			
1	200 x 160 mm		No.	589
2	160 x 140 mm		"	334
3	160 x 110 mm		"	245
4	160 x 90 mm		"	199
5	140 x 110 mm		"	165
6	140 x 90 mm		"	148
7	140 x 75 mm		"	148
8	110 x 90 mm		"	123
9	110 x 75 mm		"	119

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
10	110 x 63 mm		"	112
11	90 x 75 mm		"	72
12	90 x 63 mm		"	68
13	75 x 63 mm		"	54
9.2.H	**P. V. C. Bend 90^0 (Fabricated) 4.0 kg**			
1	63	mm	No.	48
2	75	mm	"	67
3	90	mm	"	124
4	110	mm	"	215
5	140	mm	"	479
6	160	mm	"	712
7	200	mm	"	988
9.2.I	**P. V. C. Bend 90^0 (Fabricated) 6.0 kg**			
1	63	mm	No.	58
2	75	mm	"	90
3	90	mm	"	154
4	110	mm	"	275
5	140	mm	"	678
6	160	mm	"	1,070
7	200	mm	"	2,120
9.2.J	**P. V. C. Bend 90^0 (Moulded) Light**			
1	63	mm	No.	56
2	75	mm	"	84
3	90	mm	"	141
4	110	mm	"	234
5	140	mm	"	352
6	160	mm	"	449
9.2.K	**P. V. C. Bend 90^0 (Moulded) Heavy**			
1	63	mm	No.	77
2	75	mm	"	114
3	90	mm	"	208
4	110	mm	"	339
5	140	mm	"	529
6	160	mm	"	635
Item No. 10	**R. C. C. PIPE (Horizontal Cast)**			
Providing and supplying ISI Standard R.C.C. pipes(of Sulphate Resisting Cement) in standard lengths of following class and diameter suitable for either collar joints or rubber ring joints including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc.				
Note : One collar should be supplied with each full length plain ended RCC pipe, cost included in rates below. One rubber ring should be supplied with each full length socketed pipe, cost included in rates below.				
10.1.A	**Class P2 Test Pressure 4 Kg/sq.cm**			
1	150	mm	Rmt	340.0
2	200	mm	Rmt	453.0
3	225	mm	Rmt	504.0
4	250	mm	Rmt	563.0
5	300	mm	Rmt	806.0
6	350	mm	Rmt	1,126.0

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
7	400	mm	Rmt	1,352.0
8	450	mm	Rmt	1,840.0
9	500	mm	Rmt	1,991.0
10	600	mm	Rmt	2,649.0
11	700	mm	Rmt	3,753.0
12	750	mm	Rmt	3,874.0
13	800	mm	Rmt	4,774.0
14	900	mm	Rmt	5,852.0
15	1000	mm	Rmt	6,989.0
10.1.B	**Class P3 Test Pressure 6 Kg/sq.cm**			
1	150	mm	Rmt	418.0
2	200	mm	Rmt	552.0
3	225	mm	Rmt	618.0
4	250	mm	Rmt	688.0
5	300	mm	Rmt	987.0
6	350	mm	Rmt	1,377.0
7	400	mm	Rmt	1,650.0
8	450	mm	Rmt	2,111.0
9	500	mm	Rmt	2,648.0
10	600	mm	Rmt	3,653.0
11	700	mm	Rmt	4,942.0
12	750	mm	Rmt	4,734.0
13	800	mm	Rmt	6,261.0
14	900	mm	Rmt	5,152.0
15	1000	mm	Rmt	6,296.0
10.1.C	**Class NP2 Test Pressure 0.7 Kg/sq.cm**			
1	150	mm	Rmt	339.0
2	200	mm	Rmt	406.0
3	225	mm	Rmt	472.0
4	250	mm	Rmt	537.0
5	300	mm	Rmt	753.0
6	350	mm	Rmt	862.0
7	400	mm	Rmt	742.0
8	450	mm	Rmt	915.0
9	500	mm	Rmt	1,137.0
10	600	mm	Rmt	1,491.0
11	700	mm	Rmt	2,189.0
12	750	mm	Rmt	2,271.0
13	800	mm	Rmt	2,353.0
14	900	mm	Rmt	2,773.0
15	1000	mm	Rmt	3,845.0
16	1100	mm	Rmt	3,804.0
17	1200	mm	Rmt	4,615.0
18	1400	mm	Rmt	6,051.0
19	1600	mm	Rmt	9,195.0
20	1800	mm	Rmt	11,074.0

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
10.1.D	**Class NP3 Test Pressure 0.7 Kg/sq.cm**			
1	150	mm	Rmt	371.0
2	200	mm	Rmt	467.0
3	225	mm	Rmt	528.0
4	250	mm	Rmt	590.0
5	300	mm	Rmt	846.0
6	350	mm	Rmt	985.0
7	400	mm	Rmt	1,288.0
8	450	mm	Rmt	1,524.0
9	500	mm	Rmt	1,663.0
10	600	mm	Rmt	2,180.0
11	700	mm	Rmt	3,245.0
12	750	mm	Rmt	3,401.0
13	800	mm	Rmt	3,556.0
14	900	mm	Rmt	4,033.0
15	1000	mm	Rmt	5,400.0
16	1100	mm	Rmt	5,670.0
17	1200	mm	Rmt	6,607.0
18	1400	mm	Rmt	8,497.0
19	1600	mm	Rmt	12,507.0
20	1800	mm	Rmt	15,241.0
10.1.E	**Class IRS/NP-4**			
1	150	mm	Rmt	550.0
2	225	mm	Rmt	721.0
3	250	mm	Rmt	848.0
4	300	mm	Rmt	1,217.0
5	350	mm	Rmt	1,545.0
6	400	mm	Rmt	2,098.0
7	450	mm	Rmt	2,441.0
8	500	mm	Rmt	2,617.0
9	600	mm	Rmt	3,353.0
10	700	mm	Rmt	4,368.0
11	800	mm	Rmt	6,244.0
12	900	mm	Rmt	7,435.0
13	1000	mm	Rmt	9,276.0
14	1100	mm	Rmt	9,711.0
15	1200	mm	Rmt	10,869.0
16	1400	mm	Rmt	15,915.0
17	1600	mm	Rmt	19,826.0
18	1800	mm	Rmt	21,566.0
19	2000	mm	Rmt	23,393.0
Item No. 10.2	**R. C. C. PIPE (vertically cast)**			
Providing and supplying ISI Standard R.C.C. pipes(of Sulphate Resisting Cement) in standard lengths of following class and diameter suitable for either collar joints or rubber ring joints including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS - 458/ 1989)				
10.2.A	**Class NP3 Test Pressure 0.7 Kg/sq.cm**			
1	300	mm	Rmt	892.0
2	350	mm	Rmt	1,080.0

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
3	400	mm	Rmt	1,267.0
4	450	mm	Rmt	1,605.0
5	500	mm	Rmt	1,755.0
6	600	mm	Rmt	2,295.0
7	800	mm	Rmt	3,637.0
8	900	mm	Rmt	4,245.0
9	1000	mm	Rmt	5,685.0
10	1200	mm	Rmt	6,952.0
11	1400	mm	Rmt	8,940.0
10.2.B	**Class NP4 Test Pressure 0.7 Kg/sq.cm**			
1	300	mm	Rmt	1,282.0
2	350	mm	Rmt	1,691.0
3	400	mm	Rmt	2,100.0
4	450	mm	Rmt	2,572.0
5	500	mm	Rmt	2,760.0
6	600	mm	Rmt	3,532.0
7	800	mm	Rmt	7,087.0
8	900	mm	Rmt	7,837.0
9	1000	mm	Rmt	9,765.0
10	1200	mm	Rmt	11,437.0
11	1400	mm	Rmt	16,751.0
Item No. 10.3	**R. C. C. Collars:** Supplying of RCC Collars for RCC pipes including all taxes, carting, loading, unloading, etc. complete.			
1	100	mm	No.	51.0
2	150	mm	"	65.0
3	225 or 250	mm	"	90.0
4	300	mm	"	128.0
5	350	mm	"	154.0
6	380 or 400	mm	"	174.0
7	450	mm	"	204.0
8	500 or 525	mm	"	234.0
9	600	mm	"	326.0
10	680 or 700	mm	"	436.0
11	750	mm	"	485.0
12	800	mm	"	525.0
13	900	mm	"	721.0
14	1000	mm	"	831.0
15	1100	mm	"	990.0
16	1200	mm	"	1,191.0
17	1400	mm	"	1,394.0
18	1600	mm	"	1,705.0
19	1800	mm	"	1,896.0
Item No. 10.4	**RCC precast M.H. Frame & Cover**			
RCC precast M.H. Frame & Cover Manufacture, supply & Delivery at store or at site of work precast RCC M.200 Frame & cover suitable to drainage M.H. and as per type design & Drawing including cost of reinforcement M.S. Angles or Flat, curing mold work etc.				
10.4.A	**Heavy duty**			
1	Frame suitable for 50cm opening of MH		No.	1,255.00

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
2	Cover suitable for 50cm opening of MH		No.	1,314.00
10.4.B	**Light Duty**			
1	Frame suitable for 50cm opening of MH		No.	1,120.00
2	Cover suitable for 50cm opening of MH		No.	1,194.00
10.4.C	**House Connection Chamber light duty**			
1	Frame		No.	911.00
2	Cover		No.	1,030.00
Item No. 11	**Stoneware Pipe**			
Providing and supplying ISI marked only Standard length Stoneware pipes in standard lengths of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. (IS - 651 / 1989)				
11.1	**Class A**			
1	100	mm	Rmt	126.0
2	150	mm	Rmt	182.0
3	200	mm	Rmt	282.0
4	230	mm	Rmt	335.0
5	250	mm	Rmt	403.0
6	300	mm	Rmt	592.0
11.2	**Class AA**			
1	100	mm	Rmt	139.0
2	150	mm	Rmt	200.0
3	200	mm	Rmt	310.0
4	230	mm	Rmt	369.0
5	250	mm	Rmt	442.0
6	300	mm	Rmt	651.0
Item No. 12	**C.I.D. Joints**			
Manufacture, supply and delivery of cast iron Detachable joints (Short & long) complete with joint flanges duly drilled, synthetic rubber sealing rings manufactured from styrene butadine rubber (SBR) and other required accessories such as nut, bolts etc. conforming to IS specification 8794-1988 or its latest revision if any suitable for use with A.C. Pressure pipes. Delivery of joints including its accessories including loading, unloading, carting, stacking, insurance, all taxes, octroi etc. complete.				
12.1	**Short Collar with ISI Mark**			
12.1.A	**Class- 5,10**			
1	80	mm	No.	221
2	100	mm	"	278
3	125	mm	"	351
4	150	mm	"	448
5	200	mm	"	669
6	250	mm	"	861
7	300	mm	"	1,071
8	350	mm	"	1,721
9	400	mm	"	2,023
10	450	mm	"	2,437
11	500	mm	"	3,575
12	600	mm	"	5,415
12.1.B	**Class- 15**			
1	80	mm	"	221
2	100	mm	"	278

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
3	125	mm	"	351
4	150	mm	"	460
5	200	mm	"	669
6	250	mm	"	892
7	300	mm	"	1,100
8	350	mm	"	1,835
9	400	mm	"	2,109
10	450	mm	"	2,551
11	500	mm	"	3,804
12	600	mm	"	5,655
12.2	**Short Collar without ISI Mark**			
12.2.A	**Class- 5,10**			
1	80	mm	No.	212
2	100	mm	"	276
3	125	mm	"	346
4	150	mm	"	439
5	200	mm	"	640
6	250	mm	"	804
7	300	mm	"	1,005
8	350	mm	"	1,688
9	400	mm	"	1,959
10	450	mm	"	2,316
11	500	mm	"	3,453
12	600	mm	"	5,301
13	700	mm	"	7,611
12.2.B	**Class- 15**			
1	80	mm	"	218
2	100	mm	"	278
3	125	mm	"	351
4	150	mm	"	472
5	200	mm	"	651
6	250	mm	"	856
7	300	mm	"	1,062
8	350	mm	"	1,745
9	400	mm	"	2,047
10	450	mm	"	2,385
11	500	mm	"	3,627
12	600	mm	"	5,655
13	700	mm	"	7,992
12.3	**Long Collar without ISI Mark**			
12.3.A	**Class- 5,10**			
1	80	mm	No.	282
2	100	mm	"	350
3	125	mm	"	467
4	150	mm	"	646
5	200	mm	"	1,082
6	250	mm	"	1,405
7	300	mm	"	1,763
8	350	mm	"	2,500

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
9	400	mm	"	2,980
10	450	mm	"	3,580
11	500	mm	"	5,526
12	600	mm	"	7,684
13	700	mm	"	11,264
12.3.B	**Class- 15**			
1	80	mm	"	282
2	100	mm	"	350
3	125	mm	"	467
4	150	mm	"	677
5	200	mm	"	1,112
6	250	mm	"	1,468
7	300	mm	"	1,828
8	350	mm	"	2,500
9	400	mm	"	2,980
10	450	mm	"	3,580
11	500	mm	"	5,710
12	600	mm	"	7,814
13	700	mm	"	11,264
12.4	**Short Collar Over size without ISI Mark**			
12.4.A	**Class- 5,10**			
1	80	mm	No.	203
2	100	mm	"	244
3	125	mm	"	322
4	150	mm	"	403
5	200	mm	"	603
6	250	mm	"	786
7	300	mm	"	961
8	350	mm	"	1,621
9	400	mm	"	1,940
10	450	mm	"	2,357
11	500	mm	"	3,460
12	600	mm	"	5,190
13	700	mm	"	7,841
12.4.B	**Class- 15**			
1	80	mm	"	204
2	100	mm	"	247
3	125	mm	"	326
4	150	mm	"	411
5	200	mm	"	603
6	250	mm	"	822
7	300	mm	"	979
8	350	mm	"	1,740
9	400	mm	"	1,970
10	450	mm	"	2,476
11	500	mm	"	3,687
12	600	mm	"	5,428
13	700	mm	"	7,895

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
12.5	**Long Collar Over size without ISI Mark**			
12.5.A	**Class- 5,10**			
1	80	mm	No.	297
2	100	mm	"	357
3	125	mm	"	556
4	150	mm	"	666
5	200	mm	"	1,130
6	250	mm	"	1,460
7	300	mm	"	2,071
8	350	mm	"	2,644
9	400	mm	"	3,499
10	450	mm	"	3,859
11	500	mm	"	5,070
12	600	mm	"	7,228
13	700	mm	"	13,951
12.5.B	**Class- 15**			
1	80	mm	"	297
2	100	mm	"	357
3	125	mm	"	556
4	150	mm	"	666
5	200	mm	"	1,168
6	250	mm	"	1,646
7	300	mm	"	2,260
8	350	mm	"	2,758
9	400	mm	"	3,658
10	450	mm	"	3,915
11	500	mm	"	5,282
12	600	mm	"	7,493
13	700	mm	"	13,951
12.6	**Long Collar Over Size Suitable to PVC/HDPE**			
12.6.A	**6 Kg / Cm^2**			
1	90	mm	No.	218
2	110	mm	"	265
3	140	mm	"	333
4	160	mm	"	433
5	180	mm	"	547
6	200	mm	"	643
7	250	mm	"	1,000
8	315	mm	"	1,452
12.6.B	**10 Kg / Cm^2**			
1	90	mm	"	229
2	110	mm	"	281
3	140	mm	"	360
4	160	mm	"	469
5	180	mm	"	559
6	200	mm	"	673
7	250	mm	"	1,057
8	315	mm	"	1,513

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
Item No. 13	**Sluice valves**			
Providing and supplying ISI mark CI D/F Sluice Valves as per IS:14846 (Latest Edition) of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.				
13.1.A	**PN-1 With hand wheel /cap operated (PD type short body)**			
1	50	mm	No.	2,170
2	65	mm	"	2,650
3	80	mm	"	2,970
4	100	mm	"	3,990
5	125	mm	"	5,000
6	150	mm	"	6,550
7	200	mm	"	10,990
8	250	mm	"	17,830
9	300	mm	"	22,830
10	350	mm	"	33,740
11	400	mm	"	51,240
12	450	mm	"	59,790
13	500	mm	"	100,650
14	600	mm	"	137,510
15	700	mm	"	314,730
16	750	mm	"	398,110
17	800	mm	"	498,260
18	900	mm	"	547,250
19	1000	mm	"	955,000
20	1100	mm	"	1,260,770
21	1200	mm	"	1,440,880
13.1.B	**PN-1 With gear operated (PD type short body)**			
1	50	mm	No.	3,000
2	65	mm	"	3,250
3	80	mm	"	3,680
4	100	mm	"	5,070
5	125	mm	"	6,140
6	150	mm	"	8,070
7	200	mm	"	13,510
8	250	mm	"	21,940
9	300	mm	"	28,080
10	350	mm	"	41,130
11	400	mm	"	59,190
12	450	mm	"	72,230
13	500	mm	"	121,590
14	600	mm	"	166,130
13.1.D	**PN-1 With hand/wheel cap operated (Alt-1 type long body)**			
1	50	mm	No.	2,370
2	65	mm	"	2,860
3	80	mm	"	3,200
4	100	mm	"	4,340
5	125	mm	"	5,500
6	150	mm	"	7,260

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
7	200	mm	"	12,210
8	250	mm	"	19,620
9	300	mm	"	25,530
10	350	mm	"	37,630
11	400	mm	"	57,310
12	450	mm	"	67,110
13	500	mm	"	116,800
14	600	mm	"	157,030
15	700	mm	"	314,750
16	800	mm	"	398,130
17	900	mm	"	548,110
18	1000	mm	"	536,340
19	1100	mm	"	935,950
20	1200	mm	"	1,261,500
13.1.E	**PN-1 With gear operated (Alt-1 type long body)**			
1	50	mm	No.	3,240
2	65	mm	"	3,500
3	80	mm	"	3,970
4	100	mm	"	5,470
5	125	mm	"	6,620
6	150	mm	"	8,700
7	200	mm	"	14,570
8	250	mm	"	23,660
9	300	mm	"	30,280
10	350	mm	"	44,350
11	400	mm	"	63,820
12	450	mm	"	77,880
13	500	mm	"	131,100
14	600	mm	"	179,130
13.1.F	**PN-1.6 With hand wheel /cap operated (PD type short body)**			
1	50	mm	No.	2,190
2	65	mm	"	2,670
3	80	mm	"	3,000
4	100	mm	"	4,030
5	125	mm	"	5,080
6	150	mm	"	6,560
7	200	mm	"	11,530
8	250	mm	"	18,370
9	300	mm	"	23,460
10	350	mm	"	35,040
11	400	mm	"	52,650
12	450	mm	"	61,650
13	500	mm	"	103,660
14	600	mm	"	141,640
13.1.G	**PN-1.6 With gear operated (PD type short body)**			
1	50	mm	No.	3,080
2	65	mm	"	3,330
3	80	mm	"	3,780
4	100	mm	"	5,200

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
5	125	mm	"	6,300
6	150	mm	"	8,280
7	200	mm	"	13,860
8	250	mm	"	22,510
9	300	mm	"	28,820
10	350	mm	"	42,200
11	400	mm	"	60,730
12	450	mm	"	74,110
13	500	mm	"	124,760
14	600	mm	"	171,000
13.1.H	**PN-1.6 With hand/wheel cap operated (Alt-1 type long body)**			
1	50	mm	No.	2,400
2	65	mm	"	2,940
3	80	mm	"	3,300
4	100	mm	"	4,370
5	125	mm	"	5,670
6	150	mm	"	7,330
7	200	mm	"	12,390
8	250	mm	"	20,170
9	300	mm	"	26,050
10	350	mm	"	45,480
11	400	mm	"	58,480
12	450	mm	"	68,470
13	500	mm	"	118,850
14	600	mm	"	162,390
13.1.I	**PN-1.6 With gear operated (Alt-1 type long body)**			
1	50	mm	No.	3,320
2	65	mm	"	3,580
3	80	mm	"	4,070
4	100	mm	"	5,600
5	125	mm	"	6,780
6	150	mm	"	8,910
7	200	mm	"	14,920
8	250	mm	"	24,230
9	300	mm	"	31,010
10	350	mm	"	45,420
11	400	mm	"	65,360
12	450	mm	"	79,770
13	500	mm	"	134,280
14	600	mm	"	183,470
Item No. 14	**Butterfly Valves**			
Providing and supplying ISI mark CI D/F Butterfly Valves as per IS:13095 (Latest Edition) of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.				
14.1.A	**Butterfly valves IS 13095 with ISI mark PN 1.0**			
1	50	mm	No.	1,770
2	65	mm	"	1,910
3	80	mm	"	2,670
4	100	mm	"	2,870
5	125	mm	"	3,560

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
6	150	mm	"	4,580
7	200	mm	"	6,570
8	250	mm	"	9,590
9	300	mm	"	18,820
10	350	mm	"	31,810
11	400	mm	"	35,620
12	450	mm	"	37,680
13	500	mm	"	50,010
14	600	mm	"	57,550
15	700	mm	"	142,580
16	750	mm	"	207,600
17	800	mm	"	222,420
18	900	mm	"	250,920
19	1000	mm	"	308,000
20	1100	mm	"	372,770
21	1200	mm	"	469,050
14.1.B	**Butterfly valves IS 13095 with ISI mark PN 1.6**			
1	50	mm	No.	1,850
2	65	mm	"	1,990
3	80	mm	"	2,790
4	100	mm	"	2,990
5	125	mm	"	3,710
6	150	mm	"	4,780
7	200	mm	"	6,850
8	250	mm	"	9,990
9	300	mm	"	19,610
10	350	mm	"	33,140
11	400	mm	"	37,110
12	450	mm	"	39,250
13	500	mm	"	52,100
14	600	mm	"	59,950
15	700	mm	"	148,530
16	750	mm	"	216,250
17	800	mm	"	231,690
18	900	mm	"	261,380
19	1000	mm	"	320,840
20	1100	mm	"	388,310
21	1200	mm	"	488,600
Item No. 15	**Reflux Valves**			
Providing and supplying ISI mark CI D/F Reflux Valves as per IS:5312 (Latest Edition) of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.				
15.1.A	**Reflux valves PN 1.0 IS 5312 with ISI mark**			
1	50	mm	"	3,280
2	65	mm	"	3,850
3	80	mm	"	4,420
4	100	mm	"	5,990
5	125	mm	"	7,560
6	150	mm	"	8,990

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
7	200	mm	"	17,840
8	250	mm	"	29,970
9	300	mm	"	39,250
10	350	mm	"	68,520
11	400	mm	"	89,930
12	450	mm	"	99,210
13	500	mm	"	151,320
14	600	mm	"	239,150
15	700	mm	"	360,180
16	750	mm	"	440,510
15.1.B	**Reflux valves PN 1.6 IS 5312 with ISI mark**			
1	50	mm	"	3,420
2	65	mm	"	4,010
3	80	mm	"	4,600
4	100	mm	"	6,230
5	125	mm	"	7,870
6	150	mm	"	9,350
7	200	mm	"	18,560
8	250	mm	"	31,170
9	300	mm	"	40,820
10	350	mm	"	71,270
11	400	mm	"	93,530
12	450	mm	"	103,180
13	500	mm	"	157,380
14	600	mm	"	248,720
15	700	mm	"	374,590
16	750	mm	"	458,140
Item No. 16	**Air valves**			
Providing and supplying C. I. Air valves of approved make & quality of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.				
16.1.A	**Air valves single (S1) Type**			
1	15	mm	No.	517
2	25	mm	"	803
3	40	mm	"	1,060
4	50	mm	"	1,487
16.1.B	**Air valves single (S2) Type**			
1	25	mm	No.	741
2	40	mm	"	1,070
3	50	mm	"	1,568
16.1.C	**Air valves double acting (DS2)**			
1	40	mm	No.	2,255
2	50	mm	"	2,796
3	80	mm	"	4,099
4	100	mm	"	5,899
5	150	mm	"	13,870
6	200	mm	"	25,669
16.1.D	**Kinetic Air Valve (DK)**			
1	40	mm	No.	4,327

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
2	50	mm	"	5,092
3	80	mm	"	7,500
4	100	mm	"	11,760
5	150	mm	"	21,861
6	200	mm	"	35,527
16.2	**Temper proof Air valves**			
	Providing and supplying C. I. Temper proof Air valves with SS 304 Float gun metal- nozzle of approved make & quality of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.			
16.2.A	**Without Isolating Sluice Valve PN 1.0**			
1	40	mm	No.	4,791.00
2	50	mm	"	6,159.00
3	80	mm	"	8,273.00
4	100	mm	"	9,798.00
5	150	mm	"	15,541.00
6	200	mm	"	25,902.00
16.2.B	**Without Isolating Sluice Valve PN 1.6**			
1	40	mm	No.	8,029.00
2	50	mm	"	9,471.00
3	80	mm	"	11,161.00
4	100	mm	"	11,756.00
5	150	mm	"	18,645.00
6	200	mm	"	31,082.00
16.2.C	**With Isolating Sluice Valve PN 1.0**			
1	40	mm	No.	11,734.00
2	50	mm	"	12,567.00
3	80	mm	"	15,444.00
4	100	mm	"	18,180.00
5	150	mm	"	28,173.00
6	200	mm	"	45,466.00
16.2.D	**With Isolating Sluice Valve PN 1.6**			
1	40	mm	No.	13,068.00
2	50	mm	"	13,873.00
3	80	mm	"	17,938.00
4	100	mm	"	21,403.00
5	150	mm	"	33,159.00
6	200	mm	"	53,556.00
Item No. 17	**Water hammer control device**			
Providing, supplying and delivery of Water Hammer Control Devices for use on various pumping main of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.				
17.1.A	**Zero velocity valves with bypass arrangement up to 300mm dia with C.I. body (class-10)**			
1	100	mm	No.	55,357
2	125	mm	"	69,893
3	150	mm	"	81,885
4	200	mm	"	86,280
5	250	mm	"	96,408
6	300	mm	"	109,555

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
17.1.B	**Zero velocity valves with bypass arrangement up to 300mm dia with C.I. body (class-15)**			
1	100	mm	No.	59,508
2	125	mm	"	84,892
3	150	mm	"	87,962
4	200	mm	"	93,009
5	250	mm	"	103,721
6	300	mm	"	117,765
17.1.C	**Zero velocity valves above 300mm dia with M.S. body (class-10)**			
1	350	mm	No.	109,578
2	400	mm	"	121,122
3	450	mm	"	130,961
4	500	mm	"	131,416
5	600	mm	"	195,809
6	700	mm	"	255,486
7	750	mm	"	282,988
8	800	mm	"	344,731
9	900	mm	"	409,734
10	1000	mm	"	497,010
11	1100	mm	"	633,213
12	1200	mm	"	762,129
13	1400	mm	"	1,143,193
14	1500	mm	"	1,332,016
15	1600	mm	"	1,358,654
16	1800	mm	"	1,492,024
17	2000	mm	"	1,653,640
17.1.D	**Zero velocity valves above 300mm dia with M.S. body (class-15)**			
1	350	mm	No.	126,012
2	400	mm	"	139,288
3	450	mm	"	162,006
4	500	mm	"	163,266
5	600	mm	"	225,180
6	700	mm	"	281,175
7	750	mm	"	311,328
8	800	mm	"	396,442
9	900	mm	"	471,194
10	1000	mm	"	497,010
11	1100	mm	"	718,013
12	1200	mm	"	838,358
13	1400	mm	"	1,257,534
14	1500	mm	"	1,465,204
15	1600	mm	"	1,494,505
16	1800	mm	"	1,549,965
17	2000	mm	"	1,653,640
17.2	**Air Cushion Valve with Cast Iron Body**			
17.2.A	**Class-10**			
1	100	mm	No.	71,585
2	150	mm	"	108,562
3	200	mm	"	115,875
4	300	mm	"	163,049
17.2.B	**Class-15**			
1	100	mm	No.	78,692
2	150	mm	"	119,377

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
3	200	mm	"	127,514
4	300	mm	"	179,426
Item No. 18.1	**Ball or stop Valves**			
18.1.A	**Threaded ends, Metallic to metallic chrome coated wedge PVC seat rings**			
1	50	mm	No.	521
2	65	mm	"	642
3	80	mm	"	1,020
4	100	mm	"	1,451
5	150	mm	"	2,471
18.1.B	**Threaded ends, Metallic to PVC, PVC wedge PVC seat rings.**			
1	50	mm	No.	521
2	65	mm	"	798
3	80	mm	"	924
4	100	mm	"	1,506
5	150	mm	"	2,471
18.1.C	**Flanged ends, Metallic to metallic chrome coated wedge PVC seat rings**			
1	50	mm	No.	1,451
2	65	mm	"	1,596
3	80	mm	"	2,046
4	100	mm	"	2,615
5	150	mm	"	3,587
18.2	**Stop valves / cocks**			
18.2.A	**Providing & fixing gun metal check or non return full-way wheel valve**			
1	15	mm	No.	309
2	20	mm	"	361
3	25	mm	"	512
4	40	mm	"	654
5	50	mm	"	920
18.2.B	**Providing & fixing brass screw down stop tap**			
1	15	mm	No.	176
2	20	mm	"	196
3	25	mm	"	237
18.2.C	**C. I. Stop cock or push button type self closing tap as per IS 1711**			
1	15	mm	No.	196
2	20	mm	"	196
Item No. 19	**C.I. Miscellaneous Items**			
19.1	**C.I.Specials plain ended**			
Manufacture, supply and delivery of 80 mm to 700 mm dia cast iron plain ended specials complete as per IS: 5531-1977 (Part- I to III) or its latest revision if any, suitable for use with A.C. Pressure pipes manufactured as per IS: 1592-1989 or its latest revision for various dia meter and classes. The delivery of specials is to be made to GWSSB store or sites any where in Gujarat States including all taxes, loading, carting, unloading, stacking, insurance, octroi, inspection charges etc. complete				
19.1.A	**All type of Specials Such as Bends, Tees, Reducers etc. Class 5 & 10**			
1	Up to 300 mm dia.		Kg	65

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
19.1.B	**C.I.Specials flange ended**			
Manufacture, supply and delivery of 80 mm to 700 mm dia cast iron flange ended specials complete as per IS: 5531-1977 (Part- I to III) or its latest revision if any, suitable for use with A.C. Pressure pipes manufactured as per IS: 1592-1989 or its latest revision for various dia meter and classes. The delivery of specials is to be made to GWSSB store or sites any where in Gujarat States including all taxes, loading, carting, unloading, stacking, insurance, octroi, inspection charges etc. complete				
1	80 to 300mm dia		Kg	65
2	350 to 650mm dia		"	65
3	700 onwards		"	65
19.2	**C. I. Fire hydrants : Double Valves type underground.**			
	C. I. Fire hydrants- Double Valves type UG.		No.	7,250
19.3	**C. I. Manhole Frame & Cover**			
	All type		Kg.	65.00
19.4	**C.I. Steps All type & size**			
1			Kg.	65.00
19.5	**C.I. surface box with cover**			
1			Kg.	65.00
19.6	**C.I. Cowl Ventilator**			
	Providing C. I. Cowl Type ventilator with air filter & Jali etc. complete.			
1	All dia		Kg.	65.00
Item No. 20	**HDPE Storage Tanks:** Supplying Rotationally moulded HDPE storage tank with ISI Mark of approved make incl. all taxes transportation octroi etc. complete.			
20.1.A	**Storage Tanks With ISI Mark (with outside Black colour & inside lining)**			
1	100	lit cap.	No.	1,003
2	200	"	"	2,006
3	300	"	"	3,009
4	400	"	"	4,011
5	500	"	"	5,014
6	1000	"	"	10,028
7	1500	"	"	15,043
8	2000	"	"	20,057
9	2500	"	"	25,254
10	3000	"	"	30,305
11	4000	"	"	40,406
12	5000	"	"	50,508
13	6000	"	"	60,609
14	7500	"	"	75,762
15	10000	"	"	102,417
20.1.B	**Storage Tanks Without ISI Mark (with outside Black colour & inside lining)**			
1	100	lit cap.	No.	732
2	200	"	"	1,463
3	300	"	"	2,195
4	400	"	"	3,221
5	500	"	"	4,026
6	1000	"	"	8,052
7	1500	"	"	12,078
8	2000	"	"	16,104
9	2500	"	"	20,313

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
10	3000	"	"	24,376
11	4000	"	"	32,501
12	5000	"	"	40,626
13	6000	"	"	48,751
14	7500	"	"	60,939
15	10000	"	"	80,470
20.1.C	**Loft Storage Tanks With ISI Mark (with outside Black colour & inside lining)**			
1	100	lit cap.	No.	1,013
2	200	"	"	2,027
3	300	"	"	3,040
4	400	"	"	4,100
5	500	"	"	5,124
6	1000	"	"	10,418
20.1.D	**Loft Storage Tanks Without ISI Mark (with outside Black colour & inside lining)**			
1	100	lit cap.	No.	878
2	200	"	"	1,757
3	300	"	"	2,635
4	400	"	"	3,514
5	500	"	"	4,392
6	1000	"	"	8,930
Item No. 21	**Coupline & Rings**			
21.1.A	**Supplying AC coupling with EPDM rubber rings and carting, loading, unloading and all taxes etc.**			
1	80	mm	No.	170
2	100	mm	"	218
3	150	mm	"	314
4	200	mm	"	481
5	250	mm	"	570
6	300	mm	"	740
7	350	mm	"	962
8	400	mm	"	1,236
9	450	mm	"	1,407
10	500	mm	"	1,665
11	600	mm	"	2,258
21.1.B	**Rubber Rings for AC pipes / CID Joints**			
Manufacturing, Supplying & Delivery of EPDM Rubber Sealing Ring with ISI mark as per Type-3 specified in Table-I & II of IS specification 5382-1985 and IS 10292-1982 (Part-I & II) or its latest revision of any suitable for use with A.C.Coupler or CID Joints for A.C.Pressure Pipe (IS 1592-1989) including all taxes loading, carting, unloading and stacking at GWSSB store any where in Gujarat State including insurance, inspection charges, octroi etc. complete.				
21.2.A	**"O" Type rings**			
1	80	mm	No.	27
2	100	mm	"	38
3	125	mm	"	41
4	150	mm	"	47
5	200	mm	"	67
6	250	mm	"	79
7	300	mm	"	98
8	350	mm	"	133

Item no.	Sr. No.	Size	Unit	Rate for 2019-20
9	400	mm	"	144
10	450	mm	"	190
11	500	mm	"	330
12	600	mm	"	420
13	700	mm	"	550
21.2.B	**"V" Type rings**			
1	80	mm	No.	35
2	100	mm	"	45
3	125	mm	"	50
4	150	mm	"	61
5	200	mm	"	85
6	250	mm	"	97
7	300	mm	"	124
8	350	mm	"	167
9	400	mm	"	169
10	450	mm	"	191
11	500	mm	"	421
12	600	mm	"	499
13	700	mm	"	661
21.2.C	**Suitable for CID Joints**			
1	80	mm	No.	27
2	100	mm	"	38
3	125	mm	"	41
4	150	mm	"	47
5	200	mm	"	67
6	250	mm	"	79
7	300	mm	"	98
8	350	mm	"	133
9	400	mm	"	144
10	450	mm	"	190
11	500	mm	"	330
12	600	mm	"	420
13	700	mm	"	550
Item No. 22	**MS iron Ladder**			
Providing and fixing at site of work M. S. iron ladder with Rly. freight, loading, unloading, carting & all taxes etc. comp as directed including paints 2 coats etc comp.				
	-do- as above		Kg.	72
22.1	**Channels, angles, iron rails etc..**			
22.1.A	**Purchasing & supplying at site of works, with Railway freight, loading, unloading, carting, etc. complete such as joints, channels, angles, iron rails, etc.**			
1	Angles & channels below 10 mm thickness		MT	64683
2	Angles 10mm & above thick		MT	72741
22.1.B	- do - M. S. Flats of various thickness		MT	66249
Note : All the Rates in material section includes GST, transportation and storage charges				

Labour

Part 1 & 2 : Section:- B

SECTION : 1 & 2.B - LABOUR				
Item no.	**Size**		**Unit**	**Rate for 2019-20**
Item No. 1	**Excavation for Pipeline trenches**			
	Excavation for pipe line trenches for water supply, sewerage line, manhole etc. all with shoring and struting if required as per required gradient and line including safety provisions using site rails and stacking excavated stuff including up to all required lead cleaning the site etc. complete for all lifts and strata as specified.			
a)	In all sorts of soil and soft murrum			
b)	In hard murrum, boulders incl. macadam road.			
c)	In soft rock and/or masonry in CM or L M or Lime Concrete.			
d)	In hard rock and / or in C. C. 1:2:4 or RCC with blasting, breaking, chiseling, or by chiseling/breaking only.			
1.A.1	**Upto 1.50 mt depth**			
	a)	"	Cu.M.	**88**
	b)	"	"	**132**
	c)	"	"	**160**
	d)	"	"	**365**
1.A.2	**1.50 mt to 3.00 mt depth**			
	a)	"	Cu.M.	**97**
	b)	"	"	**145**
	c)	"	"	**176**
	d)	"	"	**381**
1.A.3	**3.00 mt to 4.50 mt depth**			
	a)	"	Cu.M.	**101**
	b)	"	"	**151**
	c)	"	"	**184**
	d)	"	"	**390**
1.A.4	**4.50 mt to 6.00 mt depth**			
	a)	"	Cu.M.	**107**
	b)	"	"	**158**
	c)	"	"	**192**
	d)	"	"	**398**
1.A.5	**6.00 mt to 7.50 mt depth**			
	a)	"	Cu.M.	**111**
	b)	"	"	**164**
	c)	"	"	**199**
	d)	"	"	**407**
1.A.6	**Excavation for P/L trenches beyond 7.5m**			
	For every extra additional depth of 1.5 m or part thereof beyond 7.5 m depth			
	a)	"	Cu.M.	**28**
	b)	"	"	**40**
	c)	"	"	**49**
	d)	"	"	**51**

Item no.	Size		Unit	Rate for 2019-20
Item No. 2	**Excavation in Bituminous Road**			
	Excavation in bituminous road as per required gradient and line including safety provisions using site rails and stacking excavated stuff including up to all required lead cleaning the site etc. complete for all lifts as specified.			
	a)	Excavation in Bituminous Road	Cu.M.	**247**
Item No. 3	**Providing bedding incl. ramming, watering, levelling, consolidating etc. Complete as per standard and instruction of engineer incharge**			
1	As above with selected excavated earth available near site		Cu.M.	**63**
2	As above with Murrum brought from outside incldluing all lead		"	**185**
3	As above with required quality Sand brought from outside incldluing all lead		"	**346**
Item no.4 (A)	**: L, L & J of MS Pipe (outside gunniting & inside lining / epoxy)**			
	Lowering, laying, Jointing & welding in position to correct line & level M.S. Pipe with outer gunniting & inside lining/Epoxy painting on pedestal or chairs upon prepared formation or prepared bedding in trenches the rates include conveyance from store to site of work loading, unloading, joint plastering, hydrotesting etc.complete.			
4.a.1	**4mm to 7mm Thick**			
	Pipe Dia in mm			
1	168.3		RMT	**177**
2	193.7		"	**194**
3	219.7		"	**212**
4	244.5		"	**228**
5	273.1		"	**247**
6	323.9		"	**292**
7	355.6		"	**314**
8	406.4		"	**348**
9	457		"	**384**
10	508		"	**420**
11	559		"	**462**
12	610		"	**499**
13	660		"	**534**
14	711		"	**569**
15	762		"	**620**
16	813		"	**655**
17	864		"	**692**
18	914		"	**733**
19	965		"	**768**
20	1016		"	**805**

Item no.	Size	Unit	Rate for 2019-20
4.a.2	**Above 7 mm thick**		
	Pipe Dia in mm		
1	559	Rmt	**509**
2	610	"	**550**
3	660	"	**589**
4	711	"	**629**
5	762	"	**682**
6	813	"	**723**
7	864	"	**765**
8	914	"	**811**
9	965	"	**849**
10	1016	"	**904**
11	1067	"	**945**
12	1118	"	**985**
13	1168	"	**1025**
14	1219	"	**1070**
15	1321	"	**1166**
16	1422	"	**1247**
17	1524	"	**1329**
18	1626	"	**1417**
19	1727	"	**1513**
20	1829	"	**1596**
21	2032	"	**1762**
Item no.4 (B)	**L, L & J of MS Pipe (with 3 LPE coating & with lining or epoxy)**		
	Lowering, laying, jointing & welding in position to correct line & level M.S. Pipe with outerside 3 LPE coating & inside solvent free liquid epoxy lining on pedestal or chairs upon prepared formation or prepared bedding in trenches the rates include conveyance from store to site of work loading, unloading, heat shrink sleev jointing hydrotesting etc.complete.		
4.b.1	**4 mm to 7 mm thick**		
	Pipe Dia in mm		
1	168.3	RMT	**236**
2	193.7	"	**261**
3	219.7	"	**288**
4	244.5	"	**314**
5	273.1	"	**341**
6	323.9	"	**404**
7	355.6	"	**437**
8	406.4	"	**487**
9	457	"	**542**
10	508	"	**594**
11	559	"	**655**
12	610	"	**710**
13	660	"	**761**
14	711	"	**813**
15	762	"	**881**

Item no.	Size	Unit	Rate for 2019-20
16	813	"	934
17	864	"	989
18	914	"	1048
19	965	"	1099
20	1016	"	1153
4.b.2	Above 7 mm thick		
	Pipe Dia in mm		
1	559	Rmt	723
2	610	"	785
3	660	"	842
4	711	"	901
5	762	"	975
6	813	"	1034
7	864	"	1096
8	914	"	1160
9	965	"	1220
10	1016	"	1278
11	1067	"	1338
12	1118	"	1398
13	1168	"	1456
14	1219	"	1523
15	1321	"	1641
16	1422	"	1761
17	1524	"	1880
18	1626	"	2007
19	1727	"	2127
20	1829	"	2249
21	2032	"	2490
Item No. 5	L, L & J of DI / CI Pipe (flanged Joint)		
	Providing and making flanged **joints** to **flanged** DI / C.I. pipes of all classes / specials etc. including cost of all jointing materials rubber packing, nut bolts, incldluing lowering laying jointing labour hydraulic testing etc. complete.		
	Pipe Dia in mm		
1	80	Joint	427
2	100	"	469
3	125	"	533
4	150	"	601
5	200	"	823
6	250	"	990
7	300	"	1202
8	350	"	1417
9	400	"	1670
10	450	"	2095
11	500	"	2543
12	600	"	3162

Item no.	Size	Unit	Rate for 2019-20
13	700	"	3919
14	750	"	4629
15	800	"	5086
16	900	"	5852
17	1000	"	6623
18	1100	"	7484
19	1200	"	8457
Item No. 6	L, L & J of DI / CI Pipe (tyton Joint)		
	Lowering, laying and jointing C. I. S & S Spun pipes suitable for Tyton joints / Mortar lined D. I. Pipes of various classes with CI / MS specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including hydraulic testing etc. comp.		
	Pipe Dia in mm		
1	80	RMT	49
2	100	"	54
3	125	"	63
4	150	"	75
5	200	"	98
6	250	"	124
7	300	"	152
8	350	"	185
9	400	"	221
10	450	"	261
11	500	"	306
12	600	"	397
13	700	"	504
14	750	"	561
15	800	"	624
16	900	"	753
17	1000	"	899
18	1100	"	1070
19	1200	"	1273
Item No. 7	L,L& J of G.I.Pipes		
	Lowering, laying and jointing G. I. pipes with G. I. specials of following diameters in proper position, grade and alignment as directed by Engineer-in-charge including conveyance from stores to site of work, labour, giving hydraulic testing, etc. comple		
	Pipe Dia in mm		
1	32	RMT	14.00
2	40	"	16.00
3	50	"	19.00
4	65	"	21.00
5	80	"	29.00
6	100	"	36.00
7	125	"	46.00

Item no.	Size	Unit	Rate for 2019-20
8	150	"	**53.00**
Item No. 8	**L, L & J PVC/uPVC/cPVC pipes and specials**		
	Lowering, laying, fixing and jointing PVC/uPVC/cPVC pipes and specials of following class and diameter including cost of conveyance from stores to site of works including cost of labour, material, cement solvent, giving satisfactory hydraulic testing as per ISI code.		
	Pipe Dia in mm		
1	63	RMT	**13**
2	75	"	**16**
3	90	"	**18**
4	110	"	**20**
5	125	"	**23**
6	140	"	**25**
7	160	"	**30**
8	180	"	**36**
9	200	"	**40**
10	225	"	**50**
11	250	"	**55**
12	280	"	**64**
13	315	"	**74**
Item No. 9	**L,L& J of HDPE Pipes**		
9.A	Lowering, laying and jointing HDPE pipes and specials of following class and diameter **(By butt fusion welding method)** including cost of conveyance from stores to site of works at all level including cost of labour, material, giving satisfactory hydraulic testing etc. comp.		
	Pipe dia. in mm		
1	50	RMT	**4**
2	63	"	**5**
3	75	"	**7**
4	90	"	**8**
9.B	Lowering, laying and jointing HDPE pipes and specials of following class and diameter (**By butt fusion welding method**) including cost of conveyance from stores to site of works at all level including cost of labour, material, giving satisfactory hydraulic testing etc. comp.		
	Pipe dia. in mm		
1	110	RMT	**48**
2	125	"	**79**
3	140	"	**97**
4	160	"	**109**
5	180	"	**111**
6	200	"	**121**
7	225	"	**147**
8	250	"	**179**
9	280	"	**186**

Item no.	Size	Unit	Rate for 2019-20
10	315	"	311
11	355	"	348
12	400	"	408
13	450	"	430
14	500	"	836
15	600	"	901
16	630	"	1115
17	710	"	1280
18	800	"	1601
19	900	"	1680
20	1000	"	3132
Item No. 10	**L,L& J of Corruguated DWC HDPE Pipes (Gravity Line)**		
	Lowering, laying and jointing of class SN 8 structured wall (External Annular Corrugated & Smooth Internal surface) Polyethylene Piping and fittings with the help of **coupler** (on line / off line) attached with one end of pipes, sliding over the elastomeric sealing **rubber ring** placed on the specified valley of the corrugation at the spigot end, lowering the same into the trench at all level, laying on the lower bedding (constructed at bottom of trenches) at prescribed gradient,depth & alignment ,testing the water tightness of the joints, ensuring the continuity tests of specified pipe segments etc. complete as per drawing,specifications & detailed engineering, including carriage of pipes & fittings from site stacks to the place of laying etc. as per direction of Engineer-in-charge.		
	Pipe dia. ID in mm		
1	75	RMT	23
2	100	"	23
3	125	"	24
4	135	"	25
5	150	"	25
6	170	"	25
7	200	"	35
8	225	"	40
9	250	"	45
10	300	"	66
11	400	"	86
12	500	"	113
13	600	"	139
14	800	"	180
15	1000	"	246
16	1200	"	312

Item no.	Size	Unit	Rate for 2019-20
Item No. 11	**L,L& J of R.C.C. Pipes**		
	Lowering, laying and jointing R. C. C. pipes in C. M. 1:1 1/2 of following diameters in proper position, grade and alignment at all level as directed by Engineer-in-charge including conveyance from stores to site of work, labour, giving hydraulic testing as per ISI code.		
11.a	**RCC pipe (p1,p2,p3)**		
	Pipe dia. in mm		
1	80	RMT	**43**
2	100	"	**48**
3	150	"	**67**
4	225	"	**94**
5	250	"	**103**
6	300	"	**127**
7	350	"	**142**
8	380	"	**156**
9	400	"	**165**
10	450	"	**182**
11	500	"	**202**
12	525	"	**216**
13	600	"	**243**
14	680	"	**273**
15	700	"	**298**
11.b	**Class NP2,NP3,NP4**		
	Pipe dia. in mm		
1	80	RMT	**43**
2	100	"	**48**
3	150	"	**67**
4	225	"	**94**
5	250	"	**103**
6	300	"	**127**
7	350	"	**142**
8	380	"	**156**
9	400	"	**162**
10	450	"	**182**
11	500	"	**202**
12	525	"	**216**
13	600	"	**243**
14	680	"	**273**
15	700	"	**286**
16	750	"	**308**
17	800	"	**322**
18	900	"	**362**
19	1000	"	**400**
20	1100	"	**436**
21	1200	"	**470**
22	1400	"	**548**

Item no.	Size	Unit	Rate for 2019-20
23	1600	"	**615**
24	1800	"	**694**
Item No. 12	**L,L& J of Stone Ware Pipes**		
	Lowering, laying and jointing Stone Ware pipes of following diameters with cement joints in C. M. 1:1 proportion in proper position, grade and alignment at all level as directed by Engineer-in-charge including conveyance from stores to site of work, Jointing material etc. comp.		
	Pipe Dia in mm		
1	75	RMT	**53**
2	100	"	**62**
3	150	"	**94**
4	200	"	**120**
5	230	"	**136**
6	250	"	**149**
7	300	"	**169**
Item No. 13	**Dewatering**		
1	In all sorts of soil and soft murrum, hard Murrum and boulders, Soft Rock, Hard Rock, upto 1.5 mt. depth from G. L.	Cu.M.	**17**
2	Extra for dewatering in all sorts of strata's, for each 1.5 mt. or part thereof beyond 1.5 mt. depth.	Cu.M.	**10**
Item No. 14	**Refilling of pipeline trenches**		
	Refilling the pipeline trenches incl. ramming, watering, consolidating desposal of surplus stuff as directed within a radius of 3 km.		
1	Refilling as directed	Cum	**22**
2	--do-- with selected soil brought from outside including all lead	Cu. M.	**172**
Item No. 15	**L,L& J of SV / AV / BFV / RV**		
	Lowering, laying and jointing in position following C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves including cost of all labour, jointing material, including nut bolts and giving satisfactory hydraulic testing, etc. complete.		
15.a	**Sluice valves, Butterfly Valves, Reflux Valves**		
	Dia. in mm		
1	50	No.	**403**
2	65	"	**419**
3	80	"	**427**
4	100	"	**468**
5	125	"	**510**
6	150	"	**624**

Item no.	Size		Unit	Rate for 2019-20
7	200		"	**791**
8	250		"	**1009**
9	300		"	**1217**
10	350		"	**1858**
11	400		"	**2101**
12	450		"	**2943**
13	500		"	**3099**
14	600		"	**4231**
15	700		"	**5364**
16	750		"	**6191**
17	800		"	**6946**
18	900		"	**8078**
19	1000		"	**9966**
15.b	**Air valves single ball Flanged / screwed type**			
	Dia. in mm			
1	15		No.	**31**
2	20		"	**45**
3	25		"	**60**
4	40		"	**74**
5	50		"	**190**
15.c	**Air valves double ball Flanged**			
	Dia. in mm			
1	25		No.	**212**
2	40		"	**268**
3	50		"	**404**
4	65		"	**424**
5	80		"	**439**
6	100		"	**561**
7	150		"	**645**
8	200		"	**914**
Item No. 16	**Fixing M.S.Sections**			
	Labour charges for lowering laying, erecting, fixing, various size of M. S. section such as joints channel, angles plates etc. complete.			
	a)	-do-	MT	**9090**
	b)	- do - with fabrication.	MT	**12120**
Item No. 17	**Cutting, bending, binding MS reinforcement WITH WIRE**			
17.a	Labour charges for fabricating in position M. S. reinforcement of various dia. including shifting, cutting, bending, binding with 16 gauge wire, hooking, overlapping, scraping etc. complete for water retaining and water treatment structure and their related structures. INCL. COST OF WIRE			
	- do -		MT	**9090**
17.b	- do - for deformed bars		MT	**9090**

Item no.	Size		Unit	Rate for 2019-20
Item No. 18	**Cutting of pipes**			
	Labour charges for cutting pipes with the help of requisite tools and as directed.			
18.a	**C. I. Pipe/D.I. Pipe**			
1	Pipe thickness upto 10 mm		10 cm.	**12**
2	Pipe thickness upto 11 to 20 mm		"	**15**
3	Pipe thickness upto 21 to 30 mm		"	**17**
4	Pipe thickness upto 31 to 40 mm		"	**22**
18.b	**R. C. C. Pipe/A.C.Pipe**			
1	Pipe thickness upto 20 mm		10 cm.	**3**
2	Pipe thickness upto 21 to 30 mm		"	**5**
3	Pipe thickness upto 31 to 40 mm		"	**7**
4	Pipe thickness upto 41 to 50 mm		"	**9**
5	Pipe thickness upto 51 to 60 mm		"	**12**
6	Pipe thickness upto 61 to 70 mm		"	**15**
Item No. 19	**Erecting Precast RCC Chamber**			
	Labour charges for erecting precast RCC chamber for water main incl carting from store and fixing etc. complete (excluding excavation and refilling)			
1	0.60 x 0.60 x 1.0 mt		No.	**737**
2	0.90 x 0.90 x 1.0 mt		"	**964**
3	1.30 x 1.30 x 1.0 mt		"	**1174**
Item No. 20	**Fixing RCC stand post with platform**			
	Labour charges for fixing RCC precast stand post four taps.			**935**

SECTION : 1.C - RCC, ESR, GSR, SUMP, HGLR

Item no.	Description of Item	Unit	Rate for 2019-20
Item No. 1	**P.C.C (M7.5) 1:4:8 Mass concrete**		
	Providing and casting in situ mass cement concrete in 1:4:8 proportion using granite quartzite trap metal of size 25 mm to 40 mm including consolidation curing etc. complete.	Cu. M.	3,484
Item No. 2	**P.C.C. M-10 levelling Course**		
	Providing and casting in situ mass cement concrete in grade M-10 (approx. corresp. to prop. 1:3:6) using granite quartzite trap metal of size 12 mm to 25 mm incl. consolidation curing etc. complete.		
	2.1 With Form Work	Cu. M.	4,043
	2.2 Without Forms Work	Cu. M.	3,698
Item No. 3	**C.C. (M-15)**		
	Providing and casting in situ C.C. in grade M-15 (approx. corresp. to prop. 1:2:4) (proportions as per mix design or as per Table 9 of IS456 2000 in masses by weigh batching) using granite, quartzite trap metal of size 6 mm to 20 mm for RCC work, including scaffolding centering, form work, needle vibrated consolidation, curing comp. up to 6 meter depth or height (excluding cost of reinforcement and neat finishing) with centering and shuttering/deshuttering etc. comp. for structure for other than water retaining.		
	1. Footing (without form work)	Cu. M.	4,723
	2. Footing for column or foundation (with form work)	Cu. M.	4,916
Item No. 4	**C.C. M-20 (without w.p.chemical)**		
	Providing and casting in situ C.C. in grade M-20 (proportions as per mix design or as per table9 of IS456 2000 in masses by weigh batching) using granite, quartzite trap metal of size 6 mm to 20 mm for RCC work, including scaffolding centering, formwork, needle vibrated consolidation, curing complete up to 6 meter depth or height (excluding cost of reinforcement and neat finishing) with centering and shuttering/deshuttering etc. complete for structure other than water retaining (Below G.L)		
	1. Footing (without form work)	Cu. M.	5,205
	2. Footing for column or foundation (with form work)	Cu. M.	5,460
	3. Columns	Cu. M.	7,514
	4. Braces and Beams/ Ring beam/Ring beams	Cu. M.	6,799
	5. Top flat slab/slab of various thickness	Cu. M.	6,555
	6. Top/roof Dome	Cu. M.	7,139
	7. Vertical Wall/Cylindrical wall	Cu. M.	6,862
Item No. 5	**C.C. M-20 Nominal Mix (with w.p.chemical)**		
	Providing and cast in situ C.C. in grade M-20 (approx. corresp. to prop. 1:1.5:3) (proportions as per mix design or as per table9 of IS456 2000 in masses by weigh batching) using quartzite trap metal of size 12 mm to 20 mm and or 6 mm to 12 mm including scaffolding centering form work, needle vibrated consolidation, curing and hydraulic testing etc. complete (excluding cost of reinforcement) with centering and shuttering/deshuttering etc. complete up to 6 meter height/depth from Av. G.L. for all structures with water proofing compound.		
	1. Bottom slab or floor slab with shuttering	Cu. M.	7,448
	2. Bottom slab or floor slab – without shuttering	Cu. M.	5,969

Item no.	Description of Item	Unit	Rate for 2019-20
	3. Bottom dome / roof dome	Cu. M.	7,665
	4. Slant slab/conical wall or conical shell	Cu. M.	7,648
	5. Beams /Ring beams/Ring girders	Cu. M.	7,725
	Vertical Wall		
	6. up to 15 cm thick	Cu. Mt.	7,975
	7. Above 15 cm and up to 20 cm	Cu. Mt.	7,628
	8. Above 20 cm and up to 25 cm	Cu. Mt.	7,363
	9. Above 25 cm	Cu. Mt.	7,289
	10. Columns	Cu. Mt.	8,619
Item No. 6	**C.C. M-25 Control concrete for water retaining structures**		
	Providing and cast in situ C.C. in grade M-25 proportions of ingredients as per mix design by weigh batching using granite, quartzite trap metal of size 12 mm to 20 mm and or 6 mm to 12 mm including scaffolding centering formwork, needle vibrated consolidation, curing and hydraulic testing etc. complete (excluding cost of reinforcement) with centering and shuttering/deshuttering etc. comp. up to 6 meter height /depth Av. G.L.for all water retaining structures		
	1. Flat bottom slab/floor slab/slab with shuttering	Cu. M.	8,039
	2. Flat bottom slab/floor slab/slab without shuttering	Cu. M.	6,510
	3. Bottom dome / Top dome	Cu. M.	8,267
	4. Slant slab /conical wall or conical shell	Cu. M.	8,250
	5. Beams/ ring beams/girders	Cu. M.	8,340
	Vertical Wall		
	6. up to 15 cm thick	Cu. Mt.	8,618
	7. Above 15 cm and up to 20 cm	Cu. Mt.	8,245
	8. Above 20 cm and up to 25 cm	Cu. Mt.	7,960
	9. Above 25 cm	Cu. Mt.	7,881
	10. Columns	Cu. Mt.	9,284
Item No. 7	**C.C. M-30 Control concrete for water retaining structures**		
	Providing and cast in situ C.C. in grade M-30 proportions of ingredients as per mix design by weigh batching using granite, quartzite trap metal of size 12 mm to 20 mm and or 6 mm to 12 mm including scaffolding centering formwork, needle vibrated consolidation, curing and hydraulic testing etc. complete (excluding cost of reinforcement) with centering and shuttering/deshuttering etc. comp. up to 6 meter height /depth Av. G.L.for all water retaining structures		
	1. Flat bottom slab/floor slab/slab with shuttering	Cu. M.	8,170
	2. Flat bottom slab/floor slab/slab without shuttering	Cu. M.	6,714
	3. Bottom dome / Top dome	Cu. M.	8,392
	4. Slant slab /conical wall or conical shell	Cu. M.	8,373
	5. Beams/ ring beams/girders	Cu. M.	8,475
	Vertical Wall		
	6. up to 15 cm thick	Cu. Mt.	8,766
	7. Above 15 cm and up to 20 cm	Cu. Mt.	8,392
	8. Above 20 cm and up to 25 cm	Cu. Mt.	8,117
	9. Above 25 cm	Cu. Mt.	8,026
	10. Columns	Cu. Mt.	9,401
Item No. 8	**Extra for raising / lowering of C.C.**		
	Extra for raising / lowering of C.C. for every additional 3 meter of part thereof in all RCC items of reservoirs or water retaining structures.		
	(for item 4, 5 , 6and 7)	Cu. Mt.	212

Item no.	Description of Item	Unit	Rate for 2019-20
Item No. 9	**Steel /Reinforcement bars**		
	Supplying cutting, bending, binding and placing in position steel as per plan and design and as per ISS 2502 including cost of steel and binding wire for reservoirs/structures only including lift up to 6 meter height or depth below G.L. for all diameters		
9.1	High yield strength deformed(HYSD)bars/ Cold twisted deformed (CTD) bars confirming to IS1786(latest) Fe – 415 grade	MT	58,799
9.2	Do-Thermo mechanically treated (TMT)bars Fe-415 grade for all diameters.	MT	63,083
9.3	Do-Corrosion resistance steel(CRS) Fe 415 grade for all diameters confirming to relevant I.S.	MT	67,368
9.4	Do – deformed (TMT) bars confirming to relevant IS Fe – 500 grade for all diameters.	MT	67,368
9.5	Do-CRS steel all diameter Fe 500grade confirming to relevant I.S.	MT	68,439
9.6	Do-Using Mild steel confirming to ISS 226 – 1962 or ISS 432 (i) or latest	MT	56,657
Item No. 10	**Extra for raising Steel bars**		
	Extra for raising steel bars for every additional height of 3 meters or part thereof.	MT	467
Item No. 11	**RCC Spiral Staircase**		
	RCC circular spiral staircase with central circular in M-20 as per design including M.S. reinforcement, centering, shuttering, form work , scaffolding ,finishing and curing including providing and fixing balusters of 1.0 m (work below G.L. for column and footing will be paid extra) for 1m radius and 20 cms rise .	Step	1,022
Item No. 12	**Cement Plaster (20 mm thick)**		
	A) Cement plaster 20 mm thick in C.M. 1:2 using water proofing compound of approved quality including finishing etc. complete.	Sq. M.	207
	B) – do – Without water proofing compound.	Sq. M.	200
Item No. 13	**Epoxy paint to RCC**		
	Providing and applying Epoxy paint of approved make to concrete surface for RCC ESR of 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 IS codes.		
	1. For new surface – Two coats	Sq. M.	101
	2. For old surface – Two coats	Sq. M.	108
Item No. 14	**(a) M.S. Ladder(Without safety cage)**		
	Providing and fixing 50 cm wide M.S. Ladder fabricated from M.S. Flats 10 mm x 75 mm with 20 mm dia steel bar steps in double rows, @ 30 cm C/C. The include stays of 10 mm x 50 mm flats fixed at 3 meter C/C with welding anchoring and 3 coats anticorrosive paint.	R. Mt.	2,943
	(b) Note: For M.S. Ladder(With safety cage)		

Item no.	Description of Item	Unit	Rate for 2019-20
	Item No 14 (a) plus Rs. 67 per kg of additional structural steel consumed for safety cage arrangement		
Item No. 15	**Aluminium Pole Ladder (1.2m to 4.0m)**		
	Providing Aluminium pole ladder made from channel size 44 mm x 25 mm x 3 mm and step made from non sleep corrugated aluminium pipe 25 mm dia. complete with rubbers shores at top and bottom available in Aluminium any height from 1.2 mt to 4.0 mt.	R. Mt.	1,111
Item No. 16	**Water Level Indicator / Depth Gauge**		
	Providing and fixing Water Level Indicator or depth gauge painted on TW plank 25 mm / MS plate 4 mm thick float, level indicator sliding wire on standard pulleys incl. necessary arrangement to prevent the swinging etc. complete with calibration up to 5 mt height.		
		No.	5,506
Item No. 17	**Construction /Expansion Joints .**		
	Providing and Fixing water tight construction or expansion joints.		
	1. Made of G.I. plain sheet of 16 to 18 gauge 30 cms wide.	R. Mt.	235
	2. 150 mm wide thin ribbed PVC.	R. Mt.	330
	3. 180 mm dumbbell type	R. Mt.	376
Item No. 18	**Copper Lightning Arrestor**		
	Providing and fixing copper lightning arrestor incl. copper strip and earthing plate etc. complete (incl. cost of excavation for earthing plate etc. rate per kgs of copper).	Kg.	894
Item No. 19	**CIDF Pipes for ESR / Reservoir**		
	Providing and fixing flanged steel cylinder reinforced concrete or C.I.D.F. / Class A pipes vertically for R.C.C. Reservoir incl. providing clamps at every 3 mt incl. jointing materials such as nuts, bolts, rubber packing, hydraulic testing and necessary scaffolding etc. complete.		
	1. 80 mm	R. Mt.	2,690
	2. 100 mm	R. Mt.	3,148
	3. 125 mm	R. Mt.	3,761
	4. 150 mm	R. Mt.	4,411
	5. 200 mm	R. Mt.	6,178
	6. 250 mm	R. Mt.	8,003
	7. 300 mm	R. Mt.	10,087
	8. 350 mm	R. Mt.	12,415
	9. 400 mm	R. Mt.	14,973
	10. 450 mm	R. Mt.	18,732
	11. 500 mm	R. Mt.	22,273
	12. 600 mm	R. Mt.	29,075
	13. 700 mm	R. Mt.	38,011
	14. 750 mm	R. Mt.	43,330

Item no.	Description of Item	Unit	Rate for 2019-20
Item No. 20	**DIDF pipes for ESR / Reservoir**		
	Providing and fixing flanged D.I.D.F. / Class K-9 pipes vertically for RCC. Reservoir incl. providing clamps at every 3 mt incl. jointing materials such as nuts, bolts, rubber packing, hydraulic testing and necessary scaffolding etc. complete.		
	1. 100 mm	R. Mt.	2,601
	2. 150 mm	R. Mt.	3,812
	3. 200 mm	R. Mt.	5,100
	4. 250 mm	R. Mt.	6,488
	5. 300 mm	R. Mt.	8,045
	6. 350 mm	R. Mt.	9,822
	7. 400 mm	R. Mt.	11,690
	8. 450 mm	R. Mt.	14,243
	9. 500 mm	R. Mt.	17,103
	10. 600 mm	R. Mt.	22,279
	11. 700 mm	R. Mt.	28,271
Item No. 21	**M.S. Pipe Railing**		
	Providing an fixing 25 mm x 5.2 mm MS railing with three horizontal rows and posts of angle iron of size 65 mm x 65 mm x 8 mm RCC 150 mm and 1.15 meter height and placed at 1.85 mt / c/c including painting two coats and anchorage in CC etc complete	Kg.	77
Item No. 22	**Cement Paint to ESR**		
22-A	Applying any approve quality of cement paint in three coats including cleaning washing etc. complete for E.S.R. only.	Sq. Mt.	65
22-B	-do- for Existing ESR Incl. Scaffolding	Sq. Mt.	81

RCC ESR, GSR (Underground & Partial U/G Sump)
Intake Well, HGLR, Water & Drainage Pumping Stations
Section :- C




SECTION : 1.C - RCC, ESR, GSR, SUMP, HGLR

	Description of item	Unit	Rate for 2019-20		
	Item No.1: RCC ESR (description of item for turnkey tender)				
	Designing structurally (and aesthetically) complying provisions of relevant Indian standards and constructing RCC Elevated service Reservoir of the following capacity and height , using latest Soil Investigation Report of proposed site , Seismic zone, Wind speed Zone. Including (1) Container shape any suitable type(or as specified), (2) Staging consisting of column brace trestle / shaft / combination column- brace trestle and shaft as appropriate(or as specified) and (3) Appropriate foundation system. This includes excavation in all types of soil strata(including hard rock), casting100 mm thick P.C.C. levelling course in M-10 , Refilling the pit with proper soil and disposing of the surplus stuff at all required lead. (4) This will also include cement plaster in CM 1:2 with approved water proofing compound all over inside container (i.e. walls, base, top slab/dome bottom etc. all).. (5) All types of labour & material charges of lowering , laying, erecting / hoisting & joining of pipe assembly of Inlet, Outlet, overflow, washout and bye pass arrangement as per hydraulic design are including. (6) Providing and fixing of any accessories(specified), CI Manhole frame and covers, water level indicator , lightening conductor, GI Pipe railing around walk way, at roof level, at gallery and around landing of inside shaft, Adequate cowl type ventilators or lantern type ventilator with stainless steel jali. (7) Scope of work includes constructing RCC spiral staircase with adequate tie beams,staircase footing ,Rcc chambers for valves. ventilating shaft and ventilators as well as door in shaft, SS grating to be provided to outlet pipe (inside container) for safety.(8) including providing and applying three coats of cement paint/snowcem (as specified) to the whole structure. (9) It also includes satisfactory water tightness test as per relevant I.S. Code and painting name of scheme & capacity on the tank as per direction of engineer in charge.				
	List of Indian Standards for design of ESR:				
	Note: The structural design of ESR shall be in accordance with provisions of				
	relevant Indian Standards				
	(1) I.S. 3370 part I & II 2009 or Its latest revision				
	(1.1) I.S. 3370 part III & IV 1965 or Its latest revision				
	(2) IS 456-2000 or Its latest revision				
	(3) IS 11682- 1985 or Its latest revision				
	(4) IS 1893-2002 part I to V or Its latest revision				
	(5) IS 13920-1993, or Its latest revision				
	(6) IS 875 part I to III,1987 or Its latest revision				
	(7) IS 11089- 1987 or Its latest revision				
	General specifications:				
	(1) The Min. concrete grade for RCC shall be M :30. Proportion of concrete ingredients shall be as per Mix design using weigh batching.				
	(2) HYSD(Fe 415)or higher grade reinforcing bars confirming to IS 1786/1139 or CRS /TMT bars shall be used as per detailed specification.				
	(3) In case of column –brace trestle type staging having more than 6 columns internal horizontal bracing is obligatory. One bracing shall be at foundation level in case of Individual footings .				
	(4) Min. size/ thickness of various components shall be provided as per design criteria/specifications/IS Code (or as per std. practice). Capacity of the ESR shall be considered excluding free board.				
	(5) Minimum dimensions specified for various components in tender data /specifications should be provided.				
	(6) The Safe bearing capacity (SBC) /allowable pressure on soil shall be referred from latest SBC test report or tender datasheet. During execution If poor soil strata or ground water table is encountered, the SBC shall have to be re ascertained and the design should be revised accordingly.				
	(7) Maximum spacing between horizontal bracings shall be 5 m (storey height).				
	(8) The BB Masonry cabin with MS door shall be constructed when spiral staircase is outside the staging.				
	(9) RCC Staircase/ MS Staircase shall be provided and fixed for access to roof when height of roof from G.L. is up to 10 m. For ESR having more than 10 m height proper RCC staircase or suitable RCC spiral staircase shall be constructed. Railing should be provided through out the staircase and around the top ring beam.				
	(10) For ESR-having staging height more than 15 m the spiral staircase shall be provided inside the staging with effective tie beams in more than one direction.				
	(11) Water level indictor shall be provided and fixed float type /electronic (as specified).				
	(12) The rate shall include providing and fixing pipes, specials, and valves required for inlet, outlet , wash out, over flow and bye pass arrangement. The scope of work includes constructing supporting RC pillars, erecting, laying ,fixing and joining pipes and specials etc up to 5m length from face of staging (outer most column).				
	(13) DI pipes & specials shall only be used .				
	(14) The rate shall include cost of dewatering during execution making all arrangement with any dewatering technique.				
	(15) The structure shall be designed properly for uplift due to Ground water table specified in data or GWT encountered during execution. No extra payment shall be paid for the same.				
	(16) Effective curing shall be carried out up to required period as per specifications.				
	(17) Agency shall engage qualified (at least graduate)consulting engineer for designing the structure and he/she shall visit the site for guidance of work at all levels (i.e. below foundation, up to GL, above GL for all lifts up to container).				
	(18) 75 % part rate shall be payable for Concrete, Reinforcement and Plastering items of container until satisfactory hydraulic testing for water tightness is performed. Or as per tender condition. Till then the work shall be treated as incomplete.				
	Above conditions / general specifications Sr. No. 1 to 18 are part & parcel of tender(contract)				
1.A	**As above up to staging height(L.S.L.) 12m from G.L. and S.B.C.10)**	Unit per	**Rate Rs./- for the year 2019-20**		
	Capacity of ESRs (shell type container like cylindrical, conical, intze, folded plates & its combination)		**Seismic ZONE 3**	**Seismic ZONE 4**	**Seismic ZONE 5**
	1. Up to 25000 litres	Litre	**27.64**	**35.75**	**36.85**
	Cost of 25000 litres capacity	No	**691,063.00**	**893,750.00**	**921,328.00**
	2. Add above 25000 up to 50000 litres	Litre	**19.49**	**25.26**	**25.99**

SECTION : 1.C - RCC, ESR, GSR, SUMP, HGLR

	Description of item	Unit	Rate for 2019-20		
	Item No.1: RCC ESR (description of item for turnkey tender)				
	3. Cost of 50000 litres	No	**1,178,368.00**	**1,525,372.00**	**1,571,157.00**
	4. Add above 50000 up to 100000 litres	Litre	**11.01**	**13.21**	**14.21**
	5. Cost of 100000 litre capacity	No	**1,728,862.00**	**2,185,643.00**	**2,281,766.00**
	6. Add above 100000 up to 200000 litres	Litre	**8.33**	**9.59**	**10.37**
	7. Cost of 200000 litres	No	**2,562,100.00**	**3,144,188.00**	**3,318,494.00**
	8. Add above 200000 up to 500000 litres	Litre	**7.70**	**8.48**	**9.26**
	9. Cost of 500000 litres capacity	No	**4,873,532.00**	**5,688,884.00**	**6,096,453.00**
	10.Add above 500000 up to 1000000 litres	Litre	**6.87**	**7.51**	**8.20**
	11.Cost of 10lacs lit. capacity	No	**8,307,693.00**	**9,441,133.00**	**10,196,241.00**
	12.Add above 10 Lacs up to 15 Lacs litres	Litre	**6.04**	**6.61**	**7.16**
	13.Cost of 15 Lacs litre capacity	No	**11,329,520.00**	**12,745,703.00**	**13,777,665.00**
	14.Add above 15 Lacs up to litres	Litre	**5.46**	**5.95**	**6.43**
1.B	**Extra staging height above 12 mt onward, for each 1000 L per meter height.**				
	For Capacity of ESR				
	1. Up to 25000 litres	per 1000 Litre	**224.06**		
	2. Above 25000 to 50000 litres		**192.03**		
	3. Above 50000 to 100000 litres		**171.70**		
	4. Above 100000 to 200000 litres		**133.58**		
	5. Above 200000 to 500000 litres		**105.00**		
	6. Above 500000 to 1000000 litres		**85.51**		
	7. Above 1000000 to 1500000 litres		**64.36**		
	8. Above 1500000 litres		**51.50**		

SECTION : 1.C - RCC, ESR, GSR, SUMP, HGLR

It. No.	Description of item	Unit	Rate for 2019-20
2	**RCC GSR (description of item for turnkey tender)**		
	Preparing structural design of RCC Under Ground / Partially under ground / above high ground level Reservoir of required capacity as per relevant I.S. standards and constructing the same, including excavation in all types of soil strata (including rock) including shoring strutting if required, for loose soil / to protect from collapse, casting 100 mm thick P.C.C. levelling course in M-15, Refilling the pit with proper soil and disposing of the surplus stuff at all lead. Including cement plaster in CM 1:2 with approved water proofing compound to all over inside container (i.e. walls, base, top slab/dome bottom etc. all). Including all types of labour and material charges of lowering, laying, erecting / hosting and jointing of pipe assembly to inlet, outlet overflow, washout and bye pass arrangement as per hydraulic design. Providing and fixing accessories, CI Manhole frame and cover, water level indicator, adequate cowl type ventilators or lantern type ventilator with stainless steel jail. RCC chambers for valves. Providing and applying three coats of cement paint / snowcem to the out side face of structure. It also includes satisfactory water tightness test as per relevant I.S. code and painting name of scheme and capacity on the tank as per direction of engineer in charge.		
	List of Indian Standards for Design of GSR / SUMP:-		
	The structural design of GSR shall be in accordance with provisions relevant I.S standards		
	(1) I.S. 3370 part I & II 2009 or Its latest revision		
	(1.1) I.S. 3370 part III & IV 1965 or Its latest revision		
	(2) I.S. 456 – 2000 or Its latest revision.		
	(3) I.S. 1893 – 2000 – 1984 or Its latest revision.		
	(4) I.S. 875, Part – 1 to 3, 1987 or Its latest revision.		
	General Specifications:-		
	(1) Water depth in container shall be adopted as per data of tender. Capacity shall be calculated excluding free board of the reservoir. If water depth is not specified, the suitable water depth / acceptable to field engineer in accordance with hydraulic		
	(2) Shape of container (in plan) specified by in data shall be adopted in absence circular shape shall be adopted.		
	(3) Size shall be fixed as per availability of space (land area) at site / acceptable engineer in charge.		
	(4) Effect of overlapping of pressure bulbs on soil due near by structure and proposed sump should be considered.		
	(5) Care shall be taken that no damage should occur to nearby existing structure. Compensation shall be paid for the same by agency.		
	(6) The minimum concrete grade for RCC shall be M-30.		
	(7) HYSD Fe 415 / 500 grade reinforcing bars confirming to I.S. 1786 / 1139 shall be considered in design. CRS / TMT bars shall be provided. In saline atmosphere corrosion resistance stainless steel / HCR rebar shall be provided. Any other steel can be used with approval of C.E./ in situation of non availability in market without extra cost.		
	(8) Minimum size (or thickness) of various components shall be provided as per tender criteria / specifications in absence as per I.S./ Std. practice of G.W.S.S.B. Minimum dimensions specified for various components in tender data / specifications shall be provided without fail.		
	(9) The safe bearing capacity (SBC) shall be referred from SBC test report. In absence of report it shall be referred from data sheet. If poor soil is found / water table is met with during excavation SBC shall be scientifically ascertained and design shall be revise. No extra shall be paid for increase in quantity.		
	(10) DI pipes and special shall only be used if type is not specified in tender.		
	(11) The rate shall include cost of dewatering during excavation making all arrangement when water table meets within depth.		
	(12) The structure shall be designed properly to resist uplift due to ground water table specified in data or actual ground water table meets with during excavation. If GWT / Uplift is mentioned in tender and during excavation it dose not meet 7.5% rate shall be reduced.		
	(13) SS pipes railing shall be provided over sump perifery when sump height is ≥ 1.5 meter above ground level.		
	(14.a) RCC staircase/RCC Steps should be provided from GL to sump top slab based on the height of the GSR above/below the ground.		
	(14.b) RCC Staircase with SS railing to be provided inside reservoir container. BB Masonry staircabin to be provided to cover the same with MS safety door having locking arrangement.		
	(15) Appearance of structure should be aesthetically good looking acceptable to authority.		
	(16) Any change in size, shape, depth below GL, height above GL, water depth, F.B., size of member etc can be permitted in exceptional case due to site condition or hydraulic design requirement by C.E. No extra shall be paid for change.		
	(17) Any change in data, dimensions, shape, water depth, reduction in size if permitted by competent authority and if it reduces quantity then payment shall be reduced prorate.		
	(18) When capacity of GSR / Sump is > 20 lakh litres two or suitable compartments acceptable to executive engineer shall be designed and provided.		
	(19) Agency shall engage qualified (at least graduate) consulting engineer for designing the structure and he / she shall visit the site for guidance of work.		
	(20) 75% part rate shall be payable for concrete, reinforcement and plastering items of container until satisfactory hydraulic testing for water tightness is performed as per tender condition. Till the work shall be treated as incomplete.		
	Above conditions / general specifications Sr. No. 1 to 20 are part and parcel of tender (contact) and prevail over other provisions in tender.		
A	**As above without water table (Sub soil water level below foundation)**		
	Capacity of GSR/Sump	Unit	
	1. Up to 50000 litres	Litre	**5.25**
	2. Cost of 50000 litres	No	262,500.00
	2(a). Add for capacity above 50000 up to 100000 litre	Litre	**2.10**
	3.Cost of 100000 litres	No	367,500.00
	3(a).-do- 100000 up to 200000	Litre	**2.94**
	4. Cost of 200000 litre capacity	No	661,500.00
	4(a).-do- 200000 up to 500000	Litre	**2.73**
	5. Cost of 500000 litres capacity	No	1,480,500.00
	5(a).-do-500000 up to 100000	Litre	**2.31**
	6. Cost of 10lacs litre capacity	No	2,635,500.00
	6(a).-do- 10 Lacs up to 15 Lacs	Litre	**1.94**
	7. Cost of 15 Lacs litre capacity	No	3,606,750.00
	7(a). -do- 15 Lacs up to 50 Lacs	Litre	**1.79**
	8.Cost of 50 Lacs litre capacity	No	9,854,250.00

It. No.	Description of item	Unit	Rate for 2019-20
	8(a).Add capacity above 50 Lacs litres	Litre	**1.63**
	Note:1		
	For GSR(U/G sump) with cover slab to be constructed at site situated in seismic zone V, the above rates shall be increased by 2%		2% increment
B	**As above with water table (Sub soil water level above foundation)**		
	Capacity of GSR/Sump	Unit	
	1. Up to 50000 litres	Litre	**5.57**
	2. Cost of 50000 litres	No	278,250.00
	2(a). Add for capacity above 50000 up to 100000 litre	Litre	**3.52**
	3.Cost of 100000 litres	No	454,125.00
	3(a).-do- 100000 up to 200000	Litre	**3.15**
	4. Cost of 200000 litre capacity	No	769,125.00
	4(a).-do- 200000 up to 500000	Litre	**2.94**
	5. Cost of 500000 litres capacity	No	1,651,125.00
	5(a).-do-500000 up to 100000	Litre	**2.47**
	6. Cost of 10lacs litre capacity	No	2,884,875.00
	6(a).-do- 10 Lacs up to 15 Lacs	Litre	**2.05**
	7. Cost of 15 Lacs litre capacity	No	3,908,625.00
	7(a). -do- 15 Lacs up to 50 Lacs	Litre	**1.89**
	8.Cost of 50 Lacs litre capacity	No	10,523,625.00
	8(a).Add capacity above 50 Lacs litres	Litre	**1.73**
	Note:1		
	For GSR(U/G sump) with cover slab to be constructed at site situated in seismic zone V, the above rates shall be increased by 2%		2% increment
C	**As above rectangular sump without water table (Sub soil water level below foundation)**		
	Capacity of GSR/Sump	Unit	
	1. Up to 50000 litres	Litre	**5.46**
	2. Cost of 50000 litres	No	273,000.00
	2(a). Add for capacity above 50000 up to 100000 litre	Litre	**3.47**
	3.Cost of 100000 litres	No	446,250.00
	3(a).-do- 100000 up to 200000	Litre	**3.05**
	4. Cost of 200000 litre capacity	No	750,750.00
	4(a).-do- 200000 up to 500000	Litre	**2.89**
	5. Cost of 500000 litres capacity	No	1,617,000.00
	5(a).-do-500000 up to 100000	Litre	**2.36**
	6. Cost of 10lacs litre capacity	No	2,798,250.00
	6(a).-do- 10 Lacs up to 15 Lacs	Litre	**2.00**
	7. Cost of 15 Lacs litre capacity	No	3,795,750.00
	7(a). -do- 15 Lacs up to 50 Lacs	Litre	**1.84**
	8.Cost of 50 Lacs litre capacity	No	10,227,000.00
	8(a).Add capacity above 50 Lacs litres	Litre	**1.68**
	Note:1		
	For GSR(U/G sump) with cover slab to be constructed at site situated in seismic zone V, the above rates shall be increased by 2%		2% increment
D	**As above rectangular sump with water table (Sub soil water level above foundation)**		
	Capacity of GSR/Sump	Unit	
	1. Up to 50000 litres	Litre	**5.78**
	2. Cost of 50000 litres	No	288,750.00
	2(a). Add for capacity above 50000 up to 100000 litre	Litre	**3.68**
	3.Cost of 100000 litres	No	472,500.00
	3(a).-do- 100000 up to 200000	Litre	**3.26**
	4. Cost of 200000 litre capacity	No	798,000.00
	4(a).-do- 200000 up to 500000	Litre	**3.15**
	5. Cost of 500000 litres capacity	No	1,743,000.00
	5(a).-do-500000 up to 100000	Litre	**2.52**
	6. Cost of 10lacs litre capacity	No	3,003,000.00
	6(a).-do- 10 Lacs up to 15 Lacs	Litre	**2.10**
	7. Cost of 15 Lacs litre capacity	No	4,053,000.00
	7(a). -do- 15 Lacs up to 50 Lacs	Litre	**1.94**
	8.Cost of 50 Lacs litre capacity	No	10,851,750.00
	8(a).Add capacity above 50 Lacs litres	Litre	**1.79**
	Note:1		
	For GSR(U/G sump) with cover slab to be constructed at site situated in seismic zone V, the above rates shall be increased by 2%		2% increment
3	**Gunniting exterior surface for Civil Structures only**		
	Gunniting the surface in CM 1:2 having thickness of 40 mm to 50 mm (Ave.) for beam, braces, column and container slab incl. chiselling and scraping loose concrete cleaning the surface with water and air under pressure and including providing and fixing in position steel wires square mesh 75 mm x 75 mm as per IS:1966-1982 3.15 mm Wt/Sq.Mt. 1.64 Kg. with spot welding wherever necessary with main reinforcement incl. tying binding with wire incl. scaffolding centering staging all equipment and materials etc. complete incl. labour and testing of the container.	Sq. Mt.	663.00

It. No.	Description of item	Unit	Rate for 2019-20
4	**Gunniting Internal Surface**		
	Providing the gunniting to interior surface of cement / masonry / Water Tank of various capacities as specified at various places with cement mortar (1:2) in thickness of 40 mm including chiselling and scraping loose concrete and plaster incl. providing and fixing in position 6 mm dia. mild steel bars reinforcement at 15 cm c/c both ways including fabricating and cost of binding wires including centering , staging all equipments etc. complete including scaffolding , carting of all type of material and equipments to site of work and giving hydraulic testing up to satisfaction of engineer in – charge .		
	For top , bottom of ESR/ GSR/tank /cistern		
	With vertical walls ,columns, braces and shaft up to6 m height	Sq.M	478.00
	Do- for columns ,braces and shaft staging above 6m height	Sq.M	659.00
	Do- for RCC container (inside)	Sq.M	610.00
5	**Pressure Grouting**		
	Providing pressure grouting at 5.6 Kg/Sq.cm in required row/zigzag fashion as specified at 1.5 m interval as per site conditions to stop leakages from water retaining structures including supply of cement and hardening chemical, bringing equipments like compressor and all scaffolding works to get smooth finishing as directed by engineer in charge.		
	(1) To masonry structures	Per cement bag	573.00
	(2) Concrete/RCC structures	Per cement bag	594.00
6	**Drilling holes for grouting**		
	Drilling 40 mm Dia. Holes in masonry/concrete structures with providing and fixing 500 mm long GI Pipeline for pressure grouting including supply of material, machineries and labour cost etc. complete.	RM	510.00

Water Treatment Plant

Section :- D

SECTION : 1.D - WTP

Unconventional (Non Mechanical) Water Treatment Plant

(Description of Item for Turnkey Tender)

Item No.	Description of Item	Unit	Rate for 2019-20
1	**Unconventional WTP**		
	Designing (hydraulic, process, structural and aesthetic), constructing and commissioning **high rate Unconventional Water Treatment Plant(** i.e. Non Mechanical) consisting of Civil, Mechanical and Electrical components of various sub-works as given below; including necessary hydraulic testing and trial run for 3 months, etc. complete as directed by Engineer-in-charge (turn-key job). The design shall conform to IS / CPHEEO Manual.		
1.1	Aeration Fountain/Cascade aerator		
1.2	Mixing channel with ventury flume/partial flume and flow measuring devices.		
1.3	Flocculator		
	RCC Hopper bottom units having slope >45 Deg as per hydraulic and process design with detention period 15 minutes and surface loading rate 8000 litres/hour/sq.m and depth 2.5m using PVC FlocModules @45 deg fabricated from square tubes with supporting arrangement and sludge collecting pipes as per detail specifications.		
1.4	Tube Settlers		
	RCC Hopper bottom units having slope >45 Deg as per hydraulic and process design with detention period 40 to 60 minutes(as specified) and surface loading rate 6500 litres/hour/sq.m with 3 m depth using PVC tube settler Modules @60 deg fabricated from tubes with supporting arrangement as well as sludge drain pipes as per detail specifications.		
1.5	Rapid sand gravity filters.		
	Filter House(RCC framed structure with infill brick masonry walls) and RCC filter beds with sand and gravel bedding as per hydraulic and process design adopting 6000 Litres/hour/sq.m filtration rate with 2m water above sand media with under drainage system and inlet, outlet, backwash (rate 600 LPM per sq.M) piping and valves/gates arrangement as per design and detail specifications.		
1.6	Chemical house		
	RCC framed structure with brick masonry infill walls .ground floor and first flour area as per data/specifications shall be provided. Minimum clear head room for doors, passages, galleries etc. shall be 2.10 m. It shall be 2.40 m in case of Alum dosing tank.		
	Alum tanks 2 Nos. with mixing, carrying ,dosing with piping arrangement.		
1.7	Gravity feed gas chlorinator with 100% stand by.TCI solution with mixing carrying and dosing arrangement with piping.		
1.8	Bye-pass arrangement		
1.9	External and internal electrification as per planning and specifications		
1.10	Laboratory room with equipments as per planning and specifications. All platform of granite.		

Item No.	Description of Item	Unit	Rate for 2019-20
1.11	Wash water tanks of capacity equal to 2% of designed quantity of filtered water in a day (+) 10% with 8 to 10 m head (as specified) Wash water tank shall be constructed on RCC column/slabs only.		
1.12	Wash water pumps with 100% standby		
1.13	Air blowers capable of delivering 750 to 833 LPM per sq.M of free air flow area at 0.35 to 0.4 Kg/sq.M at the under drains (100% standby).(For capacity of FP more than 10 MLD)		
1.14	Drainage arrangements as per planning and design.		
	Alum store area as per data /specifications		
1.15	Sanitary block with necessary water supply and drainage arrangements . Bathroom with shower facility.		
1.16	All vehicle access roads shall be of RCC and balance of Paver block type		
1.17	Rates given below are inclusive of uplift pressure if any and dewatering during the entire work using any appropriate technique.		
1.18	Following conditions shall form a part and parcel of the tender		
	All channels should be with inside china mosaic/epoxy coated.		
	All railing should be SS railing (SS 304) as per latest IS standard.		
	External paint should be of weather proof coating		
	All Window shall be of Anodised Aluminum section with wired glasses, also provided with grill / jaali/aluminium weldmesh to prevent birds entry.		
	Roof top of all unit of the WTP is approchable through staircase. All staircase of entire WTP should be RCC only.		
	Fire safety equipment , Safety kit to be kept handy.		
	Opening of window & door should be framed with granite. All platform for kitchen/laboratory shall be of granite and fixed in sandwich with bottom of kota/white marble .		
	All building terrace shall be finished with high quality water proofing like china mosaic flooring with proper slope and drainage for rain water		
	Flooring of Loading area shall be of stone flooring and open/other space shall be of paver block pitching.		
	All walkways of WTPs shall have cast in-situ with 1mt projection on both sides		
	Note		
	(1)Conditions from Sr. No. 1 to 1.18 shall form a part and parcel of the tender and must be included in draft tender papers for the work of unconventional treatment plants.		
	(2) The necessary changes should be carried out as per site condition and project requirements at the time of preparing DTP's		
	(3) All other details shall be as per design criteria and detail specifications.		
	(4) The following rates are for sites falling in seismic zone III for sites falling in zone IV and V rates shall be increased 5% and 8 % respectively		
	(5) The rates includes excavation, refilling and throwing away extra stuff to lead up to 50m		
	(6) Hydraulic design criteria approved by Technical committee shall be referred and item description shall be modified accordingly.		

Item No.	Description of Item	Unit	Rate for 2019-20
	(7) Structural design criteria approved by technical committee shall be applicable for design.		
	(8) Design flow shall be specified in M^3/hour in data sheet considering 22 hours WTP run time in a day to treat requirement water quantity of a day (i.e. 24 hours) of population to be served with design rate of water supply. No separate overloading provision shall be kept in any tender clause.		
	(9) The following rates are for preliminary or rapid estimate of WTP	Job	
	1. Fixed cost up to and including 1 MLD	No	2,123,100
	2. Add for capacity above 1MLD up to 2MLD	MLD	1,592,850
	3. Cost of 2MLD treatment plant	No	3,687,600
	4. Add for capacity above 2MLD up to 4MLD	MLD	1,401,750
	5. Cost of 4 MLD treatment plant	No	6,435,450
	6. Add for capacity above 4 MLD up to 10MLD	MLD	1,352,400
	7. Cost of 10 MLD treatment plant	No	14,523,600
	8. Add for capacity beyond 10MLD	MLD	1,162,350
	Section - D		
	Conventional Water Treatment Plant		
2	**Conventional WTP(Description of Item for turnkey Tender)**		
	Designing (hydraulic, process, structural and aesthetic),constructing and commissioning Conventional Water Treatment Plant consisting of all Civil, Mechanical and Electrical components of various sub-works as given below including necessary hydraulic testing, structural testing, equipment testing, trial run for 3 months, etc. complete as directed by Engineer-in-charge (turn-key job). The design shall conform to IS / CPHEEO Manual.		
2.1	Aeration Fountain/Cascade Aerator		
2.2	Ventury Flume/Partial flume		
	With necessary flow measuring devices/meter consisting of mechanical/digital indicator.		
	Flash Mixer		
2.3	Rapid mixing device design conforming to IS : 7090 of 1985.Detenion time 60second, velocity gradient 300-400 sec-1 with fans gear and motor assembly as per design.		
2.4	Flocculator		
	Design conforming to IS : 7208 – 1974 (Type-C) .		
	Detention period 30miutes with flocculator paddles		
	with gear and motor assembly as per design .		
2.5	Clarifier		
	Circular tank with horizontal flow pattern, detention period 2.5 hours, overflow rate 30 cubic meter per square meter per day (to be specified), Weir loading not more than 300 cubic meter per meter per day, with mechanical sludge scraper conforming to IS : 10313 – 1982 and bridge of standard make as per design with gear and motor assemblies.		
2.6	Rapid Sand Filters and Filter House		
	Filter designed for filtration rate of 6,000 litres per square meter per hour, minimum 2 beds for plants up to 10 MLD, for larger plants as specified, pipe gallery and platform minimum 5.5 meter in width.		
	a) Filter Media		

Item No.	Description of Item	Unit	Rate for 2019-20
	Effective size of filter sand 0.45 to 0.70 mm, uniformity coefficient not more than 1.7 nor less than 1.3, depth of filter 0.75 M, free board 50 cm, gravel 0.45 M in depth, sand and gravel conforming to IS : 8491 (i) – 77, backwash by air wash(if specified) and hard wash by water, standard appurtenances (to be specified), rate of flow controller, filter gauge, sand expansion gauge, etc.		
	b) Wash Water Tank		
	Wash water tanks of capacity equal to 2% of designed quantity of filtered water in a day (+) 10% with 8 to 10 m head (as specified) Wash water tank shall be constructed on RCC column/slabs only.		
	c) Wash Water Pumps		
	Capacity to fill water tank in 1 hour with 100% standby.		
	d) Air Blowers		
	Capable of delivering 600 LMP per square meter of free air, of filter area with pressure@ 0.4 kg/square cm at the under drains (100% standby).		
	e) Valves/gates		
	Inlet, outlet, wash water inlet –outlet and all types and sizes of valves/ gates as per design. (MOC of gate shall be CI)		
	f) Gauges/meters		
	All types gauges and meters required for filter operations and backwashing etc. as per design.		
2.7	Chemical House in Two Stories (floor wise area as specified) RCC framed structure with brick masonry infill walls .ground floor and first flour area as per data/specifications shall be provided. Minimum clear head room for doors, passages, galleries etc. shall be 2.10 m. It shall be 2.40 m in case of Alum dosing tank.		
	Ground floor to accommodate 90 days alum requirements and		
	a) Sundry storage		
	b) First floor to accommodate alum and lime tanks, etc.		
	c) Solution Tanks		
	Minimum 3 tanks (one for preparation, second for dosing and third as standby), each tank capable of giving 8 hours maximum dose without interruption, minimum free board 0.30 M, trays for dissolving, level indicator, mechanical agitation devices, solution feed and drain lines, solution feed device (constant head device, strength of solution up to 10% only) conforming to IS : 9222 Part – 1/1979.		
Chemical house, laboratory & administrative building with areas as per details			
<u>Areas of the Chemical House</u>			
Sr. No.	**Details**	**Capacity of the plant up to 500 m³/hr.**	
A	**Ground Floor**		
1	Alum Store	As per calculations-90 day storage	
2	Toilet Block	9	

Item No.	Description of Item	Unit	Rate for 2019-20
3	Control panel area	9	
4	Stair case	15	
5	Chlorinator Room	15	
6	Chlorine Tonner Store (5.00 m height)	30	
	Total Area of Ground Floor	78	
B	**First Floor**		
1	Alum tanks	As per calculations + conveyance space	
2	Store	9	
3	Laboratory	15	
4	Office	10	
5	Stair Case	15	
	Total Area of First Floor	49	
	Total Area of Ground Floor & First Floor	127	
# **Note :** Space for pipe gallery, platform for valve operation etc. are included in filter house and hence removed from the areas of chemical house given under 15 of the tender.			
2.8	Store House (area as specified)		
	Suitable for alum storage of three months requirement in monsoon with 10% extra capacity for other sundry articles.		
2.9	Vacuum feed type Chlorinators – make to be specified and approved by GWSSB.		
	a) conforming to IS : 10533 – A Part – 2/1983.		
	b) Rate of withdrawal shall be as per clause 6.1 Table-1 confirming to IS 10553 (2)-1983		
	c) Chlorinator equipment and container room to confirm to IS **:** 10533 Part – 1/1983.		
	d) 100% standby shall be provided.		
2.10	By pass arrangements – for Inlet to CCT, Clarifloculator to Filter bed through channel & Filter feed channel to CCT - C.I. or M.S. pipes(as specified) of size as per design		
	Drainage arrangements – RCC pipes up to plot boundary (as specified) diameter as per design. (Backwash drain with RCC pipe to plant boundery Or to recirculation sump), (Clarifloculator sludge removing drain with RCC pipe)		
2.11	Electric installation.		
	Both internal and external including entire plant area (as specified).		
2.12	Laboratory equipments		
	As per requirement (to be specified during tendering).		
2.13	Sanitary blocks.		
	Sanitary Block Area – 15 square meter minimum up to 25 MLD and 25 square meter above 25 MLD (or as specified).		
2.14	Administrative block and internal roads.		
	To accommodate office room, chlorine room, laboratory room, panel board room, blower room etc. and asphalt road to connect all units from main gate of plot.		
2.15	Dewatering during entire work using any technique.		

Item No.	Description of Item	Unit	Rate for 2019-20
2.16	Necessary Instrumentation and control as per specifications (for ≥ 10 MLD WTP). The plant shall be provided with required instrumentation equipment for measurement & control functions, indicated below as a minimum, but not limited to the following:		
a)	Rate of Flow (ROF) Measurement at WTP Inlet Parshall Flume and at each Filter Bed Outlet. Flow Meter shall be Ultrasonic type with remote display to indicate level and corresponding/ proportionate Flow values on field.		
b)	Torque switch at Clariflocculator for alarm of Overload and Trip function of Clariflocculator mechanism.		
c)	Loss of Head (LOH) Measurement across each Filters. LOH Meter shall be Ultrasonic type with remote display to indicate level values and Head Difference on field.		
d)	Level measurement at each Sump/ Tank/ ESR. Level Indicator shall be Float & board type to indicate level values on field. Level switch shall be Displacer/Float type with Low & High set point to start/ stop respective pumps.		
e)	Float & Horizontal Scale type level gauge at Chemical dosing tanks to indicate level values on field.		
f)	Pressure Gauges at each pump/ blower delivery line and at common header.		
g)	Constant Head Flow Measurement at Alum dosing tanks with Float operated flow meter.		
h)	All alarm/indications shall be provided in instrument chamber of MCC.		
i)	pH indicator cum Transmitter (Online Analyzer) to measure, display & transmit pH Value of Raw Water (Location: WTP Inlet Parshall Flume) and Clear Water (Location: CCT Outlet).		
j)	Turbidity Indicator cum Transmitter (Online Analyzer) to measure, display & transmit Turbidity Value of Raw Water (Location: WTP Inlet Parshall Flume), settled water (Location: Clariflocculator outlet) and Clear Water (Location: CCT Outlet).		
k)	Chlorine Indicator cum Transmitter (Online Analyzer) to measure, display & transmit Residual Chlorine Value of clear water (Location: CCT Outlet) and Chlorine Leak Detector at Chlorination Room.		
l)	Sampling Pump for Sampling to Laboratory at Raw Water Channel, At Inlet to Filter & Outlet to Filter		
m)	PLC based control panel with SCADA system shall be provided in central control room of treatment plant for monitoring, control, recording, and logging etc. Necessary alarms, status signals along with the measurements of process parameters etc. shall be displayed in SCADA System.		
n)	Additional instruments & control equipments if any for safe, reliable & efficient operation of treatment process.		
3	Following conditions shall form a part and parcel of the tender		
3.1	Filter house tiles should be glazed vitrified mat finish and tile on wall up to window sill. Around valve area granite flooring to be provided.		
3.2	All channels should be with inside china mosaic/epoxy coated.		
3.3	All railing should be SS railing (SS 304) as per latest IS standard.		

Item No.	Description of Item	Unit	Rate for 2019-20
3.4	External paint should be of weather proof coating with primer and 3 coat paint		
3.5	Opening of window & door should be framed with granite. All platform for kitchen/laboratory shall be of granite and fixed in sandwich with bottom of kota/white marble. All Window shall be of Anodised Aluminum section (1.2mm guage section) with wired glasses, also provided with grill / jaali/aluminium weldmesh to prevent birds entry. Doors shall be of anodised aluminum section(1.2mm guage of section) partial glazed and partial panel with 4mm backelite sheet. Main entry door should be 2.0meter wide with 3.0mtr entry poarch.		
3.6	Roof top of all unit of the WTP is approchable through staircase. All staircase of entire WTP should be RCC only.(No MS ladder or No MS Staircase)		
3.7	Bathroom should have shower facility.		
3.8	Chlorination neutralized pits(Lime pit) shall be made and mock drill practice for leakage neutralization to be carried out while commissioning		
3.9	Fire safety equipment with Safety kit.		
3.10	At chlorination room safety mask and hand gloves, gum boots etc. should be available.		
3.11	All vehicle access roads shall be of RCC and balance of Paver block type		
3.12	Proper arrangement shall be made for storage of PAC solution and Alum with arrangment of vertical lifting of platform through guide rails operated by motors.		
3.13	Proper sludge disposal arrangement shall be made with sludge drying beds		
3.14	All building terrace shall be finished with high quality water proofing like china mosaic flooring with proper slope and drainage for rain water		
3.15	Minimum plinth height of filter house shall be 0.6 m. Also outlet channel RL shall be at plinth level		
3.16	Clear walkway excluding column and valve operating valves shall be 1 meter.		
3.17	Air blower shall be placed on ground floor		
3.18	Pipe gallery shall be embedded in flooring		
3.19	Inlet pipe from flash-mixture to Clariflocculator shall be epoxy coated.		
3.20	Flooring of Loading area like tonner/alum store etc. shall be of Polished Kota stone flooring and open/other space shall be of paver block pitching.		
	Notes		
	(1)Conditions from Sr. No. 2 to 2.16 & 3.1 to 3.20 shall from a part and parcel of the tender and must be incorporated in draft tender papers of conventional treatment plants.		
	(2) Aerator must be provided.		
	(3) Hydraulic design criteria approved by Technical committee shall be referred and item description shall be modified accordingly		
	(4) Structural design criteria approved by technical committee shall be applicable for design.		

Item No.	Description of Item	Unit	Rate for 2019-20
	(5) Design flow shall be specified in M^3/hour in data sheet considering 22 hours WTP run time in a day to treat requirement water quantity of a day(i.e. 24 hours) of population to be served with design rate of water supply. No separate overloading provision shall be kept in any tender clause .		
	(6) All other details shall be as per design criteria and detail specifications.		
	(7) The following rates are for sites falling in seismic zone III for sites falling in zone IV and V rates shall be increased 5% and 8 % respectively		
	(8) The rates includes excavation ,refilling and throwing away extra stuff at all lead.		
	(9) The following rates are for preliminary or rapid estimate of WTP		
	1. Fixed cost up to and including up to 1MLD	Each	1,424,325
	2. Add for capacity above 1MLD up to 2MLD	Per MLD	1,295,700
	3. Cost of 2MLD treatment plant	Each	2,975,175
	4. Add for capacity above 2MLD up to 4MLD	Per MLD	1,264,200
	5. Cost of 4MLD treatment plant	Each	5,460,525
	6. Add for capacity above 4MLD up to 10MLD	Per MLD	1,162,350
	7. Cost of 10MLD treatment plant	Each	13,567,575
	8. Add for capacity above 10MLD to 25MLD	Per MLD	1,114,050
	9. Cost of 25MLD treatment plant	Each	28,487,550
	10. Add for capacity above 25MLD to 50MLD	Per MLD	1,163,400
	11. Cost of 50MLD treatment plant	Each	57,271,200
	12. Add for capacity above 50MLD to 100MLD	Per MLD	1,157,100
	13. Cost of 100MLD treatment plant	Each	115,119,900
	14. Add for capacity above 100MLD	Per MLD	1,157,100
	---do---- ---do--- with 'V' wire screen under drainage system for filter beds with filter media only filter sand in place of conventional under drain system with gravel supporting media.		
	1. Fixed cost up to and including up to 1MLD	Each	1,368,675
	2. Add for capacity above 1MLD up to 2MLD	Per MLD	1,255,800
	3. Cost of 2MLD treatment plant	Each	2,863,875
	4. Add for capacity above 2MLD up to 4MLD	Per MLD	1,222,200
	5. Cost of 4MLD treatment plant	Each	5,547,675
	6. Add for capacity above 4MLD up to 10MLD	Per MLD	1,180,200
	7. Cost of 10MLD treatment plant	Each	13,493,025
	8. Add for capacity above 10MLD to 25MLD	Per MLD	1,107,750
	9. Cost of 25MLD treatment plant	Each	27,524,700
	10. Add for capacity above 25MLD to 50MLD	Per MLD	1,124,550
	11. Cost of 50MLD treatment plant	Each	56,585,550
	12. Add for capacity above 50MLD to 100MLD	Per MLD	1,143,450
	13. Cost of 100MLD treatment plant	Each	113,748,600
	14. Add for capacity above 100MLD	Per MLD	1,143,450
Slow Sand Filter & Pressure Filter			
3	**Slow Sand Filter**		
	Providing and erecting slow sand filter including sedimentation tank including all civil structure and piping arrangement and filter media control unit etc. complete.		
	Up to 2 MLD	MLD	2,320,000
	Beyond 2MLD	MLD	1,439,000

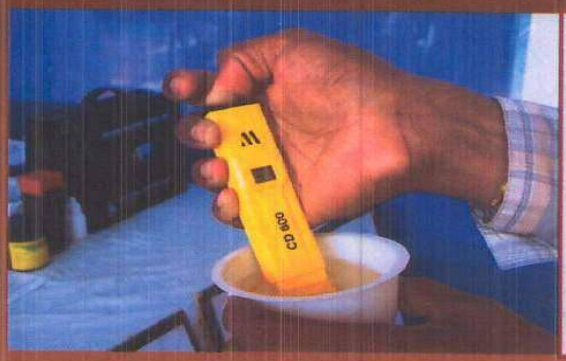
Item No.	Description of Item	Unit	Rate for 2019-20
4	**Pressure Filter / Package WTP**		
	Designing, providing, fabricating pressure filter / package WTP transporting to site, installing, testing and commissioning at site including supply and erection of pressure pump set with all electrical work etc. complete one month trial run with guarantee for one year.		
	Capacity 0.5 MLD	MLD	650,000
	Capacity 1.0 MLD	MLD	706,000
	Capacity 2.0 MLD	MLD	817,000
	Capacity 3.0 MLD	MLD	928,000
	Capacity 4.0 MLD	MLD	1,039,000
	Capacity 5.0 MLD	MLD	1,150,000
Treatment Plant, Mechanical / Electrical & Miscellaneous Items			
5.1	**Filter Media - Sand for Rapid Sand Filter Bed**		
	Providing & Supplying the filter sand of specified effective size (0.45 to 0.70 mm) and uniformity coefficient(not more than 1.7, nor less than 1.3) and laying over gravel support conforming to IS : 8491 (i) – 77 in filter bed of required depth as per design and drawing. Inclusive of all lead.	Cum	1,320
5.2	**Filter Gravel**		-
	Providing & supplying gravels of different size as per design and drawing and laying in layers in filter beds Inclusive of all lead.	Cum	1,320
			-
5.3.a	**Under Drains System:**		-
	Providing & laying & fixing PVC laterals (pipes) 6 kg/sq.cm of size & perforations as per the hydraulic design to resist 10 m Back wash water head for filter bed area	Sq MT	2,200
5.3.b	**V-wire under drain system**		-
	Supply of V-wire under drain system for RSF beds made from stainless steel screen with base pipe of HDPE pipes with other accessories for one bed having two compartment & size of each bed is 6 m x 4 m . The system shall consist of required length of laterals, each having MOC SS 304 with 300 micron slot screen based on 3" HDPE pipe . The air distribution shall be done uniformly and shall cover all laterals individually.	Sq MT	32,500
5.4	**Flash Mixer: Apertures**		
	Providing, installing & commissioning Flash mixer impeller with motor, gear arrangement & electrical cable, connections, control panels etc.(size as per design)		-
	1 hp	Each	25,000
	2hp	Each	40,000
	3hp	Each	65,000
	5hp	Each	80,000
	7.5hp	Each	110,000
	10hp	Each	125,000
	12.5hp	Each	170,000
5.5	**M.S. Gates**		
	providing fabricating and fixing /installing mild steel gates of size as per design with operating handle etc.for **by pass arrangement**		
	M.S. Gates	KG	78
5.5A	**C.I. Gates**		

Item No.	Description of Item	Unit	Rate for 2019-20
	providing fabricating and fixing /installing C.I. gates of size as per design with operating handle etc.for **by pass arrangement with ISI Mark**		
	C.I. Gates	KG	85
5.6	**M.S. Bridge with Floculator & Scraper**		
	Providing, fabricating, fixing/installing/fitting & commissioning Clarifier M.S Bridge with chequered plate platform 1 m wide, scrapers, floculator connections with rails and wheels rotating arrangement incl. peripheral trolley, central bearing etc. complete size as per design. Should be of branded.		
	M.S. Bridge with Floculator & Scraper	Rmt	28,400
5.7	**Motors and Gearboxes: For clari Bridge**		
	Extra for 3 motors of required RPM and 3 gear box assemblies with one slippering unit including wiring and installing switch and control panel as per requirement.	**Set**	110,000
5.8	Providing, supplying & fixing **Sluice valve PN 1.6** instead of filter gate including cost of valves/specials/nut bolts/rubber packing / key to operate valves incl. all labour, equipments, materials required.		
	100 mm dia	No.	5,500
	150 mm dia	No.	8,300
	200 mm dia	No.	14,300
	250 mm dia	No.	22,900
	300 mm dia	No.	29,300
	350 mm dia	No.	42,900
	400 mm dia	No.	61,300
	450 mm dia	No.	75,100
	500 mm dia	No.	124,700
	600 mm dia	No.	170,400
5.9	**Air Blower:**		
	Providing, installing & commissioning Air agitation system including Blowers(40 HP), piping and valve arrangement etc, as per design FOR ALL BEDS	set	357,720
5.10	**Alum Stirrer:**		
	Providing, installing & commissioning Alum stirrers with motor(1 HP), gear arrangement & electrical cable, connections, control panels etc.(size as per design)		
	Alum Stirrer	No	20,000
5.11	**Pumping Machineries**		
	Providing, installing & commissioning pumps for filling the wash water tank / recirculation / lab use as per design including all electrical cable connection complete considering filtration rate		
	For wash water tank	Set	As Per Mech SOR
	For recirculation	Set	
	For Laboratory	Set	
5.12	**Manometer:**		
	Providing and fixing manometer of approved make	No	22,000
5.13	**Loss of Head Indicator:**		
	Providing and fixing LOH Indicator of approved make	No	4,200
5.14	**Lifting Device:**		
	Providing, installing & commissioning Lifting Device including all electrical cable connection complete:		

Item No.	Description of Item	Unit	Rate for 2019-20
	Electrically Operated Hoist 3 tonne capacity in Chlorination room	No	As Per Mech SOR
	Supporting MS girder of lifting device of required size	Rmt	
	Travelling Trolley	No	
	HOT	No	
	Single Girder EOT for Blower room	No	
5.15	**Weighing Machine**		
	Providing Supplying 500 Kg capacity weighing machine at destination	No	10,000
	Providing Supplying 2500 Kg capacity weighing machine at destination	No	35,000
5.16	**Chemical Dosing Pump: incl. Tank**		
	Providing and installing chemical dosing metering pump model V-12 with PP head and flow of suitable size	No	12,500
5.17	**Electrical Lighting :**		
	Providing, installing & commissioning Electrical Installation & lighting as per planning & design. Note : detail estimates as per GWSSB mechanical S.O.R. items		
	a) Internal	LS	As per R&B
	b) External	LS	
	c) Cables	LS	
	d) Panel Board	LS	
5.18	**Chlorination Plant:**		
	Providing, installing & commissioning Chlorination plant as per design capacity with		
	Gravity feed type chlorinator		
	5 Kg / hr capacity	Set	35,000
	Pressure feed type chlorinator with injector booster etc.complete		
	5 Kg / hr capacity	Set	47,000
5.19	**Refilling of Chlorine Gas Cylinder :**		
	Refilling of Chlorine gas in cylinder **including transportation** to and from factory and back		
	a) Chlorine cylinders 900 kg	No	8,000
	b) Chlorine cylinders 100 kg	No	1,800
	c) Emergency drum leakage kit-900 kg	No	48,000
	c.1) Emergency drum leakage kit-100 kg	No	42,000
	d) Chlorine gas metering arrangement	Set	35,000
5.19A	**Transportation** of Chlorine Gas Cylinder with loading, unloading, Cylinder transportation should have a Licence public liability insurance at 1991		
	(A) 100 Kg. Cylinder	Per No.	1,500
	(B) 900 Kg. Tonner	Per No.	3,000
5.20	**Supply of Chlorine Cylinders (Empty)**		-
	Providing and supplying Chlorine gas cylinder empty of required capacity with necessary explosive certificates including all taxes		-
	a) Chlorine cylinders 900 kg (tonner)	No	65,000
	b) Chlorine cylinders 100 kg	No	28,000
5.21	**Laboratory Instruments**		
	a) Digital PH Meter		
	Providing and supplying microprocessor based digital pocket PH tester.	No	7,500
	b) Digital TDS Meter		
	Providing and supplying microprocessor based digital pocket TDS tester.	No	7,800
	c) Fluoride Test Kit (Digital)		
	Providing and supplying fluoride spot test kit.	No	2,500

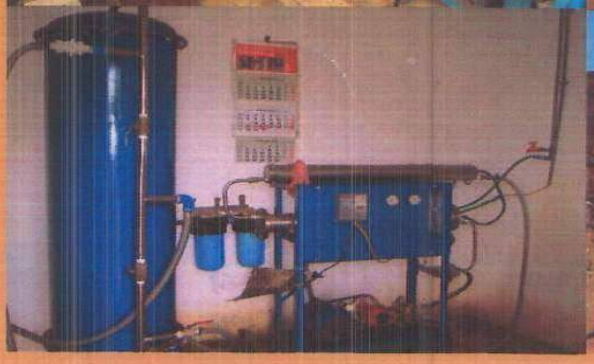
Item No.	Description of Item	Unit	Rate for 2019-20
5.22	**Chlorine Safety equipments & vacuum control type gaseous chlorination plant.**		
A	Providing, Supplying & installing Vacuum Control **Direct cylinder mounted gas chlorinator** including necessary fittings, installation and commissioning of plant incl. Clamp & control valve with injector.		
	A. 1 Kg. Capacity per hour	No.	93,500
	B. 2 Kg. Capacity per hour	No.	121,000
	C. 3 Kg. Capacity per hour	No.	139,700
B	Providing, Supplying & installing Vacuum Control **Direct wall mounted gas chlorinator** including necessary fittings, installation and commissioning of plant incl. Clamp, copper pipe, ferule filter & control valve with injector.		
	A. 1 Kg. Capacity	No.	107,800
	B. 2 Kg. Capacity	No.	136,400
	C. 3 Kg. Capacity	No.	157,300
	D. 5 Kg. Capacity [Cabinet Type]	No.	217,800
	E. 10 Kg. Capacity [Cabinet Type]	No.	264,000
C	Providing, supplying, fixing, erecting & commissioning of Panel Mounted Chlorination Plant with complete equipments Govt. approved make		
	(A) 500 Grams/Hr. capacity	No.	37,400
	(B) 1000 Grams/Hr. capacity	No.	41,800
	(C) 1500 Grams/Hr. capacity	No.	50,600
D	Providing & supplying digital chlorine detector monitor meter - 0 to 20 ppm capacity	No.	65,000
E	Providing & supplying safety kit for 900 Kg cap. Toner.	No.	48,000
F	Providing & supplying safety kit for 100 Kg cap. Toner.	No.	42,000
G	Providing, Supplying & erecting Motor Driven Bleaching Dozing Pump with Cast iron		
	With 15 Lit Per hour capacity.	No.	34,000
	With 45 Lit Per hour capacity.	No	36,000
H	Providing & supplying air breathing apparatus as per IS:10245 Part-II.		
	With 30 minutes duration cylinder	No	40,000
	With 45 minutes duration cylinder	No	43,000
5.23	**Laboratory Instruments**		
	Providing and supplying microprocessor based digital pocket TDS tester.	No	7,800
	a) Providing and supplying fluoride spot test kit.	No	2,500
	b) Chloroscope 0.2 ppm including testing materials.	No.	900
	c) Chloroscope 0.5 ppm including testing materials.	No.	1,500
	d) Chlorine Tablet Hypo tab - 60	Per Kg.	215
5.24	Servicing of existing Panel Mounted gaseous Chlorination Plant.		
	a) Gravity Feed. Type.	No.	2,500
	b) Pressure Feed. Type.	No.	2,500
	c) Vacuum Feed Type.	No.	2,500
	d) Bleaching Dozing Type.	No.	650

Item No.	Description of Item	Unit	Rate for 2019-20
	Removal of Chlorine Effect On RCC & M.S. Existing Structures.		
6	Applying Anti corrosive Chemical treatment Food Grade epoxy for water retaining structure including cleaning the surface with required treatment and cleaning the surface thoroughly & Making Surface dry, even & smooth for applying treatment and coats. DCL1400 With 3 Years Guarantee	Sq.mt.	1,500
7	Applying Anti corrosive Chemical treatment Food Grade for Exposed Surfaces of M.S. Structures / Pipe Grade for Exposed Surfaces of M.S. Structures / Pipe and smooth and applying treatment in two coats and smooth and applying treatment in two coats	Sq.mt.	250



Miscellaneous Item

Section - E



SECTION : 1.E - MISCELLINEOUS COMPLETED ITEM

Item no.	Description of Item	Unit	Rate for 2019-20
Item no.1	**Precast Half Round Gutter**		
	Providing and laying precast cement concrete M-150 metal size 12 mm to 20 mm half round gutters with 5 cm thick rectangle block laid on necessary packing of rubble masonry in C.M. 1:6 and C.P. in C.M. 1:3		
1	100 mm dia	R.Mt.	**145**
2	150 mm dia	"	**207**
Item no.2	**Painting letters**		
	Painting letters for "Capacity of tank" the size of letters will be 45 cm height and 50 mm width.		
	Painting letters 45 Cm Ht.	No.	**38**
	Painting letters 23 Cm Ht.	No.	**25**
Item no.3	**Supplying of various material**		
	Supplying following materials including all taxes and carting.		
3.1	Alumina ferric	Kg.	10
3.2	Solvent Cement	Lit.	**300**
3.3	Bolts and washer for valves	Kg.	**70**
3.4	Bleaching powder	Kg.	**16**
3.5	Rubber Packing Normal	Kg.	**90**
3.6	Rubber Packing Neoprene type	Kg.	**175**
3.7(a)	P.A.C solution 10% concentration	Lit.	**10**
3.7(b)	P.A.C solution 30% concentration	Lit.	
Item no.4	**Pipe Coating (out Side)**		
(A) Gunniting	Providing and applying with mechanical arrangement in 1:2 proportion cement, sand **Guniting** to M.S. pipe surface under 2.1 Kg/Sq.Cm. to 2.80 Kg/Sq.Cm. pressure including removing the loose materials as directed by the Engineer- in-charge and including scrapping the surface with wire brushes, degreasing, cleaning by compressed air and providing, fixing BRC fabric No.14 as reinforcement, curing for 21 days, disposing off the rebound materials with in a lead of 50 m etc. comp. As directed by the E.I.C.		
1	25 mm thick	Sq.M.	402
2	40 mm thick	Sq.M.	471
B 3 LPE	Providing and applying 3 LPE Coating outside 3 layers polyethylene (LPE) coating with required tk. As per DIN_30670 or its latest revision or amendment and detail specifications with necessary material & Labour and Equipments etc.	Sq.M.	**900**
Item no.5(A)	**Inner Cement Mortar Lining**		
	Providing and making inner cement mortar lining to M.S. Pipes with mechanical devices in cement mortar 1:1 proportion including cost of all materials, labour, special sand required, machinery, power generation, all equipments and taking necessary access openings and manholes, cuts at suitable intervals as directed by Engineer-in-charge and rewelding the same after done with doubler plates pipes including necessary excavation, refilling, concrete breaking and remaking if any, breaking guniting and remaking the same, repainting whever required with epoxy paint in 3 coats, all dewatering including emptying the pipeline and refilling the same after done with (water to be supplied by Department free of cost within 5 km. lead at fixed point and all other arrangements to be done by agency), including carrying out "C" value performance test of pipeline, complete job as per the directions of the Engineer-in-charge.		
1	9 mm thick for pipes up to 700 mm dia	Sq.M.	**277**
2	12 mm thick for pipes above 700 mm dia	"	**312**
Item no.5(B)	**Providing 406 Micron epoxy coating to inside pipe line**		
1	Providing epoxy coating to inside pipe line with two parts of **Solvent free** high build liquid epoxy lining as per AWWA C210-07 Suitable for potable water application & shall be approved by CFTRI- India/BS 6920-UK/international standard /NSF/ANSI/-61 2004 to be fit for contact with potable water for human consumption **with 406 micron thickness.** inclusive of necessary materials , labour ,Equipment ,Contractor's overhead charges and profit and including all taxes.	Sq.M.	**370**

Item no.	Description of Item	Unit	Rate for 2019-20
Item no.5(C)	**Providing 100 Micron epoxy coating to inside pipe line**		
1	Providing and applying 1 coat of 25 micron of zinc rich primer confirming to specifications of DGS-175, Type- A , and 3 coats each of 25 micron of Non toxic high build black epoxy paint suitable for water potable water application inclusive of necessary materials , labour ,Equipment ,Contractor's overhead charges and profit and including all taxes.	**Sq.M.**	**173**

Item no.6			
	Constructing the air Valve cage having following dimension & specification	No.	49,890
	(1) Excavation of pit having size 2.01mX2.01mX0.225m		
	(2) P.C.C in M-10 with size 2.01mX2.01mX0.225m		
	(3) All Conc. Work in M-25		
	(4) Bottom Flat base slab of size 1.86mX1.86mX.18m		
	(5)Top Flat base slab of size 0.91mX0.91mX.10m		
	(6)Vertical wall 0.68 mt height of 1.68 m length &0.18 m wide		
	(7) wide horizontal slab of Size 0.195 mX1.305mx0.18m		
	(8)vertical wall of size 0.93mX0.18mX2.68m		
	(9)Top square of size 0.93mX0.93mX0.10m		
	(10) CRS steel is to be used & dia of all bars are 10 mm & min.350 kg. steel into be used.(AS per approved Drawing of GWSSB)		
Item no. 7	**Extra Welding for fixing various appurtances**		
	Welding in all positions with required number runs, for M.S.Pipes internally and/or externally including gauging wherever necessary, fixing appurtenances and other accessories in connection with pipe laying work as per specification.		
	As above for Butt Joints : Plate thickness		
1	Welding for Pipe thickness 4 mm to 7mm	RMT	**759.00**
2	Welding for Pipe thickness above 7mm	"	**813.00**
Item no. 8	**Gas Cutting of MS Pipe / Plates**		
	Gas cutting(Either square cut or V cut) pipes, plates etc. including all costs for the followng thickness.		
1	Up to 5 mm	RMT	**40.00**
2	Above 5 mm up to 10 mm	"	**63.00**
3	Above 10 mm	"	**81.00**
Item no. 9	**Fixing water level indicator**		
	Labour charges for fixing wooden / steel water level indicator including all accessories and jointing material etc. complete.		
	For Sump	No.	572
	For ESR	No.	640
Item no. 10	**Fixing CI/MS frame & cover**		
	Fixing all types of C. I. frame and cover in C.C. 1:2:4 including carting etc. complete excluding cost of R. C. C.	No.	**311**
Item no.11	**Fixing lightning arrester**		
	Labour charge for fixing lighting conductors including fixing copper strip incl. suitable Hole fast at suitable intervels incl. fixing earth electrodes in charcoals and salt 0.5 Cu. Mt. and welding copper strip with copper plates etc. complete.		
11.a	as above	No.	**2858**
11.b	- do – for copper strip every one mt above or below 15 mt.	R. Mt.	**96**
11.c	Alternative on weight basis.	Kg.	**74**
Item no.12	**Fixing CI Steps**		
	Fixing C. I. steps in masonry in C. M. 1:3 including necessary C.C. for jointing etc. complete during progress of the work.		
1		No.	**68**
Item no.13	**Fixing Surface Boxes**		
	Fixing surface boxes including jointing materials incl. cost of jointing materials for concerting C. C. 1:2:4 etc. complete excluding cost of surface Box.		
1		Sq.M.	**292**

Item no.	Description of Item	Unit	Rate for 2019-20
Item no.14	**Fixing Cowl ventilatoR**		
	Fixing C. I. cowl type ventilator in C. C. 1:2:4 with bolts and nuts etc. complete including cost of jointing materials.		
	Dia. in mm		
1	80	No.	**197**
2	100	No.	**235**
3	150	No.	**286**
Item No. 15	**Fixing M.S.ladder**		
	Labour charges for fixing 45 cm wide M. S. ladder made from angle iron or Flats, in position including cost of jointing materials etc. complete.	R.Mt.	**136**

Wells & Gallery

Section : - F

SECTION : 1.F - Wells & Gallery

Sr. No.	Item		Unit	Rate for 2019-20
1	2		3	5
	Item No. 1 : Excavation for well including removing and spreading the excavated stuffs directed with all lead.			
(I)	In all sorts of soils & Soft Murrum			
(II)	In Hard Murrum			
(III)	In Soft rock			
(IV)	In hard rock with blasting and chiselling or by chiselling/Breaking only for finishing			
1	0.0 m to 1.5 m depth	I	Cu.M.	126
		II	Cu.M.	183
		III	Cu.M.	269
		IV	Cu.M.	649
2	1.5 m to 3.0 m depth	I	Cu.M.	138
		II	Cu.M.	196
		III	Cu.M.	282
		IV	Cu.M.	665
3	3.0 m to 4.5 m depth			
		I	Cu.M.	153
		II	Cu.M.	210
		III	Cu.M.	296
		IV	Cu.M.	680
4	4.5 m to 6.0 m depth			
		I	Cu.M.	169
		II	Cu.M.	226
		III	Cu.M.	312
		IV	Cu.M.	696
5	6.0 m to 7.5 m depth			
		I	Cu.M.	187
		II	Cu.M.	244
		III	Cu.M.	330
		IV	Cu.M.	714
6	7.5 m to 9.0 m depth			
		I	Cu.M.	207
		II	Cu.M.	265
		III	Cu.M.	352
		IV	Cu.M.	736
7	9.0 m to 10.5 m depth			
		I	Cu.M.	229
		II	Cu.M.	287
		III	Cu.M.	383
		IV	Cu.M.	767
8	10.5 m to 12.0 m depth			
		I	Cu.M.	255
		II	Cu.M.	312
		III	Cu.M.	415
		IV	Cu.M.	799
9	12.0 m to 13.50 m depth			
		I	Cu.M.	280
		II	Cu.M.	337
		III	Cu.M.	447
		IV	Cu.M.	831

Sr. No.	Item		Unit	Rate for 2019-20
10	13.50 m to 15.00 m depth			
		I	Cu.M.	305
		II	Cu.M.	363
		III	Cu.M.	480
		IV	Cu.M.	864
11	15.00 m to 16.50 m depth			
		I	Cu.M.	330
		II	Cu.M.	388
		III	Cu.M.	512
		IV	Cu.M.	896
12	16.50 m to 18.00 m depth			
		I	Cu.M.	350
		II	Cu.M.	408
		III	Cu.M.	544
		IV	Cu.M.	928
13	18.00 m to 19.50 m depth			
		I	Cu.M.	371
		II	Cu.M.	428
		III	Cu.M.	577
		IV	Cu.M.	961
14	19.50 m to 21.00 m depth			
		I	Cu.M.	391
		II	Cu.M.	448
		III	Cu.M.	612
		IV	Cu.M.	996
15	21.00 m to 22.50 m depth			
		I	Cu.M.	411
		II	Cu.M.	469
		III	Cu.M.	647
		IV	Cu.M.	1,036
16	22.50 m to 24.00 m depth			
		I	Cu.M.	431
		II	Cu.M.	489
		III	Cu.M.	683
		IV	Cu.M.	1,077
17	24.00 m to 25.50 m depth			
		I	Cu.M.	451
		II	Cu.M.	509
		III	Cu.M.	718
		IV	Cu.M.	1,117
18	25.50 m to 27.00 m depth			
		I	Cu.M.	472
		II	Cu.M.	529
		III	Cu.M.	753
		IV	Cu.M.	1,193
19	27.00 m to 28.50 m depth			
		I	Cu.M.	492
		II	Cu.M.	549
		III	Cu.M.	789
		IV	Cu.M.	1,274
20	28.50 m to 30.00 m depth			
		I	Cu.M.	512
		II	Cu.M.	570
		III	Cu.M.	824
		IV	Cu.M.	1,365

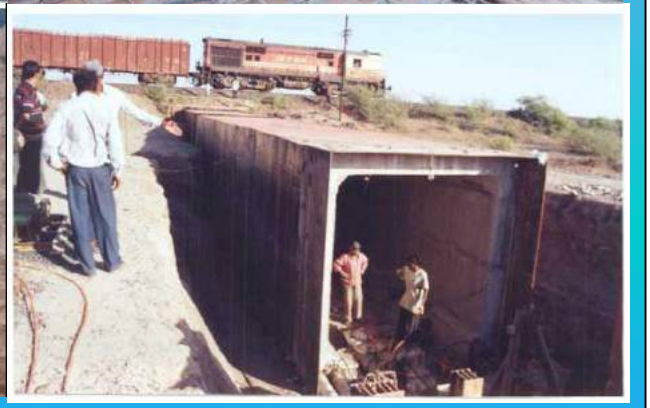
Sr. No.	Item		Unit	Rate for 2019-20
	Extra for every additional depth of 1.5 m or part there of beyond 30 m depth			
		I	Cu.M.	40
		II	Cu.M.	45
		III	Cu.M.	63
		IV	Cu.M.	90
	NOTE : For Desilting of well rates of excavation of well in all soils including hard murrum should be adopted as per lifts			
	(B) Extra for dewatering for excavation in wet condition and in all strata			
	0.00 m to 1.50 m depth		Cu.M.	20
	1.50 m to 3.00 m depth		Cu.M.	27
	3.00 m to 4.50 m depth		Cu.M.	32
	4.50m to 6.00 m depth		Cu.M.	43
	6.00 m to 7.50 m depth		Cu.M.	59
	7.50 m to 9.00 m depth		Cu.M.	75
	9.00 m to 10.50 m depth		Cu.M.	95
	10.50 m to 12.00 m depth		Cu.M.	109
	12.00 m to 13.50 m depth		Cu.M.	136
	13.50 m to 15.00 m depth		Cu.M.	183
	15.00 m to 16.50 m depth		Cu.M.	188
	16.50 m to 18.00 m depth		Cu.M.	215
	18.00 m to 19.50 m depth		Cu.M.	247
	19.50 m to 21.00 m depth		Cu.M.	269
	21.00 m to 22.50 m depth		Cu.M.	304
	22.50 m to 24.00 m depth		Cu.M.	335
	24.00 m to 25.50 m depth		Cu.M.	363
	25.50 m to 27.00 m depth		Cu.M.	398
	27.00 m to 28.50 m depth		Cu.M.	429
	28.50 m to 30.00 m depth		Cu.M.	460
	(C) Extra for dewatering for excavation for every extra additional depth of 1.5 m or part there of beyond 30 m depth			
			Cu.M.	33
Item No.2 :	Sinking single circular well of internal diameter and thickness of steining as specified up to the level as specified in all sorts of soil including hard murrum, boulders and all strata type & strata up to the level as per drawing by dredging, dewatering, drop chiselling with necessary kentiedge and with mechanical means as may be necessary for this type of work including all labour, plant machinery etc. complete. Zero level to be considered from cutting edge level. Including all labour charges with Dewatering but Excluding cost of Cutting Edge & Well steining			
	Well Excavation by sinking			
	2.1 For 4.0 mt internal dia well incl. Dewatering			
	1. 0 to 3 mt depth		R.Mt	9,798
	2. Beyond 3 mt up to 6 mt depth		R.Mt	10,556
	3. Beyond 6 mt to 9 mt depth		R.Mt	11,318
	4. Beyond 9 mt to 12 mt depth		R.Mt	11,807
	5. Beyond 12 mt to 15 mt depth		R.Mt	12,312
	6. Beyond 15 mt to 18 mt depth			13,075
	2.2 For 6.0 mt internal dia well incl. Dewatering			
	1. 0 to 3 mt depth		R.Mt	22,048

Sr. No.	Item	Unit	Rate for 2019-20
	2. Beyond 3 mt up to 6 mt depth	R.Mt	23,751
	3. Beyond 6 mt to 9 mt depth	R.Mt	25,488
	4. Beyond 9 mt to 12 mt depth	R.Mt	26,567
	5. Beyond 12 mt to 15 mt depth	R.Mt	27,703
	6. Beyond 15 mt to 18 mt depth	R.Mt	29,429
	2.3 For 8.0 mt dia well, internal incl. Dewatering		
	1. 0 to 3 mt depth	R.Mt	39,225
	2. Beyond 3 mt up to 6 mt depth	R.Mt	42,224
	3. Beyond 6 mt to 9 mt depth	R.Mt	45,313
	4. Beyond 9 mt to 12 mt depth	R.Mt	47,230
	5. Beyond 12 mt to 15 mt depth	R.Mt	49,338
	6. Beyond 15 mt to 18 mt depth	R.Mt	52,394
	Note :Rate for various dia meter of well other than shown can be arrived on area basis, considering internal dia. 'O' (Zero) is to be considered from where sinking operation is started		
Item No.3 : Cutting edge			
	Providing fabricating and placing cutting edge and curbs as per design and drawing manufactured from structural steel or M.S. plate confirming to ISS 226-1962 incl. Riveting, welding etc. complete. incl. m.s.bars, anchor bolts and structural steel etc complete.	MT	78,081
Item No. 4			
	RCC for well steining		
	Providing and laying cement concrete 1:2:4 (1 Cement : 2 Coarse sand: 4 graded stone aggregates 20 mm nominal size) and curing complete incl cost of formwork but excluding cost of reinforcement for well steining work		
	1. Well steining incl beam	Cu.M	5,450
	2. Add extra per Cum per m depth beyond 6 m depth	Cu.M	95
Item No. 5 :			
	Masonry for well steining		
	Masonry for well steining in C.M. 1:6 above ground level and up to 1.5 mt depth below average ground level		
	1. Using uncoursed rubble	Cu.M	2,698
	2. Using Bela stones	Cu.M	4,673
	3. Using burnt brick of standard size	Cu.M	3,747
	4. Using CC 1:3:6 block of approved size	Cu.M	3,216
	5. Inverted bela masonry (Veraval area)	Cu.M	5,141
	6. ---do --- Without C.M. joints	Cu.M	4,535
	7. For additional depth of 1.5 m or part there of beyond 1.5 m depth	Cu.M	90
Item No. 6 :			
	Cement plaster for Wells		
	Cement plaster 20 mm thick rough coat with C.M. 1:3 incl watering curing etc. comp. For well	Sq.M	148
	Extra for cement finishing incl. Watering and curing for well	Sq.M	33
Item No. 7 :			
	Coffer dam		

Sr. No.	Item		Unit	Rate for 2019-20
	Providing and constructing cofferdam in river basin including excavation ,filling, middle portion with B.C.soil (in empty Cement/Gunny bags) to the entire satisfaction of EIC till completion of the work including dismantling coffer dam after completion of the work as directed by EIC. **Bags Filled with...**			
1	Local sand (up to 0.5 Km)		Per Bag	7
2	Local selected Soil (Up to 0.5 KM)		Per Bag	8
3	Sand brought from Outside		Per Bag	10
4	Selected Soil brought from outside		Per Bag	11
5	Dismantling Charges		Per Bag	2
Item No. 8				
	Horizontal Bore in well			
	Drilling of horizontal bore inwell in hard strata of required size and length (without air compressor test & dewatering)			
8.1	115 mm dia		Rmt	600
8.2	100 mm dia		Rmt	495
8.3	80 mm dia		Rmt	395

Maintanance & Repairs

Section :- F



SECTION : 1.G - Maintenance & Repair

Item No.	Description	Unit	Rate for 2019-20
Item No. 1	Labour charges for repairing of leakage in MS pipeline of following diameter at different places including necessary excavation manually or by machinery, dewatering, removing of mud, cleaning of pipe and leakage portion, grinding, cutting the pipeline or joint if necessary incl. welding the joint by using ISI marked welding rods duly approved by EIC of appropiate number and size inclusive of excavator, Hydra/ Crane, D.G. set, welding machine, Gas cutter with LPG Cylinder, Oxygen cylinder, Grinding machine etc. with fuel, opertor & labour as required. (incl. all material but excluding cost of pipe)		
1	Dia. from 168.3 to 323.9mm	No.	5164
2	355.60 mm	No.	5383
3	406.40 mm	No.	5927
4	457.00 mm	No.	6260
5	508.0 mm	No.	6290
6	559.0 mm	No.	6471
7	610.0 mm	No.	8376
8	660.0 mm	No.	8634
9	711.0 mm	No.	9102
10	762.0 mm	No.	9284
11	813.0 mm	No.	9616
12	864.0 mm	No.	10009
13	914.0 mm	No.	10418
14	965.0 mm	No.	11295
15	1016 mm	No.	12777
16	1067 mm	No.	12822
17	1118 mm	No.	13563
18	1168 mm	No.	13593
19	1219 mm	No.	15317
20	1321 mm	No.	15378
21	1422 mm	No.	15438
22	1524 mm	No.	19142
23	1626 mm	No.	19944
24	1727 mm	No.	21213
25	1829 mm	No.	21273
26	2032 mm	No.	21152
Item No. 2	Labour charges for repairing of leakage in CI/DI pipeline for following diameter at different places including necessary excavation manually or by machinery, removing mud, dewatering, cleaning of pipe and leakage portion and repairing by Inserting lead wool including tools required for **inserting lead wool,** hiring charges of excavators, Hydra/Crane, dewatering set, fuel, operator, cost of lead wool etc complete (including all material but excluding cost of pipe)		
	Dia. in mm		
1	80 mm	No.	690.00
2	100 mm	No.	971.00
3	125 mm	No.	1035.00
4	150 mm	No.	1315.00
5	200 mm	No.	1634.00
6	250 mm	No.	2391.00
7	300 mm	No.	2670.00
1	350 mm dia	No.	2750.00
2	400 mm dia	No.	3572.00
3	450 mm dia	No.	4536.00
4	500 mm dia	No.	4714.00
5	600 mm dia	No.	6786.00
6	700 mm dia	No.	7785.00
7	750 mm dia	No.	8571.00

Item No.	Description	Unit	Rate for 2019-20
Item No. 3	Labour charges for repairing leakage in CI/DI pipeline of following diameter at different places including necessary excavation manually or by machinery, removing of mud, dewatering, cleaning of pipe, cutting of pipe, Jointing & repairing using CID joints including **CID joints, rubber rings, nut bolts,** hiring excavator, Hydra/ Crane, dewatering machine, fuel, operator etc complete (including cost of jointing material but excluding cost of pipe)		
1	80 mm	No.	1565.00
2	100 mm	No.	1770.00
3	125 mm	No.	2115.00
4	150 mm	No.	2457.00
5	200 mm	No.	3366.00
6	250 mm	No.	4548.00
7	300 mm	No.	5596.00
8	350 mm	No.	7573.00
9	400 mm	No.	9047.00
10	450 mm	No.	10913.00
11	500 mm	No.	13528.00
12	600 mm	No.	20029.00
13	700 mm	No.	33168.00
14	750 mm	No.	33826.00
Item No. 4	Labour charges for repairing of leakage in AC pipeline of following diameter at different places including necessary excavation manually or by mechanized excavation, removing of mud, cleaning of pipe and leakage portion, cutting the pipeline & removing piece of pipe from trench with inclusive of mechanical devices JCB, Hydra/Crane if necessary & labourers required .(Exclu. cost of pipe & Fittings)		
	Dia in mm		
1	350	No.	1192
2	400	No.	1631
3	450	No.	1882
4	500	No.	2321
5	600	No.	3951
6	700	No.	5896
Item No. 5	Labour charges for repairing of leakage in AC pipeline of falling diameter at different places including necessary excavation manually or by mechanized excavation, removing of mud, cleaning of pipe and leakage portion, cutting the pipeline & removing piece of pipe from trench with inclussive of mechanical deviced JCB, Hydra/Crain if necessary & labours required with providing material such Turened **C.I.D. joints** with nut bolt, rubber rings etc. comp. (incl. all material but Exclu. cost of pipe)		
1	80 mm dia	No.	1005
2	100 mm dia	No.	1189
3	125 mm dia	No.	1490
4	150 mm dia	No.	1817
5	200 mm dia	No.	2924
6	250 mm dia	No.	4024
7	300 mm dia	No.	5072
8	350 mm dia	No.	6796
9	400 mm dia	No.	8662
10	450 mm dia	No.	10152
11	500 mm dia	No.	13539
12	600 mm dia	No.	16481
13	700 mm dia	No.	36502
Item No. 6	Labour charges for repairingof leakage in PVC pipeline of folling dia meter at different places including necessary excavation manually or by mechanise excavation, dewatering removing of mud, cleaning of pipe and leakage portion, cutting the pipeline & removing piece of pipe from trench with inclussive of mechanical devices JCB, Hydra/Crain if necessary & labours required with providing material such couplers, solution etc. comp. (incl. all material but Exclu. cost of pipe)		
1	90 mm dia	No.	825
2	110 mm dia	No.	962
3	125 mm dia	No.	1113
4	140 mm dia	No.	1300
5	160 mm dia	No.	1603

Item No.	Description	Unit	Rate for 2019-20
6	180 mm dia	No.	2045
7	200 mm dia	No.	2610
8	225 mm dia	No.	2910
9	250 mm dia	No.	3588
10	280 mm dia	No.	4163
11	315 mm dia	No.	4717
	Leakage in HDPE Pipe Repairing		
Item No. 7	Labour charges for repairing of leakage in HDPE pipe line **with butt welding** of following diameter at different places including necessary excavation manually or by mechanize excavation, dewatering, removing of mud, cleaning of pipe and leakage portion of pipe from trench with incl. of mechanical deviced JCB if necessary and labours required with providing, jointing material with welding machine etc. comp. (incl. all materials)		
	Dia. in mm		
1	63 mm	No	**719**
2	75 mm	No	**797**
3	90 mm	No	**899**
4	110 mm	No	**1038**
5	125 mm	No	**1151**
6	140 mm	No	**1299**
7	160 mm	No	**1494**
8	180 mm	No	**1672**
9	200 mm	No	**1965**
10	225 mm	No	**2218**
11	250 mm	No	**2744**
12	280 mm	No	**3191**
13	315 mm	No	**3616**
Item No. 8	Labour charges for repairing of leakage in HDPE pipeline of following diameter at different places including necessary excavation manually or by machinery, dewatering, removing of mud, cleaning of pipe and leakage portion, Jointing & repairing using **MS Clamp** inclusive of using all required machinery, labour, dewatering set, fuel, operator, rubber sheet, all Jointing materials, nut bolts etc complete (but excluding cost of Pipe)		
1	63 mm dia	No.	1090
2	75 mm dia	No.	1110
3	90 mm dia	No.	1138
4	110 mm dia	No.	1174
5	125 mm dia	No.	1201
6	140 mm dia	No.	1261
7	160 mm dia	No.	1331
8	180 mm dia	No.	1366
9	200 mm dia	No.	1537
10	225 mm dia	No.	1581
11	250 mm dia	No.	1961
12	280 mm dia	No.	2150
13	315 mm dia	No.	2212
14	355 mm dia	No.	2419
15	400 mm dia	No.	2969
16	450 mm dia	No.	3328
17	500 mm dia	No.	3416
Item No. 9	Labour charges for repairing of leakage in HDPE pipeline of following diameter at different places including necessary excavation manually or by machinery, dewatering, removing of mud, cleaning of pipe and leakage portion, cutting the pipeline, Jointing & repairing using **CID joint** inclusive of using all required machinery, labour, D G Set, fuel, operator, CID joints, rubber rings, nut bolts etc complete (but excluding cost of Pipe)		
1	90 mm	No.	1675.5
2	110 mm	No.	1778.9
3	125 mm	No.	1853.7
4	140 mm	No.	1928.5
5	160 mm	No.	2148.5
6	180 mm	No.	2399.3
7	200 mm	No.	2610.5
8	225 mm	No.	3003.2
9	250 mm	No.	3691.7

Item No.	Description	Unit	Rate for 2019-20
10	280 mm	No.	4388.9
11	315 mm	No.	5190.4
12	355 mm	No.	6943.8
13	400 mm	No.	7382.6
14	450 mm	No.	9321.9
15	500 mm	No.	12657.7
Item No. 10	Labour charges for **cleaning of sump / GL** cistern including cleaning and removing algae, calcinations, sludge, dirt deposition from bottom and as well as from wall of container, disinfection by bleaching powder with all necessary tools and plants, labours and cost of disinfectant etc complete		
	Capacity of sump in Ltr		
1	10000	No.	1120
2	20000	No.	1120
3	30000	No.	1120
4	40000	No.	1120
5	50000	No.	1680
6	60000	No.	1680
7	70000	No.	1680
8	80000	No.	1680
9	90000	No.	1680
10	100000	No.	2240
11	110000	No.	2240
12	120000	No.	2240
13	130000	No.	2240
14	140000	No.	2240
15	150000	No.	2240
16	160000	No.	2352
17	170000	No.	2352
18	180000	No.	2352
19	190000	No.	2576
20	200000	No.	2576
21	250000	No.	2912
22	300000	No.	3360
23	350000	No.	4032
24	400000	No.	4480
25	450000	No.	4928
26	500000	No.	5376
27	550000	No.	5600
28	600000	No.	5824
29	650000	No.	6272
30	700000	No.	6720
31	750000	No.	7168
32	800000	No.	7392
33	850000	No.	7840
34	900000	No.	8288
35	950000	No.	8736
36	1000000	No.	8960
37	1100000	No.	10080
38	1200000	No.	10752
39	1300000	No.	11648
40	1400000	No.	12544
41	1500000	No.	13216
42	1600000	No.	14336
43	1700000	No.	15680
44	1800000	No.	15904
45	1900000	No.	16576
46	2000000	No.	17472
47	2500000	No.	21504
48	3000000	No.	25760
49	3500000	No.	29792
50	4000000	No.	33936
51	4500000	No.	37968
52	5000000	No.	42000

Item No.	Description	Unit	Rate for 2019-20
53	5500000	No.	46144
54	6000000	No.	49952
55	6500000	No.	54096
56	7000000	No.	58128
57	7500000	No.	61936
58	8000000	No.	66080
59	8500000	No.	70112
60	9000000	No.	74032
61	9500000	No.	78064
62	10000000	No.	82096
Item No. 11	Labour charges for **cleaning of RCC ESR** including cleaning and removing algae, calcinations, sludge, dirt deposition from bottom and as well as from wall of container, disinfection by bleaching powder with all necessary scafolding, tools and plants, labours and cost of disinfectant etc complete		
	Capacity of ESR in Ltr		
1	10000	No.	2240
2	20000	No.	2240
3	30000	No.	2240
4	40000	No.	2240
5	50000	No.	2240
6	60000	No.	2464
7	70000	No.	2464
8	80000	No.	2464
9	90000	No.	2464
10	100000	No.	2464
11	110000	No.	2576
12	120000	No.	2576
13	130000	No.	2576
14	140000	No.	2576
15	150000	No.	2576
16	160000	No.	2688
17	170000	No.	2688
18	180000	No.	2688
19	190000	No.	2688
20	200000	No.	2688
21	250000	No.	2912
22	300000	No.	3136
23	350000	No.	3472
24	400000	No.	3920
25	450000	No.	4368
26	500000	No.	4592
27	550000	No.	4816
28	600000	No.	5040
29	650000	No.	5376
30	700000	No.	6048
31	750000	No.	6272
32	800000	No.	6496
33	850000	No.	6720
34	900000	No.	6944
35	950000	No.	7168
36	1000000	No.	7616
37	1100000	No.	7840
38	1200000	No.	8400
39	1300000	No.	8960
40	1400000	No.	9520
41	1500000	No.	10192
42	1600000	No.	10640
43	1700000	No.	11200
44	1800000	No.	11760
45	1900000	No.	12320
46	2000000	No.	12880
47	2500000	No.	14560
48	3000000	No.	17360

Item No.	Description	Unit	Rate for 2019-20
49	3500000	No.	19936
50	4000000	No.	22400
Item No. 12	Labour charges for repairing of Sluice valve/ Reflux valve including materials, labours and testing etc. complete		
	(A) Repairing of Sluice Valve / Reflux Valve		
12.A.1	**(1) Replacing of glan flange only**		
1	50 mm dia	No.	54
2	65 mm dia	No.	54
3	80 mm dia	No.	57
4	100 mm dia	No.	62
5	125 mm dia	No.	64
6	150 mm dia	No.	71
7	200 mm dia	No.	106
8	250 mm dia	No.	114
9	300 mm dia	No.	121
10	350 mm dia	No.	185
11	400 mm dia	No.	198
12	450 mm dia	No.	220
13	500 mm dia	No.	233
14	600 mm dia	No.	255
15	700 mm dia	No.	305
16	750 mm dia	No.	319
17	800 mm dia	No.	340
18	900 mm dia	No.	368
12.A.2	**(2)Replacing of glan packing only**		
1	50 mm dia	No.	59
2	65 mm dia	No.	59
3	80 mm dia	No.	59
4	100 mm dia	No.	66
5	125 mm dia	No.	74
6	150 mm dia	No.	88
7	200 mm dia	No.	119
8	250 mm dia	No.	125
9	300 mm dia	No.	133
10	350 mm dia	No.	193
11	400 mm dia	No.	207
12	450 mm dia	No.	222
13	500 mm dia	No.	236
14	600 mm dia	No.	251
15	700 mm dia	No.	288
16	750 mm dia	No.	304
17	800 mm dia	No.	318
18	900 mm dia	No.	333
12.A.3	**(3)) Replacing of S.S spindal only**		
1	50 mm dia	No.	283
2	65 mm dia	No.	346
3	80 mm dia	No.	468
4	100 mm dia	No.	654
5	125 mm dia	No.	777
6	150 mm dia	No.	900
7	200 mm dia	No.	1166
8	250 mm dia	No.	1536
9	300 mm dia	No.	1906
10	350 mm dia	No.	2566
11	400 mm dia	No.	3060
12	450 mm dia	No.	3799
13	500 mm dia	No.	4539
14	600 mm dia	No.	5772
15	700 mm dia	No.	8011
16	750 mm dia	No.	11218
17	800 mm dia	No.	13684

Item No.	Description	Unit	Rate for 2019-20
18	900 mm dia	No.	16150
	(B) Repairing of Butterfly Valve		
12.B.1	**(1) Repairng of leakage in flange only**		
1	80 mm dia	No.	189
2	100 mm dia	No.	227
3	125 mm dia	No.	264
4	150 mm dia	No.	340
5	200 mm dia	No.	832
6	250 mm dia	No.	907
7	300 mm dia	No.	983
8	350 mm dia	No.	1286
9	400 mm dia	No.	1361
10	450 mm dia	No.	1512
11	500 mm dia	No.	1663
12	600 mm dia	No.	2042
13	700 mm dia	No.	4915
14	750 mm dia	No.	5066
15	800 mm dia	No.	5217
16	900 mm dia	No.	5368
17	1000 mm dia	No.	5746
18	1200 mm dia	No.	6048
19	1400 mm dia	No.	10886
20	1500 mm dia	No.	11038
Item No. 13	Labour charges for repairing of Single Acting / Dopuble Acting Air valve including materials, labours and testing etc. comp.		
13.A	**(A) Replacing of one floating ball only**	**No.**	
1	25 mm dia	No.	118
2	40 mm dia	No.	200
3	50 mm dia	No.	283
4	65 mm dia	No.	366
5	80 mm dia	No.	449
6	100 mm dia	No.	532
7	150 mm dia	No.	615
8	200 mm dia	No.	864
13.B	**(B) Replacing of one Rubber packing only**		
1	25 mm dia	No.	64
2	40 mm dia	No.	72
3	50 mm dia	No.	81
4	65 mm dia	No.	88
5	80 mm dia	No.	96
6	100 mm dia	No.	128
7	150 mm dia	No.	168
8	200 mm dia	No.	208
13.C	**(C) Replacing of one C.I. Plate only**		
1	25 mm dia	No.	85
2	40 mm dia	No.	114
3	50 mm dia	No.	128
4	65 mm dia	No.	161
5	80 mm dia	No.	175
6	100 mm dia	No.	222
7	150 mm dia	No.	296
8	200 mm dia	No.	376
Item No. 14	**Restoration**		
	Add for restoration of infrastructures like Kharkuwa, Electrical Line, Telephone cables all types, water lines, gas line, septic tanks, etc.		
14.a	Kharkuwa Repairing		
1	0.00 to 1.5 Mt.	No	**1800**
2	1.5 to 3.00 Mt	No	**1900**
14.b	Cable Repairing		
	Electric/ Telephone cable	LS	**700**

Item No.	Description	Unit	Rate for 2019-20
Item No. 15	**Removing of Existing Pipeline**		
	Removing of existing pipeline incl. removal of specials, valves jointing material including carting and stacking of removed material from site of work to the department store as directed excl. excavation and refilling.		
15.a	**D.I./ C. I. S. & S. Spun Pipes suitable for tyton joints.**		
	Dia. in mm		
1	80	R. Mt.	**17**
2	100	R. Mt.	**20**
3	125	R. Mt.	**25**
4	150	R. Mt.	**31**
4	200	R. Mt.	**42**
5	250	R. Mt.	**55**
6	300	R. Mt.	**69**
7	350	R. Mt.	**85**
8	400	R. Mt.	**104**
9	450	R. Mt.	**124**
10	500	R. Mt.	**142**
11	600	R. Mt.	**189**
12	700	R. Mt.	**241**
13	750	R. Mt.	**271**
14	800	R. Mt.	**301**
15	900	R. Mt.	**365**
15.b	**A. C. Pressure Pipe**		
	Dia. in mm		
1	80	R. Mt.	**10**
2	100	"	**11**
3	125	"	**12**
4	150	"	**16**
5	200	"	**21**
6	250	"	**26**
7	300	"	**31**
8	350	"	**38**
9	400	"	**45**
10	450	"	**51**
11	500	"	**62**
12	600	"	**86**
15.c	**Galvanised M. S. Tubes**		
	Dia. in mm		
1	15	R. Mt.	**9**
2	20	"	**11**
3	25	"	**12**
4	32	"	**13**
5	40	"	**14**
6	50	"	**18**
7	65	"	**20**
8	80	"	**23**
9	100	"	**29**
10	125	"	**39**
11	150	"	**43**
15.d	**RCC/ Pre-stressed concrete Pipes**		
	Dia. in mm		
1	300	R. Mt.	**60**
2	350	"	**69**
3	380	"	**73**
4	400	"	**81**
5	450	"	**88**
6	500	"	**96**
7	525	"	**101**
8	600	"	**118**
9	700	"	**133**

Item No.	Description	Unit	Rate for 2019-20
10	750	"	**141**
11	800	"	**152**
12	900	"	**168**
15.e	**P. V. C./ HDPE/ GRP Pipes**		
	Dia. in mm		
1	63	R. Mt.	**3**
2	75	"	**4**
3	90	"	**5**
4	110	"	**5**
5	125	"	**5**
5	140	"	**5**
6	160	"	**6**
7	180	"	**8**
8	200	"	**10**
9	225	"	**11**
10	250	"	**14**
11	280	"	**21**
12	300	"	**23**
15.f	**MS Pipe**		
	Dia. in mm		
1	168.3	RMT	**44**
2	193.7	"	**51**
3	219.7	"	**58**
4	244.5	"	**63**
5	273.1	"	**70**
6	323.9	"	**85**
7	355.6	"	**92**
8	406.4	"	**105**
9	457	"	**117**
10	508	"	**131**
11	559	"	**143**
12	610	"	**155**
13	660	"	**168**
14	711	"	**181**
15	762	"	**194**
16	813	"	**206**
17	864	"	**221**
18	914	"	**235**
19	965	"	**247**
20	1016	"	**258**
Item No. 16	**Shoring or timbering INCLUDING COST OF LOCAL WOOD MATERIAL**		
1	Shoring or timbering for trench with 50 mm thick planks and suitable size struts etc. complete.	Sq. M.	**70**

Schedule of Rates

Year-2019-20

Part-2 Drainage Section

Sewage Treatment Plant

Section :- C

SECTION : 2.C - Sewage Treatment Plant			
ITEM NO.	**ITEM DESCRIPTION**	**UNIT**	**Rate for 2019-20**
1A	**Activated Sludge Process based Treatment Plant**		
A	Designing (hydraulic, process, structural and aesthetic), constructing and commissioning of Activated Sludge Process based Treatment Plant. Extended Aeration Process and its variants without primary clarification, is preferred for STP capacities less than 10 MLD. Scope of work consists of all Civil, Mechanical, Electrical, instrumentation components of various sub-works as given below including necessary hydraulic testing, structural testing, equipment testing, trial run for 3 months, etc. complete as directed by Engineer-in-charge (turn-key job), to achieve BOD < 20ppm, TSS < 30 ppm, to meet GPCB standard of inland surface water discharge. The Coagulant Dosing System shall be provided, if required.		
	Minimum free board of 0.3 m shall be maintained unless other wise asked for 0.5 m stipulated for specific units.		
	UNITS INCLUDED:		
A	**PRIMARY TREATMENT**		
1	**Inlet Chamber** : Designing, providing, and constructing RCC (M:30) inlet chamber for the peak flow as per CPHEEO Manual including necessary excavation in all types of strata including walkway all around the periphery. Inlet chamber having minimum HRT of 60 seconds, each compartment will have steel gates with extension rod, head stock operating wheels. GI pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications.		
2	**Screen Chamber** : Designing , providing, constructing, testing and commissioning of Two approach channels (min 4.5 m long), mechanically cleaned bar rack screen (6 mm clear opening 10 mm flats), Escalator screens, with 100% standby manual fine screen (10 mm clear opening) MOC: SS316, CI sluice gates (one before screen & one after screen) , designed for average 1 DWF and maximum peak flow of 2 DWF in RCC (M -300), including inlet pipe/ channel from inlet chamber, outlet pipe / channel to detritus tank, free board of 0.5 m minimum, RCC walkway 1.2 m wide with GI pipe railing. RCC stair case of 1.2 m width from GL to screen chamber. with operating platform and belt conveyor system incl. panel & push bottom switch at local level as well as MCC room for two way control.		
3	**Grit Chamber :** Designing, providing and constructing grit Chamber- Detritus or vortex type or aerated type (100% standby), mechanically operated in RCC (M 30) capable of removing 100% of 0.2 mm size particle and above, having specific gravity 2.40, HRT of 1 minute at average flow (Detritus Tank), horizontal velocity not exceeding 0.30 m/sec at peak flow (Detritus Tank) with suitable arrangement of separation of grit from putrescible solids. Inlet and outlet channels of required sizes as may be required to connect the flow to connecting unit etc. Complete including hydraulic testing for water tightness of structure having minimum FB of 0.3 m, wash out arrangement to Grit chamber and platform 1.2 m wide RCC walkway with GI pipe handling shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as detailed specifications and as directed. CI sluice gates for upstream of grit chamber and for bypass arrangement to be provided.		
4	**Parshall flume** as per CPHEEO with necessary flow measuring devices/meter consisting of digital indicator in LPS & MLD		
B	**SECONDARY TREATMENT**		
5	**Distribution chamber with CI sluice gates** for each clarifier & bypass chamber, having appropriate size, operating platform with CI pipe upto central pier		
6	**Primary Clarifier** Surface loading rate of 25-30 cum./sq.m/day and free board of 0.5, weir loading limited to 125 cum/day.m. at average flow (upto 10 mld flow & 200 cum/day.m at average flow for larger than 10 mld capacities), scum removal arm, double armed scrapper mechanism, launder as required, telescopic valve, sludge removal pit with CI piping for inlet & outlet, 6 mm th. FRP weir plate, upflow velocity in central pier receiving sewage from the pipeline (from distribution chamber) limited to 0.2 m /sec in central pier, sewage outlet fins of required size as per manual of practice (CPHEEO/ ASCE) (One unit upto 10 MLD & two units for more than 10 MLD (maximum diameter 48 m)		
7	**Distribution chamber with CI sluice gates** for each compartment of anoxic followed by aeration tank & bypass chamber, having appropriate size, operating platform with CI pipe upto central pier		
8	**Aeration tank** Minimum HRT 6 hours (at average flow + return sludge flow), 2 nos., minimum free board 0.6 m in case of diffused aeration system (disc/ tube type diffusers with retrievable mechanism) & 1 m in case of aspirator aerator, CS piping, air blowers, all biological parameters as per manual, minimum power level 0.015 kW/cu.m. and energy efficient aerators.		
9	**Process Air Blowers or aeration Device** The Plant should be based on Dissolved Oxygen/Oxygen Uptake Rate Control with VFD driven Aeration Device.The Aeration System shall be designed for 100 % Capacity of the design Air requirement.The aeration Blower/Aeration Device shall be having 100% installed standby unit. Air diffuser shall be of disc/ tubular , retrievable type installation. The wetted part of the aeration system of non-corrosive materials such as UPVC. Blowers shall be housed in process air blower building. The minimum area of the building is 20 sq.m. and height of 5m (min). The surface Aerators are not acceptable.		
10	**Distribution chamber with CI sluice gates** for each clarifier (in no case bypass shall be provided after aeration without secondary clarification), having appropriate size, operating platform with CI pipe upto central pier		
11	**Secondary Clarifier** surface loading rate of 15-35 cum./sq.m/day or less as required and free board of 0.5, weir loading limited to 185 cum/day.m. (at average flow), double armed scrapper mechanism, launder as required, telescopic valve, sludge removal pit with CI piping for inlet & outlet, 6 mm th. FRP weir plate, upflow velocity in central pier receiving sewage from the pipeline (from distribution chamber) limited to 0.2 m/sec in central pier, sewage outlet fins of required size as per manual of practice (CPHEEO/ ASCE) (One unit upto 10 MLD & two units for more than 10 MLD (maximum diameter 48 m)		
12	**Raw sludge pump house** Sump with minimum HRT of 30 minutes & depth of sludge limited to 2 m, separate panel room outside the wet well		

ITEM NO.	ITEM DESCRIPTION	UNIT	Rate for 2019-20
13	**Return sludge pump house** Sump with minimum HRT of 30 minutes upto flow of 100% of return sludge capacity & depth of sludge limited to 2 m, separate panel room outside the wet well, 100% standby pumps		
D	**DISINFECTION**		
14	**Chlorine Contact Tank:** Designing providing and constructing chlorine contact chamber with baffle walls for adequate capacity to deal with 1 DWF average flow. The chlorine contact tank should be of 30 min capacity, during average flow to achieve 99.99 % coliform reduction. Chlorine dose shall be maintained as per standard provisions, including designing, providing and constructing water supply provision for chlorination, including providing dewatering and by pass arrangement jointing to final effluent mains and outlet weir etc complete. The effluent quality should match with the standards laid down by Gujarat Pollution Control Board and as per obligatory provision and as detailed specification and as directed by engineer in - charge.		
15	**Chlorinator and Chlorinator Room/Tonner Room:** Designing, providing and constructing chlorinators vacuum type 2 Nos, (1 working + 1 stand by) with auto switchover facility and having capacity for dosage of 5ppm or adequate for 0.5ppm FRC, chlorine booster pump (1W+1S), chlorine tonner with 15 days storage, chlorination room with specified area etc. complete. Necessary provision of having chlorinator room of adequate size. The chlorinator equipment shall include cost of chlorine cylinders/tonner, piping, valves, measuring and controlling equipment, safety devices , lifting equipment, etc. complete as per IS -10553 (part II) 1982. The tonner room should have minimum 3 MT capacity Hoist for loading and unloading facility. Tonner storage should be distinctly isolated and should be for minimum storage space as directed in the design specification and as per gas laws 1981 and factory act shall be provided. All other matching amenities shall be provided, Minimum 5 MT gantry rail shall be provided for full length of tonner room at 6 m height from level of tonner room, with outlet chamber and treated effluent outlet channel etc complete as per detailed specification.		
E	**Sludge treatment** Raw/ excess sludge to be treated & digested prior to dewatering by means of belt filter press/ centrifuge/ Combi-machine/ Screw Press/ Bag Filter		
16	**Sludge Thickener with equipments:** Solids loading rate of 25-35 kg/m2/day, Designing, providing & constructing watertight of sludge thickener-gravity type (picket fence) in RCC (M-30) with inlet & outlet pipes, central feed well & sludge removal arrangement, grouting wherever necessary with walkway all around of 1.20m with GI pipe railing interconnecting CI pipes all complete as per specifications, having bottom slope 1:6 & min. 4.5m SWD with necessary fixed bridge scraper arrangement as per detailed specifications & necessary inlet & outlet arrangement. All other arrangement as per detailed specifications. (Necessary above 3 MLD). Min sludge concentration of thickened sludge shall be 4%.		
17	**Sludge Digester** of suitable capacity as per CPHEEO Manual (only cylindrical volume to be considered without hopper bottom), sludge mixing (by gas/mechanical mixing). Sludge digester shall comprise all the fixtures, fasteners, accessories, supernatant handling, PRV, other safety mechanism etc. along with Flare System		
18	**Sludge Dewatering Room with Centrifuge or Belt Press or Screw Press or Bag Type or Filter Press or Combi-machine:** Designing, providing constructing and installing including foundation etc. Sludge Centrifuge or Belt Pres or Screw Press or Bag Type or Filter Press or Combi-machine: to handle the sludge flow as per specifications, with appropriate inlet and outlet provision, sludge dewatering unit drain etc. Complete as per specifications.		
19	**Filtrate Pumps** with 100% standby, designed to empty Recycle sump in 1 hour		
20	**Valves/gates**		
	Inlet, outlet, wash water inlet – only CI D/F and minimum size of 200 mm (for sludge) as per approved make/brand.		
21	All types **gauges and meters** required for O & M as per design of specified make/brand.		
22	Dewatering during entire work using any technique.		
23	**Necessary Instrumentation and control** as per specifications		
24	**Outfall Sewer:** Designing, providing and constructing appropriate outfall sewer of RCC NP2 pipe, up to plot boundary (as specified) and beyond for treated sewage disposal upto 500m, diameter as per design, including necessary chambers for inspection and cleaning including necessary excavation, dewatering, refilling, concrete encasing/bedding concrete steps to reach the disposal/ nallah bed level. pitching and energy dissipation chamber in nallah portion etc. complete up to 500 m length RCC NP2 pipe line and including all above items.		
25	**By pass arrangements** RCC pipes with manholes and C.I. sluice gates (MH to be raised above TWL of adjacent unit)		
26	**Piping work in CI-LA Class including Sluice valves, Reflux Valves, MS Gates:** Providing laying and jointing pipes other than those already included in the above items for interconnection by - pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavations, refilling and hydraulic testing of pipes, valves, gates, accessories and cost of jointing materials. The items includes required channels with gates for interconnection of units by pass drains etc for all units as directed etc complete as per detailed specifications.		
27	**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 and ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M 200 framed structure B. B masonry (11- 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.		
	a) Ground floor to accommodate administrative office & laboratory		

ITEM NO.	ITEM DESCRIPTION	UNIT	Rate for 2019-20
	b) First floor to accommodate Office of the Plant In Charge, air monitoring equipments to measure wind direction & speed, hydrogen sulphide concentration etc.		
27.1	**Laboratory equipments** Laboratory equipment (as per specifications), beautification, telephone and intercom arrangement and wireless system.		
27.2	Furniture and Office Equipments, Office furniture (Make: Godrej/ or similar approved quality) as per specifications		
27.3	**Ventilation and Safety equipments** as per specifications		
27.4	**Sanitary blocks** Carpet area – 15 square meter minimum up to 25 MLD and 25 square meter above 25 MLD (or as specified).		
28	**Maintenance Workshop** of size as per specification		
29	**Air blower Building with Air Blowers:** Capable of delivering adequate free air for aeration device with suitable pressure (100% standby).		
30	**MCC Room** of minimum 9 m x 6 m clear inside with safety measures, approval of various statutory/ central/ foreign authority as applicable		
31	**Electric installation**		
31.1	Both internal and external including entire plant area (as specified).		
31.2	**Electric installation** - Sub Station Room as per specifications.		
32	**DG room with DG sets**, as per electric load and specifications (50 % energy requirement).		
33	**General Infrastructure Development:** Scope also includes, Designing, providing and constructing general infrastructure development such as internal roads, compound wall for STP site, internal street and building lightings, pathways of minimum 1 m wide to access all STP units and Entrance Gate in MS fabrication, etc. all complete as per specifications and directed by engineering in charge.		
33.1	**Internal roads** Asphalt road (Minimum 4.5 m) to connect all units from main gate of plot.		
33.2	**Compound Wall** as per the plant layout, along the boundary of STP site (considering plant layout for intermediate and ultimate build out capacity and 33% landscaping area).		
33.3	**Green Belt** (33% landscaping area) as per specification		
	Notes		
1	All the above conditions shall form a part and parcel of the tender and must be incorporated in draft tender papers of conventional Sewage Treatment Plants.		
2	The necessary changes should be carried out as per Site condition and project requirements at the time of preparing DTPs.		
3	Fine screens (SS 316) are of mechanically cleaned type for working unit and manual bar screen type (SS 316) for standby unit.		
4	Upto 5 MLD Capacity STP chlorination could be done by using sodium hypochlorite solution. Above 5 MLD capacity gas chlorinator to be provided.		
5	Gravity sludge thickener is not provided upto 3 MLD capacity STP. Sludge will be collected into sludge sump & pumped directly to digester or sludge dewatering system.		
6	Filter press or Bag Type for dewatering can be provided for STP's upto 5MLD capacity.		
7	Chlorinator room not provided for STP upto 3 MLD.		
8	Boundary wall, gate, Internal plant roads, storm water drains, site clearance, landscaping is considered in scope. Plant road shall be 4.5m wide. Landscaping area shall be min. 33% of plant area.		
9	All water retaining structures are in M-30 grade of concrete.		
10	Lead for excavation is considered as 500m.		
11	Grade of steel used is Fe 415.		
12	Peak factor considered for design for plants 2 to 5 MLD is 2.5, 6 to 20 MLD is 2.25.		
13	The rates mentioned above STP are considering sites falling in Seismic Zone III. For sites falling in seismic zone IV and V shall be increased by 5% and 8% respectively.		
14	Structural design criteria approved by technical committee shall be applicable for design.		
15	Hydraulic design of the plant shall be considered with free fall discharge of treated sewage to local water body (above HFL). Hydraulic loss shall be worked out for peak flow condition and shall not exceed 4.5m in any circumstances unless otherwise site specific condition and approved by technical committee.		
16	The cost of sewage pumping station and rising main is not included.		
17	Makes of equipment shall be approved by GWSSB.		
18	The rates include excavation, refilling and throwing away extra stuff as directed by the Engineer in Charge.		
19	All other details shall be as per design criteria and detail specifications.		
	The Rates are as under		
1	Fixed cost up to and including up to 1MLD	1No	8,697,990.00
2	Add(prorata) for capacity above 1MLD up to 2MLD	MLD	8,477,990.00
3	Cost of 2MLD treatment plant	1No	17,175,980.00
4	Add (prorata)for capacity above 2MLD up to 5MLD	MLD	8,147,990.00
5	Cost of 5MLD treatment plant	1No	41,619,950.00
6	Add (prorata)for capacity above 5MLD up to 10MLD	MLD	6,444,660.78
7	Cost of 10MLD treatment plant	1No	73,843,253.90
8	Add (Prorata)for capacity above 10MLD to 25MLD	MLD	6,010,885.54
9	Cost of 25MLD treatment plant	1No	164,006,536.93
10	Add (prorata)for capacity above 25MLD to 50MLD	MLD	4,275,949.00
11	Cost of 50MLD treatment plant	1No	270,905,250.00
12	Add (prorata)for capacity above 50MLD to 100MLD	MLD	4,141,995.00
13	Cost of 100MLD treatment plant	1No	478,005,000.00
14	Add (prorata)for capacity above 100MLD	MLD	4,070,000.00

SECTION : 2.C - Sewage Treatment Plant			
ITEM NO.	**DESCRIPTION**	**UNIT**	**Rate for 2019-20**
1B	**Modified Activated Sludge Process based Treatment Plant with Biological Nitrogen & Phosphorous Removal**		
A	Designing (hydraulic, process, structural and aesthetic), constructing and commissioning of Modified Activated Sludge Process based Treatment Plant with Biological Nitrogen and Phosphorous Removal. Extended Aeration Process and its variants without primary clarification, is preferred for STP capacities less than 10 MLD. For nutrient removal, coagulant dosing system for phosphorus removal and tertiary treatment by filtration to be opted wherever applicable. Scope of work consists of all Civil, Mechanical, Electrical, instrumentation components of various sub-works as given below including necessary hydraulic testing, structural testing, equipment testing, trial run for 3 months, etc. complete as directed by Engineer-in-charge (turn-key job), to achieve BOD < 10ppm, TSS < 10ppm, Biological TN < 10ppm & PO_4 < 2ppm to get recyclable quality of water for industrial / agricultural purposes. The Coagulant Dosing System shall be provided as an optional/ back up.		
	UNITS INCLUDED:		
A	**PRIMARY TREATMENT**		
1	**Inlet Chamber** : Designing, providing, and constructing RCC (M:30) inlet chamber for the peak flow as per CPHEEO Manual including necessary excavation in all types of strata including walkway all around the periphery. Inlet chamber having minimum HRT of 60 seconds, each compartment will have steel gates with extension rod, head stock operating wheels. GI pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications.		
2	**Screen Chamber** : Designing, providing, constructing, testing and commissioning of Two approach channels (min 4.5 m long), mechanically cleaned bar rack screen (6 mm clear opening 10 mm the. flats), Escalator screens, with 100% standby manual fine screen (10 mm clear opening) MOC: SS316, CI sluice gates (one before screen & one after screen), designed for average 1 DWF and maximum peak flow of 2 DWF in RCC (M - 300), including inlet pipe/ channel from inlet chamber, outlet pipe / channel to detritus tank, free board of 0.5 m minimum, RCC walkway 1.2 m wide with GI pipe railing. RCC stair case of 1.2 m width from GL to screen chamber. with operating platform and belt conveyor system incl. panel & push bottom switch at local level as well as MCC room for two way control.		
3	**Grit Chamber :** Designing, providing and constructing grit Chamber- Detritus or vortex type or aerated type (100% standby), mechanically operated in RCC (M 30) capable of removing 100% of 0.2 mm size particle and above, having specific gravity 2.40, HRT of 1 minute at average flow (Detritus Tank), horizontal velocity not exceeding 0.30 m/sec at peak flow (Detritus Tank) with suitable arrangement of separation of grit from putrescible solids. Inlet and outlet channels of required sizes as may be required to connect the flow to connecting unit etc. Complete including hydraulic testing for water tightness of structure having minimum FB of 0.3 m, wash out arrangement to Grit chamber and platform 1.2 m wide RCC walkway with GI pipe handling shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as detailed specifications and as directed.CI sluice gates for upstream of grit chamber and for bypass arrangement to be provided.		
4	**Parshall flume** as per CPHEEO with necessary flow measuring devices/meter consisting of digital indicator in LPS & MLD		
B	**SECONDARY TREATMENT**		
5	**Distribution chamber with CI sluice gates** for each clarifier & bypass chamber, having appropriate size, operating platform with CI pipe up to central pier		
6	**Primary Clarifier** Surface loading rate of 25-30 cum./sq.m/day and free board of 0.5, weir loading limited to 125 cum/day.m. at average flow (upto 10 MLD flow & 200 cum/day.m at average flow for larger than 10 MLD capacities), scum removal arm, double armed scrapper mechanism, launder as required, telescopic valve, sludge removal pit with CI piping for inlet & outlet, 6 mm th. FRP weir plate, upflow velocity in central pier receiving sewage from the pipeline (from distribution chamber) limited to 0.2 m/sec in central pier, sewage outlet fins of required size as per manual of practice (CPHEEO/ ASCE) (One unit upto 10 MLD & two units for more than 10 MLD (maximum diameter 48 m)		
7	**Distribution chamber with CI sluice gates** for each compartment of anoxic followed by aeration tank & bypass chamber, having appropriate size, operating platform with CI pipe upto central pier		
8	**Anoxic and/ or Anaerobic Tanks with Submersible Mixers:** Suitable Anaerobic and/or Pre-Anoxic Tanks for Biological phosphorus removal and denitrification with submersible mixer arrangement, respectively, as per CPHEEO Manual.		
9	**Aeration tank** Minimum HRT 6 hours (at average flow + return sludge flow), 2 nos., minimum free board 0.6 m in case of diffused aeration system (disk / tube type diffusers with fixed/ retrievable mechanism) & 1 m in case of aspirator aerator, CS piping, air blowers, all biological parameters as per manual, minimum power level 0.015 kW/cu.m. and energy efficient aerators.		
10	**Internal Sludge recirculation pumps** Suitable pumps of capacity upto 400% to be provided for internal recirculation of MLSS from Aeration Tank to Anoxic Tank. There should also be the provision of 100% standby pumps in the warehouse.		

ITEM NO.	DESCRIPTION	UNIT	Rate for 2019-20
11	**Process Air Blowers or aeration Device** The Plant should be based on Dissolved Oxygen/Oxygen Uptake Rate Control with VFD driven Aeration Device. The Aeration System shall be designed for 110 % Capacity of the design Air requirement. The aeration Blower/Aeration Device shall be having 100% installed standby unit. Air diffuser shall be of disk/ tubular type, retrievable. The wetted part of the aeration system of non-corrosive materials such as UPVC. Blowers shall be housed in process air blower building. The minimum area of the building is 20 sq.m. and height of 5m (min). The surface Aerators are not acceptable.		
12	**Distribution chamber with CI sluice gates** for each clarifier (in no case bypass shall be provided after aeration without secondary clarification), having suitable size, operating platform with CI pipe upto central pier		
13	**Secondary Clarifier** surface loading rate of 15-35 cum./sq.m/day or less as required and free board of 0.5, weir loading limited to 185 cum/day.m. (at average flow), double armed scrapper mechanism, launder as required, telescopic valve, sludge removal pit with CI piping for inlet & outlet, 6 mm th. FRP weir plate, upflow velocity in central pier receiving sewage from the pipeline (from distribution chamber) limited to 0.2 m/sec in central pier, sewage outlet fins of required size as per manual of practice (CPHEEO/ ASCE) (One unit upto 10 MLD & two units for more than 10 MLD (maximum diameter 48 m)		
14	**Raw sludge pump house** Sump with minimum HRT of 30 minutes & depth of sludge limited to 2 m, separate panel room outside the wet well		
15	**Return sludge pump house** Sump with minimum HRT of 30 minutes upto flow of 100% of return sludge capacity & depth of sludge limited to 2 m, 4.5 m minimum diameter, separate panel room outside the wet well, 100% standby pumps		
C	**TERTIARY TREATMENT** Pressure Sand Filter / Rapid Sand Gravity Filter/ Coagulant Dosing System / Flash Mixer / Flocculator / Settling Tank / Clariflocculator. The design values / specifications for the tertiary treatment units are to be considered from current CPHEEO Manual on Water Supply & Treatment.		
16	**Flash Mixer** Rapid mixing device design confirming to IS: 7090 of 1985. Detention time 60 sec, velocity gradient 300-400 sec-1 with fans gear and motor assembly as per design.		
17	**Coagulant Dosing System** Dosing Tanks- 2Nos. with mixing, carrying, dosing with piping arrangement. Chemical Storage area as per data/specifications		
18	**Flocculation & Settling Tank or Clariflocculator** RCC Hopper bottom units having slope >45 Deg as per hydraulic and process design with detention period 20 minutes with flocculator paddles with gear and motor assembly as per design. Flocculator design conforming to IS: 7208-1974 (Type-C). Surface loading rate for clarifier 8,000 litres/hour/sq.m and depth 2.5m using PVC media with supporting arrangement and sludge collecting pipes as per detail specifications.		
19	**Filter Feed Sump & Pumps**		
20	**Pressure Sand Filters** for STP capacities less than 10 MLD		
21	**Rapid Sand Gravity Filters with shed** Applicable to plant capacity above 10MLD only. Filter House (RCC framed structure with infill brick masonry walls) and RCC filter beds with sand and gravel bedding as per hydraulic and process design adopting 6000 Litres/hour/sq.m. Filtration rate with 2m water above sand media with under drainage system and inlet, outlet, backwash (rate 600LPM per Sq.m.) piping, pipe gallery, platform min. 5.5m in width and valves/gates arrangement as per design and detail specifications.		
21.1	**a. Filter Sand**		
	Effective size 0.45 to 0.7 mm, uniformity coefficient not more than 1.7 nor less than 1.3, depth of sand 0.75m, free board 50cm, gravel 0.45m in depth, sand and gravel confirming to IS: 8491 (i)- 77, backwash by air wash (if specified) and hard wash by water, standard appurtenances (to be specified), rate of flow controller, filter gauge, sand expansion gauge, etc.		
21.2	**Wash Water Tank** Wash Water tanks of capacity equal to 2% of designed quantity of filtered water in a day (+) 10% with 8 to 10 Mtr. Head (as specified)		
21.3	**Wash Water Pumps** Wash Water Pumps with 100% Standby		
21.4	**Air Blowers** Capable of delivering 750 to 833 LPM per sq.m of free air flow area at 0.35 to 0.4 Kg/sq.m at the under drains (100% standby). (For capacity of FP more than 10 MLD)		
21.5	**Valves/gates** Inlet, outlet, wash water inlet- outlet and all types and sizes of valves/gates as per design of specified make/brand.		
21.6	All types **gauges and meters** required for filter operations and backwashing etc.		

ITEM NO.	DESCRIPTION	UNIT	Rate for 2019-20
D	**DISINFECTION**		
22	**Chlorine Contact Tank:** Designing providing and constructing chlorine contact chamber with baffle walls for adequate capacity to deal with 1 DWF average flow. The chlorine contact tank should be of 30 min capacity, during average flow to achieve 99.99 % coliform reduction. Chlorine dose shall be maintained as per standard provisions, including designing, providing and constructing water supply provision for chlorination, including providing dewatering and by pass arrangement jointing to final effluent mains and outlet weir etc complete. The effluent quality should match with the standards laid down by Gujarat Pollution Control Board and as per obligatory provision and as detailed specification and as directed by engineer in - charge.		
23	**Chlorinator and Chlorinator Room/Tonner Room:** Designing, providing and constructing chlorinators vacuum type 2 Nos, (1 working + 1 stand by) with auto switchover facility and having capacity for dosage of 5ppm or adequate for 0.5ppm FRC, chlorine booster pump (1W+1S), chlorine tonner with 15 days storage, chlorination room with specified area etc. complete. Necessary provision of having chlorinator room of adequate size. The chlorinator equipment shall include cost of chlorine cylinders/tonner, piping, valves, measuring and controlling equipment, safety devices , lifting equipment, etc. complete as per IS -10553 (part II) 1982. The tonner room should have minimum 3 MT capacity Hoist for loading and unloading facility. Tonner storage should be distinctly isolated and should be for minimum storage space as directed in the design specification and as per gas laws 1981 and factory act shall be provided. All other matching amenities shall be provided, Minimum 5 MT gantry rail shall be provided for full length of tonner room at 6 m height from level of tonner room, with outlet chamber and treated effluent outlet channel etc complete as per detailed specification.		
E	**Sludge treatment Raw/ excess sludge to be treated & digested prior to dewatering by means of belt filter press/ centrifuge/ Combi-machine/ Screw Press/ Bag Filter**		
24	**Sludge Thickener with equipments:** Solids loading rate of 25-35 kg/m2/day, Designing, providing & constructing watertight of sludge thickener-gravity type (picket fence) in RCC (M-30) with inlet & outlet pipes, central feed well & sludge removal arrangement, grouting wherever necessary with walkway all around of 1.20m with GI pipe railing interconnecting CI pipes all complete as per specifications, having bottom slope 1:6 & min. 4.5m SWD with necessary fixed bridge scraper arrangement as per detailed specifications & necessary inlet & outlet arrangement. All other arrangement as per detailed specifications. (Necessary above 3 MLD). Min sludge concentration of thickened sludge shall be 4%.		
25	**Sludge Digester** of suitable capacity as per CPHEEO Manual (only cylindrical volume to be considered without hopper bottom), sludge mixing by gas or mechanical mixing system. Sludge digester shall comprise all the fixtures, fasteners, accessories, supernatant handling, PRV, other safety mechanism etc. along with flare system		
26	**Sludge Holding Sump** Minimum HRT of 4 hours, Designing, providing and constructing of sludge holding sump and pump for discharging sludge to centrifuge using CI pipe complete as per detailed specification. Agitators/Mixers shall be provided in sump for keeping sludge in suspension. The pump shall be of Helical Screw pumps, 100% standby.		
27	**Sludge Dewatering Room with Centrifuge or Belt Pres or Screw Press or Bag Type or Filter Press or Combi-machine:** Designing, providing constructing and installing including foundation etc. Sludge Centrifuge or Belt Pres or Screw Press or Bag Type or Filter Press or Combi-machine: to handle the sludge flow as per specifications, with appropriate inlet and outlet provision, sludge dewatering unit drain etc. Complete as per specifications.		
28	**Filtrate Pumps** with 100% standby, designed to empty Recycle sump in 1 hour		
29	**Valves/gates**		
	Inlet, outlet, wash water inlet – only CI D/F and minimum size of 200 mm (for sludge) as per approved make/brand.		
30	All types **gauges and meters** required for O & M as per design of specified make/brand.		
31	Dewatering during entire work using any technique.		
32	**Necessary Instrumentation and control** as per specifications		
33	**Outfall Sewer:** Designing, providing and constructing appropriate outfall sewer of RCC NP2 pipe, up to plot boundary (as specified) and beyond for treated sewage disposal upto 500m, diameter as per design, including necessary chambers for inspection and cleaning including necessary excavation, dewatering, refilling, concrete encasing/bedding concrete steps to reach the disposal/ nallah bed level. pitching and energy dissipation chamber in nallah portion etc. complete up to 500 m length RCC NP2 pipe line and including all above items.		
34	**By pass arrangements** RCC pipes with manholes and C.I. sluice gates (MH to be raised above TWL of adjacent unit)		
35	**Piping work in CI-LA Class including Sluice valves, Reflux Valves, MS Gates:** Providing laying and jointing pipes other than those already included in the above items for interconnection by - pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavations, refilling and hydraulic testing of pipes, valves, gates, accessories and cost of jointing materials. The items includes required channels with gates for interconnection of units by pass drains etc for all units as directed etc complete as per detailed specifications.		

ITEM NO.	DESCRIPTION	UNIT	Rate for 2019-20
36	**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 and ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M 200 framed structure B. B masonry (11- 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.		
	a) Ground floor to accommodate administrative office & laboratory		
	b) First floor to accommodate Office of the Plant In Charge, air monitoring equipments to measure wind direction & speed, hydrogen sulphide concentration etc.		
36.1	**Laboratory equipments** Laboratory equipment (as per specifications), beautification, telephone and intercom arrangement and wireless system.		
36.2	Furniture and Office Equipments, Office furniture (Make: Godrej/ or similar approved quality) as per specifications		
36.3	**Ventilation and Safety equipments** as per specifications		
36.4	**Sanitary blocks** Carpet area – 15 square meter minimum up to 25 MLD and 25 square meter above 25 MLD (or as specified).		
37	**Maintenance Workshop** of size as per specification		
38	**Air blower Building with Air Blowers:** Capable of delivering adequate free air for aeration device as well as filter air scouring with suitable pressure (100% standby).		
39	**MCC Room** of minimum 9 m x 6 m clear inside with safety measures, approval of various statutory/ central/ foreign authority as applicable		
40	**Electric installation**		
40.1	Both internal and external including entire plant area (as specified).		
40.2	**Electric installation** - Sub Station Room as per specifications.		
41	**DG room with DG sets**, as per electric load and specifications (50 % energy requirement).		
42	**General Infrastructure Development:** Scope also includes, Designing, providing and constructing general infrastructure development such as internal roads, compound wall for STP site, internal street and building lightings, pathways of minimum 1 m wide to access all STP units and Entrance Gate in MS fabrication, etc. all complete as per specifications and directed by engineering in charge.		
42.1	**Internal roads** Asphalt road (4.5 m Minimum) to connect all units from main gate of plot.		
42.2	**Compound Wall** as per the plant layout, along the boundary of STP site (considering plant layout for intermediate and ultimate build out capacity and 33% landscaping area).		
42.3	**Green Belt** (33% landscaping area) as per specification		
	Notes		
1	All the above conditions shall form a part and parcel of the tender and must be incorporated in draft tender papers of conventional Sewage Treatment Plants with Biological Nitrogen Removal and Tertiary treatment for phosphorus removal.		
2	The necessary changes should be carried out as per Site condition and project requirements at the time of preparing DTPs.		
3	Fine screens (SS 316) are of mechanically cleaned type for working unit and manual bar screen type (SS 316) for standby unit.		
4	Tertiary units such as flash mixing tanks, coagulant dosing system, flocculation chamber, clarifier or Clariflocculator and filters (optional) shall be provided if required as per process design for AO process to achieve specified effluent quality.		
5	Upto 5 MLD Capacity STP chlorination could be done by using sodium hypochlorite solution. Above 5 MLD capacity gas chlorinator to be provided.		
6	Gravity sludge thickener is not provided upto 3 MLD capacity STP. Sludge will be collected into sludge sump & pumped directly to digester or sludge dewatering system.		
7	Filter press or Bag Type for dewatering can be provided for STP's upto 5MLD capacity.		
8	Chlorinator room not provided for STP upto 3 MLD.		
9	Boundary wall, gate, Internal plant roads, storm water drains, site clearance, landscaping is considered in scope. Plant road shall be 4.5m wide. Landscaping area shall be min. 33% of plant area.		
10	All water retaining structures are in M-30 grade of concrete.		
11	Lead for excavation is considered as 500m.		
12	Grade of steel used is Fe 415.		
13	Peak factor considered for design for plants 2 to 5 MLD is 2.5, 6 to 20 MLD is 2.25.		
14	The rates mentioned above STP are considering sites falling in Seismic Zone III. For sites falling in seismic zone IV and V shall be increased by 5% and 8% respectively.		
15	Structural design criteria approved by technical committee shall be applicable for design.		
16	Hydraulic design of the plant shall be considered with free fall discharge of treated sewage to local water body (above HFL). Hydraulic loss shall be worked out for peak flow condition and shall not exceed 4.5m in any circumstances unless otherwise site specific condition and approved by technical committee.		
17	The cost of sewage pumping station and rising main is not included.		

ITEM NO.	DESCRIPTION	UNIT	Rate for 2019-20
18	Makes of equipment shall be approved by GWSSB.		
19	The rates include excavation, refilling and throwing away extra stuff as directed by the Engineer in Charge.		
20	All other details shall be as per design criteria and detail specifications.		
	The Rates are as under		
1	Fixed cost up to and including up to 1MLD	1No	13,200,000.00
2	Add(prorata) for capacity above 1MLD up to 2MLD	MLD	12,767,088.00
3	Cost of 2MLD treatment plant	1No	25,967,088.00
4	Add (prorata)for capacity above 2MLD up to 5MLD	MLD	8,147,990.00
5	Cost of 5MLD treatment plant	1No	50,411,058.00
6	Add (prorata)for capacity above 5MLD up to 10MLD	MLD	7,433,623.00
7	Cost of 10MLD treatment plant	1No	87,579,172.00
8	Add (Prorata)for capacity above 10MLD to 25MLD	MLD	6,434,679.00
9	Cost of 25MLD treatment plant	1No	184,099,353.00
10	Add (prorata)for capacity above 25MLD to 50MLD	MLD	4,966,500.00
11	Cost of 50MLD treatment plant	1No	308,261,853.00
12	Add (prorata)for capacity above 50MLD to 100MLD	MLD	4,400,000.00
13	Cost of 100MLD treatment plant	1No	528,261,853.00
14	Add (prorata)for capacity above 100MLD	MLD	4,070,000.00

SECTION : 2.C - Sewage Treatment Plant					
ITEM NO.	**DESCRIPTION**		**UNIT**		**Rate for 2019-20**
2	**Sequential Batch Reactor Technology (SBR TECHNOLOGY)**				
A	Designing, providing, constructing, hydraulic testing, commissioning and giving satisfactorily trials of STP consisting of Inlet Chamber, Screen Chamber, Detritus Tanks, Distribution Chamber and SBR Basins, Sludge Sump, Chlorine Contact Tank, Chlorinator Room / Shed, Sludge Dewatering Equipment, necessary piping work with required valves, gates, drains, pathways, Administration Block cum Laboratory, Laboratory Equipments, Internal Roads, Pathways, compound wall, Tools and Plants, complete as turnkey job with all involved civil, electrical, instrumentation and mechanical works inclusive of following items, units as per detailed specifications for civil, electrical and mechanical components with all duties and taxes etc. complete to achieve BOD < 10ppm, TSS < 10ppm,Biological TN < 10ppm & PO4 < 2ppm to get recyclable quality of water for industrial / agricultural purposes. The Coagulant Dosing System shall be provided as an optional/ back up. All units shall be interconnected with administration building by Suitable or RCC overhead walkways.				
	UNITS INCLUDED:				
A	**PRIMARY TREATMENT**				
1	**Inlet Chamber :** Designing, providing, and constructing RCC (M:30) inlet chamber for the peak flow as per CPHEEO Manual including necessary excavation in all types of strata including walkway all around the periphery. Inlet chamber having minimum HRT of 60 seconds, each compartment will have steel gates with extension rod, head stock operating wheels. GI pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications.				
2	**Screen Chamber :** Designing , providing, constructing, testing and commissioning of Two approach channels (min 4.5 m long), mechanically cleaned bar rack screen (6 mm clear opening 10 mm the. flats), Escalator screens, with 100% standby manual fine screen (10 mm clear opening) MOC: SS316, CI sluice gates (one before screen & one after screen) , designed fast per CPHEEO Manual in RCC (M -30), including inlet pipe/ channel from inlet chamber, outlet pipe / channel to detritus tank, free board of 0.5 m minimum, RCC walkway 1.2 m wide with GI pipe railing. RCC stair case of 1.2 m width from GL to screen chamber. with operating platform and belt conveyor system incl. panel & push bottom switch at local level as well as MCC room for two way control.				
3	**Grit Chamber :** Designing, providing and constructing grit Chamber- Detritus or vortex type or aerated type (100% standby), mechanically operated in RCC (M 30) capable of removing 100% of 0.2 mm size particle and above, having specific gravity 2.40, HRT of 1 minute at average flow (Detritus Tank), horizontal velocity not exceeding 0.30 m/sec (Detritus Tank) at peak flow with suitable arrangement of separation of grit from putrescible solids. Inlet and outlet channels of required sizes as may be required to connect the flow to connecting unit etc. Complete including hydraulic testing for water tightness of structure having minimum FB of 0.3 m, wash out arrangement to Grit chamber and platform 1.2 m wide RCC walkway with GI pipe handling shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as detailed specifications and as directed.				
4	**Parshall flume** having head loss limited to 0.15 m with necessary flow measuring devices/meter consisting of digital indicator in LPS & MLD				
B	**SECONDARY TREATMENT**				
5	**SBR Basins:** Designing, providing and constructing in RCC (M 300), CASP basins for biological removal of BOD along with built-in nitrification-de-nitrification, Bio-P removal in compartments to handle combine flow of 1 DWF incoming flow and recirculation flow including construction of selector compartments and providing 1.2 m wide clear approach walkways, expansion joints wherever necessary, including foundations etc as per specifications. Peak factor shall be 2, F/M ratio shall be 0.15, complete with air blowers, fine diffused aeration grid with Retrievable type installation equipment and FB 0.5 m and SWD as required. DO level in basin to be minimum 2 mg/l complete with "Oxygen Uptake Rate" control system and all related instruments, Stainless steel decanters and automation works. MLSS concentrations shall be 3000 - 5000 mg/l or more, MLVSS to MLSS ratio to be 0.6-0.7. HRT shall be min. 13.5 hrs and SRT suitable for fully digested sludge. SBR process shall have independent steps like Fill & aeration, Settling(Sedimentation/clarification), Decanting without overlapping each other. Since it is complete batch process, filling will not be acceptable during settling or Decanting. Minimum decanting depth shall not be less than 2.20 m. The system should work on a gravity influent condition. No influent/effluent equalization tanks or flash filling is accepted. It should have all other related works.				
	SRT shall be suitably provided to achieve N, P removal. Since these are the technology driven plants, bidders has to adopt well established, well tested and proven, IIT/ NEERI evaluated/approved SBR process /specifications and at least 50 % of the tendered capacity has been in successfully operating condition as per the outlet criteria mentioned in above in Government organizations of India since last two years including one year of standard defect liability period. Bidder has to tie-up with the well qualified technology provider who having experience in India at least 50 % of the tendered capacity with 1 year O & M experience in government organizations of India.				
6	**Process Air Blowers or Aspirator Aerator:** The Plant should be based on Dissolved Oxygen/Oxygen Uptake Rate Control with VFD driven Aeration Device. The Aeration System shall be designed for 110 % Capacity of the design Air requirement. The aeration Blower/Aeration Device shall be having 100% installed standby unit. Air diffuser shall be of disk/ tubular type, retrievable. The wetted part of the aeration system of non-corrosive materials such as UPVC. Blowers shall be housed in process air blower building. The minimum area of the building is 20 sq.m. and height of 5m (min).				
7	**Raw sludge pump house:** Raw Sludge Sump minimum HRT of 30 minutes & depth of sludge limited to 2 m, 4.5 m minimum diameter, separate panel room outside the wet well				

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
C	**DISINFECTION**				
8	**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 min capacity, during average flow to achieve 99.99 % coliform reduction. Chlorine dose shall be maintained as per standard provisions, including designing, providing and constructing water supply provision for chlorination, including providing dewatering and by pass arrangement jointing to final effluent mains and outlet weir etc complete. The effluent quality should match with the standards laid down by Gujarat pollution control board and as per obligatory provision and as detailed specification and as directed by engineer in - charge.				
9	**Chlorinator and Chlorinator Room/Tonner Room**: Designing, providing and constructing chlorinators vacuum type 2 Nos, (1 working+ 1 stand by) with auto switchover facility and having capacity for dosage of adequate chlorine to ensure 99.99 % coliform reduction as per obligatory provisions and detailed specifications with necessary provision of having chlorinator room of adequate size. The chlorinator equipment shall include cost of chlorine cylinders/tonner, piping, valves, measuring and controlling equipment, safety devices , lifting equipment, etc. complete as per IS -10553 (part II) 1982. The tonner room should have minimum 3 MT capacity Hoist for loading and unloading facility. Tonner storage should be distinctly isolated and should be for minimum storage space as directed in the design specification and as per gas laws 1981 and factory act shall be provided. All other matching amenities shall be provided, Minimum 5 MT gantry rail shall be provided for full length of tonner room at 6 m height from level of tonner room, with outlet chamber and treated effluent outlet channel etc complete as per detailed specification.				
10	**Sludge treatment**				
10.1	**Sludge Thickner with equipments:** Solids loading rate of 25-35 kg/m2/day, Designing, providing & constructing watertight of sludge thickener-gravity type (picket fence) in RCC (M-30) with inlet & outlet pipes, central feed well, sludge it & sludge removal arrangement, grouting wherever necessary with walkway all around of 1.20m with GI pipe railing interconnecting CI pipes all complete as per specifications, having bottom slope 1:6 & min. 4.5m SWD with necessary fixed bridge scraper arrangement as per detailed specifications & necessary inlet & outlet arrangement. All other arrangement as per detailed specifications. (One unit upto 10 MLD and two units for more than 10 MLD). Min sludge concentration in thickened sludge shall be 4%.				
10.2	**Sludge Holding Sump :** Designing, providing and constructing of sludge sump and pump house of appropriate size with pumps, ceiling height minimum 6 m over sump for discharging sludge to centrifuge using CI pipe complete as per detailed specification.				
10.3	**Sludge Dewatering Equipment Room with Centrifuge or belt press or screw press or Filter Press or Combi-machine or Bag Type:** Designing, providing constructing and installing including foundation etc. Centrifuge or belt press or screw press or Filter Press or Combi-machine or bag Type to handle the sludge flow as per specifications, with appropriate inlet and outlet provision, sludge dewatering unit drain etc. Complete as per specifications.				
10.4	**Sludge/ filtrate Pumps**				
	a) Capacity to pump sludge in 1 hour with 100% standby (20-25% efficiency, "C" value to be adopted 50% than that of water to calculate friction loss)				
	b) Filtrate from thickening and dewatering to be conveyed only by PVC 10 kg/sq.cm.				
11	**Valves/gates**				
	Inlet, outlet ,wash water inlet – only CI D/F and minimum size of 200 mm as per approved make/brand.				
12	**All types gauges and meters** required for O & M as per design of specified make/brand.				
13	**Necessary Instrumentation and control** as per specifications				
14	**Outfall Sewer:** Designing, providing and constructing appropriate outfall sewer of RCC NP2 pipe, to discharge treated effluent from outlet chamber after chlorination tank to the disposal point at outlet battery limit of STP including necessary chambers for inspection and cleaning including necessary excavation, dewatering, refilling, concrete encasing/bedding concrete steps to reach the disposal/ nallah bed level. pitching and energy dissipation chamber in nallah portion etc. complete up to 500 m length RCC NP2 pipe line and including all above items.				
15	**By pass arrangements** RCC pipes with manholes and C.I. sluice gates (MH to be raised above TWL of adjacent unit)				
16	**Piping work in CI-LA Class including Sluice valves, Reflux Valves, MS Gates:** Providing laying and jointing pipes other than those already included in the above items for interconnection by - pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavations, refilling and hydraulic testing of pipes, valves, gates, accessories and cost of jointing materials. The items includes required channels with gates for interconnection of units by pass drains etc for all units as directed etc complete as per detailed specifications.				

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
17	**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 and ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M 200 framed structure B. B masonry (11- 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.				
	a) Ground floor to accommodate administrative office & laboratory				
	b) First floor to accommodate Office of the Plant In Charge, air monitoring equipments to measure wind direction & speed, hydrogen sulphide concentration etc.				
17.1	**Laboratory equipments** Laboratory equipment (as per specifications), beautification, telephone and intercom arrangement and wireless system.				
17.2	Furniture and Office Equipments, Office furniture (Make: Godrej/ or similar approved quality) as per specifications				
17.3	**Ventilation and Safety equipments** as per specifications				
17.4	**Sanitary blocks** Carpet area – 15 square meter minimum up to 25 MLD and 25 square meter above 25 MLD (or as specified).				
18	**Maintenance Workshop** of size as per specification				
19	**Air blower Building with Air Blowers:** Capable of delivering adequate free air for aeration device with suitable pressure (100% standby).				
20	**MCC Room** of minimum 9 m x 6 m clear inside with safety measures, approval of various statutory/ central/ foreign authority as applicable				
21	**Electric installation**				
21.1	Both internal and external including entire plant area (as specified).				
21.2	**Electric installation** - Sub Station Room as per specifications.				
22	**DG room with DG sets**, as per electric load and specifications (50 % energy requirement).				
23	**General Infrastructure Development:** Scope also includes, Designing, providing and constructing general infrastructure development such as internal roads of minimum 6 mtr wide, compound wall for STP site, internal street and building lightings, pathways of minimum 1 m wide to access all STP units and Entrance Gate in MS fabrication, etc. all complete as per specifications and directed by engineering in charge.				
23.1	**Internal roads** Asphalt road (Minimum 4.5 m) to connect all units from main gate of plot.				
23.2	**Compound Wall** as per the plant layout, long the boundary of STP site (considering plant layout for intermediate and ultimate build out capacity and 33% landscaping area).				
23.3	**Green Belt** (33% landscaping area) as per specification				
	NOTES: 1. Fine screens (SS 316) are of mechanically cleaned type for working unit and manual bar screen type (SS 316) for standby unit. 2. Upto 5 MLD Capacity STP chlorination may be done by using sodium hypochlorite solution. Above 5 MLD capacity gas chlorinator to be provided. 3. Gravity sludge thickener is not provided upto 3 MLD capacity STP. Sludge will be collected into sludge sump & pumped directly to sludge dewatering system. 4. Filter press or Bag Type dewatering can be provided for STP's upto 5MLD capacity. 5. Chlorinator room not provided for STP upto 3 MLD. 6. Boundary wall, gate, Internal plant roads, storm water drains, site clearance, landscaping is considered in scope. Plant road shall be 4.5m wide. 7. All water retaining structures are in M-30 grade of concrete. 8. Lead for excavation is considered as 500m. 9. Grade of steel used is Fe 415. 10. Peak factor considered for design for plants 2 to 5 MLD is 2.5, 6 to 20 MLD is 2.25.				
	11. The rates mentioned above STP are considering sites falling in Seismic Zone III. For sites falling in seismic zone IV and V shall be increased by 5% and 8% respectively. 12. Structural design criteria approved by technical committee shall be applicable for design. 13. Hydraulic design of the plant shall be considered with free fall discharge of treated sewage to local water body (above HFL). Hydraulic loss shall be worked out for peak flow condition and shall not exceed 4.5m in any circumstances unless otherwise site specific condition and approved by technical committee. 14. The cost of sewage pumping station and rising main is not included. 15. Makes of equipment shall be approved by GWSSB. 16. The rates includes excavation, refilling and throwing away extra stuff as directed by the Engineer in Charge. 17. All other details shall be as per design criteria and detail specifications.				

No.	Capacity of Plant MLD	No of Basin		Area Req (Ha)	Rate per MLD Rs. In Lakh
1	Up to 2	2	MLD	0.20	225.00
	Cost of 2MLD treatment plant				450.00
2	2 to 3 mld prorata	2	MLD	0.25	150.00
	Cost of 3MLD treatment plant				600.00

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
3	3 to 5	2	MLD	0.40	75.00
	Cost of 5MLD treatment plant				750.00
4	5 to 10	2	MLD	0.70	70.00
	Cost of 10MLD treatment plant				1,100.00
5	10 to 15	2	MLD	0.75	65.00
	Cost of 15MLD treatment plant				1,425.00
6	15 to 20	4	MLD	0.80	67.00
	Cost of 20MLD treatment plant				1,760.00
7	20 to 25	4	MLD	1.00	73.00
	Cost of 25MLD treatment plant				2,125.00
8	25 to 30	4	MLD	1.20	67.00
	Cost of 30MLD treatment plant				2,460.00
9	30 to 40	4	MLD	1.60	70.00
	Cost of 40MLD treatment plant				3,160.00
10	40 to 50	4	MLD	1.75	64.00
	Cost of 50MLD treatment plant				3,800.00
11	50 to 60	4	MLD	1.90	58.00
	Cost of 60MLD treatment plant				4,380.00
12	60 to 75	4	MLD	2.25	58.00
	Cost of 75MLD treatment plant				5,250.00
13	75 to 100	6	MLD	2.40	58.00
	Cost of 100MLD treatment plant				6,700.00
14	100 to 125	6	MLD	3.00	52.00
	Cost of 125MLD treatment plant				8,000.00
15	125 to 150	6	MLD	3.50	40.00
	Cost of 150MLD treatment plant				9,000.00
3	**Moving Bed Bio Reactor Technology (MBBR)**				
	Designing (hydraulic, process, structural and aesthetic), providing, construction, hydraulic testing, commissioning and giving satisfactorily trial run for 3 months of STP consisting of Inlet Chamber, Screen chamber, Grit Separator, MBBR (Based on technologies providing attached growth on plastic media kept suspended in the sewage due to low density of plastic & provided with diffused air for aeration with tank, Secondary Clarifier, Sludge collection sump, Gravity Sludge Thickener, Chlorine Contact Tank, Chlorinator room, Sludge Dewatering Equipment, associated piping work with required valves, gates, drains, Administration Block cum Laboratory, associated buildings, Laboratory Equipments, inclusive of mandatory spare parts and instrumentation, etc. complete as turnkey job with all involved civil, electrical, instrumentation and mechanical works inclusive of following items, units as per detailed specifications for civil, electrical, instrumentation and mechanical components with all duties and taxes etc. complete to achieve BOD < 10ppm, TSS < 10ppm, Biological TN < 10ppm & PO4 < 2ppm to get recyclable quality of water for industrial / agricultural purposes. The Coagulant Dosing System is mandatory for chemical phosphorus removal. All units shall be interconnected with administration building by Suitable or RCC overhead walkways.				
	Min. freeboard of 0.3m shall be maintained unless otherwise asked for 0.5m stipulated for specific units.				
A	**PRIMARY TREATMENT**				
1	**Inlet Chamber :** Designing, providing, and constructing RCC (M:30) inlet chamber for the peak flow as per CPHEEO Manual including necessary excavation in all types of strata including walkway all around the periphery. Inlet chamber having minimum HRT of 60 seconds, each compartment will have steel gates with extension rod, head stock operating wheels. GI pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications.				
2	**Screen Chamber :** Designing , providing, constructing, testing and commissioning of Two approach channels (min 4.5 m long), mechanically cleaned bar rack screen (6 mm clear opening 10 mm the. flats), Escalator screens, with 100% standby manual fine screen (10 mm clear opening) MOC: SS316, CI sluice gates (one before screen & one after screen) , designed as per CPHEEO Manual in RCC (M -30), including inlet pipe/ channel from inlet chamber, outlet pipe / channel to detritus tank, free board of 0.5 m minimum, RCC walkway 1.2 m wide with GI pipe railing. RCC stair case of 1.2 m width from GL to screen chamber. with operating platform and belt conveyor system incl. panel & push bottom switch at local level as well as MCC room for two way control.				
3	**Grit Chamber :** Designing, providing and constructing grit Chamber- Detritus or vortex type or aerated type (100% standby), mechanically operated in RCC (M 30) capable of removing 100% of 0.2 mm size particle and above, having specific gravity 2.40, HRT of 1 minute at average flow (Detritus Tank), horizontal velocity not exceeding 0.30 m/sec (Detritus Tank) at peak flow with suitable arrangement of separation of grit from putrescible solids. Inlet and outlet channels of required sizes as may be required to connect the flow to connecting unit etc. Complete including hydraulic testing for water tightness of structure having minimum FB of 0.3 m, wash out arrangement to Grit chamber and platform 1.2 m wide RCC walkway with GI pipe handling shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as detailed specifications and as directed.				
4	**Parshall flume** having head loss limited to 0.15 m with necessary flow measuring devices/meter consisting of digital indicator in LPS & MLD				
B	**SECONDARY TREATMENT**				

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
5	**Distribution Chamber** Distribution chamber with CI sluice gates for each basin of MBBR and bypass chamber, min. 3m x 2m of required depth, operating platform with CI pipe to connect to MBBR basins. Bypass pipe from distribution chamber upto inlet of CCT shall be provided in RCC pipe with manholes and CI sluice gates.				
6	**MBBR Tank** Minimum Total HRT of 6.0 hours (at average flow with Aerobic Detention Time - 4.5 Hrs & Anoxic Detention Time -1.5 Hrs), Designing, providing & constructing in RCC (M-30) biological reactor tank for removal of BOD and T-N to handle the average flow & having hydraulics suitable to handle peak flow conditions with suitable 1.2m wide walkway, expansion joints as required, including foundation etc as per specifications. The tank shall be equipped with inlet & outlet arrangement, process air blowers for supply of air, fine bubble diffusers of EPDM material / Coarse bubble aeration grid in SS-304, PP (virgin plastic material of minimum 600 m2 specific surface area/ m3) carrier bio media etc. FB of 0.5m & SWD as required should be complete as per detailed specifications. The outlet of tank shall be provided with strainer (SS-304) for preventing escape of Media from the tank. (One unit upto 10 MLD and two units for more than 10 MLD) Air pipe of GI and Sub water pipe of SS316 material. Volume of the bio media shall not be less than 20% of the volume of the tank. Process air blowers of rotary twin lobe shall be capable of providing adequate oxygen for biological process to maintain minimum DO of 2 mg/lit in MBBR basin and also to keep media in suspension. In addition there would be internal sludge recirculation facility from Aerobic Tank to Anoxic Tank as per standard Design practice.				
7	**Process Air Blowers or aeration Device** The Plant should be based on Dissolved Oxygen/Oxygen Uptake Rate Control with VFD driven Aeration Device. The Aeration System shall be designed for 110 % Capacity of the design Air requirement. The aeration Blower/Aeration Device shall be having 100% installed standby unit. Air diffuser shall be of disk/ tubular type, fixed/retrievable. The wetted part of the aeration system of non-corrosive materials such as UPVC. Blowers shall be housed in process air blower building. The minimum area of the building is 20 sq.m. and height of 5m (min). The surface Aerators are not acceptable.				
8	**Secondary Clarifier** Designing, providing & constructing in RCC (M-30) water tight secondary clarifier as per design guidelines by CPHEEO manual. The settler shall be provided with a scraper mechanism in MS with epoxy painting for collecting the settled solids at the bottom .The sludge will be collected in sludge sump by gravity & supernatant will flow over a weir & will be collected in a launder. Return Sludge Pump House - wet well with minimum HRT of 60 minutes upto flow of 80% of return sludge capacity and depth of sludge to be limited to 2m, separate panel room outside wet well, 100% standby pumps.				
9	**Raw sludge pump house** Sump with minimum HRT of 30 minutes & depth of sludge limited to 2 m, 4.5 m minimum diameter, separate panel room outside the wet well				
C	**TERTIARY TREATMENT** Coagulant Dosing System/ Flash Mixer + Flocculation + Settling Tank/ Clariflocculator. The design values of the tertiary treatment units are to be considered from CPHEEO Manual on Water Supply & Treatment.				
10	**Flash Mixer** Rapid mixing device design confirming to IS: 7090 of 1985. Detention time 60 sec, velocity gradient 300-400 sec-1 with fans gear and motor assembly as per design.				
11	**Coagulant Dosing System** Dosing Tanks- 2Nos. With mixing, carrying, dosing with piping arrangement. Chemical Storage area as per data/specifications				
12	**Flocculation Tank** RCC Hopper bottom units having slope >45 Deg as per hydraulic and process design with detention period 20 minutes with flocculator paddles with gear and motor assembly as per design. Flocculator design conforming to IS: 7208-1974 (Type-C). Surface loading rate 8000 liters/hour/sq.m and depth 2.5m using PVC media with supporting arrangement and sludge collecting pipes as per detail specifications.				
13	**Filter Feed Sump & Pumps**				
14	**Pressure Sand Filters** for STP capacities less than 10MLD				
15	**Rapid Sand Gravity Filters with shed** Applicable to plant capacity above 10MLD only. Filter House (RCC framed structure with infill brick masonry walls) and RCC filter beds with sand and gravel bedding as per hydraulic and process design adopting 6000 Liters/hour/sq.m. Filtration rate with 2m water above sand media with under drainage system and inlet, outlet, backwash (rate 600LPM per Sq.m.) piping, pipe gallery, platform min. 5.5m in width and valves/gates arrangement as per design and detail specifications.				
15.1	**a. Filter Sand**				
	Effective size 0.45 to 0.7 mm, uniformity coefficient not more than 1.7 nor less than 1.3, depth of sand 0.75m, free board 50cm, gravel 0.45m in depth, sand and gravel confirming to IS: 8491 (i)- 77, backwash by air wash (if specified) and hard wash by water, standard appurtenances (to be specified), rate of flow controller, filter gauge, sand expansion gauge, etc.				
15.2	**Wash Water Tank** Wash Water tanks of capacity equal to 2% of designed quantity of filtered water in a day (+) 10% with 8 to 10 Mtr. Head (as specified)				

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
15.3	**Wash Water Pumps** Wash Water Pumps with 100% Standby				
15.4	**Air Blowers** Capable of delivering 750 to 833 LPM per sq.m of free air flow area at 0.35 to 0.4 Kg/sq.m at the under drains (100% standby). (For capacity of FP more than 10 MLD)				
15.5	**Valves/gates** Inlet, outlet, wash water inlet- outlet and all types and sizes of valves/gates as per design of specified make/brand.				
15.6	**All types gauges and meters** required for filter operations and backwashing etc.				
15.7	**The filtration system could also be well tested cloth media disk filtration**.				
D	**DISINFECTION**				
16	**Chlorine Contact Tank** Designing, providing and constructing chlorine contact tank of adequate capacity to deal with average flow. The CCT shall have baffle walls for enhancing mixing of chlorine. One unit of two compartments, contact time 30 minutes of average flow to achieve 99.99% reduction in coliform. Chlorine dosage shall be minimum 5 ppm provision including designing, providing & constructing water supply system for chlorination, chemicals preparation, domestic use, gardening etc. complete.				
17	**Chlorinator & Chlorinator Room / Tonner Room** Designing, providing and constructing vacuum type chlorinators having adequate capacity for dosage of adequate chlorine to ensure 99.99% coliform reduction as per obligatory provisions detailed specifications with necessary provision of having chlorinator room of adequate size. The chlorinator (min. 1W+1SB) equipment shall include chlorine cylinders, tonners, piping, valves, measuring controlling equipments, safety devices, lifting equipment, chlorine booster pumps (min. 1W+1SB) etc. complete as per IS-10553 (Part-II). The tonner room should have min. 3 MT capacity crane for loading & unloading facility, neutralization pit. Tonner storage should be distinctly isolated and should have min. storage space for 15 days as per the detailed specifications & as per gas law & factory act shall be provided. Chlorination room of minimum 25 m2 area shall be provided. All other matching amenities shall be provided, 5 MT gantry rail shall be provided for full length of tonner room a 6 m Ht from level of tonner room with outlet.				
18	**Sludge treatment**				
18.1	**Gravity Sludge Thickener** Solids loading rate of 25-35 kg/m2/day, Designing, providing & constructing watertight of sludge thickener-gravity type (picket fence) in RCC (M-30) with inlet & outlet pipes, central feed well, sludge it & sludge removal arrangement, grouting wherever necessary with walkway all around of 1.20m with GI pipe railing interconnecting CI pipes all complete as per specifications, having bottom slope 1:6 & min. 4.5m SWD with necessary fixed bridge scraper arrangement as per detailed specifications & necessary inlet & outlet arrangement. All other arrangement as per detailed specifications. (One unit upto 10 MLD and two units for more than 10 MLD). Min sludge concentration in thickened sludge shall be 5%.				
18.2	**Sludge Holding Sump** Minimum HRT of 4 hours, Designing, providing and constructing of sludge holding sump and pump for discharging sludge to centrifuge using CI pipe complete as per detailed specification. Agitators/Mixers shall be provided in sump for keeping sludge in suspension. The pump shall be of Helical Screw pumps, 100% standby.				
18.3	**Sludge Dewatering Equipment Room with Centrifuge or belt press or screw press or Filter Press or Combi-machine or Bag Type:** Designing, providing constructing and installing including foundation etc. Centrifuge or belt press or screw press or Filter Press or Combi-machine or bag Type to handle the sludge flow as per specifications, with appropriate inlet and outlet provision, sludge dewatering unit drain etc. Complete as per specifications.				
18.4	**Sludge/ filtrate Pumps**				
	a) Capacity to pump sludge in 1 hour with 100% standby (20-25% efficiency, "C" value to be adopted 50% than that of water to calculate friction loss)				
	b) Filtrate from thickening and dewatering to be conveyed only by PVC 10 kg/sq.cm.				
19	Valves/gates				
	Inlet, outlet ,wash water inlet – only CI D/F and minimum size of 200 mm as per approved make/brand.				
20	All types **gauges and meters** required for O & M as per design of specified make/brand.				
21	Dewatering during entire work using any technique.				
22	Necessary **Instrumentation and control** as per specifications				
23	**Outfall Sewer** It shall be designed for peak flows. Designing, providing, constructing appropriate sized outfall sewer of RCC (NP2 class) pipe to discharge treated effluent to the local water body/nallah at the point shown on the drawing including necessary chambers for inspection & cleaning including excavation, dewatering, refilling including appropriate bedding.				
24	**Piping work including Valves and Gates** Providing, laying and jointing plant pipes as per specifications, including interconnection bypass arrangement etc. of treatment units including adequate numbers of manhole chambers. The item includes excavations, refilling & hydraulic testing of pipes, valves, gates, accessories & cost of jointing materials. The item includes required channels with gates or interconnection of units, etc. for all units as directed etc. complete as per detailed specifications. Sludge pipes shall be sized for maintaining minimum velocity for prevention of solids.				

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
25	**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 and ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M 200 framed structure B. B masonry (11- 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.				
	a) Ground floor to accommodate administrative office & laboratory				
	b) First floor to accommodate Office of the Plant In Charge, air monitoring equipments to measure wind direction & speed, hydrogen sulphide concentration etc.				
25.1	Laboratory equipments Laboratory equipment (as per specifications), beautification, telephone and intercom arrangement and wireless system.				
25.2	Furniture and Office Equipments, Office furniture (Make: Godrej/ or similar approved quality) as per specifications				
25.3	**Ventilation and Safety equipments** as per specifications				
25.4	Sanitary blocks Carpet area – 15 square meter minimum up to 25 MLD and 25 square meter above 25 MLD (or as specified).				
26	**Maintenance Workshop** of size as per specification				
27	**Air blower Building with Air Blowers:** Capable of delivering adequate free air for aeration device with suitable pressure (100% standby).				
28	**MCC Room** of minimum 9 m x 6 m clear inside with safety measures, approval of various statutory/ central/ foreign authority as applicable				
29	**Electric Installation:** Both internal and external including entire plant area as per technical specifications. DG set shall be provided for min. 50% of electrical load on average flow condition. DG room shall be provided. Instrumentation shall be provided in the plant which includes level sensors, DO sensor, residual chlorine analyser, pressure gauges, flow meters, level switches, pressure indicating and temperature transmitters, alarms, etc. Maintenance workshop of size 5m x 4m x 3.5m shall be provided.				
30	**General Infrastructure Development:** Scope also includes, Designing, providing and constructing general infrastructure development such as internal roads of minimum 6 mtr wide, compound wall for STP site, internal street and building lightings, pathways of minimum 1 m wide to access all STP units and Entrance Gate in MS fabrication, etc. all complete as per specifications and directed by engineering in charge.				
30.1	**Internal roads** Asphalt road (Minimum 4.5 m) to connect all units from main gate of plot.				
30.2	**Compound Wall** as per the plant layout, long the boundary of STP site (considering plant layout for intermediate and ultimate build out capacity and 33% landscaping area).				
30.3	**Green Belt** (33% landscaping area) as per specification				
Sr. No.	Capacity of Plant (MLD)				**Rate (Rs. in Lacs per MLD)**
1	Up to 2				212.000
	Cost of 2MLD treatment plant				424.000
2	2 to 3				137.000
	Cost of 3MLD treatment plant				561.000
3	3 to 5				62.000
	Cost of 5MLD treatment plant				685.000
4	5 to 10				61.000
	Cost of 10MLD treatment plant				990.000
5	10 to 15				60.000
	Cost of 15MLD treatment plant				1290.000
6	15 to 20				50.000
	Cost of 20MLD treatment plant				1540.000

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
	NOTES: 1. Fine screens (SS 316) are of mechanically cleaned type for working unit and manual bar screen type (SS 316) for standby unit. 2. For chemical precipitation, Flash mixing Tank and Flocculation Chamber are optional. The design values of the coagulation systems are to be considered from CPHEEO Manual on Water Supply & Treatment. 3. Upto 5 MLD Capacity STP chlorination may be done by using sodium hypochlorite solution. Above 5 MLD capacity gas chlorinator to be provided. 4. Gravity sludge thickener is not provided upto 3 MLD capacity STP. Sludge will be collected into sludge sump & pumped directly to sludge dewatering system. 5.Filter press or Bag Type dewatering can be provided for STP's upto 5MLD capacity. 6. Chlorinator room not provided for STP upto 3 MLD. 7. Boundary wall, gate, Internal plant roads, storm water drains, site clearance, landscaping is considered in scope. Plant road shall be 4.5m wide. 8. All water retaining structures are in M-30 grade of concrete. 9. Lead for excavation is considered as 500m. 10. Grade of steel used is Fe 415. 11. Peak factor considered for design for plants 2 to 5 MLD is 2.5, 6 to 20 MLD is 2.25.				
	12. The rates mentioned above STP are considering sites falling in Seismic Zone III. For sites falling in seismic zone IV and V shall be increased by 5% and 8% respectively. 13. Structural design criteria approved by technical committee shall be applicable for design. 14. Hydraulic design of the plant shall be considered with free fall discharge of treated sewage to local water body (above HFL). Hydraulic loss shall be worked out for peak flow condition and shall not exceed 4.5 m in any circumstances unless otherwise site specific condition and approved by technical committee. 15. The cost of sewage pumping station and rising main is not included. 16. Makes of equipment shall be approved by GWSSB. 17. The rates includes excavation, refilling and throwing away extra stuff as directed by the Engineer in Charge. 18. All other details shall be as per design criteria and detail specifications.				
4	**Waste Stabilization Pond(Oxidation Pond)**				
	Constructing Waste stabilization pond of size as per design and drawing including providing and laying flat brick pitching 12 cm thick in C.M. 1:6 including filling in joints with C.M. and cement pointing 1 :2 on surface, providing and laying dry rubble pitching 20 cm thick at side of embankment of oxidation pond, providing and fixing/fitting inlets, outlets ,distribution boxes ,valves and gates levelling the bed and constructing earthen embankment of size and slope in 30cm layers including watering and consolidating to MDD At OMC as per soil expert's advice.				
	A) Up to 2 MLD		MLD		**1,222,000.00**
	B) Beyond 2MLD but not exceeding 4MLD		MLD		**1,076,000.00**
	C) Beyond 4MLD but not exceeding 10 MLD		MLD		**1,091,000.00**
	D) Beyond 10MLD		MLD		**1,071,000.00**
5	**Aerated lagoon type sewage treatment plant**				
5	Designing (hydraulic, process, structural and aesthetic),constructing and commissioning Aerated Lagoon Sewage Treatment Plant consisting of all Civil, Mechanical, Electrical, instrumentation components of various sub-works as given below including necessary hydraulic testing, structural testing, equipment testing, trial run for 3 months, etc. complete as directed by Engineer-in-charge (turn-key job).				
5.1	Minimum free board of 0.6 m shall be maintained unless other wise asked for 0.5 m stipulated for specific units.				
5.2	Inlet chamber having minimum HRT of 60 seconds with platform, hand railing & hand wheel operated CI sluice gates for each channel and plant bypass mechanism				
5.3	Two approach channels (min 4.5 m long), mechanically cleaned bar rack screen 100% standby (20 mm clear opening 10 mm the. flats), CI sluice gates (one before screen & one after screen) with operating platform and walkway on both sides with hand railing, belt conveyor system incl. panel & push bottom switch at local level as well as MCC room for two way control				
5.4	Grit Chamber (100% standby units) of 1 m and surface loading suitable for sp. Gr of 2.4, HRT of 1 minute at average flow, horizontal velocity not exceeding 0.30 m/sec at peak flow comprising CI sluice gates at upstream to regulate flows to either chamber as well as bypass units				
5.5	Parshall flume having head loss limited to 0.15 m with necessary flow measuring devices/meter consisting of digital indicator in lps & mld				
5.6	Distribution chamber with CI sluice gates for each lagoon & bypass chamber, min 2.4 m x 1.8 m of required depth, operating platform with CI pipe upto central pier				

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
5.7	Facultative aerated lagoons including all excavations/civil works/embankment work/brick/stone pitching , baffles, fixed platforms, walk ways with rilings, fixed type surface aerators, polishing pond if required as per specifications etc. complete. The design considerations shall be as stated earlier and shall confirm to the latest stipulation of Manual on Sewerage & Sewage Treatment. CPHEEO, Ministry of Urban Development. The design of the Surface Aeration System shall be worked out as per design standard criteria as per the Oxygen transfer efficiency given by the approved manufacturers. Necessary calculations of oxygen demand using standard formula taking into consideration the oxygen saturation value of sewage, temperature, barometric pressure, D.O to be maintained in the waste etc. Including calculations for determining conversion factor for assessing oxygen deviations from standard conditions to field conditions should be submitted along with the bidder's design information.				
	Surface fixed type aerators is worked out. Each radial flow low speed aerator shall comprise:				
	Suitable HP electric motor, 1440 rpm, TEFC type, IP 55 PROCTECTION, CLASS F insulation, vertical flange mounted. Aerator duty HELICAL GEAR BOX with service factor of 2, drywell arrangement on output shaft to make it oil leak proof, integrally cast MOUNTING BLOCKS WITH CASTING to facilitate aerator cone immersion adjustment in water. AERATOR CONE of appropriate technical design, statically balanced along with DRIVE TUBE in mild steel, sand blasted epoxy painted construction. Cone speed shall be nearly 55 rpm and shall not exceed 60 rpm. MOUNTING STUDS and FASTENERS shall be in mild steel galvanized construction.				
	After aeration flow shall discharge over outlet which shall be provided with adjustable FRP weir to adjust the TWL in lagoons within range of 100 mm. Suitable baffles of adequate size shall be provided to dampen the waves in lagoon due to aerators.				
5.8	Distribution chamber with CI sluice gates for each compartment of aerated lagoons & bypass chamber, min 2.4 m x 1.8 m of required depth, operating platform with CI pipe upto central pier				
5.9	MCC Room of minimum 9 m x 6 m clear inside with safety measures, approval of various statutory/ central/ foreign authority as applicable				
5.10	Administrative Building in Two Storeys (floor wise area as specified)				
	Ground floor to accommodate administrative office & laboratory				
	First floor to accommodate Office of the Plant In Charge, air monitoring equipments to measure wind direction & speed, hydrogen sulphide concentration etc.				
5.11	By pass arrangements RCC pipes with manholes and C.I. sluice gates (MH to be raised above TWL of adjacent unit)				
	Drainage arrangements RCC pipes up to plot boundary (as specified) diameter as per design.				
5.12	Electric installation.				
	Both internal and external including entire plant area (as specified).				
5.13	Laboratory equipments				
	As per requirement (to be specified during tendering).				
5.14	Sanitary blocks.				
5.15	Carpet area 15 square meter minimum up to 25 MLD and 25 square meter above 25 MLD (or as specified).				
5.16	Administrative block and internal roads.				
	To accommodate office room, laboratory room, and asphalt road to connect all units from main gate of plot.				
5.17	Dewatering during entire work using any technique.				
	Notes				
	(l)Conditions from Sr. No.7 to 7.25 shall from a part and parcel of the tender and must be incorporated in draft tender papers of aerated lagoon type Sewage Treatment Plants.				
	(2)Lhe necessary changes should be carried out as per Site condition and project requirements at the time of preparing DLP s Inlet chamber can be dropped when Aerator is proposed otherwise it should be included.				
	(3) Hydraulic loss in entire Aerated lagoon shall not exceed 1.0 m in any circumstances unless otherwise site specific condition design criteria approved by Technical committee shall be referred and item description shall be modified accordingly				
	(4) Structural design criteria approved by technical committee shall be applicable for design.				
	(5) Design flow shall be specified in mid in data sheet. No separate overloading provision shall be kept in any tender clause.				
	(6) All other details shall be as per design criteria and detail specifications.				
	(7) The following rates are for sites falling in seismic zone III for sites falling in zone IV and V rates shall be increased 5% and 8 % respectively				
	(8) The rates includes excavation ,refilling and throwing away extra stuff to lead up to 500m				
	A) Up to 5 MLD		MLD		**2,545,000.00**
	B) Beyond 5 MLD		MLD		**2,142,000.00**

ITEM NO.	DESCRIPTION		UNIT		Rate for 2019-20
6	**DEWATS (Decentralized wastewater treatment system)**				
	Detailed design and engineering of Providing, construction, testing and commissioning DEWATS (Decentralized waste water treatment system) plant for sewage treatment based on anaerobic treatment systems. Constructing of settling chambers (Primary, secondary), anaerobic baffle reactor, anaerobic filter, treated water storage tank, necessary piping works for inlet, outlet, scouring and Bypass arrangement with required valves, gates, drain, screen, inlet chambers etc. complete including cost of all associated civil, mechanical, electrical works, process and instrumentation diagram, hydraulic diagram, site layout plan and site grading plan, single line diagram, control philosophy, quality assurance plan, civil and mechanical General arrangement drawings, structural designs and drawings, construction drawings, mechanical equipments datasheets and drawings, as-built drawings, operation and maintenance manuals, etc. complete.				
	UNITS INCLUDED:				
	1. Settling Chambers (Primary and/or secondary) 2. Anaerobic Baffle Reactor 3. Anaerobic Filter 4. Treated water storage tank				
	NOTES: 1.) The necessary changes should be carried out as per Site condition and project requirements at the time of preparing DTP's. 2.) Structural design criteria approved by technical committee shall be applicable for design. 3.) Design flow shall be specified in mld in data sheet. No separate overloading provision shall be kept in any tender clause. 4.) All other details shall be as per design criteria and detail specifications. 5.) The rates includes excavation, refilling and throwing away extra stuff to lead up to 50m.				
	A) Cost of 0.1 MLD capacity DEWATS		No	-	**1,800,000.00**
	* Add (Prorate) for capacity above 0.1MLD up to 0.25MLD		0.05 MLD	-	**580,000.00**
	B) Cost of 0.25 MLD capacity DEWATS		No	-	**3,540,000.00**
	* Add (Prorate) for capacity above 0.25MLD up to 0.5MLD		0.05 MLD	-	**550,000.00**
	C) Cost of 0.5 MLD capacity DEWATS		No	-	**6,290,000.00**
	* Add (Prorate) for capacity above 0.5MLD up to 0.75MLD		0.05 MLD	-	**500,000.00**
	D) Cost of 0.75 MLD capacity DEWATS		No	-	**8,790,000.00**
	NOTE: **Planted Gravel Filter bed shall be provided separately if required and the rate of the same shall be derived.**				

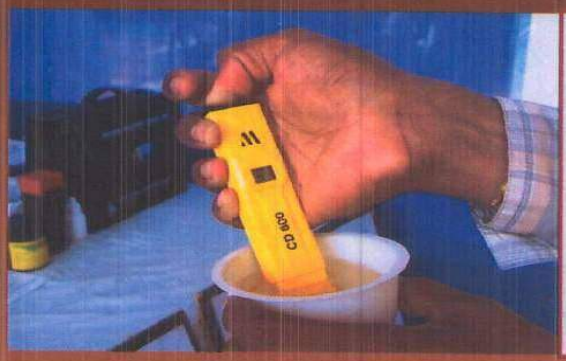
Chamber & Manhole Items

Section :- D

SECTION : 2.D - Chambers & Manholes				
ITEM NO.	**DESCRIPTION**	**UNIT**		**Rate for 2019-20**
Item no.1	**Valve Chambers and Manholes**			
	Construction of valves chambers in brick or bela stone masonry, locally available in C. M. 1:6. Foundation concrete 150 mm thick in C. C. 1:4:8 of trap metal size 25 mm to 40 mm thick, inside cement plaster in C. M. 1:3 and cement pointing outside in C. M. 1:3 and top cover of precast RCC slab 100 mm thick (with key hole in two parts, each with handles or MS Bar etc. complete as given size) Upto 1 Mt. depth from G. L. to pipe invert level incl. complete civil works but excl. cost of excavation and refilling, with cast in situ RCC slab in one single piece with fixing of CI-MH Frame and cover (excl. cost of CI-MH Frame and cover) with 23 mm thick brick masonry wall in C.M.1:6			
a)	**Size of 1.30 m x 1.30 m and 1.0 m deep**			
1	With precast slab in two parts 15 mm	No.		**10,961.00**
2	- do - with single piece 10 cm with fixing M. H. cover	"		**10,330.00**
3	With bela in two parts 15 cm :	"		**10,699.00**
4	- do - in single piece 10cm	"		**9,973.00**
5	For 1 Mtr. Extra Depth			**5,875.00**
b)	**Size of chamber 1.30 m x 0.90 m and 1.0 mt deep**			
1	With precast slab in two parts 15 cm	No.		**9,067.00**
2	- do - with single piece 10 cm with fixing M. H. cover	"		**8,577.00**
3	With bela in two parts 15cm	"		**8,864.00**
4	- do - in single piece 10cm	"		**8,300.00**
5	For 1 Mtr. Extra Depth			**5,100.00**
c)	**Size of chamber 0.90 m x 0.90 m and 1.0 mt. deep**			
1	With precast slab in two parts 15 mm	No.		**7,472.00**
2	- do - with single piece 10 cm with fixing M. H. cover	"		**7,091.00**
3	With bela in two parts	"		**7,314.00**
4	- do - in single piece	"		**6,876.00**
5	For 1 Mtr. Extra Depth			**4,325.00**
d)	**Size of chamber 0.60 m x 0.60 m and 1.0 mt. deep**			
1	With precast slab in two parts 15 mm	No.		**5,195.00**
2	- do - with single piece 10 cm with fixing M. H. cover	"		**4,961.00**
3	With bela in two parts	"		**5,098.00**
4	- do - in single piece	"		**4,829.00**
5	For 1 Mtr. Extra Depth			**3,163.00**
Item no.2				
Sewer Manholes				
	Providing and constructing Sewer manholes, scraper manholes and unit house connection chamber, as per the type design in brick masonry in C. M. 1:5 and inside and outside 20mm thick plastering in C. M. 1:3 necessary 100 mm coping with reinforcement in R.C.C.M. 200 fixing C. I. steps and fixing manhole frame and covers (But excluding supply of manhole frame and covers) over manholes and house connection chambers and fixing Manhole covers (but excluding supplying of manhole covers) over scraper manhole etc. complete, providing and fixing safety chain wherever necessary as per the stipulations in the type design complete as per latest CPHEEO manual. (excl. excavation).			
a)	**Manhole type "A" Circular type having inside diameter of 1200 mm for depth upto 1.5 m depth (for 150 mm to 500 mm dia sewer)**			
1	Manhole type "A" as above but upto 1.0 M depth.	No.		**11,760.00**
2	Extra depth beyond 1.0 M but upto 1.5 M depth for "A" type manhole above.	R.Mt.		**6,400.00**
b)	**Manhole type "B" circular type having inside diameter of minimum 1500 mm and for depth from 1.5 M to 4.0 M (for 150 mm to 600 mm dia sewers)**			
1	Manhole type "B" as above but upto 1.5 M depth.	No.		**20,390.00**
2	Extra depth beyond 1.5 M but upto 4.0 M depth for type "B" manhole above.	R.Mt.		**11,890.00**
c)	**Manhole type "C" circular type having inside diameter of minimum 1500 mm and for depth beyond 4.0 m to 6.0 m (for 150 mm to 1800 mm dia sewers)**			
1	Manhole type "C" as above but upto 4.0 M depth.	No.		**51,090.00**
2	Extra depth beyond 4.0 M and up to 6.0 M depth for type "C" Manhole above.	R.Mt.		**18,140.00**
d)	**Manhole type "D1" circular type having inside diameter of minimum 1500 mm and for depth beyond 6 m to 10 m (for 150 mm to 500 mm diameter sewers)**			
1	Manhole type "D1" as above but upto 6.0 m depth	No.		**88,040.00**
2	Extra depth beyond 6.0 m and upto 10 mt depth but type "D1" manhole above.	R.Mt.		**21,350.00**
e)	**Manhole type "D2" circular type having inside diameter of minimum 1500 mm and for depth beyond 6.0 M to 10.0 M (for 600 mm to 1000 mm dia sewers)**			
1	Manhole type "D2" as above but upto 6.0 m depth	No.		**86,730.00**
2	Extra depth beyond 6.0 m and upto 10.0 m depth for type "D2" manhole above.	R.Mt.		**21,360.00**
f)	**Manhole type "D3" circular type having inside diameter of minimum 1900 m and for depth beyond 6.0 m to 10.0 m (for 1100 mm to**			
1	Manhole type "D3" as above but upto 6.0 m depth	No.		**105,390.00**
2	Extra depth beyond 6.0 m and upto 10.0 m depth for type "D3" manhole above.	R.Mt.		**25,120.00**

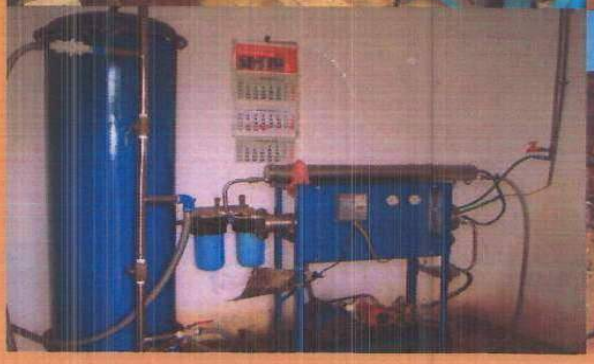
ITEM NO.	DESCRIPTION	UNIT		Rate for 2019-20
g)	**Scraper manhole type "SI" rectangular type for 600 mm dia t0 1200 mm dia sewer pipes and for depth 2.5 m to 9.0 m**			
1	Scraper manhole type "SI" as above but upto 2.5 m depth.	No.		**50,520.00**
2	Extra depth beyond 2.5 m and upto 9.0 m depth for type "SI" scraper manhole above.	R.Mt.		**30,810.00**
h)	**Scraper manhole type "S2" rectangular type for 1400 mm dia. sewer pipes and for depth 2.5 m to 9.0 m**			
1	Scraper manhole type "S2" as above but upto 2.5 m depth.	No.		**46,450.00**
2	Extra depth beyond 2.5 m and upto 9.0 m depth for type "S2" scraper manhole above.	R.Mt.		**19,670.00**
Item no.3				
Vertical Drop Manhole arrangement				
	Providing and constructing vertical drop arrangement of 0.6 m and more height as required including providing and jointing special such as double T. Bend required stoneware pipe fixed in m-100 C. C. at required level as type design cutting, jointing and filleting as per specification etc. complete.			
1	Vertical drop arrangement as above upto 0.6 m height.	No.		**2,080.00**
2	Extra over item No.3.1 above for additional drop beyond 0.6 m	R.Mt.		**1,860.00**
Item no.4				
Chamber for House Connection				
	Providing and constructing rectangular brick masonry chamber for house connection as per type design in brick masonry in C. M. 1:3 including M-100 in foundation M-150 in benching inside plastering in C. M. 1:3 and outside plastering in C. M. 1:3 coping in M200 and fixing RCC precast manhole frame and covers, but Excl. supply of manhole and cover etc. complete excl. excavation.			
		No.		**7,650.00**
Item no.5				
Ventilating Column				
	Providing and erecting C. I. and MS ventilating columns 15 cms. dia. with C.I. ornamental cap and Min 6.00 Mtr. Height (Height may be varying as per site) base fixed firmly with necessary foundation with one coat of red lead oxide paint and one coat of any approved colour with 15 cms, dia.10 Mt.in length with 0.35mt*0.35mt* M100 Encasing, stoneware or R.C.C. pipe connection with M.H. including excavation and jointing as required etc. complete. as per drawing.			
1	For 6 Mtr. Height (6 Mt MS pipe)	No.		**34,960.00**
2	For 12 Mtr. Height (2 m CI and 10m MS)	No.		**42,600.00**
Item no.6				
Temporary/Permanent plugging and blocking of sewer line, branch connections and diversion of flows and removal of all plugs, etc.				
a	300mm dia. & below sewer line	No.		**1,250.00**
b	400 to 500mm dia. Sewer line	No.		**1,500.00**
c	600 to 700mm dia. Sewer line	No.		**2,500.00**
d	800mm dia.	No.		**3,000.00**
e	900mm dia.	No.		**3,600.00**
f	1000mm dia.	No.		**4,150.00**
g	1200mm dia.	No.		**5,000.00**
h	1400 mm dia.	No.		**5,500.00**
i	1600mm dia.	No.		**7,000.00**
j	1800 mm dia.	No.		**7,500.00**
Item No.7				
	Loosen, de-silt and thoroughly clean and remove debris and objects such as boulders, bricks etc. bacteriological slimes, roots, encrustations, grease, carbonated deposits, etc from the sewer line including disposal of silt / debris / malba / objects etc. by super suction machine.			
a	300mm dia.& below	Rmt.		**1,230.00**
b	350mm dia. Sewer line	Rmt.		**1,435.00**
c	450mm dia. Sewer line	Rmt.		**1,845.00**
d	600mm dia.	Rmt.		**2,460.00**
e	800mm dia.	Rmt.		**3,280.00**
f	900mm dia.	Rmt.		**3,700.00**
g	1050mm dia.	Rmt.		**4,450.00**
h	1100 mm dia.	Rmt.		**4,620.00**
i	1200mm dia.	Rmt.		**5,040.00**
j	1400 mm dia.	Rmt.		**5,880.00**
k	1600 mm dia.	Rmt.		**6,720.00**
l	1800 mm dia.	Rmt.		**7,560.00**
m	2000 mm dia.	Rmt.		**8,500.00**

ITEM NO.	DESCRIPTION	UNIT		Rate for 2019-20
Item No.8				
	Sewer Cleaning Equipment			
a	**Supplying, testing and Commissioning Jetting cum suction machinery** inclusive of four wheeler vehicle TATA 1613/Eicher 20.16 or equivalent make with suitable RPM Imported Italian make Triplex Plunger Pump of running on vehicle engine having flow rate of minimum 255 LPM and pressure minimum 140 bar with high pressure jetting hose of I.D. 25.4 mm and length 60 mt with MS tank of minimum 5 mm thickness having total tank capacity 9000 lit. Partitioned with fresh water of 5000 litre and sludge tank of 4000 litre. With suction unit inclusive of vacuum pump of minimum capacity 390 m3/hr having maximum vacuum pressure of 85 to 95% having maximum operating relative absolute pressure of 1.5 bar running on vehicle engine with tank suction hose 75mm dia and length 15 mt. etc. complete with hydraulic system, hose reel, PTO (power take off unit), control panel, valves, instruments, accessories etc with cost of vehicles, etc. complete conforming with tender specifications and IS:11387-1985 or its latest revision			
		No.		**3,938,750.00**
b	**Supplying, testing and Commissioning Jetting machinery** inclusive of Four wheeler of MAKE TATA 275/TATA ACE or Equivalent Vehicle with suitable RPM Triplex Plunger Pump having minimum capacity 13 LPM and minimum pressure 200 Bar directly coupled with a separate 10 HP heavy duty, 4 stroke, air cooled diesel Engine, with water tank having capacity 500 lit. with jetting hose of 30 m length with ID 1/4", etc. complete with hose reel, spraying hose and gun, valves, instruments, accessories, with cost of vehicles etc. complete conforming with tender specifications.			
		No.		**920,000.00**
c	**Supplying, testing and Commissioning Hydraulic operated cum Winch Driven De-silting Grab Bucket System** inclusive of Four wheeler of MAKE TATA 275/TATA ACE or Equivalent Vehicle with system having travelling depth of at least 12 m, steel grab bucket of 20 ltrs capacity, hydraulic system driven by vehicle engine, 6mm wire rope with appropriate size reel, with hydraulic cylinder , hydro motor, flexible hose, oil tank, hopper, boom, hose of appropriate size etc. complete with valves, instruments, accessories, with cost of vehicles etc. complete conforming with tender specifications.			
				891,250.00
Item no.9				
Desilting of inter septic chamber				
Desilting of inter-septic chambers incl. fixing of covers. Cleaning etc. with cleaning, rodding etc. for 100 mm dia. S. W. pipe chamber to chamber.				
		No.		**509.00**
Item no.10				
Renovation of manhole				
	Renovation of manhole by increasing the height at top including cost of excavation, refitting of C. I. manhole frame and cover curing etc. complete incl. all carting and providing of materials which is required for the purpose (except manhole frame and cover)			
	For all type manhole by providing RCC 1:2:4 Partition walls with required reinforcement 25 cm thick and circular opening with 500mm clear dia and 0.40 mt. av. ht.			
		No.		**3,258.00**
Item no.11				
Tracing of old manhole				
1	All Type	No.		**1,242.00**
Item no.12				
R. C. C. Precast chamber				
	Manufacture, supply and delivery of Chemical fabricated RCC Precast chambers with top cover as per specification and drawing attached with the tender documents for sizes as mentioned below. The delivery of chambers with clamps, nuts, bolts and locking arrangement (without lock) is to be made to GWSSB store or sites any where in Gujarat. The rates includes all taxes, loading, carting, unloading, stacking, including all taxes.			
A)	60 x 60 x 90 cm deep (Suitable to 80 to 300 mm dia pipes)	No.		**2,948.00**
B)	Foot rests for above chambers	Pair		**786.00**
C)	90 x 90 x 145 cm deep	No.		**7,269.00**
	(Suitable to 350 to 600 mm dia pipes)			
D)	Foot rests for above chambers	Pair		**1,670.00**
E)	Rates for providing Top cover only			
1	For 60 x 60cms size chamber	No.		**983.00**
2	For 90 x 90 cms size chamber	"		**1,768.00**



Miscellaneous Item

Section - E



SECTION : 2.E - Miscellaneous

ITEM NO.	DESCRIPTION OF ITEM	UNIT	Rate for 2019-20
Item no.1	**Dewatering by pumping set**		
	Dewatering by pumping set of required capacity including temporary platform carting pumping at site and fixing the same in position including all accessories, and fuel and labour etc. complete.		
	Pump set of Capacity	HP/hr.	**18.28**
Item no.2	**C.C M:100 for Pipe Encasing**		
	Providing C.C.M.:100 for encasing pipes using trap metal size 12 mm to 50 mm incl. form work curing consolidation etc. complete for various location on pipe line		
1	using trap metal 20 mm nominal size	Cu.M	**4,040.00**
2	using trap metal 40 mm size	Cu.M	**3,270.00**
Item no.3	**Loading / Unloading**		
(A)	**Manual Handling**		
	Labour charges for loading or unloading the material such as pipes specials of all types and sizes, cement, steel and other hard ware building materials.(Wt. Upto 200 kg.)		
1	For Cement ,Sand, Steel etc.	M.T.	**67.00**
2	For Metallic pipe specials	M.T.	**134.00**
(B)	**Crane Handling**		
	Labour charges for loading or unloading the material such as pipes specials of all types and sizes, cement, steel and other hard ware building materials.(Wt. More than 200 kg)		
	Article having weight up to 1 M.T.	M.T.	**226.00**
	Article having weight From 1 M.T.to 5 M.T.		**265.00**
	Article having weight more than 5 M.T.		**311.00**
Item no.4	**Transporting of Pipe**		
	Transportation of pipe with manual loading & unloading is as per annexure.(A) &Transportation of pipe with loading & unloading with a crane is as per annexure.(B)		
Item no.5	**Unloading from Railway Wagon**		
	Unloading from railway wagon to platform for heavy articles such as C.I. Pipes, M.S. Plates, specials etc. where use of unloading equipments are necessary.& loading same material in to truck from railway platform		
		M.T.	**325.00**

ITEM NO.	DESCRIPTION OF ITEM	UNIT	Rate for 2019-20
Item no.6	**Pump House**		
	Designing (aesthetically) and constructing R.C.C frame structure of pump room with positive suction / Negative suction		
6A	**With Gantry structure** (Min. Height 4.5 M)		
	Upto 6.00 M (Plinth Level to Top slab Beam bottom)	Sq.Mt.	**15,810.00**
	Add for every 1.00 M above 6.00 M	Sq.Mt.	**1,650.00**
6B	**Without Gantry structure** (Upto 3.60 M)	Sq.Mt.	**10,710.00**
	Note:- 1. Minimum 15 % opening for ventilation should be provided. 2. Pump room rolling shutter, door and windows of aluminium section and window grill of iron should be provided (Included in Cost). 3. Plinth level of Pump house should be min.1 meter above GL. 4.Cost does not include foundation for pumping machinery.		
Item no.7	**Hiring of JCB including driver & diesel**	**Hour**	
	Hiring of Hydra / Crane with Driver (8 working Hours in Day)		
	Hiring of crane	**Day**	**6,400.00**
	Hiring of Hydra		
	12 tone	**Day**	**3,328.00**
	16 tone	**Day**	**3,412.00**
	20 tone	**Day**	**4,374.00**
	Hiring of Tractor with trolley considering 8 hrs. as working day hours incl. Driver	**Day**	**2,100.00**
	Hiring of Three wheeler carrier (Chakado Rickshaw) considering 10 hrs. as working day hours incl. Driver	**Day**	**1,151.00**
Item no.8	**CONVEYANCE OF MATERIALS**		
8.a	Transportation Charges for Construction Material (Without Crane)		As per Table-A
8.b	Transportation Charges for Construction Material (With Crane)		As per Table-B

SECTION : 2.E - Miscellenious

A. Transportation Charges for Construction Material (Without Crane)

Hire Charges of Truck Rs.	3350.0	w
Diesel Rate	70.0	x
Mobile Oil Rate	245.0	y
Mazdur per Day	312.2	
Cost of 6 Mazdoor for loading & unloadin	1873.2	z

Cost of Material over 0.5 Km including loading Unloading and stacking (for ashphalt, cement, steel etc.)

Sr No.	Lead in Km	Avg. Speed	No. of Trips N=8/(2L/S)+1	KM Done =2NL+6	Liter of Diesel Consumed	Cost of Diesel Rs. (X*F)	Liter of Mobile Oil Consumed	Cost of Mobile Oil Rs. (Y*H)	Total Cost (W+G+I+Z)	Cost Per Trip Rs. (J/D)
A	B	C	D	E	F	G 70 Rs/Ltr	H	I 245 Rs/Ltr	J	K
1	0.50	15.00	7.50	13.50	3.38	236.25	0.09	22.97	5482.42	731.00
2	1.00	16.00	7.11	20.22	5.06	353.89	0.14	34.41	5611.49	789.00
3	1.50	16.50	6.77	26.31	6.58	460.38	0.18	44.76	5728.34	846.00
4	2.00	17.00	6.48	31.90	7.98	558.33	0.22	54.28	5835.82	901.00
5	2.50	17.30	6.21	37.03	9.26	648.05	0.26	63.00	5934.25	956.00
6	3.00	17.50	5.96	41.74	10.44	730.53	0.29	71.02	6024.76	1011.00
7	3.50	17.80	5.74	46.19	11.55	808.39	0.32	78.59	6110.18	1064.00
8	4.00	18.00	5.54	50.31	12.58	880.38	0.35	85.59	6189.18	1117.00
9	4.50	18.30	5.36	54.26	13.57	949.62	0.38	92.32	6265.14	1168.00
10	5.00	18.50	5.19	57.93	14.48	1013.77	0.40	98.56	6335.53	1220.00
11	6.00	19.00	4.90	64.84	16.21	1134.68	0.45	110.32	6468.19	1319.00
12	7.00	19.50	4.66	71.19	17.80	1245.90	0.49	121.13	6590.22	1415.00
13	8.00	20.00	4.44	77.11	19.28	1349.44	0.54	131.20	6703.84	1508.00
14	9.00	20.50	4.26	82.68	20.67	1446.82	0.57	140.66	6810.68	1599.00
15	10.00	21.00	4.10	87.95	21.99	1539.15	0.61	149.64	6911.99	1687.00
16	15.00	23.50	3.51	111.42	27.86	1949.86	0.77	189.57	7362.63	2095.00
17	25.00	28.50	2.90	151.22	37.81	2646.40	1.05	257.29	8126.89	2798.00
18	50.00	35.00	2.07	213.41	47.42	3319.67	1.48	363.09	8905.96	4294.00
19	100.00	40.00	1.33	272.67	54.53	3817.33	1.89	463.91	9504.45	7128.00
20	200.00	45.00	0.81	329.60	65.92	4614.34	2.29	560.77	10398.31	12853.00
21	400.00	50.00	0.47	382.47	76.49	5354.59	2.66	650.73	11228.52	23861.00

No. of Trips = N =8/(2L/S)+1
Hours Working = 8
Trip Km distance = L

Average Speed of vehicle = S = As per CPWD
KM = Kilometer travel in 8 hours =2NL+6
Km travel per ltr Diesel Consumption = 5 Km

B. Transportation Charges for Construction Material (With Crane)

Hire Charges of Truck Rs.	3350.0	w1
Hire Charges of Crane Rs.	6400.0	w2
Diesel Rate	70.0	x
Mobile Oil Rate	245.0	y
Mazdur per Day	312.2	
Cost of 2 Mazdoor for loading & unloadin	624.4	z

Cost of Heavy Material over 0.5 Km including loading Unloading and stacking (for Pipes etc.)

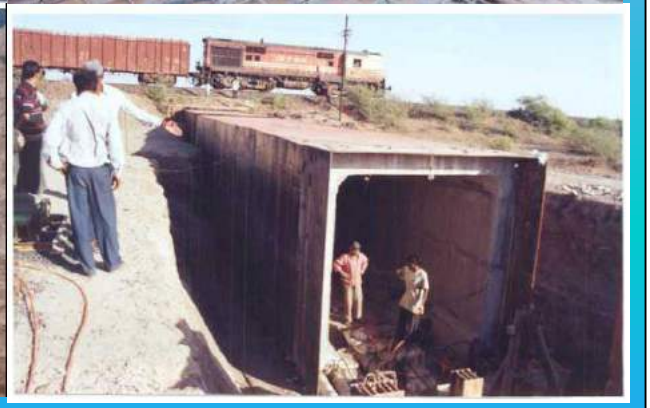
Sr No.	Lead in Km	Avg. Speed	No. of Trips N=8/(2L/S)+1	KM Done =2NL+6	Liter of Diesel Consumed	Cost of Diesel Rs. (X*F)	Liter of Mobile Oil Consumed	Cost of Mobile Oil Rs. (Y*H)	Total Cost (W1+W2+G+I+Z)	Cost Per Trip Rs. (J/D)
A	B	C	D	E	F	G 70 Rs/Ltr	H	I 245 Rs/Ltr	J	K
1	0.50	15.00	7.50	13.50	3.38	236.25	0.09	22.97	10633.6	1418.00
2	1.00	16.00	7.11	20.22	5.06	353.89	0.14	34.41	10762.7	1514.00
3	1.50	16.50	6.77	26.31	6.58	460.38	0.18	44.76	10879.5	1607.00
4	2.00	17.00	6.48	31.90	7.98	558.33	0.22	54.28	10987.0	1697.00
5	2.50	17.30	6.21	37.03	9.26	648.05	0.26	63.00	11085.5	1786.00
6	3.00	17.50	5.96	41.74	10.44	730.53	0.29	71.02	11176.0	1876.00
7	3.50	17.80	5.74	46.19	11.55	808.39	0.32	78.59	11261.4	1961.00
8	4.00	18.00	5.54	50.31	12.58	880.38	0.35	85.59	11340.4	2048.00
9	4.50	18.30	5.36	54.26	13.57	949.62	0.38	92.32	11416.3	2129.00
10	5.00	18.50	5.19	57.93	14.48	1013.77	0.40	98.56	11486.7	2212.00
11	6.00	19.00	4.90	64.84	16.21	1134.68	0.45	110.32	11619.4	2370.00
12	7.00	19.50	4.66	71.19	17.80	1245.90	0.49	121.13	11741.4	2521.00
13	8.00	20.00	4.44	77.11	19.28	1349.44	0.54	131.20	11855.0	2667.00
14	9.00	20.50	4.26	82.68	20.67	1446.82	0.57	140.66	11961.9	2808.00
15	10.00	21.00	4.10	87.95	21.99	1539.15	0.61	149.64	12063.2	2944.00
16	15.00	23.50	3.51	111.42	27.86	1949.86	0.77	189.57	12513.8	3561.00
17	25.00	28.50	2.90	151.22	37.81	2646.40	1.05	257.29	13278.1	4572.00
18	50.00	35.00	2.07	213.41	47.42	3319.67	1.48	363.09	14057.2	6778.00
19	100.00	40.00	1.33	272.67	54.53	3817.33	1.89	463.91	14655.6	10992.00
20	200.00	45.00	0.81	329.60	65.92	4614.34	2.29	560.77	15549.5	19221.00
21	400.00	50.00	0.47	382.47	76.49	5354.59	2.66	650.73	16379.7	34807.00

Matrial	Average Load in MT/Trip
PVC/HDPE Pipe	4.5
Metalic Pipe	10
Cement/M.S. Bar/Steel	9
Sand	5.75
Earth	5.6
Lime/Murram	7

Matrial	Average Load in MT/Trip
Bricks	3500 nos.
Roofing Tiles	10
Excavated Rock	3
Timber	5
Concrete Block	6
Aggregate of size 40mm &	5.75

Maintanance & Repairs

Section :- F



		SECTION : 2.F - M & R		
Item No.		**Description**	**Unit**	**Rate for 2019-20**
1		Drilling of 300mm dia Horizontal borehole for watermain pipeline under the railway tracks incl all strata with requried length including fixing of 250mm dia MS casing pipe of minimum 5mm thick Or IRS Casing Pipe with welding pushing etc complete. Providing & fixing various size of pipe for 150/168mm dia watermain of G.I/M.S pipe of minimum 6.3mm thick for railway permises as per instruction & regulations of Railway authority & under supervision of Railway authority incl Provinding, supplying & fixing of spacer at specified interval if required between Casing pipe and water main, ISI make sluice valve of required size at both side of railway boundry with construction of brickedge pavement including C:C encasing 1:3:6 in 10mtr length at both side. Incl provinding & fixing of M.S/Iron Manhole frame with cover for valve chamber with loaking arregment etc complete with all material labour fabrication,hydraulic testing of pipe & valve etc complete for total 45 mt Length which includes horizontal pushing and with open excavation.		
	1.0	MS Casing Pipe & Water Main Pipe-168	No.	271961
	1.1	Without Water main & withMS Casing Pipe-250 thick:5	No.	189361
	1.2	IRS casing pipe in place of MS Pipe + Water main -168mm	No.	189960
	1.3	Without Water main & with IRS Casing Pipe	No.	107360
2		Drilling of 500mm dia Horizontal borehole for watermain pipeline under the railway tracks incl all strata with requried length including fixing of 400mm dia M.S.casing pipe of minimum 6mm thick with welding pushing etc complete Providing & fixing various size of pipe for 193.7mm/219.10mm/244.5mm dia watermain of G.I/M.S pipe of minimum 6.3mm thick for railway permises as per instruction & regulations of Railway authority & under supervision of Railway authority incl Provinding, supplying & fixing of spacer at specified interval if required between Casing pipe and water main, ISI make sluice valve of required size at both side of railway boundry with construction of brickedge pavement incl C:C encasing 1:3:6 in 10mtr length of pipe at both side. Incl provinding & fixing of M.S/Iron Manhole frame with cover for valve chamber with loacking arregment etc. complete with all material labour fabrication,hydralic testing of pipe & valve etc complete for 45 mt Length.which includes horizontal pushing and with open excavation.		
	2.0	MS Casing Pipe + Water Main -193.7mm	No.	478673
	2.1	MS Casing Pipe + Water Main Size-219.1mm	No.	479883
	2.2	MS Casing Pipe + Water Main Size-244.5mm	No.	511018
	2.3	Without Water main & with MS Casing Pipe	No.	393309
	2.4	IRS casing pipe in place of MS Pipe + Water main -193.7mm	No.	379789
	2.5	IRS casing pipe in place of MS Pipe + Water main -219.1mm	No.	380998
	2.6	IRS casing pipe in place of MS Pipe + Water main -244.5mm	No.	412133
	2.7	Without Water main & with IRS Casing Pipe	No.	294424
3		Drilling of 600mm dia Horizontal borehole for watermain pipeline under the railway tracks incl all strata with requried length incl fixing of 500mm dia M.S.casing pipe of minimum 8mm thick Or IRS Casing Pipe with welding pushing etc complete Providing & fixing various size of pipe for 273.1mm/323.9mm/355.6mm dia watermain of G.I/M.S pipe of minimum 6.3mm thick for railway permises as per instruction & regulations of Railway authority & under supervision of Railway authority incl Provinding, suppllying & fixing of spacer at specified interval if required between Casing pipe and water main, ISI make sluice valve of required size at both side of railway boundry with construction of brickedge pavement incl C:C encasing 1:3:6 in 10mtr length of pipe at both side. Incl provinding & fixing of M.S/Iron Manhole frame with cover for valve chamber with loacking arrangement etc. complete with all material labour fabrication,hydraulic testing of pipe & valve etc complete for 45mt Length.which includes horizontal pushing and with open excavation.		
	3.0	MS Casing Pipe + Water Main -273.1mm	No.	632230
	3.1	MS Casing Pipe + Water Main Size-323.9mm	No.	655716
	3.2	MS Casing Pipe + Water Main Size-355.6mm	No.	665746
	3.3	Without Water main & with MS Casing Pipe	No.	506860
	3.4	IRS casing pipe in place of MS Pipe + Water main -273.1mm	No.	509254
	3.5	IRS casing pipe in place of MS Pipe + Water main -323.9mm	No.	532740
	3.6	IRS casing pipe in place of MS Pipe + Water main -355.6mm	No.	542770
	3.7	Without Water main & with IRS Casing Pipe	No.	383884
4		Drilling of 900mm dia Horizontal borehole for watermain pipeline under the railway tracks incl all strata with requried length incl fixing of 800mm dia M.S.casing pipe of minimum 12mm thick Or IRS Casing Pipe with welding pushing etc complete Providing & fixing various size of pipe for 406.4 mm/457mm/508mm dia watermain of G.I/M.S pipe of minimum 6.3mm thick for railway permises as per instruction & regulations of Railway authority & under supervision of Railway authority incl Provinding & suppllying fixing of spacer at specified interval if required between Casing pipe and water main, ISI make sluice valve of required size at both side of railway boundry with construction of brickedge pavement incl C:C encasing 1:3:6 in 10mtr length of pipe at both side. Incl Provinding & fixing of M.S/Iron Manhole frame with cover for valve chamber with loacking arregment etc. complete with all material labour fabrication,hydralic testing of pipe & valve etc complete for 45 mt Length.which includes horizontal pushing and with open excavation.		
	4.0	MS Casing Pipe + Water Main -406.4mm	No.	1321284
	4.1	MS Casing Pipe + Water Main Size-457mm	No.	1362119
	4.2	MS Casing Pipe + Water Main Size-508mm	No.	1413113
	4.3	Without Water main & with MS Casing Pipe	No.	1095354
	4.4	IRS casing pipe in place of MS Pipe + Water main -406.4mm	No.	1087724
	4.5	IRS casing pipe in place of MS Pipe + Water main -457mm	No.	1127609
	4.6	IRS casing pipe in place of MS Pipe + Water main -508mm	No.	1178269
	4.7	Without Water main & with IRS Casing Pipe	No.	865631

Item No.		Description	Unit	Rate for 2019-20
5		Drilling of 1300mm dia Horizontal borehole for watermain pipeline under the railway tracks incl all strata with requried length incl fixing of 1200mm dia M.S.casing pipe of minimum 16mm thick Or IRS Casing Pipe with welding pushing etc complete Providing & fixing various size of pipe for 559mm/610mm/660mm/711mm dia watermain of G.I/M.S pipe of minimum 6.3mm thick for railway permises as per instruction & regulations of Railway authority & under supervision of Railway authority incl Provinding, supplying & fixing of spacer at specified interval if required between Casing pipe and water main,ISI make sluice valve of required size at both side of railway boundry with construction of brickedge pavement incl C:C encasing 1:3:6 in 10mtr length of pipe at both side. Incl Provinding & fixing of M.S/Iron Manhole frame with cover for valve chamber with loacking arregment etc. complete with all material labour fabrication,hydraulic testing of pipe & valve etc complete for 45mtr Length.		
	5.0	MS Casing Pipe + Water Main -559mm	No.	2308372
	5.1	MS Casing Pipe + Water Main Size-610mm	No.	2369031
	5.2	MS Casing Pipe + Water Main Size-660mm	No.	2534444
	5.3	MS Casing Pipe + Water Main Size-711mm	No.	2553596
	5.4	Without Water main & with MS Casing Pipe	No.	1971218
	5.5	IRS casing pipe in place of MS Pipe + Water main -559mm	No.	1828967
	5.6	IRS casing pipe in place of MS Pipe + Water main -610mm	No.	1889626
	5.7	IRS casing pipe in place of MS Pipe + Water main -660mm	No.	2055039
	5.8	IRS casing pipe in place of MS Pipe + Water main -711mm	No.	2074191
	5.9	Without Water main & with IRS Casing Pipe	No.	1491813
6		Drilling of 200mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 150mm dia M.S casing pipe of minimum 5mm thick Or IRS Casing Pipe with pushing etc complete, providing and fixing various size of carrying pipe for 80mm dia (Complete for 45 mt length)		
	6.0	MS Casing Pipe + Water Main -80mm	No.	144799
	6.1	Without Water main & withMS Casing Pipe-150 thick:5	No.	58716
	6.2	RCC casing pipe in place of MS Pipe + Water main -80mm	No.	61074
	6.3	Without Water main & with RCC Casing Pipe	No.	16746
7		Drilling of 250mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 200mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 100mm dia (For 45 mt Length)		
	7.0	MS Casing Pipe + Water Main -100mm	No.	168084
	7.1	Without Water main & withMS Casing Pipe-200 thick:5	No.	126756
	7.2	RCC casing pipe in place of MS Pipe + Water main -100mm	No.	112644
	7.3	Without Water main & with RCC Casing Pipe	No.	71316
8		Drilling of 300mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 250mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 168mm dia watermain (For 45 mt Length)		
	8.0	MS Casing Pipe + Water Main -168mm	No.	189857
	8.1	Without Water main & with MS Casing Pipe-250 thick:5	No.	150494
	8.2	RCC casing pipe in place of MS Pipe + Water main -168mm	No.	137138
	8.3	Without Water main & with RCC Casing Pipe	No.	97776
9		Drilling of 500mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 400mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 193.7 to 244.5mm dia watermain (For 45 mt Length)		
	9.0	MS Casing Pipe + Water Main -193.7mm	No.	397662
	9.1	MS Casing Pipe + Water Main -219.1mm	No.	397662
	9.2	MS Casing Pipe + Water Main -244.5mm	No.	411522
	9.3	Without Water main & with MS Casing Pipe-400 thick:6	No.	346002
	9.4	RCC casing pipe in place of MS Pipe + Water main -193.7mm	No.	298777
	9.5	RCC casing pipe in place of MS Pipe + Water main -219.1mm	No.	298777
	9.6	RCC casing pipe in place of MS Pipe + Water main -244.5mm	No.	312637
	9.7	Without Water main & with RCC Casing Pipe	No.	247117
10		Drilling of 600mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 500mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 273.1 to 355.6mm dia watermain (For 45 mt Length)		
	10.0	MS Casing Pipe + Water Main -273.1mm	No.	575195
	10.1	MS Casing Pipe + Water Main -323.9mm	No.	599236
	10.2	MS Casing Pipe + Water Main -355.6mm	No.	608913
	10.3	Without Water main & with MS Casing Pipe-500 thick:8	No.	503577
	10.4	RCC casing pipe in place of MS Pipe + Water main -273.1mm	No.	424499
	10.5	RCC casing pipe in place of MS Pipe + Water main -323.9mm	No.	448540
	10.6	RCC casing pipe in place of MS Pipe + Water main -355.6mm	No.	458217
	10.7	Without Water main & with RCC Casing Pipe	No.	352881
11		Drilling of 900mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 800mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 406.4 to 508mm dia watermain (for 45 Mtr. Length)		

Item No.		Description	Unit	Rate for 2019-20
	11.0	MS Casing Pipe + Water Main -406.4mm	No.	1105716
	11.1	MS Casing Pipe + Water Main -457mm	No.	1126682
	11.2	MS Casing Pipe + Water Main -508mm	No.	1143703
	11.3	Without Water main & with MS Casing Pipe-800 thick:12	No.	970291
	11.4	RCC casing pipe in place of MS Pipe + Water main -406.4mm	No.	903612
	11.5	RCC casing pipe in place of MS Pipe + Water main -457mm	No.	928308
	11.6	RCC casing pipe in place of MS Pipe + Water main -508mm	No.	947460
	11.7	Without Water main & with RCC Casing Pipe	No.	754428
12		Drilling of 1300mm dia Horizontal borehole for watermain pipeline crossing under the road incl in all strata with requried length incl fixing of 1200mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 559 to 711mm dia watermain. (for 45 Mtr. Length)		
	12.0	MS Casing Pipe + Water Main -559mm	No.	1978482
	12.1	MS Casing Pipe + Water Main -610mm	No.	1996122
	12.2	MS Casing Pipe + Water Main -660mm	No.	2014770
	12.3	MS Casing Pipe + Water Main -711mm	No.	2033469
	12.4	Without Water main & with MS Casing Pipe-1200 thick:16	No.	1787466
	12.5	RCC casing pipe in place of MS Pipe + Water main -559mm	No.	1518481
	12.6	RCC casing pipe in place of MS Pipe + Water main -610mm	No.	1433697
	12.7	RCC casing pipe in place of MS Pipe + Water main -660mm	No.	1595593
	12.8	RCC casing pipe in place of MS Pipe + Water main -711mm	No.	1617517
	12.9	Without Water main & with RCC Casing Pipe	No.	1308061
		Note: The above rates are for 45 mt length for all Road/Railway crossing, if crossing length is increased or decreased than correction of Rs- (Rate of SOR)/45 per meter shall be + or - as per actual length.		
13		Drilling of Horizontal bore hole for water main pipeline under the Railway / Road tracks in all strata with required length including fixing of M.S.(or as specified by Railway / Road authority) casing pipe of suitable size and Thickness. Rate includes the cost of Drilling of bore hole , Casing pipe & welding pushing etc complete but excluding the cost of water main, valves and other items. Entire work should be as per Approved Drawing and as per instruction of Railway / Road authority for Following diameter of Bore hole. for MS pipe		
	13.0	Horizontal Drilling-1300:& MS Casing Pipe-1200 thick:16	RMT	35280
	13.1	Horizontal Drilling-900:& MS Casing Pipe-800 thick:12	RMT	17496
	13.2	Horizontal Drilling-600:& MS Casing Pipe-500 thick:8	RMT	8840
	13.3	Horizontal Drilling-500:& MS Casing Pipe-400 thick:6	RMT	6210
	13.4	Horizontal Drilling-300:& MS Casing Pipe-250 thick:5	RMT	2462
	13.5	Horizontal Drilling-250:& MS Casing Pipe-200 thick:5	RMT	2072
	13.6	Horizontal Drilling-200:& MS Casing Pipe-150 thick:5	RMT	1456
14		Drilling of Horizontal bore hole for water main pipeline under the Railway / Road tracks in all strata with required length including fixing of M.S.(or as specified by Railway / Road authority) casing pipe of suitable size and Thickness. Rate includes the cost of Drilling of bore hole , Casing pipe & welding pushing etc complete but excluding the cost of water main, valves and other items. Entire work should be as per Approved Drawing and as per instruction of Railway / Road authority for Following diameter of Bore hole. for IRS pipe		
	14.0	Horizontal Drilling-1300:& IRS Casing Pipe-1200:	RMT	35280
	14.1	Horizontal Drilling-900:& IRS Casing Pipe-800:	RMT	17496
	14.2	Horizontal Drilling-600:& IRS Casing Pipe-500:	RMT	8840
	14.3	Horizontal Drilling-500:& IRS Casing Pipe-400:	RMT	6210
	14.4	Horizontal Drilling-300:& IRS Casing Pipe-250:	RMT	2462
	14.5	Horizontal Drilling-250:& IRS Casing Pipe-200:	RMT	2072
	14.6	Horizontal Drilling-200:& IRS Casing Pipe-150:	RMT	1456
>		**Gas/Oil Pipeline crossing(excluding cost of water carrier pipe and it's laying charges)**		
		(I) In Hard Rock (Item No 15 to 19)		
15		Drilling of 1000mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in Hard rock with requried length incl fixing of 900mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 550 to 700mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	15.0	Auger Boring-1000:& IRS Casing Pipe-900:	Job	1660411
	15.1	Auger Boring-1000:& RCC Casing Pipe-900:	Job	1606080
16		Drilling of 900mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in Hard rock with requried length incl fixing of 800mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 400 to 500mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	16.0	Auger Boring-900:& IRS Casing Pipe-800:	Job	1331266
	16.1	Auger Boring-900:& RCC Casing Pipe-800:	Job	1243200
17		Drilling of 600mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in Hard rock with requried length incl fixing of 500mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 250 to 350mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	17.0	Auger Boring-600:& IRS Casing Pipe-500:	Job	641525

Item No.		Description	Unit	Rate for 2019-20
	17.1	Auger Boring-600:& RCC Casing Pipe-500:	Job	567840
18		Drilling of 500mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in Hard rock with requried length incl fixing of 400mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 180 to 200 mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	18.0	Auger Boring-500:& IRS Casing Pipe-400:	Job	438312
	18.1	Auger Boring-500:& RCC Casing Pipe-400:	Job	372960
19		Drilling of 300mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in Hard rock with requried length incl fixing of 250mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for less than 200 mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	19.0	Auger Boring-300:& IRS Casing Pipe-250:	Job	178080
	19.1	Auger Boring-300:& RCC Casing Pipe-250:	Job	154560
		(II) Other than Hard Rock (Item No 20 to 24)		
20		Drilling of 1000mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in other than Hard rock with requried length incl fixing of 900mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 550 to 700mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	20.0	Auger Boring-1000:& IRS Casing Pipe-900:	Job	652411
	20.1	Auger Boring-1000:& RCC Casing Pipe-900:	Job	598080
21		Drilling of 900mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas & oil pipeline incl in other than Hard rock with requried length incl fixing of 800mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 400 to 500mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	21.0	Auger Boring-900:& IRS Casing Pipe-800:	Job	512266
	21.1	Auger Boring-900:& RCC Casing Pipe-800:	Job	427224
22		Drilling of 600mm dia Horizontal borehole by auger methodfor watermain pipeline crossing under the gas & oil pipeline incl in other than Hard rock with requried length incl fixing of 500mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 250 to 350mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	22.0	Auger Boring-600:& IRS Casing Pipe-500:	Job	278645
	22.1	Auger Boring-600:& RCC Casing Pipe-500:	Job	204960
23		Drilling of 500mm dia Horizontal borehole by auger method for watermain pipeline crossing under the gas& oil pipeline incl in other than Hard rock with requried length incl fixing of 400mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for 180 to 200 mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	23.0	Auger Boring-500:& IRS Casing Pipe-400:	Job	186312
	23.1	Auger Boring-500:& RCC Casing Pipe-400:	Job	120960
24		Drilling of 300mm dia Horizontal borehole by auger method for watermain pipeline crossing under thegas & oil pipeline incl in other than Hard rock with requried length incl fixing of 250mm dia M.S/RCC casing pipe with pushing etc complete various size of pipe for less than 200 mm dia watermain(for crossing length of 30 mts, excluding cost of water carrier pipe and laying charges)		
	24.0	Auger Boring-300:& IRS Casing Pipe-250:	Job	77280
	24.1	Auger Boring-300:& RCC Casing Pipe-250:	Job	53760
		Note: The above rates are for 30 mt length for all Gas/Oil Pipeline crossing, if crossing length is increased or decreased than correction of Rs- (Rate of SOR)/30 per meter shall be + or - as per actual length.		
25		Replacement of airvalve riser by Dismantling the existing airvalve by excavation,dismantling conc.and cutting/shifting of riser from top of pipe and install new M.S pipe of 6mm th and 3.2mt length with necessary fittings such as flange of appropriate size,nut bolts and embeded the pipe in R CC M;15 with ofset of 10 cm around pipe with necessary steel etc complete		
		Dia of A.V		
	25.0	Dia of Air Valve 50mm	Nos	470
	25.1	Dia of Air Valve 80mm	Nos	525
	25.2	Dia of Air Valve 100mm	Nos	538
	25.3	Dia of Air Valve 150mm	Nos	552
	25.4	Dia of Air Valve 200mm	Nos	578
26		Erection of airvalve riser by installing new M.S pipe of 6mm thick and 3.2mt length with necessary fittings such as flange of appropriate size,nut bolts and embeded the pipe in R CC M;15 with offset of 10 cm around pipe with necessary steel etc complete		
		Dia of A.V		
	26.0	Dia of Air Valve 50mm& MS Pipe	Nos	3001
	26.1	Dia of Air Valve 80mm& MS Pipe	Nos	4195
	26.2	Dia of Air Valve 100mm& MS Pipe	Nos	5345
	26.3	Dia of Air Valve 150mm& MS Pipe	Nos	7514
	26.4	Dia of Air Valve 200mm& MS Pipe	Nos	9761

Item No.		Description	Unit	Rate for 2019-20
27		Designing, providing and casting reinforced concrete M-35 design mix box, including providing and casting steel cutting edge for front shield, MS rear shield RCC M-20 thrust bed, thrust wass for pushing the box below railway embankment under railway, SH, NH roads under running traffic condition as per contractors own design/ drawing including arrangement for intermediate jacking station with provision of intermediate shield and its connection with the box drag sheet as may be required for smooth controlled pushing etc complete in all respects, including cost of necessary excavation with its all lead and lift for constructing thrust bed at designed level as directed by engineer-in-charge including providing all temprory works as required and approved by Railway or statutory authority, required protection of existing road pavement/ railway track including providing water tight joints in RCC box segments using CC grout with epoxy paint on exposed facing and providing RCC saddles in the box as per details given with drawing for supporting pipe in the box as directed, including all plants machinery, equipments , all labour material and all temprory works in all respects, dismantling and removal of temprory work, restoring ground to its original profile on completed work. Rate is inclusive of construction of pushing pit, receiving pit and intermediate pit if required and inclusive of all tools & tackle etc complete.		
	27.1	Size 2.0 x 2.0 in all strata of Soil	RMT	132000
	27.2	Size 2.5 x 2.5 in all strata of Soil	RMT	206250
	27.3	Size 2.5 x 3.0 in all strata of Soil	RMT	247500
	27.4	Size 3.0 x 3.0 in all strata of Soil	RMT	297000
	27.5	Size 3.0 x 3.5 in all strata of Soil	RMT	346500
	27.6	Size 3.5 x 3.5 in all strata of Soil	RMT	404250
	27.7	Size 4.0 x 4.0 in all strata of Soil	RMT	528000

Extra Details

Section - G

ABBREVIATIONS

C.M. or Cu.M.or cu.m.	= Cubic Meter
Sq.M. or SQM or Sq.m.	= Square Meter
R.Mt. or R.M.	= Running Meter
K.M. or Km	= Kilo Meter
No.	= Number
M.T.	= Metric Tonne
Qtl.	= Quintal
Dia.	= Diameter
m.m.	= Mili Meter
Cm	= Centi Meter
Lit or Lit.	= Liter
KG or Kg.	= Kilogram
Mld or mld	= Million liter per day
A.C.	= Asbestos Cement
R.C.C	= Reinforced Cement Concrete
C.I.	= Cast Iron
P.V.C.	= Polyvinyl Chloride
H.D.P.E.	= High Density Polyethylene
C.M.	= Cement Mortar
L.M.	= Lime Mo
M.S.	= Mild Steel
G.R.P.	= Glass Fiber Reinforced Plastic Pipe
B.W.S.C.	= Bar Wrapped Steel Cylindrical
P.S.C.	= Pre Stressed Concrete
G.L.	= Ground Level
S.V.	= Sluice Valve
A.V.	= Air Valve
E.S.R.	= Elevated Service Reservoir
M.H.	= Manhole
O.D.	= Outer Diameter
I.D.	= Inner Diameter

SLUICE VALVES :

For pipe size upto 300 mitt . Same size as pipe
For pipe size greater than 300 mm about *2/3* of pipe size

SCOUR VALVES :

For all size d/2 plus 25 mm where d is the dia of main in mm. **AIR VALVES :**

Ratio of air valve he pipe dia
For release of air only =1:12
For admission as well as release of air = 1:8

Size of main	Size of Air valve
80 mm single air valve	20 mm
100 mm double air valves	50 mm
125-200 mm double air valves	50 mm
250-350 mm double air valves	80 mm
400-500mm double air valves	100 mm
600 mm double air valves	150 mm

Date for pipe laying works
Schedule of work to be done in Excavation for laying and jointing pipes, fixing valves etc. (15:3114-1965).

Sr. No.	Dia of pipe in mm	Depth of bottom of pipe below G.L in cm	Width of trench at bottom in - cm	Quantity per meter length in cum
1	80	105	75	1.07
2	100	105	75	1.07
3	125	105	75	1.07
4	150	105	75	1.10
5	200	110	80	1.18
6	250	120	80	1.32
7	300	135	80	1.54
8	350	145	90	1.83
9	400	155	90	2.00
10	450	170	100	2.42
11	500	185	100	2.71
12	600	205	110	3.27 1 Depth 0.06 11 Depth
13	700	230	120	3.86 1 Depth 0.38 11 Depth
14	750	245	125	4.17 1 Depth 0.61 11 Depth

Note : Width of trench for PVC pipes shall be 0.60 mm up to 350 mm dia pipe.

Weight of C.I. Sluice Valves (I.S.780-1969)
(Weights in Kg.)

Size mm	Weight exc. cap in g. (10 kg/cm)	Weight of Cap in kg.
50	20	1.3
65	22	1.3
80	31	1.3
100	43	1.3
125	55	1.3
150	71	1.5
200	120	1.5
250	178	1.9
300	240	2.4

Weight of C.I. Sluice Valves (IS-2906-1969)
(Weights in Kg.)

Size in mm	Weight with ran class 11 (10 kg/cm^2)
350 mm	325
400 mm	544
450 mm	637
500 mm	855
600 mm	1067

Weight of Tail Pieces required for Sluice Valves
(15:1537-1960)

Size of. valve mm	Length of tail piece with one end flanged and the other end socket	Weight of each tail piece Kg.	Number required No.	Total weight of tail piece Kg.
80	0.75	21.20	2	42.40
100	0.75	26.68	2	53.36
125	0.75	34.30	2	68.60
150	0.90	480.08	2	96.16
200	0.90	69.39	2	138.78
250	0.90	93.40	2	186.80
300	0.90	120.20	2	240.40
350	0.90	151.00	2	302.00
400	1.00	198.40	2	396.80
450	1.00	238.50	2	477.00
500	1.00	279.10	2	558.20
600	1.00	374.70	2	749.40
700	1.00	488.30	2	976.60
750	1.00	550.40	2	1100.80

WEIGHT OF P.V.C. PIPES (15:4985-1968)

Outer Diameter mm	Pressure Kg/cm^2	Inner Diameter mm	Weight per meter Kg-	Length per Mt m
50	6	46.2	0.408	2.451
63	4	59.6	0.465	2.151
63	6	58.1	0.62	1.511
75	4	71.0	0.651	1.536
75	6	69.3	0.917	1.091
90	4	85.2	0.917	1.091
90	6	83.2	1.313	762
110	4	104.2	1.315	760
110	6	102.0	1.891	529
125	4	118.7	1.712	584
125	6	115.7	2.596	401
140	4	133.0	2.131	469
140	6	129.7	3.097	323
160	4	152.0	2.783	359
160	6	148.4	3.923	255
180	4	171.9	3.560	281
180	6	166.9	5.067	197
200	4	190.1	4.256	235
200	6	185.5	6.233	160
225	4	213.8	5.480	182
225	6	208.8	7.836	123
250	4	237.8	6.636	151
250	6	231.9	10.190	98
280	4	266.3	8.315	120
280	6	259.8	12.158	82
315	4	299.6	10.553	95
315	6	292.3	15.371	65

Jointing Materials for P.V.C. Pipes Solvent Cement Joints

Outside diameter of pipe in mm	Number of complete coupler joints per Kg. of lubricant (Solvent Cement Paste).	Approx. No. of joints which can be jointed per one liters OR 1 kg. of solvent cement.
63 mm	100	80
75 mm	95	65
90 mm	90	50
110 mm	55	35
125 mm	50	--
140 mm	45	20
160 mm	35	15
180 mm	25	12
200 mm	18	10
250 mm	--	08
280 mm	--	07
315 mm	--	05

Weight per meter, Sectional Area and perimeter of Square & Round bars.

Dia in mm or width across Flat	Sectional Area		Weight in kg. per meter=W	
	Cm^2 □	Cm^2 ○	□	○
5.00	0.25	0.20	0.20	0.15
6.00	0.36	0.28	0.28	0.22
8.00	0.64	0.50	0.50	0.39
10.00	1	0.79	0.79	0.62
12.00	1.44	1.13	1.13	0.89
14.00	1.96	1.54	1.54	1.21
16.00	2.56	2.01	2.01	1.58
18.00	3.24	2.54	2.54	2.00
20.00	4	3.14	3.14	2.47
22.00	4.84	3.80	3.80	2.98
25.00	6.25	4.91	4.91	3.85
28.00	7.84	6.16	6.15	4.83
32.00	10.24	8.04	8.04	6.31
36.00	12.96	10.18	10.17	7.99
40.00	16	12.57	12.56	9.86
45.00	20.25	15.90	15.90	12.48
50.00	25	19.64	19.63	15.41

Data Sheet For Cement Consumption

Sr. No.	Particulars 1Bag Cement = 50 Kg = 35 Liter = 0.035 Cum	Average Consumption in Bag	Per
1	2	3	4
A)	**Cement Concrete (with finishing)**		
	1. C.C. 1:5:10	28.25	10 cum
	2. C.C. 1:4:8	35.25	10 cum
	3. C.C. 1:3:6	45.75	10 cum
	4. C.C. 1:2:4	63.5	10 cum
	5. C.C. 1:1:5:3	85.5	10 cum
	6. C.C. 1:1:2	127.5	10 cum
B)	**Masonry**		
	1. U.C.R. Masonry in C.M. 1:4	24.74	10 cum
	2. U.C.R. Masonry in C.M. 1:5	21.25	10 cum
	3. U.C.R. Masonry in C.M. 1:6	17.5	10 cum
	4. U.C.R. Masonry in C.M. 1:8	14	10 cum
	5. W.S. Bela Masonry in C.M. 1:6	7.5	10 cum
	6. Brick masonry in C.M. 1:6	14	10 cum
	7. Brick masonry in C.M. 1:8	8.5	10 cum
	8. C.R. in masonry 2nd sort in C.M. 1:5 for building	14.25	10 cum
	9. C.R. in masonry 2nd sort in C.M. 1:6 for building	10.5	10 cum
	10. C.R. Masonry 2nd sort in C.M. 1:5 for bridge	20	10 cum
	11. C.R. Masonry 2nd sort in C.M. 1:5 for building	16	10 cum
C)	**Plaster and Pointing**		
	1. Pointing in C.M. 1:3 to Masonry	5.25	100 Sqmt.
	2. Pointing in C.M. 1:3 to Pitching	6	100 Sqmt.
	3. Cement plaster 12 mm thick in C.M. 1:3	16	100 Sqmt.
	4. Cement plaster 12 mm thick in C.M. 1:4	13	100 Sqmt.
	5. Cement plaster 12 mm thick in C.M. 1:3	21.5	100 Sqmt.
	6. Cement plaster 25 mm thick in C.M. 1:3	24.5	100 Sqmt.
	7. Rough cast and sand faced cement plaster 20 mm thick in C.M. 1:3 and finishing coat 6 mm thick in C.M. 1:2	27	100 Sqmt.
	8. Finishing to RCC Member with C.M. 1:2	13.5	100 Sqmt.
D)	**Pavement and Flooring**		
	1. Shahabad or Koatah stone in L.M. ½ including cement pointing	8	100 Sqmt.
	2. 75 mm thick 1:2:4 C.C. Flooring wit smooth finishing	53.75	100 Sqmt.
	3. 50 mm thick 1:2:4 C.C. Flooring wit smooth finishing	35	100 Sqmt.
	4. 40 mm thick 1:2:4 C.C. Flooring wit smooth finishing	27	100 Sqmt.
	5. Cement for mosaic tiles in L.M. 1:1:5 with C.P.	7	100 Sqmt.
	6. White glazed tiles flooring C.M. 1:6	10.75	100 Sqmt.
	7. C.C. 1:3:6 with filters with Sleepers	43.25	100 Sqmt.
	8. C.C. 1:3:6 with filters with Sleepers	52.3	100 Sqmt.

Note:-

1. The consumption of cement for controlled cement concrete depends upon properties of concerting materials and water cement ratio. Therefore in case of controlled concrete, the consumption should be taken as the one considered in design mix. However, it will be necessary to fi the standard for assessing cement requirement for the purpose of fixing, quantity in Schedule – A, placing indents etc. for this purpose only a statement showing standards of cement consumption for controlled concrete items is also prepared and enclosed (statement no 2).

2. Cement consumption is independent of

    (i) Whether fine / course send in used
    (ii) Whether 20 mm / 40 mm nominal size of aggregate is used
    (iii) Whether stone / brick aggregate used

3. The cement consumption per unit of controlled concrete will be taken as worked out in mix design. The minimum requirement of cement will be as per relevant I.S. codes for those particular items.

4. The quantities shown in column 4 shall be used only for the purpose of estimating the cement requirement for the purpose of fixing in schedule ‘A’ of tender, placing indents etc.

List of IS Related To Water Supply & Sanitary Engineering.

Sr. No.	IS No.	Title
1)	**General**	
1.	SP 7 (Part 9 Section 1): 1983	National Building code of India 1983 Part 9 plumbing services: Section 1: Water Supply
2.	SP 35 **:** 1987	Handbook on water supply and drainage with special emphasis on plumbing
3.	IS 1172 **:** 1983	Code of basic requirements for water supply drainage and sanitation (third revision)
4.	IS 2065 **:** 1983	Code of practice for water supply in buildings (second revision)
5.	IS 269 **:** 1989	33 grade ordinary Portland cement (fourth revision)
6.	IS 8112 **:** 1989	43 grade ordinary Portland cement
7.	IS 12269 **:** 1987	53 grade ordinary Portland cement
8.	IS 1489 **:** 1991	Portland pozzolana cement
	Part 1 **:** 1991	Fly ash based
	Part 2 **:** 1991	Calcined clay based
9.	IS 1786 **:** 1985	High strength deformed steel bars and wires for concrete reinforcement.
10.	IS 875 **:** 1987	Code of practice for design loads for buildings and structures
	Part 1 **:** 1987	Dead loads
	Part 2 **:** 1987	Imposed loads
	Part 3 **:** 1987	Wind loads
	Part 4 **:** 1987	Snow loads
	Part 5 **:** 1987	Special loads and load combinations
11.	IS 13920 **:** 1993	Ductile detailing of reinforced concrete structures subjected to seismic forces.
12.	IS 1893 **:** 2002	Criteria for earthquake resistant design of structure.

13.	IS 456 : 2000	Code of practice for plain and reinforced concrete (third revision)
14.	IS 457 : 1957	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
15.	IS 1343 : 1980	Code of practice for prestressed concrete (first revision)
16.	IS 3103 : 1975	Code of practice for industrial ventilation.
17.	IS 3370 : 1965	Code of practice for concrete structure for the storage of liquids.
	Part 1 : 2009	General requirements
	Part 2 : 2009	Reinforced concrete structures
	Part 3 : 1967	Prestressed concrete structures
	Part 4 : 1967	Design tables
18.	IS 6518 : 1972	Code of practice for control of sediment in reservoirs
19.	IS 5330 : 1984	Criteria for design of anchor block for penstocks with expansions joints (first revision)
20.	IS 6748 : 1973	Recommendations for watershed management relating to soil conservation.
	Part 1 : 1973	Agronomic aspects
21.	IS 7357 : 1974	Code of practice for structural design of tanks.
22.	IS 3913 : 1966	Suspended sediment load samplers.
23.	IS 3917 : 1966	Scope type bed material samplers.
24.	IS 4890 : 1968	Methods for measurement of suspended sediment in open channels.
25.	IS 4926 : 1979	Ready – mixed concrete (first revision)
26.	IS 6295 : 1986	Code of practice for water supply and drainage high altitudes and / or sub-zero temperate regions (first revision).
27.	IS 4880	Code of practice for design of tunnels conveying water.

	Part 1 **:** 1975	General Design.
	Part 2 **:** 1976	Geometric design (first revision)
	Part 3 **:** 1976	Hydraulic design (first revision)
	Part 4 **:** 1971	Structural design of concrete lining in rock.
	Part 5 **:** 1972	Structural design of concrete lining in soft strata and soils.
	Part 6 **:** 1971	Tunnel support
28.	IS 5477	Methods for fixing the capacities of reservoirs.
	Part 1 **:** 1969	General Requirements
	Part 2 **:** 1969	Dead storage
	Part 3 **:** 1969	Live storage
	Part 4 **:** 1971	Flood storage
29.	IS 9668 **:** 1980	Code of practice for provision and maintenance of water supply for fire fighting.
30.	IS 8062	Code of practice for cathodic protection for steel structures
	Part 1 **:** 1976 Part 2 **:** 1976	General principles Underground pipelines
31.	IS 10221 **:** 1982	Code of practice for coating and wrapping of underground steel pipelines.
32.	IS 12183 **:** 1987	Code of practice for plumbing in multistoried buildings Part 1 Water Supply.
2)	**<u>Pipe And Pipe Laying</u>** **Cast Iron**	
1.	IS 1536 **:** 1976	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage (second revision)
2.	IS 1537 **:** 1976	Vertically cast iron pressure pipes for water, gas and sewage (first revision)
3.	IS 1538 (Parts 1 to 24)	Cast Iron fittings for pressure pipes for water, gas and sewage (second revision)
	Part 1 **:** 1976	General requirements

	Part 2 : 1976	Specific requirements for sockets and spigots of pipes
	Part 3 : 1976	Specific requirements for sockets and fittings
	Part 4 : 1976	Specific requirements for flanges of pipes and fittings
	Part 5 : 1976	Specific requirements for raised flanges
	Part 6 : 1976	Specific requirements for standard flange drilling of flanged pipes and fittings
	Part 7 : 1976	Specific requirements for flanged sockets
	Part 8 : 1976	Specific requirements for flanged spigots
	Part 9 : 1976	Specific requirements for double socket bends
	Part 10 : 1976	Specific requirements for double socket bends
	Part 11 : 1976	Specific requirements for TEEs and sockets
	Part 12 : 1976	Specific requirements for double sockets tee with flanged branch
	Part 13 : 1976	Specific requirements for crosses, all sockets
	Part 14 : 1976	Specific requirements for double socket tapers (third revision)
	Part 15 : 1976	Specific requirements for caps
	Part 16 : 1976	Specific requirements for plugs
	Part 17 : 1976	Specific requirements for bell mouth pipes
	Part 18 : 1976	Specific requirements for double flanged bends
	Part 19 : 1976	Specific requirements for all flanged tees
	Part 20 : 1976	Specific requirements for all flanged crosses
	Part 21 : 1976	Specific requirements for double flanged taper
	Part 22 : 1976	Specific requirements for split puddle or

		body flanges
	Part 23 : 1976	Specific requirements for blank flanges
	Part 24 : 1984	Specific requirements for all flanged tees (second revision)
4.	IS 1879 : 1975 Part 1 to 10	Specific requirements for all flanged tees (second revision)
5.	IS 3114 : 1985	Code of practice for laying of cast iron pipes (third revision)
6.	IS 782 : 1978	Caulking lead (third revision)
7.	IS 6163 : 1978	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage (first revision)
8.	IS 7181 : 1986	Horizontally cast iron double flanged pipes for water, gas and sewage (first revision)
9.	IS 8329 : 1977	Centrifugally cast (spun) ductile iron pressure pipes for water, gas and sewage
10.	IS 9523 : 1980	Ductile iron fittings for pressure pipes for water, gas and sewage
11.	IS 11606 : 1986	Methods of sampling cast iron pipes and fittings
12.	IS 11906 : 1986	Recommendations for cement mortar lining cast iron, mild steel and ductile iron pipes and fittings for transportation of water.
13.	IS 12288 : 1987	Code of practice for laying of ductile iron pipes
	Concrete Pipes	
14.	IS 458 : 1971	Concrete pipes (with and without reinforcements) (second revision)
15.	IS 784 : 1978	Pre-stressed concrete pipes (including fittings) (first revision)
16.	IS 1916 : 1963	Steel cylinder reinforced concrete pipes
17.	IS 3597 : 1985	Methods of test for concrete pipes (first revision)
18.	IS 783 : 1985	Code of practice for laying of concrete pipes (first revision)
19.	IS 4350 : 1967	

		Concrete porous pipes for under drainage
	Asbestos Cement Pipes	
20.	IS 1592 : 1980	Asbestos cement pressure pipes (second revision)
21.	IS 6530 : 1972	Code of practice for laying of asbestos cement pressure pipes
22.	IS 5531 : 1977	Cast iron specials for asbestos cement pressure pipes for water, gas and sewage (first revision)
23.	IS 9627 : 1980	Asbestos cement pressure pipes (light duty)
	Mild Steel Tubes and Pipes	
24.	IS 1239	
	Part 1 : 1979	Mild steel tubes, tubular and other wrought steel fittings.
	Part 2 : 1982	Mild Steel tubes (fourth revision)
25.	IS 1978 : 1982	Mild Steel tubular and other wrought steel pipe fittings (third revision)
26.	IS 3589 : 1981	Line Pipe
27.	IS 4270 : 1983	Electrically welded steel pipes for water, gas and sewage (150 to 2000 mm nominal size) (first revision)
28.	IS 4516 : 1968	Steel tubes used for water wells (first revision)
29.	IS 5504 : 1969	Elliptical mild steel tubes
30.	IS 5822 : 1986	Spiral welded pipes
31.	IS 4711 : 1974	Code of practice for laying of welded steel pipes for water supply (first revision)
32.	IS 4736 : 1986	Method for sampling of steel pipes, tubes and fittings (first revision)
33.	IS 6286 : 1971	Hot-dip zinc coatings on mild steel tubes (first revision)
34.	IS 6631 : 1972	Seamless and welded steel pipes for sub zero temperature services
35.	IS 11722 : 1968	Steel pipes for hydraulic purpose

	Plastic Pipes	Thin welded flexible quick coupling pipes
36.	IS 3076 **:** 1985	
37.	IS 4984 **:** 1987	Low destiny polyethylene pipes for potable water supplies (second revision)
38.	IS 4985 **:** 1988	High density polyethylene pipes for potable water supplies, sewage and industrial effluents (third revision)
39.	IS 12818 **:** 1989	Unplasticized PVC pipes for potable water supplies (second revision)
40.	IS 7634	UPVC ribbed and casing pipes for potable water supply
	Part 1 **:** 1975	Code of practice for plastic pipe work for potable water supplies.
	Part 2 **:** 1975	Choice of materials and general recommendation
	Part 3 **:** 1975	Laying and Jointing polyethylene (PE) pipes.
41.	IS 7834	Laying and Jointing of unplasticized PVC pipes.
	Part 1 **:** 1975	Injection molded PVC fittings with solvent cement joints for water supplies.
	Part 2 **:** 1975	General requirements
	Part 3 **:** 1975	Specific requirements of 45 degree elbows
	Part 4 **:** 1975	Specific requirements for 900 elbows
	Part 5 **:** 1975	Specific requirements for 900 tees
	Part 6 **:** 1975	Specific requirements for 450 tees
	Part 7 **:** 1975	Specific requirements for sockets
	Part 8 **:** 1975	Specific requirements for unions
42.	IS 8008	Specific requirements for caps
	Part 1 **:** 1976	Injection moulded HDPE fittings for potable water supplies
	Part 2 **:** 1976	General requirements
	Part 3 **:** 1976	Specific requirements for 900 bends

	Part 4 : 1976	Specific requirements for 900 tees
	Part 5 : 1976	Specific requirements for reducers
	Part 6 : 1976	Specific requirements for ferrule
	Part 7 : 1976	Specific requirements for pipe ends
43.	IS 8360	Specific requirements for sandwich flange
	Part 1 : 1977	Fabricated high density polyethylene (HDPE) fittings for potable water supplies
	Part 2 : 1977	General requirements
	Part 3 : 1977	Specific requirements for 900 tees
44.	IS 10124	Specific requirements for 900 bends
	Part 1 : 1988	Fabricated PVC fittings for potable water supplies
	Part 2 : 1988	General requirements
	Part 3 : 1988	Specific requirements for sockets (first revision)
	Part 4 : 1988	Specific requirements for straight reducers (first revision)
	Part 5 : 1988	Specific requirements for caps (first revision)
	Part 6 : 1988	Specific requirements for equal tees (first revision)
	Part 7 : 1988	Specific requirements for flanged in to pieces with metallic flanges (first revision)
	Part 8 : 1988	Specific requirements for threaded adaptors (first revision)
	Part 9 : 1988	Specific requirements for 90 degree bends (first revision)
	Part 10 : 1988	Specific requirements for 60 degree bends (first revision)
	Part 11 : 1988	Specific requirements for 45 degree bends (first revision)
	Part 12 : 1988	Specific requirements for 30 degree bends (first revision)

	Part 13 : 1988	Specific requirements for $22\frac{1}{2}$ degree bends (first revision) Specific requirements for $11\frac{1}{4}$ degree bends (first revision)
45.	IS 12231 : 1988	UPVC pipes for use in suction and delivery of agriculture pump.
46.	IS 12235	Methods of test for unplasticized PVC pipes for potable water supplies.
	Part 1 : 1986	Methods for measurement of outside diameter.
	Part 2 : 1986	Measurements of wall thickness
	Part 3 : 1986	Test for opacity
	Part 4 : 1986	Determining the detrimental effect on the composition of water
	Part 5 : 1986	Reservoir test
	Part 6 : 1986	Stress relief test
	Part 7 : 1986	Test for resistance of sulphuric acid
	Part 8 : 1986	Internal hydrostatic pressure test
	Part 9 : 1986	Impact strength test
	Part 10 : 1986	Method for determination of organizing as aqueous solution.
	Part 11 : 1986	Extractability of cadmium and mercury occurring as impurities
47.	IS 12709 : 1989	Specification for glass fiber reinforced plastic (GRP) pipes for water supply and sewerage.
	Miscellaneous Pipes	
48.	IS 1545 : 1982	Soild drawn copper alloy tubes for condensers and heat exchanger (second revision)
49.	IS 404 : 1993	Lead Pipes
	Part 1 : 1993	For other than chemical purpose (second revision)

	Part 2 **:** 1979	For chemical purpose (second revision)
50.	IS 11906 **:** 1986	Recommendations for cement – mortar lining for cast iron, mild steel and ductile iron pipes and fittings for transportation of water.
3)	**<u>Water Fittings</u>**	
	Taps	
1.	IS 781 **:** 1984	Cast copper alloy screw drawn bid taps and stop valves for water services (third revision)
2.	IS 1700 **:** 1973	Drinking foundations (first revision)
3.	IS 1711 **:** 1984	Self – closing taps for water supply purpose (second revision)
4.	IS 1795 **:** 1982	Pillar taps for use with fittings for water services (second revision)
5.	IS 4346 **:** 1982	Washers for use with fittings for water services (first revision)
6.	IS 8934 **:** 1978	Cast copper alloy fancy pillar taps for water services.
7.	IS 9763 **:** 1981	Plastic bid taps and stop valves (rising spindle) for cold water services.
	Water Meters	
8.	IS 779 **:** 1978	Water meters (domestic type) (fifth revision)
9.	IS 2104 **:** 1981	Water meter boxes (domestic type) (first revision)
10.	IS 2373 **:** 1981	Water meter (bulk type) (third revision)
11.	IS 2401 **:** 1973	Code of practice for selection, installation and maintenance of domestic water meters (first revision)
12.	IS 6784 **:** 1984	Method for performance testing of water meters (domestic type) (first revision)
	Valves	
13.	IS 780 **:** 1984	Sluice valves for water works purpose (50 to 300 mm size) (sixth revision)
14.	IS 2906 **:** 1984	Sluice valves for water works purpose (350 to 1200 mm size) (third revision)

15.	IS 2685 : 1971	Code of practice for selection, installation and maintenance of sluice valves (first revision)
16.	IS 3042 : 1965	Single faced sluice gates (200 to 1200 mm size)
17.	IS 3950 : 1979	Surface boxes for sluice valves (first revision)
18.	IS 778 : 1984	Copper alloy gate, globe and check valves for water works purpose (fourth revision)
19.	IS 1701 : 1960	Mixing valves for ablutionary and domestic purpose
20.	IS 1703 : 1977	Ball valves (horizontal plunger type) including floats for water supply purpose (second revision)
21.	IS 4838 : 1986	Foot valves for water works purposes (second revision)
22.	IS 5312 : 1984	Single door pattern (first revision)
	Part 1 : 1984	Single door pattern (first revision)
	Part 2 : 1986	Multi door pattern
23.	IS 9338 : 1984	Cast iron screw down stop valves and stop and check valves for water works purpose (first revision)
24.	IS 9739 : 1981	Pressure reducing valves for domestic water supply systems.
25.	IS 12234 : 1988	Equilibrium plastic float valve for cold water services.
	Miscellaneous Fittings	
26.	IS 2692 : 1978	Ferrules for water services (first revision)
27.	IS 3004 : 1979	Plug cocks for water supply purpose (first revision)
28.	IS 9762 : 1981	Polyethylene floats for ball valves
29.	IS 10446 : 1983	Glossary of terms relating to water supply and sanitation
4)	**Tubewells Pumps and Prime Movers Glossary**	
1.	IS 9439 : 1980	Glossary of terms used in water well drilling technology

2.	IS 2800 : 1979	Code of practice for construction and testing of tubewells
	Part 1 : 1991	Construction (first revision)
	Part : 1979	Testing (first revision)
3.	IS 11189 : 1985	Methods for tube-well development
4.	IS 11632 : 1986	Code of practice for rehabilitation of tubewell
	Tubewell Components	
5.	IS 4097 : 1967	Gravel for use as pack in tubewells
6.	IS 4270 ; 1983	Steel tubes used for water wells (first revision)
7.	IS 8110 : 1983	Well screens and slotted pipes (first revision)
	Drilling Equipments, Accessories and Methods	
8.	IS 7156 : 1974	General requirements for reverse circulation drilling rigs
9.	IS 7206 : 1974	General requirements for straight rotary drilling rigs
10.	IS 7209 : 1974	General requirements for blast hold drilling rigs
11.	IS 8986 : 1978	Dimensions for drill steel in bar from for percussive drilling
12.	IS 9026 : 1978	Rope threaded percussive long hole drilling equipment
13.	IS 11180 : 1985	Keeleys for direct rotary drilling
14.	IS 11312 : 1986	External upset drill pipe assemblies for use in water well drilling
	Part 1 : 1986	Screwed on joints drill pipe size
15.	IS 11672 : 1986	Tungsten carbide buttons and insects of use in down the hole (DTH) bits
16.	IS 11830 : 1986	Code of practice for selection and design of diamond core drills
17.	IS 11830 : 1986	General requirements for down the hole hammer rigs for water wells

18.	IS 12097 **:** 1987	Classification and selection of drilling rigs for water well drilling
19.	IS 12194 **:** 1987	Dimensions for rock roller bits and blade drag bits for rock drilling equipment
	Pumps and Related Standards	
20.	IS 8035 **:** 1976	Shallow well hand pumps
21.	IS 9301 **:** 1984	Deep well hand pumps (second revision)
22.	IS 11004 **:** 1985	Code of practice for installation and maintenance of deep well band pumps
	Part 1	Installation
	Part 2	Maintenance
	Other Pumps	
23.	IS 1520 **:** 1980	Horizontal centrifugal pumps for clear, cold, fresh water (second revision)
24.	IS 1710 **:** 1972	Vertical turbine pumps for clear, cold, fresh water (first revision)
25.	IS 6595 **:** 1980	Horizontal centrifugal pumps for clear, cold, fresh water for centrifugal purposes (first revision)
26.	IS 8034 **:** 1976	Submersible pump sets for clear, cold, fresh water
27.	IS 8418 **:** 1977	Horizontal centrifugal self priming pumps
28.	IS 8472 **:** 1977	Regenerative self priming pumps for clear, cold, fresh water
29.	IS 9079 **:** 1979	Monoset pumps for clear, cold, fresh water for agricultural purposes
30.	IS 9137 **:** 1978	Code for acceptance test for centrifugal mixed flow and axial pumps – Class C
31.	IS 9542 **:** 1980	Horizontal centrifugal monoset pumps for cold, fresh water
32.	IS 9694	Code of practice for selection, installation, operation and maintenance for horizontal centrifugal pumps for agricultural applications.
	Part 1 **:** 1980	Selection
	Part 2 **:** 1980	Installation

	Part 3 **:** 1980	Operation
	Part 4 **:** 1980	Maintenance
33.	IS 10572 **:** 1983	Methods of sampling pumps
34.	IS 10804 **:** 1986	Recommendation pumping systems for agricultural purposes (first revision)
35.	IS 10805 **:** 1986	Foot valves, reflux valves or non return valves and bore valves to be used in suction lines of agricultural pumping systems (first revision)
36.	IS 10981 **:** 1983	Code for acceptance test for centrifugal mixed flow and axial pumps – Class B
37.	IS 11346 **:** 1985	Testing set up for agricultural pumps
38.	IS 12225 **:** 1987	Technical requirements for jet, centrifugal pump combination
39.	IS 5120 **:** 1977	Technical requirements for roto dynamic special purpose pumps
	Prime Movers	
40.	IS 325 **:** 1978	Three phase induction motors
41.	IS 900 **:** 1965	Code of practice for installation and maintenance of induction motors
42.	IS 996 **:** 1979	Single phase small A.C. and universal electric motors
43.	IS 4029 **:** 1967	Guide for testing three phase induction motors
44.	IS 7538 **:** 1975	Three phase squirrel cage induction motors for centrifugal pumps for agricultural application
45.	IS 8789 **:** 1978	Valves of performance characteristics for three phase induction motors
46.	IS 9283 **:** 1979	Motors for submersible pump sets
47.	IS 10001 **:** 1981	Performance requirement for constant speed compression ignition (diesel) engines for general purposes (up to 20 Kw)
48.	IS 11170 **:** 1985	Performance requirements for constant speed compression ignition (diesel)

49.	IS 11501 : 1986	engines for agricultural purposes (up to 20 Kw)
50.	IS 10808 : 1984	Engine monoset pumps for clear, cold, fresh water for agricultural purposes
51.	IS 10809 : 1984	Code of practice for installation, operation and maintenance of hydraulic rams
52.	Test code for hydraulic rams	Hydraulic rams Test code for hydraulic rams
5)	**Water Quality**	
1.	IS 258 : 1967	Potash ash (first revision)
2.	IS 259 : 1969	Aluminium alum (first revision)
3.	IS 260 : 1969	Aluminium sulphate
4.	IS 299 : 1980	Aluminium ferric (third revision)
5.	IS 646 : 1986	Liquid chlorine (second revision)
6.	IS 1065 : 1971	Bleaching powder, stable
7.	IS 1622 : 1981	Methods of sampling and microbiological examination of water (first revision)
8.	IS 3025 : 1964	Methods of sampling and test (physical and chemical) for water and waste water
	Part 1 : 1986	Sampling (first revision)
	Part 2 : 1987	Precision and accuracy
	Part 3 : 1983	Colour (first revision)
	Part 4 : 1983	Odour (first revision)
	Part 5 : 1983	Odour threshold (first revision)
	Part 6 : 1984	Test threshold (first revision)
	Part 7 : 1984	Test rating (first revision)
	Part 8 : 1984	Temperature (first revision)
	Part 9 : 1984	Turbidity (first revision)
	Part 10 : 1983	pH value (first revision)
	Part 11 : 1983	Density (first revision)
	Part 12 : 1983	Saturation index (with respect to calcium

		carbonate) (first revision)
	Part 13 : 1984	Specific conductance (wheat – stone bridge conductance cell) (first revision)
	Part 14 : 1984	Total residue (total dissolved solids) (first revision)
	Part 15 : 1984	Filterable residue (total dissolved solids) (first revision)
	Part 16 : 1984	Non filterable residue (total dissolved solids) (first revision)
	Part 17 : 1984	Volatile and fixed residue (total filterable and non filterable) (first revision)
	Part 18 : 1984	Settable matter (first revision)
	Part 19 : 1984	Dispersion characteristics (flow patterns) (first revision)
	Part 20 : 1983	Total hardness (first revision)
	Part 21 : 1986	Acidity (first revision)
	Part 22 : 1986	Alkalinity (first revision)
	Part 23 : 1986	Sulphate
	Part 24 : 1986	Chlorine demand (first revision)
	Part 25 : 1986	Chlorine, residual (first revision)
	Part 26 : 1986	Cyanide (first revision)
	Part 27 : 1986	Sulphate (first revision)
	Part 28 : 1986	Sulphate (first revision)
	Part 29 : 1988	Bromide
	Part 30 : 1988	Phosphorous
	Part 31 : 1988	Chloride
	Part 32 : 1988	Iodide
	Part 33 : 1988	Nitrogen
	Part 34 : 1988	Silica
	Part 35 : 1988	Ozone residual
	Part 36 : 1988	Arsenic

	Part 37 : 1989	Dissolved Oxygen
	Part 38 : 1989	Oil and Greece
	Part 39 : 1991	Calcium
	Part 40 : 1992	Cadmium
	Part 41 : 1992	Copper
	Part 42 : 1992	Phenols
	Part 43 : 1993	B.O.D.
	Part 44 : 1993	Sodium and Pottasium
	Part 45 : 1994	Magnesium
	Part 46 : 1994	Lead
	Part 47 : 1994	Mercury
9.	IS 9825 : 1981	Chlorine tablets
10.	IS 10500 : 1991	Drinking water standards
6)	**Measurement Of Fluid Flow**	
1.	IS 1191 : 1971	Glossary of terms and symbols used in connection with the measurement of liquid flow with a free surface (first revision)
2.	IS 1192 : 1981	Velocity area methods for measurement of flow of water in open channels
3.	IS 1194 : 1960	Forms for recording measurement of flow of water in open channels
4.	IS 2912 : 1964	Recommendations for liquid flow measurement in open channels by slope area method (approximate method) (Amendment No. 1)
5.	IS 2913 : 1964	Recommendation for determination of flow in tidal channels
6.	IS 2914 : 1964	Recommendation for estimation of discharge by establishing stage – discharge relation in open channels. (Amendment No.1)
7.	IS 2915 : 1964	Instructions for collection of data for the determination, of the flow by velocity area methods

8.	IS 2951 : 1965	Recommendation for estimation for flow of liquids in closed conduits
	Part 1 : 1965	Head loss in straight pipes due to friction resistance
	Part 2 : 1965	Head loss in valves and fittings
9.	IS 2952 : 1964	Recommendation for methods of measurement of liquid flow by means of orifice plates and nozzles
	Part 1 : 1964	Incompressible fluids
	Part 2 : 1975	Compressible fluids
10.	IS 3910 : 1966	Specification for current meters (cup type) for water flow measurement (Amendment No.1)
11.	IS 3911 : 1966	Specification for surface floats
12.	IS 3912 : 1966	Specification for sounding rods
13.	IS 3918 : 1966	Code of practice for use of current meter (cup type) for water flow measurement
14.	IS 4073 : 1967	Specification for fish weights
15.	IS 4080 : 1967	Specification for vertical staff gauges
16.	IS 4477	Methods of measurement of fluid flow by means of venturi meters:
	Part 1 : 1967	Liquids
	Part 2 : 1975	Compressible fluids
17.	IS 4858 : 1968	Specification for velocity rods
18.	IS 6059 : 1971	Recommendation for liquid flow measurement in open channels by wires and flumes – Weirs of finite crest width for free discharge
19.	IS 6062 : 1971	Methods of measurement of flow of water in open channels using standing wave flume fall
20.	IS 6063 : 1971	Methods of measurement of flow of water in open channel using standing wave flume
21.	IS 6064 : 1971	Specification for sounding and suspension

		equipment
22.	IS 6330 **:** 1971	Recommendation for liquid flow measurement in open channels by weirs and flumes – end depth method for estimation of flow in rectangular channels with a free overall (approximately method)
23.	IS 6339 **:** 1971	Methods of analysis of concentration, particle size distribution and specific gravity of sediment in streams and cannels
24.	IS 9108 **:** 1979	Liquid flow measurement in open channels using this plate weirs
25.	IS 9115 **:** 1979	Method for estimation of incompressible fluid flow in closed conduicts by bend meters
26.	IS 9116 **:** 1979	Specification foe water stage recorder (float type)
27.	IS 9117 **:** 1979	Recommendation for liquid flow measurement in open channels by weirs and flumes – end depth method for estimation of flow in non Rectangular channels with a free over all (approximate method)
28.	IS 9118 **:** 1979	Method for measurement of pressure by means of manometer
29.	IS 9119 **:** 1979	Method for flow estimation by jet characteristics (approximate method)
30.	IS 9163 **:** 1979 Part 1	Dilution Methods for measurement of steady flow constant rate injection method
31.	IS 9922 **:** 1981	Guide for selection of method for measuring flow in open channels
7)	**Treatment**	
1.	IS 1680 **:** 1982	Treatment of water for low and medium pressure in land boilers
2.	IS 1813 **:** 1961	Treatment of water for marine boilers
3.	IS 2859 **:** 1977	Treatment of water for locomotive boilers
4.	IS 3328 **:** 1965	Quality tolerances for swimming pool
5.	IS 4343 **:** 1983	Treatment of water for high pressure boiler
6.	IS 7090 **:** 1985	Guidelines for rapid mixing devices
7.	IS 7208 **:** 1992	Guidelines for flocculator devices

8.	IS 8419 : 1984	Requirement for rapid gravity filtration equipment
	Part 1 : 1984	Filtration media – sand and gravel
	Part 2 : 1984	Under drainage systems
9.	IS 10037	Requirement for sludge dewatering equipment
	Part 1 : 1981	Sludge drying beds including sand, gravel, under drains
	Part 2 : 1983	Vacuum filtration equipment for dewatering sludge
	Part 3 : 1983	Centrifugal equipment (solid bowl type)
10.	IS 10261 : 1982	Requirements of settling tank (clarifier equipment) for waste water treatment plant
11.	IS 10313 : 1982	Requirements of settling tank (clarifier equipment) for water treatment plant
12.	IS 10553	Requirements for chlorination equipment
	Part 1 : 1983	General guidelines for chlorination plants including handling, storage and safety of chlorine cylinders and drums
	Part 2 : 1983	Vacuum feed type chlorinators
	Part 4 : 1983	Gravity feed type gaseous chlorinators
	Part 5 : 1987	Bleaching powder solution feeder displacement type chlorinator
13.	IS 12742 : 1989	Water for drinking purposes, guide for defluoridation (chemical treatment method)
14.	IS 800 : 1984	Code of practice for general construction in steel
15.	SP 6 (1) : 1964	ISI Hand Book for structural engineers Structural steel sech
16.	SP 6 (2) : 1962	Steel Beams & Plate girders
17.	SP 6 (3) : 1962	Steel Columns & Struts
18.	SP 6 (6) : 1972	Application of plastic theory in design of steel structures

19.	SP (7) **:** 1972	Simple welded girders
20.	IS 1904 **:** 1985	Design and Construction of foundations general requirements (3rd revision)
21.	IS 2809 **:** 1972	Glossary of terms and symbols relating to soil engineering
22.	IS 3764 **:** 1966	Safety code for excavation work
23.	IS 1905 **:** 1980	Structural safety of Building Masonry walls (2nd revision)
24.	IS 1597 **:** Part – 1	Rubble stone masonry
25.	IS 1967 **:** Part – 2	Ashlars masonry
26.	IS 2212 **:** 1962	Brick Work
27.	IS 2541 **:** 1977	Preparation and use of lime concrete
28.	IS 5817 **:** 1970	Preparation and use of lime pozzolana mixture concrete in buildings and roads
29.	IS 8041	Rapid hardening Portland cement
30.	IS 8043	Hydro pholic cement
31.	IS 12600	Low heat Portland cement
32.	IS 12330	Sulphate resisting Portland cement
33.	IS 6909	Super sulphate cement
34.	IS 6542	High alumina cement
35.	IS 455 **:** 1989	Portland slag cement
36.	IS 3812	Fly ash Grade – 1
37.	IS 12089	Ground generated Blast slag cement GGBS
	Material Testing	
1.	IS 13311 **:** Part – 1	Ultra sonic pulse velocity test (non destructive testing of concrete)
2.	IS 13311 **:** Part – 2	Rebound Hammer Test
3.	IS 10262 **:** 2004	Guide lines for concrete mix proportioning (draft)
4.	IS 2386 **:** 1963	Methods of tests for aggregate for concrete
5.	IS 383 **:** 1970	Specifications for course and fine

		aggregate from Natural Sources for Concrete
6.	IS 9103 **:** 1999	Specifications for admixtures for concrete
7.	IS 1199 **:** 1959	Methods of sampling and analysis of concrete
8.	IS 516 **:** 1959	Methods of tests for strength of concrete
9.	IS 10262	Mix proportioning of plain and rice husk ash concrete (draft)
10.	SP – 23 **:** 1982	Hand Book on Concrete Mix Design
11.	IS 4031 **:** Part – 5	Test Blocks for initial secting time test OPC
	Steel – Reinforcement Bars	
1.	IS 432 **:** Part – 1	Mild steel and medium tensile steel
2.	IS 1786	High strength deformed steel bars (HYSD)
3.	IS 1566	Hand drawn steel wire fabric
4.	IS 2062	Structural steel centrifugal to Grade A
5.	IS 456 **:** 2000	Code of practice for plain and reinforced concrete
6.	IS 1893 **:** 2002 –	Criteria for Earthquake Resistant Design of Structure
	Part – 1	General Provisions & Buildings
	Part – 2 (Draft)	Liquid Retaining Tanks, Elevated & Ground Reservoirs
7.	IS 875 Part – 3 (Draft)	Code of practice for design loads (Other than earthquake) for Buildings & Structures Wind Loads
8.	IS 875 **:** 1987 Part – 5	Code of practice for design loads (Other than earthquake) for Buildings & Structures Wind Loads
9.	IS 13920 **:** 1993	Code of practice for Ductile detailing of reinforced concrete structures subjected to seismic forces.
10.	IS 3370 **:** 1965 Part – 1 & 2 Part – 3 & 4 **:** 1967	Code of practice for concrete structure for the storage of liquids.
11.	IS 11682 **:** 1985	Criteria for RCC Staging for Overhead Water Tanks

12.	IS 11089 : 1984	Code of practice for Design & Construction of Ring Foundation
13.	IS 1080 : 1985	Code of practice for Design & Construction of Shallow Foundation in Soil
14.	IS 2911 : 1988	Code of practice for Design & Construction of pile foundation
15.	IS 1786 : 1985	Specification for High Strength Deformed Bars & Wires for Concrete Reinforcement
16.	IS 1139 : 1966	Specification for Hot rolled Mild Steel Medium Steels & High Strength Deformed bars for Concrete Reinforcement

List of Vendors for miscellaneous items:

A. Paints

1) Asian Paints
2) Nerolac
3) Berger
4) Jotun
5) Dulux
6) Nippon Paints India Pvt. Ltd.
7) Snowcem Paints Pvt. Ltd.

B. Floor Tiles/Wall Tiles

1) Cera
2) Kajaria
3) AGL
4) Somany
5) Johnson Ceramic
6) Hindustan

C. Plumbing & Fittings

1) Cera
2) jaguar
3) hindware
4) Parryware

D. Clariflocculator Bridge

1) Shivpad
2) Triveni Engineers
3) Hindustan Dorr Oliver
4) Paramount

E. Lights

1) Anchor
2) Philips
3) Havells
4) Osram
5) Wipro
6) Crompton & Greaves
7) Bajaj
8) Halonix
9) Surya
10) GE
11) Sujana
12) Sahasra

F. Point Wiring/Cable

1) KEI
2) RR Kabel
3) Polycab
4) Finolex
5) Havells

G. Lighting Fixtures

1) Bajaj
2) Philips
3) Wipro
4) Crompton & Greaves
5) Havells
6) Polycab

H. Switch and Socket

1) Havells
2) Wipro
3) Anchor
4) Schneider Electric
5) Legrand
6) Polycab

I. Electrodes for Welding

1) D&H India Ltd.
2) Esab
3) Noble Electrode Pvt. Ltd
4) Modi Arc Electrode
5) Adore Welding Ltd.

J. Steel Reinforcement

1) Tiscon
2) Jindal Steel (TMT)
3) SAIL
4) ESSAR TMT
5) Electrotherm
6) Rashtriya Ispat Nigam Ltd
7) Mesco Steel

WTP Hydraulic Design Criteria

1.	AERATOR:-	
1.1	Type	Circular Type cascade aerator.
1.2	Design flow Cum/hr	as per datasheet
1.3	Space Required	0.03 Sqm/Cum/hr
1.4	No. of steps	4 to 5
2.	INLET CHAMBER	Aerator Type
2.1	Detention time	60 Seconds
3.	CHANNEL FROM AREATOR (Or inlet chamber) to flash mixer :-	
3.1	Design flow Cum/hr	as per datasheet
3.2	Velocity	0.6 m/sec
3.3	Length	10 to 15 meter
4.	FLASH MIXER :-	
4.1	Detonation time	40 Seconds
4.2	Design flow Cum/hr	as per datasheet
4.3	Ratio of tank height to diameter	1 : 1 to 3 : 1
4.4	Velocity gradient	300 Sec^{-1}
4.5	Shaft speed	100 RPM
5.	PIPE FROM FLASH MIXER TO CLARIFLOCCULATOR :-	
5.1	Type of pipe	Any Type of pipe Except M.S.
5.2	Design flow Cum/hr	as per datasheet
5.3	Velocity	1.0 m/sec
6.	CLARIFLOCCULATOR :-	
6.1	Central Shaft Velocity of flow	0.8 m/sec
	Flocculation Zone	
6.2	Detention time	30 minutes

6.3	Depth of tank	3.0 m minimum
6.4	Velocity of flow	0.2 to 0.4 m/sec
6.5	Total area of paddles	15 to 25 % cross sectional area of the tanks
6.6	Range of peripheral velocity of blades	0.3 to 0.4 m/sec
6.7	Velocity gradient	10 to 75 Sec-1
6.8	Range of G.T.	10^4 to 10^5

CLARIFIER ZONE

6.9	Out let velocity from flocculator	0.2 to 0.3 m/min
6.10	Detention time	2.5 hours
6.11	Surface loading	35 Cum/Sqm/day
6.12	Weir loading	300 Cum/Sqm/day
6.13	Depth of clarifier	3.5 m
6.14	Bottom slope	1 : 10 to 1 : 12
6.15	Tip velocity of scraper	$\leq$ 0.3 m/min
6.16	Extra depth for sludge collection at partition wall	20 %
6.17	Scraper velocity	One revolution in 60 minutes

NOTE :-

(1) Settling tank/clarifier should be capable of giving settled water having turbidity not exceeding 20 NTU (monsoon season) and preferably less than 10 NTU.

(2) Circular Clari-Flocculator maximum up to 35m dia is to reduce wind effect.

(3) Sludge disposal line should be provided from the Clari-Flocculator to sludge chamber, the minimum size of chamber should be (1m x 1m)

(4) I launder provided inside the Clari-Flocculator, the area of launder should be added in finding out final area of Clari-Flocculator.

(5) Clari-Flocculator to restrict the diameter maximum up to 35M.

7. FILTER – (Rapid sand filter)

7.1	Rate of filtration	6.0 Cum/Sqm/hr
7.2	Length width ratio of bid	1.2 – 1.33 preferred
7.3	Gravel bed	0.45m (Minimum)
7.4	Sand depth	0.70m (Minimum)
7.5	Filter bed Depth	3.3 to 3.5 meter with free board
7.6	Filter bed unit	Each bed have two units, & each unit should have area between 20 Sqm to 30 Sqm
7.7	Back wash rate	36 m3/hr/m2 (600lpm/Sqm) for a period of 10 minutes
7.8	Air Scour rate	45 m3/hr/m2(750lpm/sqm) for a period of 5 minutes at pressure of 0.35 Kg/Sqcm
7.9	Velocity in wash water main from ESR	2.5 m/sec
7.10	Inlet / Outlet of filter	Inlet, outlet shall be designed to permit 100% overload for emergency occasions
7.11 7.11.1 7.11.2 7.11.3	Under drain system Ratio of total area of orifice to the entire filter area Ratio of total area of laterals to total area of orifice Ratio of total area of manifold to total area of laterals	 0.30 % 2 1.5
7.12	Filtered water turbidity	Not more than 1NTU (i.e. 1 NTU maximum)
7.13	Minimum water depth on sand	2.0 m

NOTE :- Capacity of wash water tank depends on size of bed

and hence the same shall be fixed considering back wash for minimum 10 minutes at the rate of 600 lpm for minimum two units plus 12,000 liters for water supply to office and laboratory use. The back wash tank should give 9 (minimum) meter head at under drain from bottom of tank.

8. OFFICE BULDING AND CHAMBER HOUSE :-

G.F. Area = 80 to 150 Sqm as per the capacity of filter plant

F.F. Area = 80 to 120 Sqm as per the capacity of filter plant

9. RECIRCULATION :-

It shall be generally avoided for below 20 MLD Capacity as it increases in maintenance cost and permanently overload the plants.
The above criteria for convention all water treatment plant are finalized, the same should be now adopted for all future conventional water treatment plant. The criteria should not be changed in the tender or during pre-bid without prior consultation of design circle.

(1)A note on Overloading of WTP or design flow to be specified In Data of tender
The matter was discussed by experts in last many technical committees about concept adopted and understood by various field engineers defining Design flow in tender Data

This can be clear from following example
The water supply rate = 'R' L.P.C.D
Population projected after design period (say 30years)=P
Total daily water demand D= P * R liters/day
i.e. Total daily water demand = D liters/24 hours
For 22 hours working period of WTP for generating treated water quantity (demand)
Hourly treatment capacity= D/22 Litres /hour
Design flow of treatment plant Q=D/22000 cum/hour
(This will include 24/22= 1.09 i.e. 9% overloading in design flow .)
All WTP units should be designed for hydraulic capacity using this 'Q'Flow in Cum./hour It is assumed filter backwashing will need 2 hours in total.
If there is more time is required in any specific large capacity plant or there is interruption of power for WTP operation Generation period shall be fixed by Field officers with due consideration.

Water supply rate = R=		100	liters per capita per day (LPCD)
Projected population after design period=P=		100000	
Daily Water Demand= D=P* R=		10000000	liters
	=	10000	Cum
24 hours water requirement(demand)=		10000	Cum
IN 22 hours generating full day requirement daily generation rate=		10000	/22 hours

Hourly capacity = 454.5455 Cum./hour

Design flow of WTP= 454.5455 Cum./hour

* *75th technical scrutiny committee minutes Dt.22.2.2007*

(2) Chemical house area shall be decided according to plant capacity by field Officer before during fixing data sheet of tender.
(2) 2 % for water quantity is lost by wasting due to desludging of Clari-Flocculator.

(3) 3 % for water quantity will be lost by backwashing of filter beds.
(If recirculation of this water is not included in WTP and directly wasted)

Criteria for structural design of Water Treatment plant (Conventional).

(1) Fe - 415 grade Reinforcing bars TMT (Thermo mechanically treated) bars Or HCR (High Corrosion Resistance) Rebar.

(2) PCC leveling course 100 mm thick M-10.

(3) RCC Items: All water retaining structures shall be in M-30 (Minimum) , and other RCC items shall be executed in M-25 (Minimum)

1.0 Inlet chamber or stilling chamber. RCC – M-30

1.1 Vertical wall - Min. thickness 150 mm.

1.2 Bottom / Floor slab - Min. thickness 150 mm.

1.3 Channel between

Inlet Chamber & Flash Mixer – Min thickness 100 mm

1.4 Parshall flume- Min thickness 100 mm.

2.0 Flash Mixer. RCC

2.1 Vertical wall- Min thickness 150 mm

2.2 Bottom / Floor slab- Min thickness 150 mm.

2.3 Constant Dosing chamber of adequate Size

3.0 Clariflocculator. RCC –M-30

3.1 Central hollow column – Min wall thickness 200 mm.

With ring beam at top of openings

3.2 Flocculator wall (Partition wall)- Min thickness 150 mm.

3.3 Clarifier outer wall - Min. thickness 150 mm.

3.4 Launder – Min thickness 100 mm.

3.5 Channel -Clariflocculator to filter inlet channel –Min thickness 100 mm

3.6 Floor slab – Min thickness 200 mm.

3.7 MS Bridge Wt. Without scraper Kg/m

Clari-Flocculator Bridge should be of branded suppliers as mentioned or equivalent. Preferred suppliers are listed below.

- Triveni Engineering & Industries Ltd.
- Paramount ltd.
- Hindustan dorroliver
- Shipad Engineers Pvt. Ltd.

3.8 Inlet pipe to Clari-Flocculator and washout pipe to be embedded in M150 Concrete.

3.9 Walkway with railing Min. width of 1000mm (At Outer side of the Clari-Flocculator basin)

(Note: Walkway Should be separate than launder which shall be inside)

3.10 Precast blocks covering to channel Min. thickness 75 mm

Max gap between blocks 100 mm

3.11 MS ladders / stairs or RC stairs shall be provided to climb up/reach top of all units from GL independently.

4.0 Rapid sand Filter. RCC –M-30

4.1 Filter Vertical wall – Min .thickness 150 mm.

4.2 Filter Floor slab - Min .thickness 150 mm.

4.3 Walkway /plant form - Min. thickness 100 mm. Min Width 1000mm

4.4 Filter gallery slab –for operation of valves etc. Min. th. 150 mm

4.5 Filter Inlet channel- Min thickness 100 mm.

4.6 Filter clear water channel - Min. thickness 100 mm.

4.7 Pipe gallery clear width Min. width- 2500 mm

4.8 Headroom of pipe gallery cover slab above Filtered water channel/inspection chambers- Min. 2200 mm

This slab width should be min 2500mm to accommodate operating valves.

4.9 Troughs/gullet - Min. thickness 100 mm

4.10 Sluice gates/valves size as per design confirming to relevant IS

5.0 Chemical House And Filter house

5.1 Column size- Min. 300 mm x 300 mm
Or having equivalent area

5.2 Staircase – Width - Min. 1000 mm
Riser - Max 150 mm.
Tread - - Min. 300 mm

5.3 Floor Height GF & FF - Min. 3500 mm (clear)

5.4 Plinth – - Min. 600 mm.

5.5 Brick wall (outer) - - Min. thickness 230 mm.

5.6 Roof slab - - Min. thickness 130 mm.

If wash water tank is placed above chemical house then 200 mm.

5.7 Floor slab Min. thickness 150 mm.

5.8 Chlorine storage room- Floor height- Min. 6000 mm

Door size should be such that truck can be taken inside for Unloading the tonners/chlorine cylinders

5.9 Parapet wall Min. height 750 mm

5.10 Door window openings Approx. 25% with sizes as per std . practice/ as per site conditions

5.11Provision of adequate rain water drain pipes up to GL form terrace

6.0 Wash water tank RCC

6.1 Vertical wall - Min. thickness 150 mm.

6.2 Bottom / Floor slab- Min. thickness 200 mm.

6.3 Roof slab. - Min. thickness 130 mm.

6.4 Separate space should be provided for installation of pumps for Filling wash water tank in time as per design.

7.0 Clear water sump. (If included in WTP units) RCC

7.1 Vertical wall- Min. thickness 150 mm

7.2 Bottom / floor slab – Min. thickness 150 mm.

7.3 Roof dome - Min. 100 mm

and if slab then Min. thickness 120 mm.

7.4 Clear water Inspection chambers or any chamber etc Min. thickness 100 mm

7.5 Floor of chambers – Min. thickness150 mm.

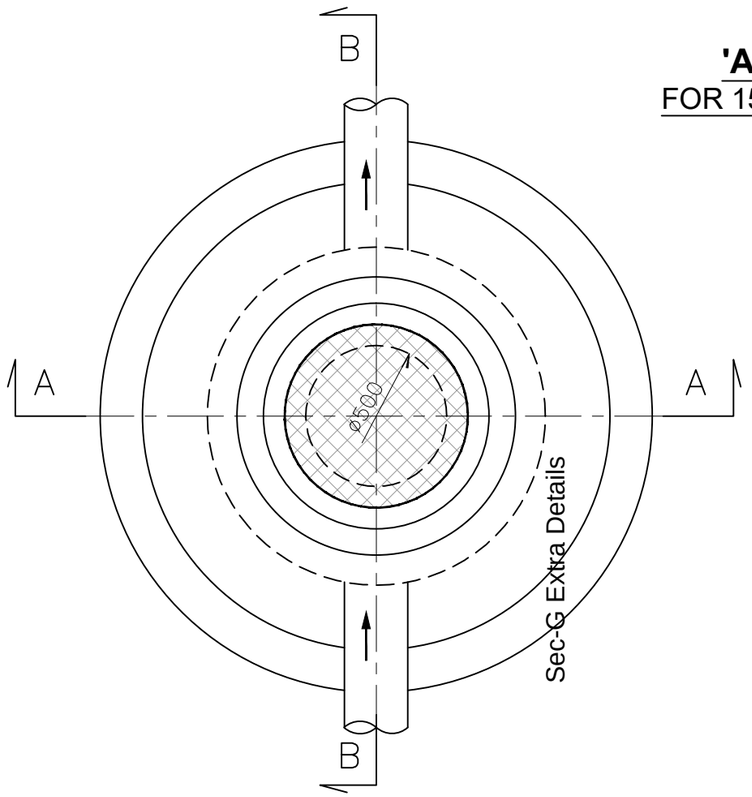
8.0 Recirculation sump. RCC-M-30

8.1 Vertical wall – Min. thickness 150 mm.

8.2 Bottom / floor slab – Min. thickness 150 mm.

8.3 Proper Drainage arrangement/pipeline shall be provided to drain the sludge in to near by Nalla.

(*Approved by 69th Technical Scrutiny Committee Dt.29.06.2004)*



'A' TYPE CIRCULAR MANHOLE

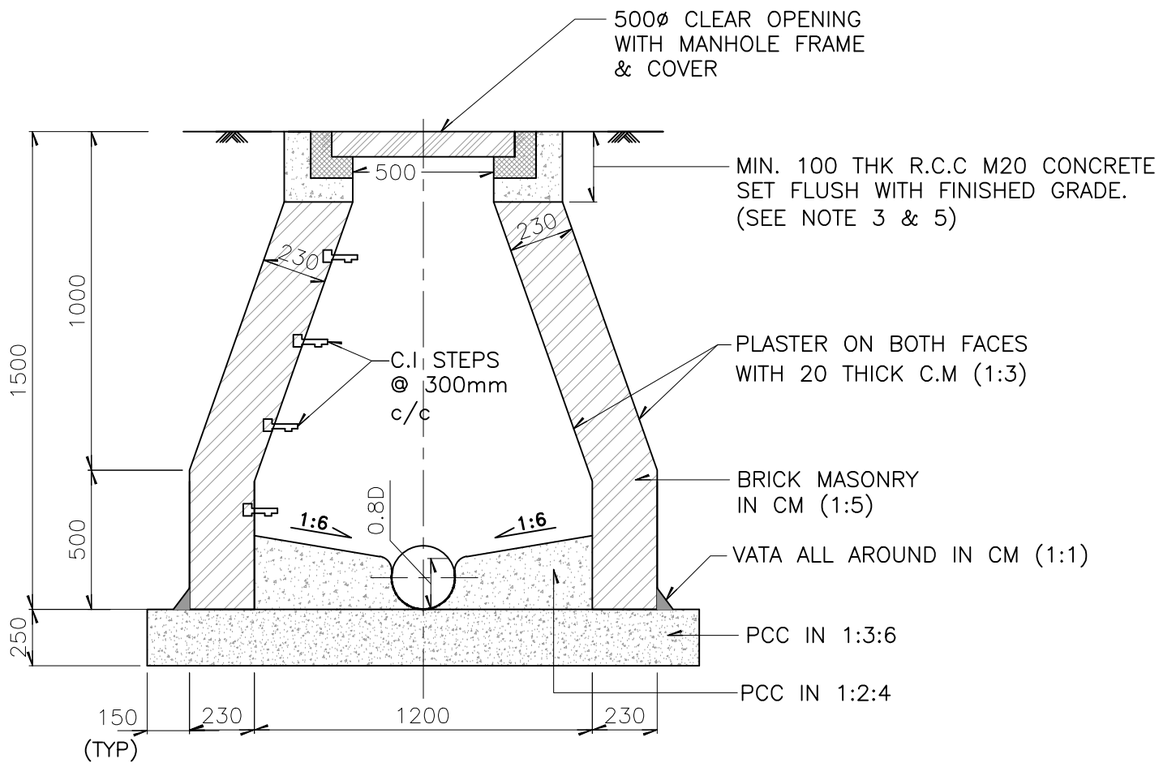
FOR 150mmØ TO 600mmØ (Depth Up to 1.5M)

NOTES

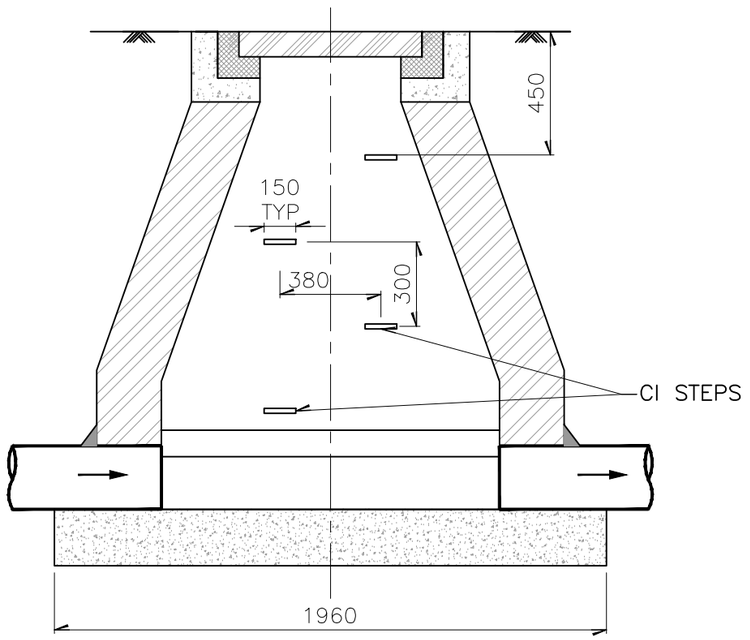
1. ALL DIMENSIONS ARE IN MM.
2. 'D' IS DIA. OF SEWER PIPELINE.
3. 100 THICKNESS OF CONCRETE CAN BE VARIED TO FLUSH MANHOLE COVER AND FRAME WITH ROAD SURFACE.
4. CI STEP FIXED WITH CEMENT MORTAR 1:3.
5. SFRC MANHOLE FRAME & COVER AS PER I.S.12592–2002.
6. THE BENCHING AT THE SIDE OF THE CHANNEL SHALL START FROM 0.8D FROM BASE AND THEN RISE WITH A SLOPE OF 1 IN 6 TOWARDS THE SIDE OF THE MANHOLE. SEMICIRCULAR PORTION WILL BE ACHIEVED IN CEMENT CONCRETE FINISHING ITSELF.
7. INTERNAL PLASTERING SHALL BE SULPHATE RESISTANT CEMENT (SRC).

LEGEND:

TYP	----------	TYPICAL
DIA	----------	DIAMETER
UN	----------	UNLESS NOTED
THK	----------	THICK
PCC	----------	PLAIN CEMENT CONCRETE
EQ	----------	EQUAL
C.I.	----------	CAST IRON
SFRC	----------	STEEL FIBRE REINFORCED CONCRETE



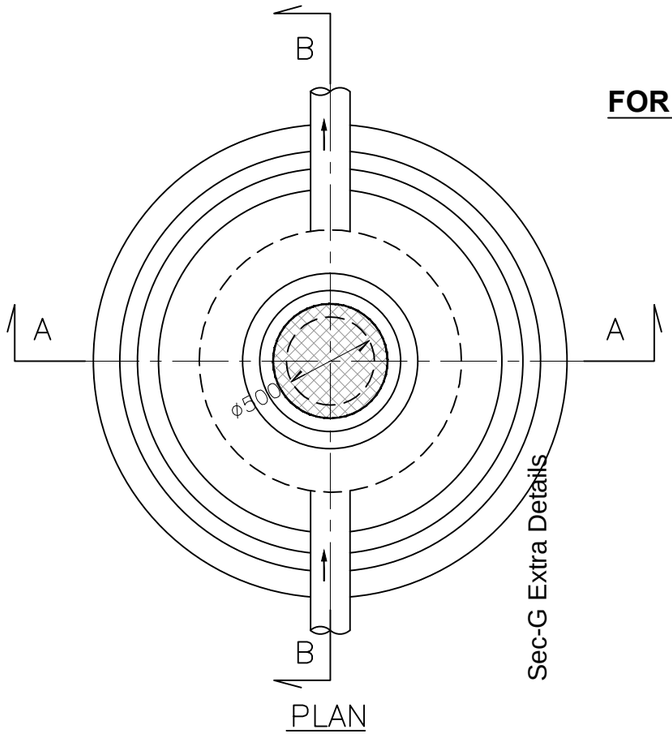
SECTION A–A



SECTION B–B

'B' TYPE CIRCULAR MANHOLE

FOR 150mmØ TO 600mmØ (Depth 1.5M To 4.0M)



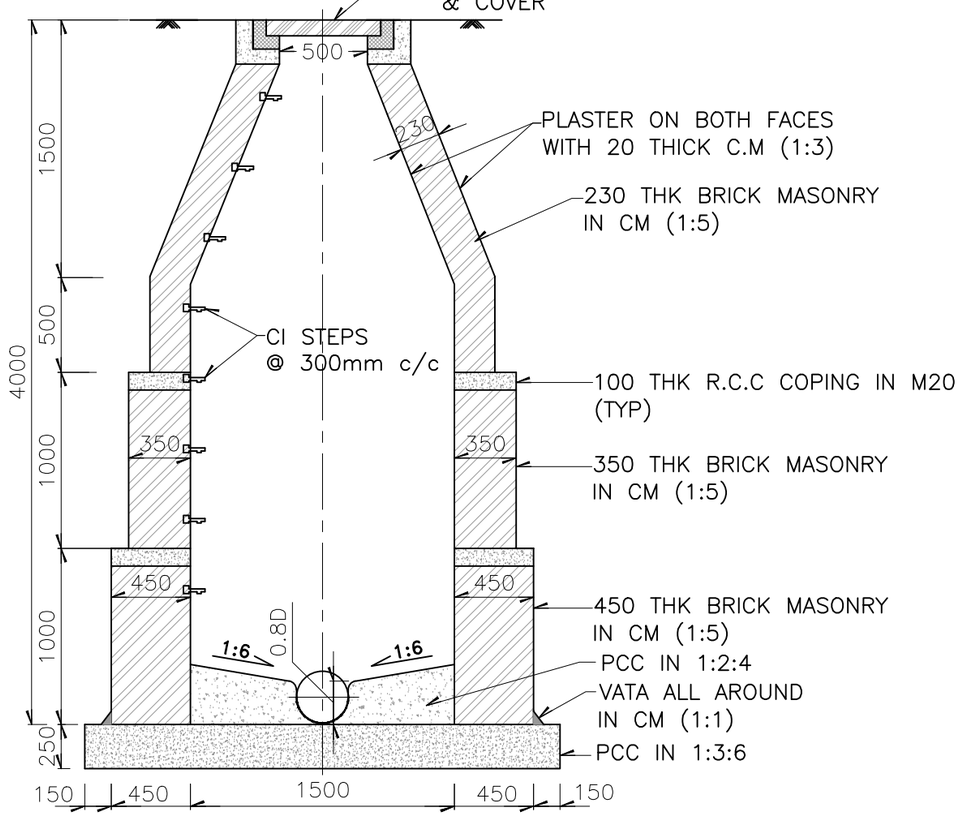
PLAN

NOTES

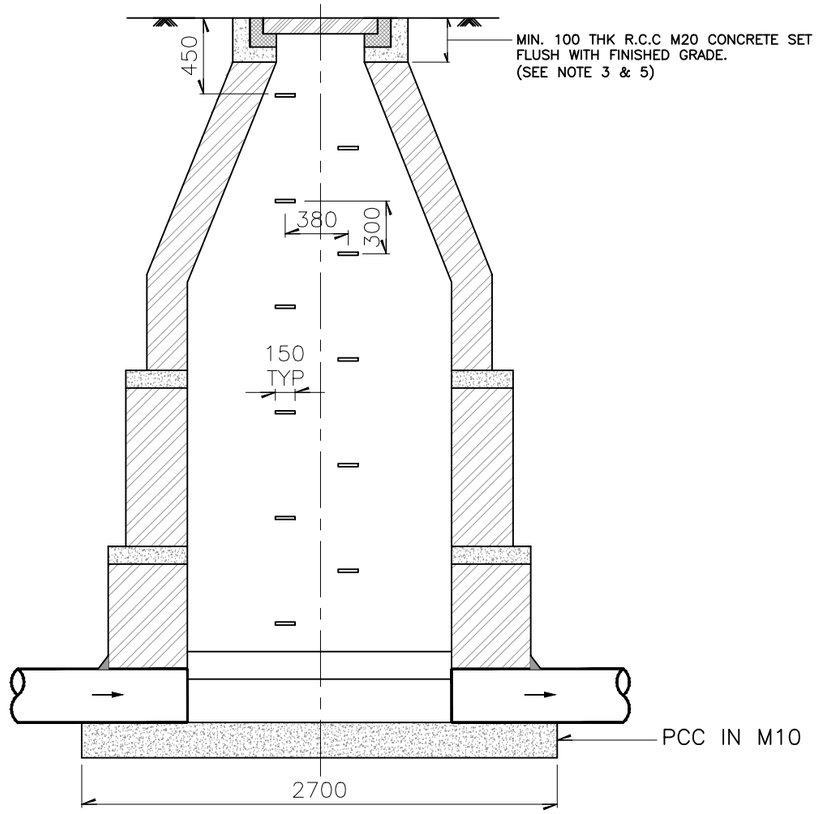
1. ALL DIMENSIONS ARE IN MM.
2. 'D' IS DIA. OF SEWER PIPELINE.
3. 100 THICKNESS OF CONCRETE CAN BE VARIED TO FLUSH MANHOLE COVER AND FRAME WITH ROAD SURFACE.
4. CI STEP FIXED WITH CEMENT MORTAR 1:3.
5. SFRC MANHOLE FRAME & COVER AS PER I.S.12592–2002.
6. THE BENCHING AT THE SIDE OF THE CHANNEL SHALL START FROM 0.8D FROM BASE AND THEN RISE WITH A SLOPE OF 1 IN 6 TOWARDS THE SIDE OF THE MANHOLE. SEMICIRCULAR PORTION WILL BE ACHIEVED IN CEMENT CONCRETE FINISHING ITSELF.
7. INTERNAL PLASTERING SHALL BE SULPHATE RESISTANT CEMENT (SRC).

LEGEND:

TYP	----------	TYPICAL
DIA	----------	DIAMETER
UN	----------	UNLESS NOTED
THK	----------	THICK
PCC	----------	PLAIN CEMENT CONCRETE
EQ	----------	EQUAL
C.I.	----------	CAST IRON
SFRC	----------	STEEL FIBRE REINFORCED CONCRETE



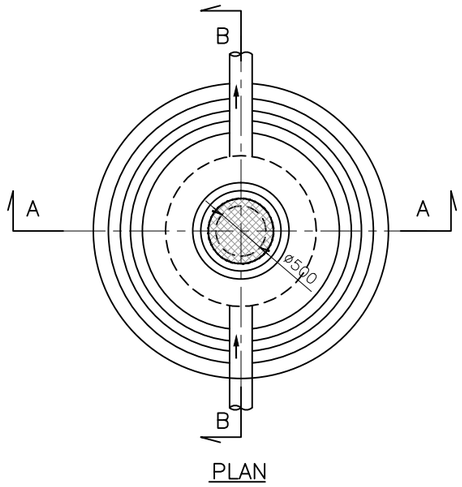
SECTION A–A



SECTION B–B

'C' TYPE CIRCULAR MANHOLE

FOR 150mmØ TO 1500mmØ (Depth 4.0M To 6.0M)

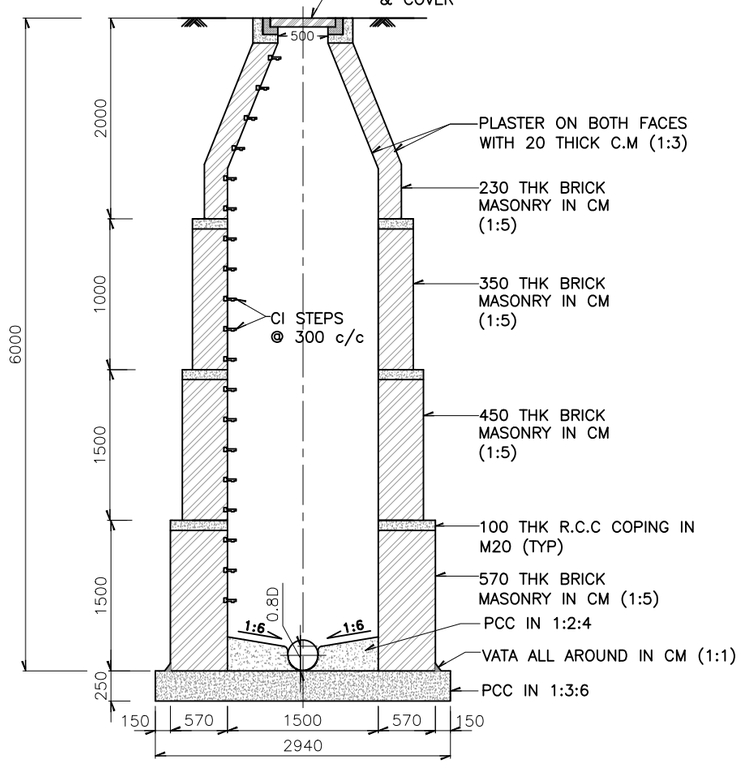


PLAN

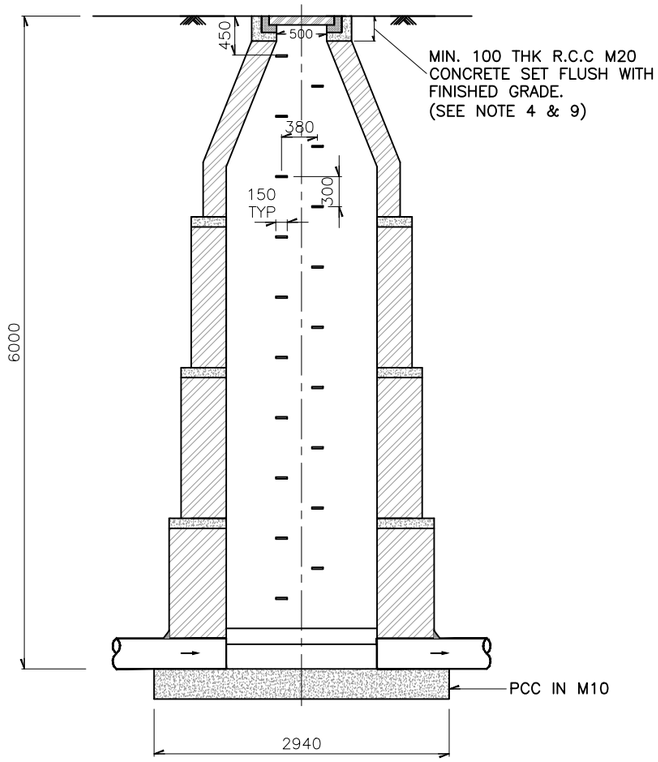
Sec-G Extra Details

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT OTHERWISE STATED.
2. 'D' IS DIA. OF SEWER PIPELINE.
3. VATA IN C.M.(1:1) SHALL BE PROVIDED ALL AROUND THE PIPE ENTERING AND LEAVING THE MANHOLE AND ALSO AT THE JUNCTION OF BRICK MASONRY AND CONCRETE BASE SLAB.
4. 100 THICKNESS OF CONCRETE CAN BE VARIED TO FLUSH MANHOLE COVER AND FRAME WITH ROAD SURFACE.
5. AT A GIVEN DEPTH THE THICKNESS OF BRICK MASONRY SHALL NOT BE LESS THAN THAT SHOWN IN THIS DRAWING.
6. THICKNESS SPECIFIED FOR BRICK MASONRY IS EXCLUDING THE THICKNESS OF CEMENT PLASTER ON BOTH FACES.
7. CHANNELS FOR MANHOLE ARE TO BE CONSTRUCTED DULY CONSIDERING THE DIRECTION OF FLOW AS WELL AS ALIGNMENT AND INVERT LEVEL OF PIPES ENTERING/LEAVING THE MANHOLE AND AS DIRECTED BY ENGINEER.
8. CI STEP FIXED WITH CEMENT MORTAR 1:3
9. SFRC MANHOLE & FRAME OF AS PER I.S.12592–2002.
10. THE BENCHING AT THE SIDE OF THE CHANNEL SHALL START FROM 0.8D FROM BASE AND THEN RISE WITH A SLOPE OF 1 IN 6 TOWARDS THE SIDE OF THE MANHOLE. SEMICIRCULAR PORTION WILL BE ACHIEVED IN CEMENT CONCRETE FINISHING ITSELF.
11. INTERNAL PLASTERING SHALL BE SULPHATE RESISTANT CEMENT (SRC).



SECTION A–A



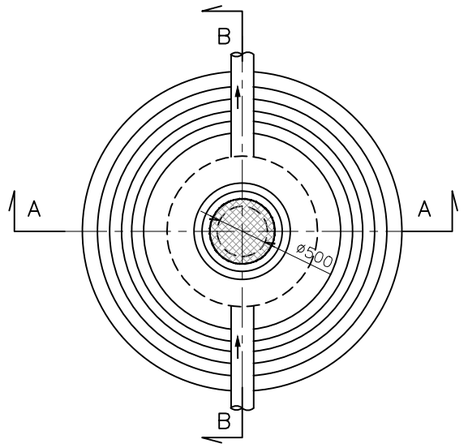
SECTION B–B

LEGEND:

TYP	----------	TYPICAL
DIA	----------	DIAMETER
UN	----------	UNLESS NOTED
THK	----------	THICK
PCC	----------	PLAIN CEMENT CONCRETE
EQ	----------	EQUAL
C.I.	----------	CAST IRON
SFRC	----------	STEEL FIBRE REINFORCED CONCRETE

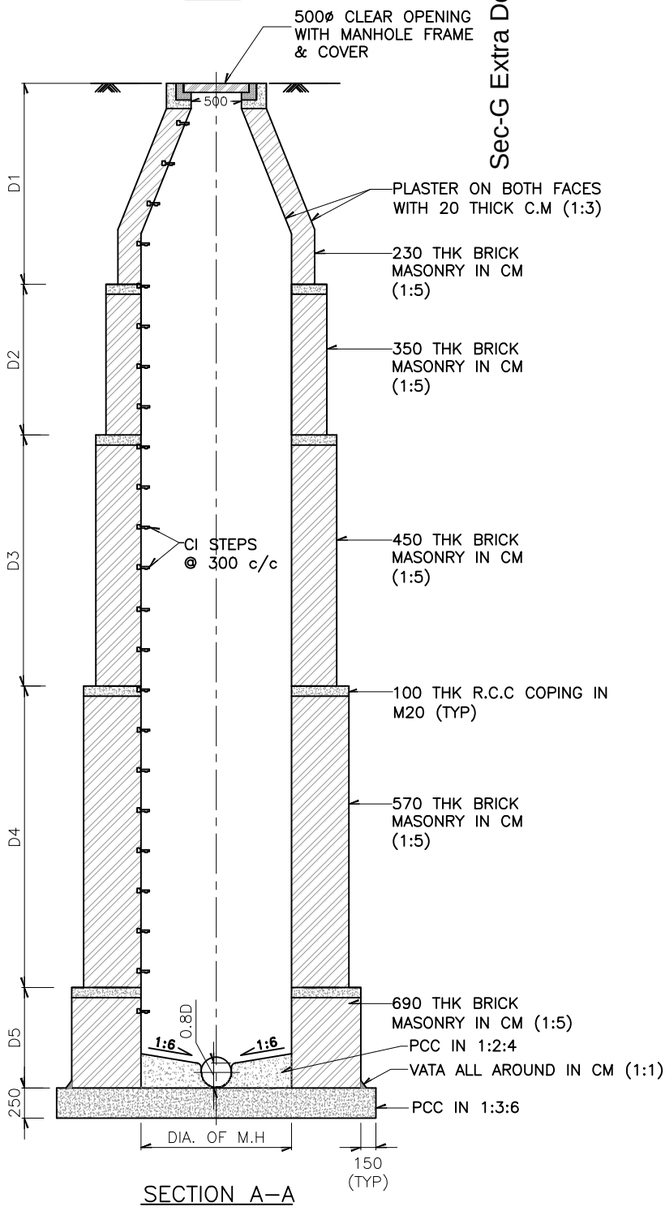
'D' TYPE CIRCULAR MANHOLE

FOR 150mmØ TO 1500mmØ (Depth 4.0M To 10.0M)

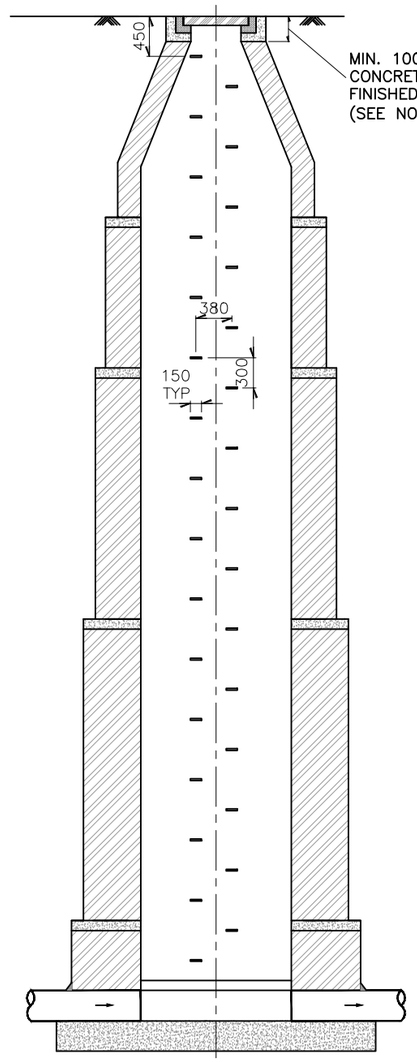


PLAN

Sec-G Extra Details



SECTION A–A



SECTION B–B

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT OTHERWISE STATED.
2. 'D' IS DIA. OF SEWER PIPELINE.
3. VATA IN C.M.(1:1) SHALL BE PROVIDED ALL AROUND THE PIPE ENTERING AND LEAVING THE MANHOLE AND ALSO AT THE JUNCTION OF BRICK MASONRY AND CONCRETE BASE SLAB.
4. 100 THICKNESS OF CONCRETE CAN BE VARIED TO FLUSH MANHOLE COVER AND FRAME WITH ROAD SURFACE.
5. AT A GIVEN DEPTH THE THICKNESS OF BRICK MASONRY SHALL NOT BE LESS THAN THAT SHOWN IN THIS DRAWING.
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11. INTERNAL PLASTERING SHALL BE SULPHATE RESISTANT CEMENT (SRC).

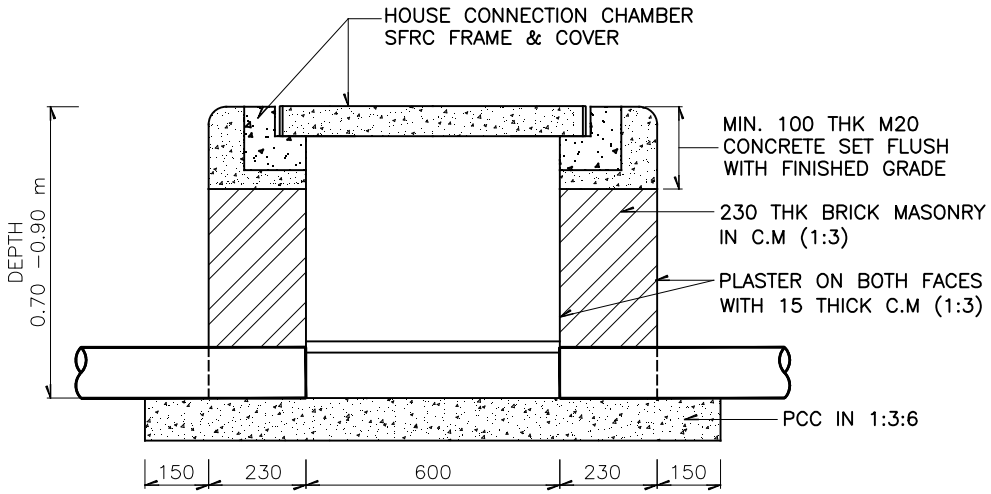
LEGEND

S. No	TYPE	UNIT	D1	D2	D3	D4	D5	DIA. OF MH
1	D1 (6.0)	DEPTH	2,250	750	2,000	1,000	-	1,500
		WALL THK	230	350	450	600	-	
2	D1 (10.0)	DEPTH	2,250	750	2,000	4,000	1,000	1,500
		WALL THK	230	350	450	600	750	
3	D2 (6.0)	DEPTH	2,250	750	2,000	1,000	-	1,500
		WALL THK	230	350	450	600	-	
4	D2 (10.0)	DEPTH	2,250	750	2,000	4,000	1,000	1,500
		WALL THK	230	350	450	600	750	
5	D3 (6.0)	DEPTH	2,250	750	2,000	1,000	-	1,900
		WALL THK	230	350	450	600	-	
6	D3(10.0)	DEPTH	2,250	750	2,000	4,000	1,000	1,900
		WALL THK	230	350	450	600	750	

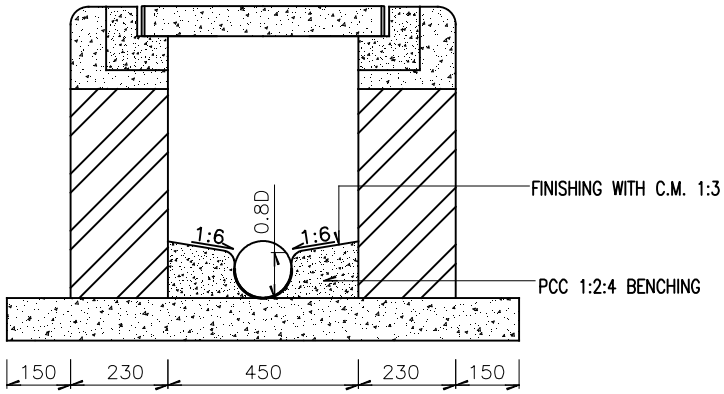
LEGEND:

TYP	----------	TYPICAL
DIA	----------	DIAMETER
UN	----------	UNLESS NOTED
THK	----------	THICK
PCC	----------	PLAIN CEMENT CONCRETE
EQ	----------	EQUAL
C.I.	----------	CAST IRON
SFRC	----------	STEEL FIBRE REINFORCED CONCRETE

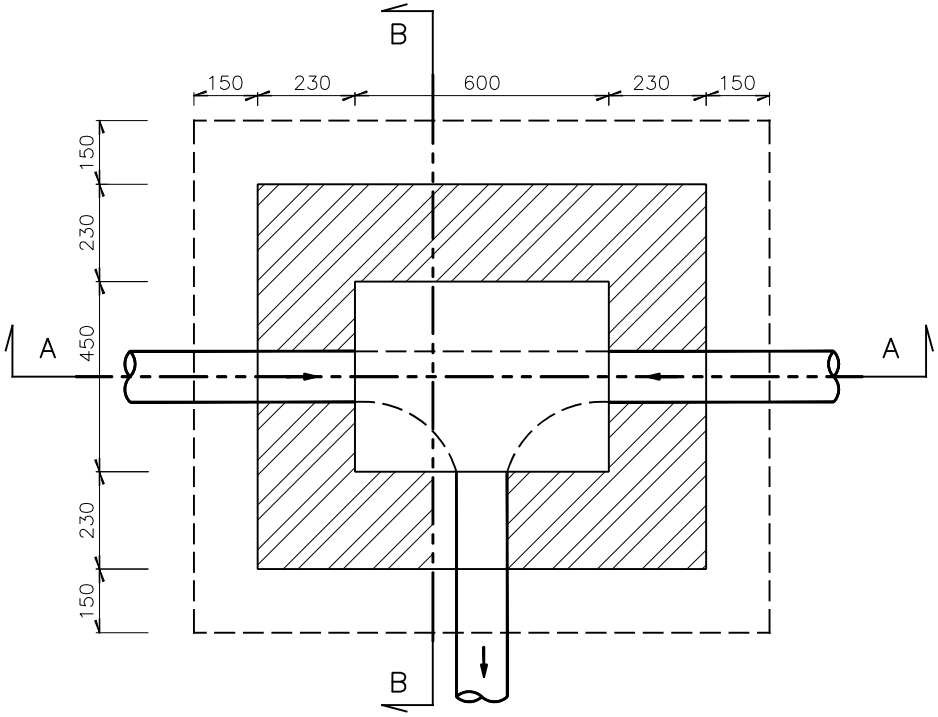
TYPICAL DETAILS OF HOUSE CONNECTION CHAMBER



SECTION A–A



SECTION B–B



PLAN

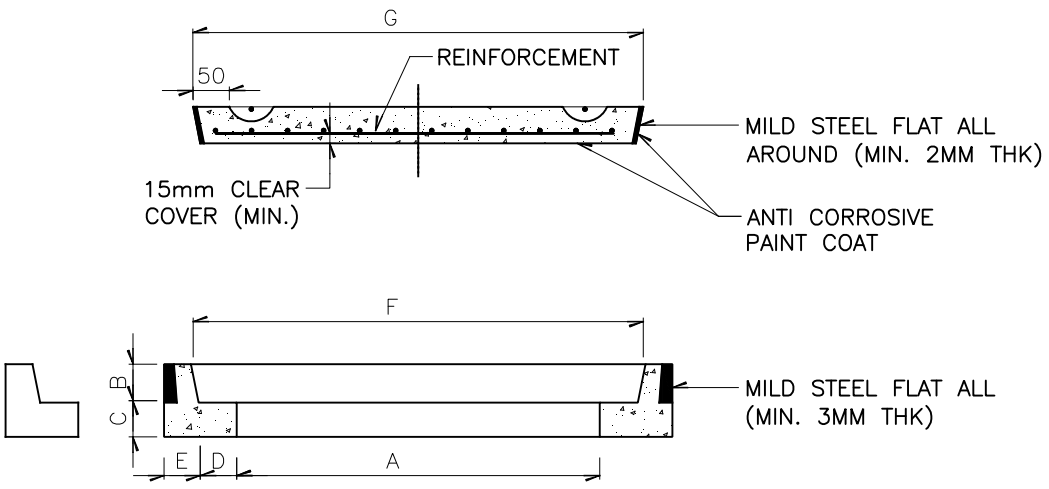
NOTES

1. ALL DIMENSIONS ARE IN MM.
2. INTERNAL PLASTERING SHALL BE SULPHATE RESISTANT CEMENT (SRC).

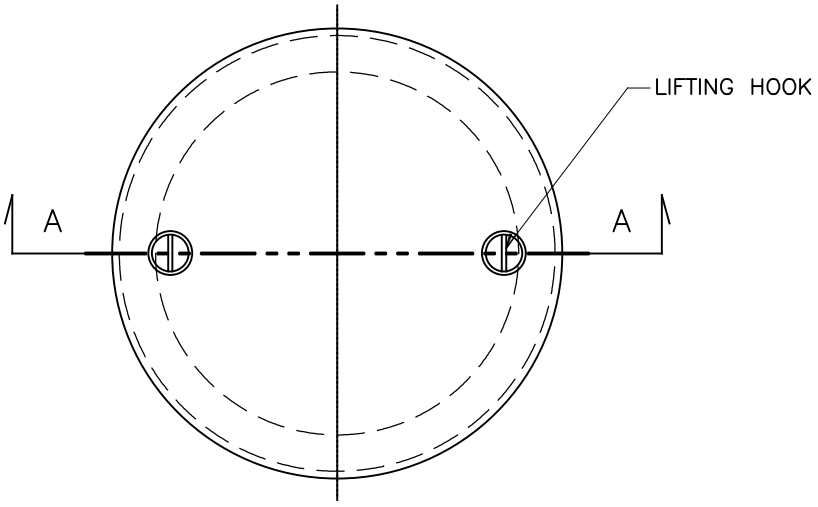
LEGEND:

TYP	——	TYPICAL
DIA	——	DIAMETER
UN	——	UNLESS NOTED
THK	——	THICK

TYPICAL DETAILS OF R.C.C FRAME & COVER



SECTION A–A



PLAN

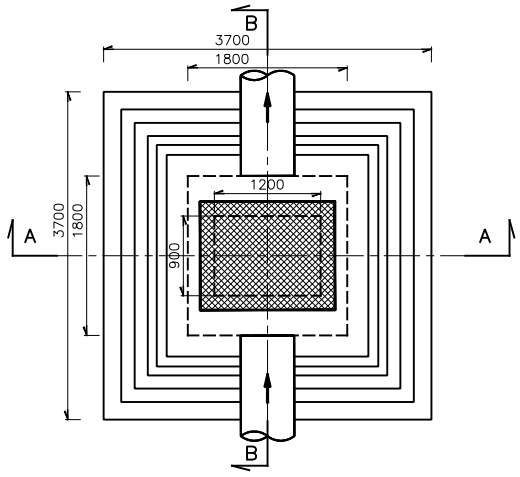
NOTES

1. ALL DIMENSIONS ARE IN MM.
2. THE MANHOLE FRAME AND COVER SHALL BE DULY MARKED BY BIS CERTIFICATION MARKING.
3. OUTSIDE DIMENSION OF COVER AT TOP SHALL MATCH WITH THE CORRESPONDING FRAME SO THAT THE MAXIMUM CLEARANCE AT THE TOP BETWEEN THE FRAME AND THE COVER ALL AROUND THE PERIPHERY IS NOT MORE THAN 5MM.
4. THE TOP SURFACE OF FRAME AND COVER SHALL BE IN LEVEL WITH THE TOLERANCE OF ± 5MM.
5. TOLERANCE ON C SHALL BE ±5MM .
6. TOLERANCE ON A,B,D & E SHALL BE 0.0MM–5MM.
7. FOR FACILITY OF REMOVING MANHOLE COVER , SUITABLE UPWARD TAPER OF NOT MORE THAN 5° MAY BE PROVIDER TO THE INNER PERIPHERY OF THE FRAME.
8. IF REQUIRED FOR THE REMOVAL OF MOLDS,SUITABLE TAPER NOT MORE THAN 5° CAN BE GIVEN AT THE LOWER INNER PERIPHERY OF THE FRAME AS INDICATED.
9. LIFTING HOOKS SHALL BE HOT DIP GALVANISED AND PROVIDED AS FOLLOWS:

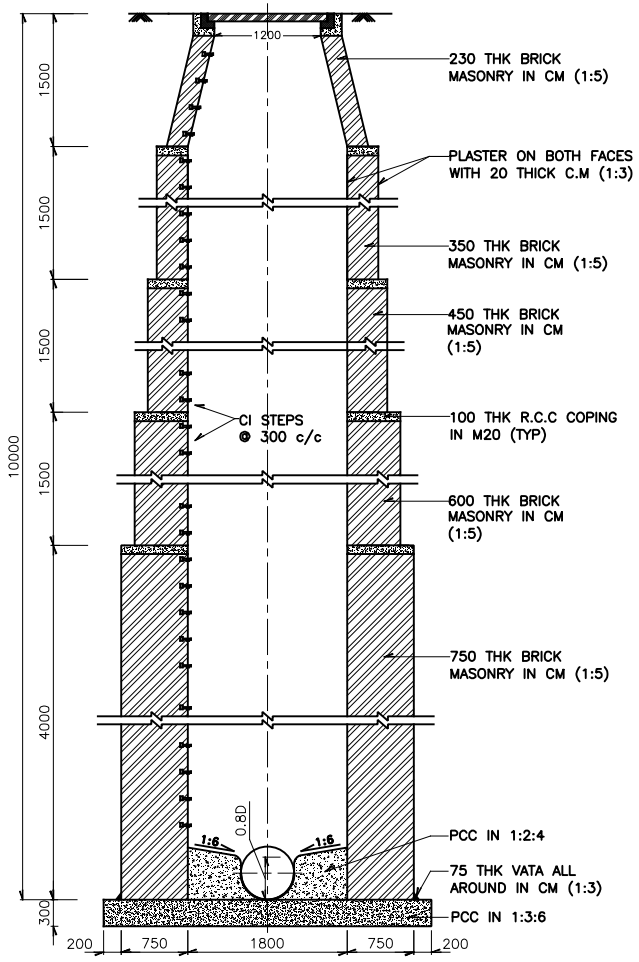
   LIGHT AND MEDIUM DUTY – 12MM (MIN.)
   HEAVY DUTY – 16MM (MIN.)
   EXTRA HEAVY DUTY – 16MM (MIN.)

S.No	Grade	Desciption	A	B	C	D	E (Min)	F (Min)	G
1	LD - 2.5	Light Duty Circular	500	50	50	50	50	608	600
2	LD - 2.5	Light Duty Rectangular	450 x 600	50	50	50	50	558 x 708	550 x 700
3	MD - 10	Medium Duty Circular	500	70	50	50	50	610	602
4	MD - 10	Medium Duty Rectangular	450 x 600	70	50	50	50	560 x 710	552 x 702
5	HD - 20	Heavy Duty Circular	500	90	75	75	75	660	652

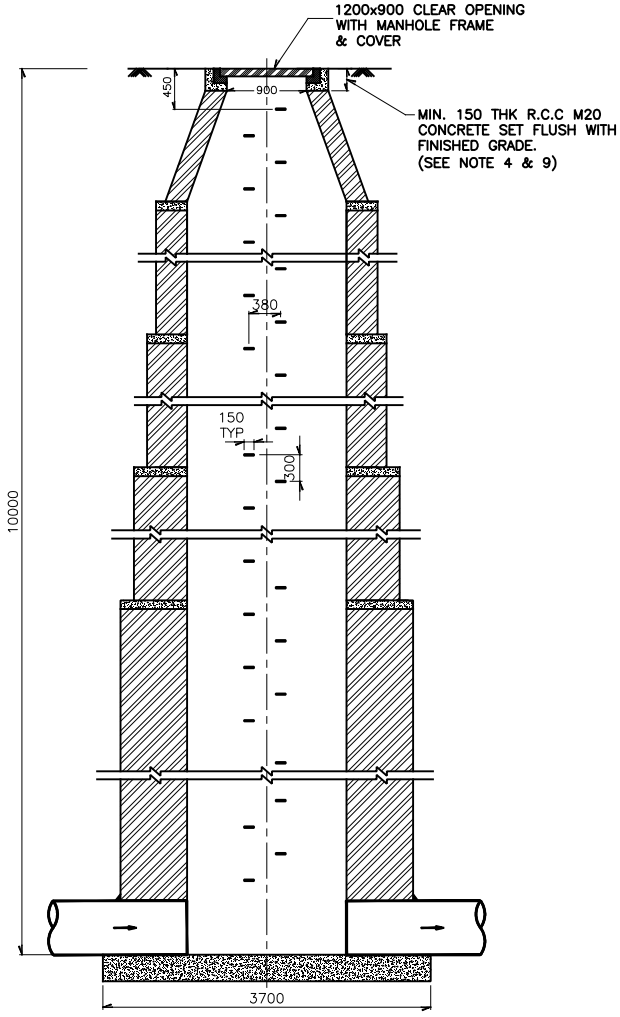
SCRAPER MANHOLE



PLAN



SECTION A–A



SECTION A–A

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT OTHERWISE STATED.
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3. VATA IN C.M.(1:1) SHALL BE PROVIDED ALL AROUND THE PIPE ENTERING AND LEAVING THE MANHOLE AND ALSO AT THE JUNCTION OF BRICK MASONRY AND CONCRETE BASE SLAB.
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8. CI STEP FIXED WITH CEMENT MORTAR 1:3
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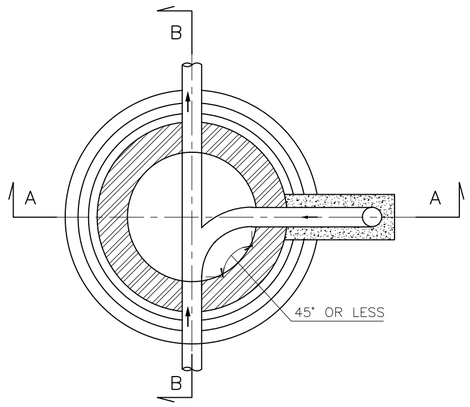
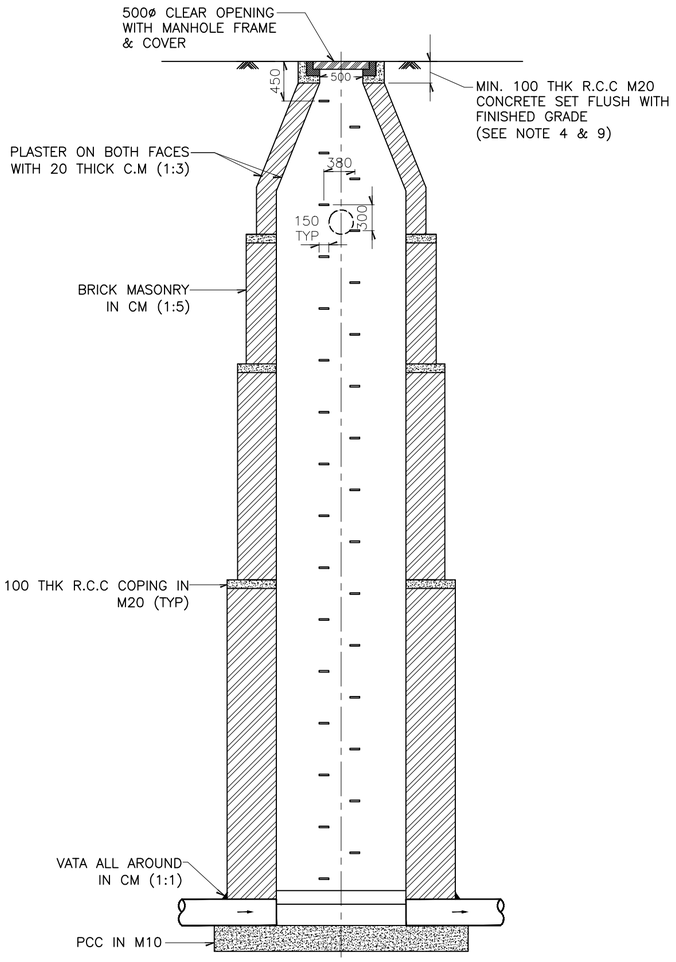
11. INTERNAL PLASTERING SHALL BE SULPHATE RESISTANT CEMENT (SRC).

LEGEND:

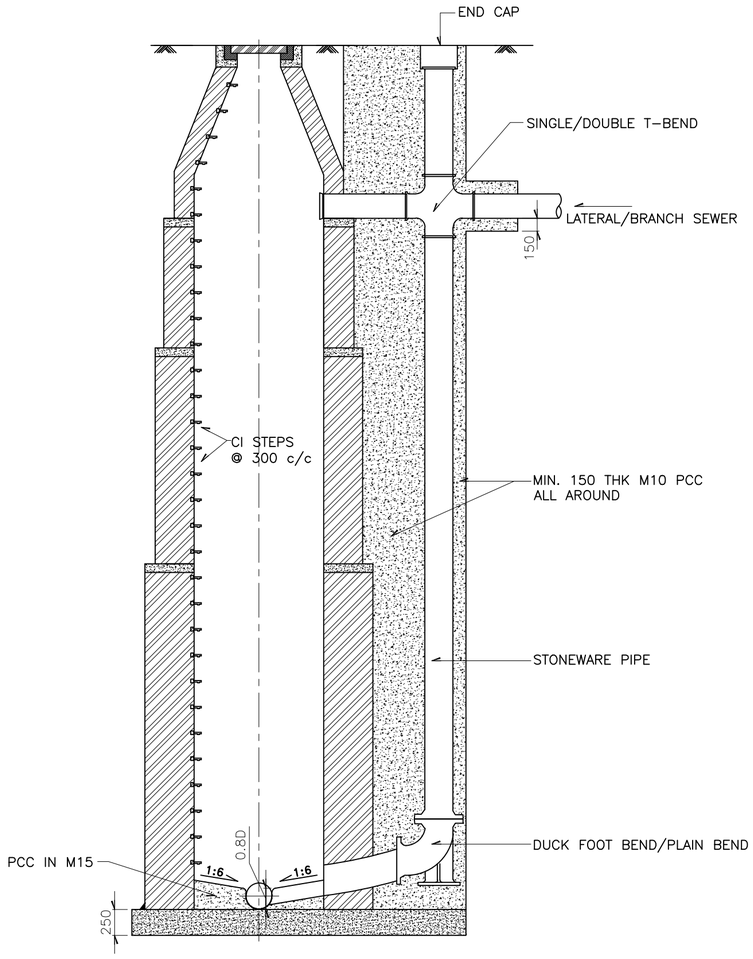
TYP	----------	TYPICAL
DIA	----------	DIAMETER
UN	----------	UNLESS NOTED
THK	----------	THICK
PCC	----------	PLAIN CEMENT CONCRETE
EQ	----------	EQUAL
C.I.	----------	CAST IRON
SFRC	----------	STEEL FIBRE REINFORCED CONCRETE



PLAN



SECTION B–B



SECTION A–A

VERTICAL DROP ARRANGEMENT FOR MANHOLES

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT OTHERWISE STATED.
2. 'D' IS DIA. OF SEWER PIPELINE.
3. DROP ARRANGEMENT TO BE PROVIDED WHEN THE DIFFERENCE BETWEEN INVERT LEVELS OF LATERAL / BRANCH SEWER AND MAIN SEWER IS GREATER THAN 600 MM.
4. 100 THICKNESS OF CONCRETE CAN BE VARIED TO FLUSH MANHOLE COVER AND FRAME WITH ROAD SURFACE.
5. CHANNELS FOR MANHOLE ARE TO BE CONSTRUCTED DULY CONSIDERING THE DIRECTION OF FLOW AS WELL AS ALIGNMENT AND INVERT LEVEL OF PIPES ENTERING/LEAVING THE MANHOLE AND AS DIRECTED BY ENGINEER.
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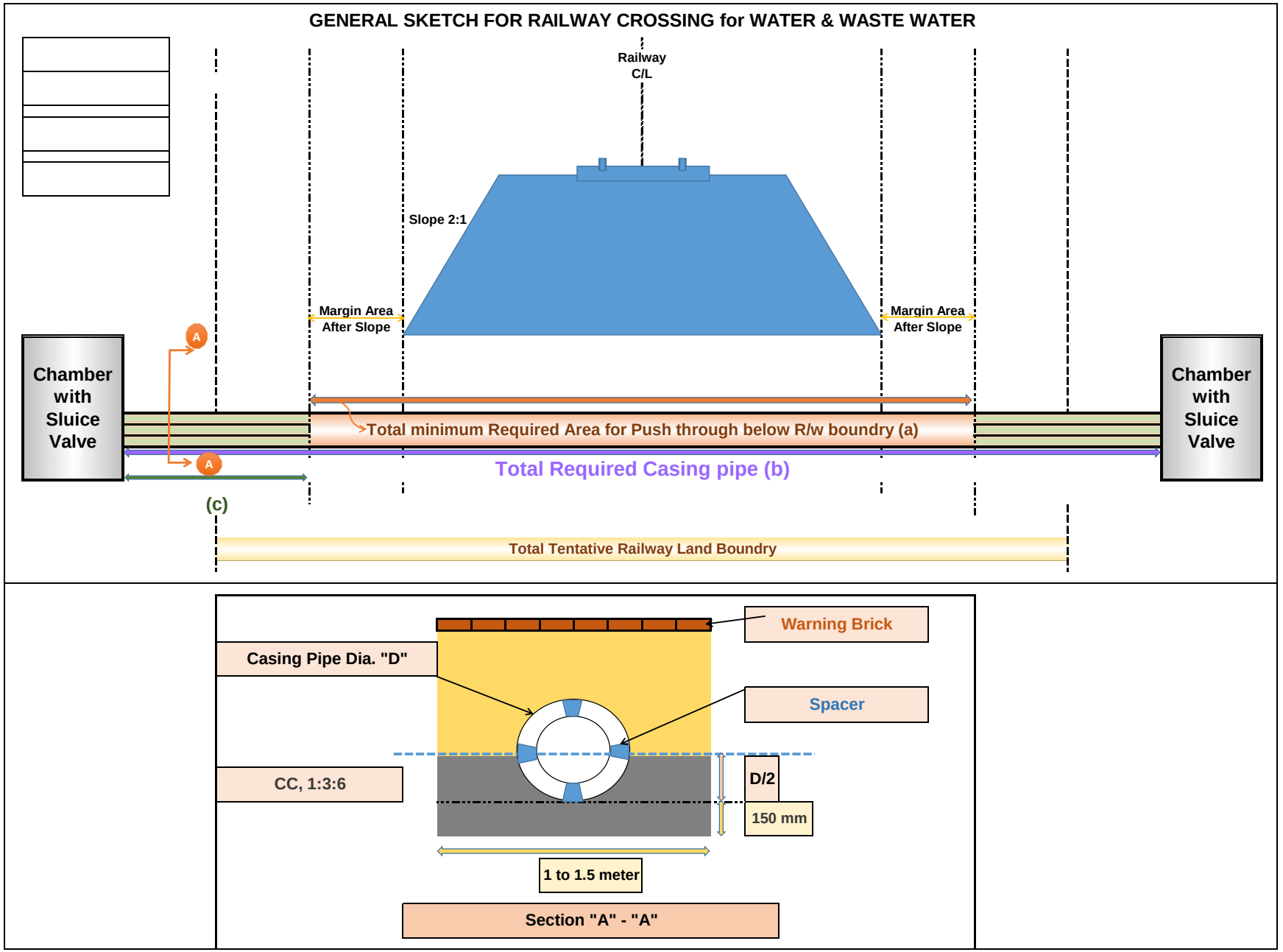
9. INTERNAL PLASTERING SHALL BE OF SULPHATE RESISTANT CEMENT (SRC).

LEGEND:

TYP	----------	TYPICAL
DIA	----------	DIAMETER
UN	----------	UNLESS NOTED
THK	----------	THICK
PCC	----------	PLAIN CEMENT CONCRETE
EQ	----------	EQUAL
C.I.	----------	CAST IRON
SFRC	----------	STEEL FIBRE REINFORCED CONCRETE


GENERAL SKETCH FOR RAILWAY CROSSING for WATER & WASTE WATER
Railway C/L
Slope 2:1
Margin Area After Slope
Margin Area After Slope
Chamber with Sluice Valve
Chamber with Sluice Valve
A
A
Total minimum Required Area for Push through below R/w boundry (a)
Total Required Casing pipe (b)
(c)
Total Tentative Railway Land Boundry
Warning Brick
Casing Pipe Dia. "D"
Spacer
CC, 1:3:6
D/2
150 mm
1 to 1.5 meter
Section "A" - "A"