

Ujjain Underground Sewerage Scheme-Sewer Network Design 1/3

SL	Starting Node	Ending Node	Chainage	Intial Population 2020	Initial Ultimate Population (Pi)	Contributory Population (Pc)	Total Ultimate population (Pu) 2050	Dry Weather Flow in LPS	Infiltration in LPS	Total Ultimate Flow in LPS	Peak Factor for Q20 (Initial Flow)	Peak Factor for Q50 (Ultimate Flow)	Qp20 (Initial Flow)	Qp50 (Ultimate Flow)	Type of Pipe	Pipe Dia (in m)
1	MH-41	MH-40	100	1869	3007	0	3007	3.76	0.0116	3.771	3	3	7.009	11.312	DWC NP3	0.6
2	MH-40	MH-39	216.34	2175	3499	3007	6506	8.13	0.0116	8.144	3	3	8.155	24.431	DWC NP3	0.5
3	MH-39	MH-38	347.94	2460	3957	6506	10463	13.08	0.0116	13.091	3	3	9.224	39.272	DWC NP3	0.5
4	MH-38	MH-37	427.35	1484	2388	10463	12851	16.06	0.0116	16.076	3	3	5.566	48.227	DWC NP3	0.5
5	MH-37	MH-36	507.87	1505	2421	12851	15273	19.09	0.0116	19.102	3	3	5.644	57.307	DWC NP3	0.5
6	MH-36	MH-35	583.11	1406	2263	15273	17535	21.92	0.0116	21.931	3	3	5.274	65.792	DWC NP3	0.5
7	MH-35	MH-34	661.42	1464	2355	17535	19890	24.86	0.0116	24.874	3	3	5.489	74.623	DWC NP3	0.5
8	MH-34	MH-33	810	2777	4468	19890	24358	30.45	0.0116	30.460	3	2.5	10.415	76.149	DWC NP3	0.5
9	MH-33	MH-32	993.06	3422	5505	24358	29863	37.33	0.0116	37.341	3	2.5	12.832	93.352	DWC NP3	0.5
10	MH-32	MH-31	1108.73	2162	3478	29863	33342	41.68	0.0116	41.689	3	2.5	8.108	104.222	DWC NP3	0.5
11	MH-31	MH-30	1215.24	1991	3203	33342	36545	45.68	0.0116	45.693	3	2.5	7.466	114.231	DWC NP3	0.5
12	MH-30	MH-29	1277.85	1170	1883	36545	38428	48.03	0.0116	48.046	3	2.5	4.389	120.115	DWC NP3	0.5
13	MH-29	MH-28	1307.54	555	893	38428	39320	49.15	0.0116	49.162	3	2.5	2.081	122.905	DWC NP3	0.5
14	MH-28	MH-27	1353.14	852	1371	39320	40692	50.86	0.0116	50.876	3	2.5	3.196	127.190	DWC NP3	0.5
15	MH-27	MH-26	1428.02	1400	2252	40692	42943	53.68	0.0116	53.691	3	2.5	5.249	134.227	DWC NP3	0.5
16	MH-26	MH-25	1459.17	582	937	42943	43880	54.85	0.0116	54.862	3	2.5	2.183	137.155	DWC NP3	0.5
17	MH-25	MH-24	1579.42	2248	3616	43880	47496	59.37	0.0116	59.382	3	2.5	8.429	148.455	DWC NP3	0.5
18	MH-24	MH-23	1689.16	2051	3300	47496	50797	63.50	0.0116	63.507	3	2.25	7.692	142.891	DWC NP3	0.5
19	MH-23	MH-22	1841.28	2843	4575	50797	55371	69.21	0.0116	69.225	3	2.25	10.663	155.757	DWC NP3	0.5
20	MH-22	MH-21	1971.81	2440	3925	55371	59296	74.12	0.0116	74.132	3	2.25	9.149	166.797	DWC NP3	0.5
21	MH-21	MH-20	2106.21	2512	4042	59296	63338	79.17	0.0116	79.184	3	2.25	9.421	178.164	DWC NP3	0.5
22	MH-20	MH-19	2200.71	1766	2842	63338	66180	82.72	0.0116	82.736	3	2.25	6.624	186.157	DWC NP3	0.5
23	MH-19	MH-18	2315.72	2150	3459	66180	69638	87.05	0.0116	87.060	3	2.25	8.062	195.884	DWC NP3	0.5
24	MH-18	MH-17	2465.69	2803	4510	69638	74148	92.69	0.0116	92.697	3	2.25	10.512	208.568	DWC NP3	0.5
25	MH-17	MH-16	2640.25	3263	5249	74148	79398	99.25	0.0116	99.259	3	2.25	12.236	223.332	DWC NP3	0.5
26	MH-16	MH-15	2795.31	2898	4663	79398	84061	105.08	0.0116	105.087	3	2.25	10.869	236.447	DWC NP3	0.5
27	MH-15	MH-14	2941.53	2733	4397	84061	88458	110.57	0.0116	110.584	3	2.25	10.249	248.814	DWC NP3	0.5
28	MH-14	MH-13	3062.41	2259	3635	88458	92093	115.12	0.0116	115.128	3	2.25	8.473	259.037	DWC NP3	0.5
29	MH-13	MH-12	3178.55	2171	3493	92093	95586	119.48	0.0116	119.493	3	2.25	8.141	268.860	DWC NP3	0.5
30	MH-12	MH-11	3293.9	2156	3469	95586	99054	123.82	0.0116	123.829	3	2.25	8.085	278.616	DWC NP3	0.5
31	MH-11	MH-10	3403.86	2055	3307	99054	102361	127.95	0.0116	127.963	3	2.25	7.708	287.917	DWC NP3	0.5
32	MH-10	MH-9	3496.33	1728	2781	102361	105142	131.43	0.0116	131.439	3	2.25	6.482	295.737	DWC NP3	0.5
33	MH-9	MH-8	3554.97	1096	1763	105142	106905	133.63	0.0116	133.643	3	2.25	4.110	300.697	DWC NP3	0.5
34	MH-8	MH-7	3613.33	1091	1755	106905	108660	135.83	0.0116	135.837	3	2.25	4.091	305.633	DWC NP3	0.5
35	MH-7	MH-6	3754.25	2634	4238	108660	112898	141.12	0.0116	141.134	3	2.25	9.878	317.552	DWC NP3	0.5
36	MH-6	MH-5	3880.07	2352	3784	112898	116682	145.85	0.0116	145.864	3	2.25	8.819	328.193	DWC NP3	0.5
37	MH-5	MH-4	4098.6	4085	6572	116682	123253	154.07	0.0116	154.078	3	2.25	15.318	346.676	DWC NP3	0.5
38	MH-4	MH-3	4147.43	913	1468	123253	124722	155.90	0.0116	155.914	3	2.25	3.423	350.806	DWC NP3	0.5
39	MH-3	MH-2	4229.22	1529	2460	124722	127181	158.98	0.0116	158.988	3	2.25	5.733	357.724	DWC NP3	0.5
40	MH-2	MH-1	4308.02	1473	2370	127181	129551	161.94	0.0116	161.950	3	2.25	5.523	364.388	DWC NP3	0.5

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SL	Starting Node	Ending Node	Qfull by Manning's Formula in LPS	Q20/Qfull	Q50/Qfull	Vfull(Vf) by Manning's formula	V20/Vf	V50/Vf	V20 Actual	V50 Actual	Depth ratio corresponding to calculated discharge ratio (d / D) for designed year 50	Remarks
1	MH-41	MH-40	428.14	0.016	0.026	1.357	0.401	0.517	0.54	0.70	0.10	d/D ratio and V50 been very small may be ignored since downstream velocity arriving is quite sartisfactory
2	MH-40	MH-39	263.13	0.031	0.093	1.173	0.517	0.701	0.61	0.82	0.15	
3	MH-39	MH-38	455.76	0.020	0.086	2.031	0.257	0.615	0.52	1.25	0.05	
4	MH-38	MH-37	322.27	0.017	0.150	1.436	0.401	0.776	0.58	1.11	0.10	
5	MH-37	MH-36	263.13	0.021	0.218	1.173	0.257	0.822	0.30	0.96	0.05	
6	MH-36	MH-35	263.13	0.020	0.250	1.173	0.401	0.517	0.47	0.61	0.10	
7	MH-35	MH-34	263.13	0.021	0.284	1.173	0.257	0.902	0.30	1.06	0.10	
8	MH-34	MH-33	263.13	0.040	0.289	1.173	0.517	0.902	0.61	1.06	0.15	
9	MH-33	MH-32	263.13	0.049	0.355	1.173	0.517	0.954	0.61	1.12	0.15	
10	MH-32	MH-31	263.13	0.031	0.396	1.173	0.517	0.954	0.61	1.12	0.15	
11	MH-31	MH-30	263.13	0.028	0.434	1.173	0.517	1	0.61	1.17	0.15	
12	MH-30	MH-29	455.76	0.010	0.264	2.031	0.401	1	0.81	2.03	0.10	
13	MH-29	MH-28	455.76	0.005	0.270	2.031	0.257	0.902	0.52	1.83	0.05	
14	MH-28	MH-27	455.76	0.007	0.279	2.031	0.401	0.902	0.81	1.83	0.10	
15	MH-27	MH-26	455.76	0.012	0.295	2.031	0.401	0.902	0.81	1.83	0.10	
16	MH-26	MH-25	263.13	0.008	0.521	1.173	0.401	1.039	0.47	1.22	0.10	
17	MH-25	MH-24	263.13	0.032	0.564	1.173	0.517	1.039	0.61	1.22	0.15	
18	MH-24	MH-23	455.76	0.017	0.314	2.031	0.401	0.902	0.81	1.83	0.10	
19	MH-23	MH-22	455.76	0.023	0.342	2.031	0.517	0.954	1.05	1.94	0.15	
20	MH-22	MH-21	144.12	0.063	1.157	0.642	0.615	1	0.40	0.64	0.20	
21	MH-21	MH-20	144.12	0.065	1.236	0.642	0.615	1	0.40	0.64	0.20	
22	MH-20	MH-19	144.12	0.046	1.292	0.642	0.517	1	0.33	0.64	0.15	
23	MH-19	MH-18	144.12	0.056	1.359	0.642	0.615	1	0.40	0.64	0.20	
24	MH-18	MH-17	144.12	0.073	1.447	0.642	0.615	1	0.40	0.64	0.20	
25	MH-17	MH-16	144.12	0.085	1.550	0.642	0.615	1	0.40	0.64	0.20	
26	MH-16	MH-15	144.12	0.075	1.641	0.642	0.615	1	0.40	0.64	0.20	
27	MH-15	MH-14	144.12	0.071	1.726	0.642	0.615	1	0.40	0.64	0.20	
28	MH-14	MH-13	144.12	0.059	1.797	0.642	0.615	1	0.40	0.64	0.20	
29	MH-13	MH-12	144.12	0.056	1.865	0.642	0.615	1	0.40	0.64	0.20	
30	MH-12	MH-11	263.13	0.031	1.059	1.173	0.517	1.124	0.61	1.32	0.15	
31	MH-11	MH-10	263.13	0.029	1.094	1.173	0.517	1	0.61	1.17	0.15	
32	MH-10	MH-9	263.13	0.025	1.124	1.173	0.517	1	0.61	1.17	0.15	
33	MH-9	MH-8	263.13	0.016	1.143	1.173	0.401	1	0.47	1.17	0.10	
34	MH-8	MH-7	161.13	0.025	1.897	0.718	0.517	1	0.37	0.72	0.15	
35	MH-7	MH-6	161.13	0.061	1.971	0.718	0.257	1	0.18	0.72	0.05	
36	MH-6	MH-5	161.13	0.055	2.037	0.718	0.615	1	0.44	0.72	0.20	
37	MH-5	MH-4	455.76	0.034	0.761	2.031	0.517	1.107	1.05	2.25	0.15	
38	MH-4	MH-3	455.76	0.008	0.770	2.031	0.401	1.107	0.81	2.25	0.10	
39	MH-3	MH-2	455.76	0.013	0.785	2.031	0.401	1.107	0.81	2.25	0.10	
40	MH-2	MH-1	455.76	0.012	0.800	2.031	0.401	1.12	0.81	2.27	0.10	

Ujjain Underground Sewerage Scheme-Sewer Network Design 3/3

SL	Node	G.L	Slope Available	Provided slope	Invert level	Pipe Dia (in m)	Thickness	Crown level	Excavation level	Depth of Excavation	Difference between invert level and Excavation level	Difference between GL and Crown level	Depth of Manhole
1	MH-41	506.65	0.0052	0.0000	505.460	0.5	0.045	506.005	505.215	1.435	0.245	0.645	1.190
2	MH-40	506.132	0.0063	0.0033	505.072	0.5	0.045	505.617	504.827	1.305	0.245	0.515	1.060
3	MH-39	505.4	0.0069	0.0100	503.756	0.5	0.045	504.301	503.511	1.889	0.245	1.099	1.644
4	MH-38	504.487	0.0016	0.0050	503.359	0.5	0.045	503.904	503.114	1.373	0.245	0.583	1.128
5	MH-37	504.363	0.0025	0.0033	503.091	0.5	0.045	503.636	502.846	1.517	0.245	0.727	1.272
6	MH-36	504.163	0.0036	0.0033	502.840	0.5	0.045	503.385	502.595	1.568	0.245	0.778	1.323
7	MH-35	503.892	0.0063	0.0033	502.579	0.5	0.045	503.124	502.334	1.558	0.245	0.768	1.313
8	MH-34	503.399	0.0030	0.0033	502.084	0.5	0.045	502.629	501.839	1.560	0.245	0.770	1.315
9	MH-33	502.952	0.0019	0.0033	501.473	0.5	0.045	502.018	501.228	1.724	0.245	0.934	1.479
10	MH-32	502.6	0.0078	0.0033	501.088	0.5	0.045	501.633	500.843	1.757	0.245	0.967	1.512
11	MH-31	501.7	0.0047	0.0033	500.733	0.5	0.045	501.278	500.488	1.212	0.245	0.422	0.967
12	MH-30	501.2	0.0030	0.0100	500.107	0.5	0.045	500.652	499.862	1.338	0.245	0.548	1.093
13	MH-29	501.015	0.0120	0.0100	499.810	0.5	0.045	500.355	499.565	1.450	0.245	0.660	1.205
14	MH-28	500.66	0.0057	0.0100	499.354	0.5	0.045	499.899	499.109	1.551	0.245	0.761	1.306
15	MH-27	500.4	0.0027	0.0100	498.605	0.5	0.045	499.150	498.360	2.040	0.245	1.250	1.795
16	MH-26	500.2	0.0193	0.0033	498.501	0.5	0.045	499.046	498.256	1.944	0.245	1.154	1.699
17	MH-25	499.6	0.0050	0.0033	498.100	0.5	0.045	498.645	497.855	1.745	0.245	0.955	1.500
18	MH-24	499	0.0091	0.0100	497.003	0.5	0.045	497.548	496.758	2.242	0.245	1.452	1.997
19	MH-23	498	0.0033	0.0100	495.482	0.5	0.045	496.027	495.237	2.763	0.245	1.973	2.518
20	MH-22	497.5	0.0015	0.0010	495.351	0.5	0.045	495.896	495.106	2.394	0.245	1.604	2.149
21	MH-21	497.7	0.0022	0.0010	495.217	0.5	0.045	495.762	494.872	2.828	0.345	1.938	2.483
22	MH-20	497.4	0.0032	0.0010	495.122	0.5	0.045	495.667	494.777	2.623	0.345	1.733	2.278
23	MH-19	497.1	0.0026	0.0010	495.007	0.5	0.045	495.552	494.662	2.438	0.345	1.548	2.093
24	MH-18	497.4	0.0020	0.0010	494.857	0.5	0.045	495.402	494.512	2.888	0.345	1.998	2.543
25	MH-17	497.7	0.0052	0.0010	494.683	0.5	0.045	495.228	494.338	3.362	0.345	2.472	3.017
26	MH-16	496.8	0.0006	0.0010	494.528	0.5	0.045	495.073	494.183	2.617	0.345	1.727	2.272
27	MH-15	496.7	0.0055	0.0010	494.382	0.5	0.045	494.927	494.037	2.663	0.345	1.773	2.318
28	MH-14	497.5	0.0099	0.0010	494.261	0.5	0.045	494.806	493.916	3.584	0.345	2.694	3.239
29	MH-13	496.3	0.0069	0.0010	494.145	0.5	0.045	494.690	493.800	2.500	0.345	1.610	2.155
30	MH-12	495.5	0.0069	0.0033	493.760	0.5	0.045	494.305	493.415	2.085	0.345	1.195	1.740
31	MH-11	494.7	0.0027	0.0033	493.393	0.5	0.045	493.938	493.048	1.652	0.345	0.762	1.307
32	MH-10	494.4	0.0022	0.0033	493.085	0.5	0.045	493.630	492.740	1.660	0.345	0.770	1.315
33	MH-9	494.2	0.0017	0.0033	492.890	0.5	0.045	493.435	492.545	1.655	0.345	0.765	1.310
34	MH-8	494.1	0.0034	0.0013	492.817	0.5	0.045	493.362	492.472	1.628	0.345	0.738	1.283
35	MH-7	494.3	0.0007	0.0013	492.641	0.5	0.045	493.186	492.296	2.004	0.345	1.114	1.659
36	MH-6	494.2	0.0135	0.0013	492.483	0.5	0.045	493.028	492.138	2.062	0.345	1.172	1.717
37	MH-5	492.5	0.0055	0.0100	490.298	0.5	0.045	490.843	489.953	2.547	0.345	1.657	2.202
38	MH-4	491.3	0.0000	0.0100	489.810	0.5	0.045	490.355	489.465	1.835	0.345	0.945	1.490
39	MH-3	491.3	0.0086	0.0100	488.992	0.5	0.045	489.537	488.647	2.653	0.345	1.763	2.308
40	MH-2	490.6	#REF!	0.0100	488.204	0.5	0.045	488.749	487.859	2.741	0.345	1.851	2.396