

**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	JM-4	MH-81	100	1633	2076	0	2076	2.60	0.0116	2.607	3	3	6.124	7.821	DWC NP3	0.8
2	MH-81	MH-80	216.34	1900	2416	2076	4492	5.62	0.0116	5.627	3	3	7.124	16.880	DWC NP3	0.8
3	MH-80	MH-79	347.94	2149	2733	4492	7225	9.03	0.0116	9.042	3	3	8.059	27.127	DWC NP3	0.8
4	MH-79	MH-78	427.35	1297	1649	7225	8874	11.09	0.0116	11.104	3	3	4.863	33.311	DWC NP3	0.8
5	MH-78	MH-77	507.87	1315	1672	8874	10546	13.18	0.0116	13.193	3	3	4.931	39.580	DWC NP3	0.8
6	MH-77	MH-76	583.11	1229	1562	10546	12108	15.13	0.0116	15.146	3	3	4.607	45.439	DWC NP3	0.8
7	MH-76	MH-75	661.42	1279	1626	12108	13734	17.17	0.0116	17.179	3	3	4.795	51.537	DWC NP3	0.8
8	MH-75	MH-74	810	2426	3085	13734	16819	21.02	0.0116	21.035	3	3	9.098	63.106	DWC NP3	0.8
9	MH-74	MH-73	993.06	2989	3801	16819	20620	25.78	0.0116	25.787	3	2.5	11.210	64.467	DWC NP3	0.8
10	MH-73	MH-72	1108.73	1889	2402	20620	23022	28.78	0.0116	28.789	3	2.5	7.083	71.972	DWC NP3	0.8
11	MH-72	MH-71	1215.24	1739	2212	23022	25233	31.54	0.0116	31.553	3	2.5	6.522	78.884	DWC NP3	0.8
12	MH-71	MH-70	1277.85	1022	1300	25233	26534	33.17	0.0116	33.178	3	2.5	3.834	82.946	DWC NP3	0.8
13	MH-70	MH-69	1307.54	485	616	26534	27150	33.94	0.0116	33.949	3	2.5	1.818	84.873	DWC NP3	0.8
14	MH-69	MH-68	1353.14	745	947	27150	28097	35.12	0.0116	35.133	3	2.5	2.792	87.832	DWC NP3	0.8
15	MH-68	MH-67	1428.02	1223	1555	28097	29652	37.06	0.0116	37.076	3	2.5	4.585	92.690	DWC NP3	0.8
16	MH-67	MH-66	1459.17	509	647	29652	30298	37.87	0.0116	37.885	3	2.5	1.907	94.712	DWC NP3	0.8
17	MH-66	MH-65	1579.42	1964	2497	30298	32795	40.99	0.0116	41.006	3	2.5	7.364	102.514	DWC NP3	0.8
18	MH-65	MH-64	1689.16	1792	2279	32795	35074	43.84	0.0116	43.854	3	2.5	6.720	109.635	DWC NP3	0.8
19	MH-64	MH-63	1841.28	2484	3159	35074	38233	47.79	0.0116	47.802	3	2.5	9.315	119.506	DWC NP3	1
20	MH-63	MH-62	1971.81	2131	2710	38233	40943	51.18	0.0116	51.190	3	2.5	7.993	127.976	DWC NP3	1
21	MH-62	MH-61	2106.21	2195	2791	40943	43734	54.67	0.0116	54.679	3	2.5	8.230	136.697	DWC NP3	1
22	MH-61	MH-60	2200.71	1543	1962	43734	45696	57.12	0.0116	57.132	3	2.5	5.787	142.829	DWC NP3	1
23	MH-60	MH-59	2315.72	1878	2388	45696	48084	60.11	0.0116	60.117	3	2.5	7.043	150.292	DWC NP3	1
24	MH-59	MH-58	2465.69	2449	3114	48084	51198	64.00	0.0116	64.009	3	2.25	9.184	144.021	DWC NP3	1
25	MH-58	MH-57	2640.25	2850	3625	51198	54823	68.53	0.0116	68.540	3	2.25	10.689	154.215	DWC NP3	1
26	MH-57	MH-56	2795.31	2532	3220	54823	58042	72.55	0.0116	72.565	3	2.25	9.495	163.270	DWC NP3	1
27	MH-56	MH-55	2941.53	2388	3036	58042	61078	76.35	0.0116	76.360	3	2.25	8.954	171.809	DWC NP3	1
28	MH-55	MH-54	3062.41	1974	2510	61078	63588	79.49	0.0116	79.497	3	2.25	7.402	178.869	DWC NP3	1
29	MH-54	MH-53	3178.55	1897	2412	63588	66000	82.50	0.0116	82.512	3	2.25	7.112	185.651	DWC NP3	1
30	MH-53	MH-52	3293.9	1884	2395	66000	68395	85.49	0.0116	85.506	3	2.25	7.064	192.387	DWC NP3	1
31	MH-52	MH-51	3403.86	1796	2283	68395	70678	88.35	0.0116	88.360	3	2.25	6.733	198.809	DWC NP3	1
32	MH-51	MH-50	3496.33	1510	1920	70678	72598	90.75	0.0116	90.760	3	2.25	5.662	204.209	DWC NP3	1
33	MH-50	MH-49	3554.97	958	1218	72598	73816	92.27	0.0116	92.282	3	2.25	3.591	207.634	DWC NP3	1
34	MH-49	MH-48	3613.33	953	1212	73816	75028	93.78	0.0116	93.796	3	2.25	3.574	211.042	DWC NP3	1.2
35	MH-48	MH-47	3754.25	2301	2926	75028	77954	97.44	0.0116	97.454	3	2.25	8.629	219.272	DWC NP3	1.2
36	MH-47	MH-46	3880.07	2055	2613	77954	80567	100.71	0.0116	100.720	3	2.25	7.705	226.619	DWC NP3	1.2
37	MH-46	MH-45	4098.6	3568	4538	80567	85104	106.38	0.0116	106.392	3	2.25	13.382	239.381	DWC NP3	1.2
38	MH-45	MH-44	4147.43	797	1014	85104	86118	107.65	0.0116	107.659	3	2.25	2.990	242.233	DWC NP3	1.2
39	MH-44	MH-43	4229.22	1336	1698	86118	87816	109.77	0.0116	109.782	3	2.25	5.008	247.009	DWC NP3	1.2
40	MH-43	MH-42	4308.02	1287	1636	87816	89453	111.82	0.0116	111.827	3	2.25	4.825	251.611	DWC NP3	1.2

**Ujjain Underground Sewerage Scheme-Sewer Network Design 2/3**

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	JM-4	MH-81	922.94	0.007	0.008	1.678	0.401	0.401	0.67	0.67	0.10	d/D ratio and V50 been very small may be ignored since downstream velocity arriving is quite sartisfactory
2	MH-81	MH-80	922.94	0.008	0.018	1.678	0.401	0.401	0.67	0.67	0.10	
3	MH-80	MH-79	1598.58	0.005	0.017	2.907	0.257	0.401	0.75	1.17	0.05	
4	MH-79	MH-78	1130.36	0.004	0.029	2.055	0.257	0.517	0.53	1.06	0.05	
5	MH-78	MH-77	922.94	0.005	0.043	1.678	0.257	0.517	0.43	0.87	0.05	
6	MH-77	MH-76	922.94	0.005	0.049	1.678	0.257	0.517	0.43	0.87	0.05	
7	MH-76	MH-75	922.94	0.005	0.056	1.678	0.257	0.615	0.43	1.03	0.10	
8	MH-75	MH-74	922.94	0.010	0.068	1.678	0.401	0.615	0.67	1.03	0.10	
9	MH-74	MH-73	922.94	0.012	0.070	1.678	0.401	0.615	0.67	1.03	0.10	
10	MH-73	MH-72	922.94	0.008	0.078	1.678	0.401	0.615	0.67	1.03	0.10	
11	MH-72	MH-71	922.94	0.007	0.085	1.678	0.401	0.615	0.67	1.03	0.10	
12	MH-71	MH-70	1598.58	0.002	0.052	2.907	0.257	0.615	0.75	1.79	0.05	
13	MH-70	MH-69	1598.58	0.001	0.053	2.907	0.257	0.615	0.75	1.79	0.05	
14	MH-69	MH-68	1598.58	0.002	0.055	2.907	0.257	0.615	0.75	1.79	0.05	
15	MH-68	MH-67	1598.58	0.003	0.058	2.907	0.257	0.615	0.75	1.79	0.05	
16	MH-67	MH-66	922.94	0.002	0.103	1.678	0.257	0.701	0.43	1.18	0.05	
17	MH-66	MH-65	922.94	0.008	0.111	1.678	0.401	0.701	0.67	1.18	0.10	
18	MH-65	MH-64	1598.58	0.004	0.069	2.907	0.257	0.615	0.75	1.79	0.05	
19	MH-64	MH-63	2900.57	0.003	0.041	3.388	0.257	0.517	0.87	1.75	0.05	
20	MH-63	MH-62	917.24	0.009	0.140	1.071	0.401	0.776	0.43	0.83	0.10	
21	MH-62	MH-61	917.24	0.009	0.149	1.071	0.401	0.776	0.43	0.83	0.10	
22	MH-61	MH-60	917.24	0.006	0.156	1.071	0.401	0.776	0.43	0.83	0.10	
23	MH-60	MH-59	917.24	0.008	0.164	1.071	0.401	0.776	0.43	0.83	0.10	
24	MH-59	MH-58	917.24	0.010	0.157	1.071	0.401	0.776	0.43	0.83	0.10	
25	MH-58	MH-57	917.24	0.012	0.168	1.071	0.401	0.776	0.43	0.83	0.10	
26	MH-57	MH-56	917.24	0.010	0.178	1.071	0.401	0.776	0.43	0.83	0.10	
27	MH-56	MH-55	917.24	0.010	0.187	1.071	0.401	0.776	0.43	0.83	0.10	
28	MH-55	MH-54	917.24	0.008	0.195	1.071	0.401	0.776	0.43	0.83	0.10	
29	MH-54	MH-53	917.24	0.008	0.202	1.071	0.401	0.822	0.43	0.88	0.10	
30	MH-53	MH-52	1674.65	0.004	0.115	1.956	0.257	0.701	0.50	1.37	0.05	
31	MH-52	MH-51	1674.65	0.004	0.119	1.956	0.257	0.701	0.50	1.37	0.05	
32	MH-51	MH-50	1674.65	0.003	0.122	1.956	0.257	0.701	0.50	1.37	0.05	
33	MH-50	MH-49	1674.65	0.002	0.124	1.956	0.257	0.701	0.50	1.37	0.05	
34	MH-49	MH-48	1668.60	0.002	0.126	1.366	0.257	0.701	0.35	0.96	0.05	
35	MH-48	MH-47	1668.60	0.005	0.131	1.366	0.257	0.701	0.35	0.96	0.05	
36	MH-47	MH-46	1668.60	0.005	0.136	1.366	0.257	0.701	0.35	0.96	0.05	
37	MH-46	MH-45	4719.51	0.003	0.051	3.862	0.257	0.615	0.99	2.38	0.05	
38	MH-45	MH-44	4719.51	0.001	0.051	3.862	0.257	0.615	0.99	2.38	0.05	
39	MH-44	MH-43	4719.51	0.001	0.052	3.862	0.257	0.615	0.99	2.38	0.05	
40	MH-43	MH-42	4719.51	0.001	0.053	3.862	0.257	0.615	0.99	2.38	0.05	

**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	JM-4	506.65	0.0052	0.0000	505.150	0.8	0.05	506.000	504.900	1.750	0.250	0.650	1.500
2	MH-81	506.132	0.0063	0.0033	504.762	0.8	0.05	505.612	504.512	1.620	0.250	0.520	1.370
3	MH-80	505.4	0.0069	0.0100	503.446	0.8	0.05	504.296	503.196	2.204	0.250	1.104	1.954
4	MH-79	504.487	0.0016	0.0050	503.049	0.8	0.05	503.899	502.799	1.688	0.250	0.588	1.438
5	MH-78	504.363	0.0025	0.0033	502.781	0.8	0.05	503.631	502.531	1.832	0.250	0.732	1.582
6	MH-77	504.163	0.0036	0.0033	502.530	0.8	0.05	503.380	502.280	1.883	0.250	0.783	1.633
7	MH-76	503.892	0.0063	0.0033	502.269	0.8	0.05	503.119	502.019	1.873	0.250	0.773	1.623
8	MH-75	503.399	0.0030	0.0033	501.774	0.8	0.05	502.624	501.524	1.875	0.250	0.775	1.625
9	MH-74	502.952	0.0019	0.0033	501.163	0.8	0.05	502.013	500.913	2.039	0.250	0.939	1.789
10	MH-73	502.6	0.0078	0.0033	500.778	0.8	0.05	501.628	500.528	2.072	0.250	0.972	1.822
11	MH-72	501.7	0.0047	0.0033	500.423	0.8	0.05	501.273	500.173	1.527	0.250	0.427	1.277
12	MH-71	501.2	0.0030	0.0100	499.797	0.8	0.05	500.647	499.547	1.653	0.250	0.553	1.403
13	MH-70	501.015	0.0120	0.0100	499.500	0.8	0.05	500.350	499.250	1.765	0.250	0.665	1.515
14	MH-69	500.66	0.0057	0.0100	499.044	0.8	0.05	499.894	498.794	1.866	0.250	0.766	1.616
15	MH-68	500.4	0.0027	0.0100	498.295	0.8	0.05	499.145	498.045	2.355	0.250	1.255	2.105
16	MH-67	500.2	0.0193	0.0033	498.191	0.8	0.05	499.041	497.941	2.259	0.250	1.159	2.009
17	MH-66	499.6	0.0050	0.0033	497.790	0.8	0.05	498.640	497.540	2.060	0.250	0.960	1.810
18	MH-65	499	0.0091	0.0100	496.693	0.8	0.05	497.543	496.443	2.557	0.250	1.457	2.307
19	MH-64	498	0.0033	0.0100	495.172	1	0.06	496.232	494.912	3.088	0.260	1.768	2.828
20	MH-63	497.5	0.0015	0.0010	495.041	1	0.06	496.101	494.781	2.719	0.260	1.399	2.459
21	MH-62	497.7	0.0022	0.0010	494.907	1	0.06	495.967	494.547	3.153	0.360	1.733	2.793
22	MH-61	497.4	0.0032	0.0010	494.812	1	0.06	495.872	494.452	2.948	0.360	1.528	2.588
23	MH-60	497.1	0.0026	0.0010	494.697	1	0.06	495.757	494.337	2.763	0.360	1.343	2.403
24	MH-59	497.4	0.0020	0.0010	494.547	1	0.06	495.607	494.187	3.213	0.360	1.793	2.853
25	MH-58	497.7	0.0052	0.0010	494.373	1	0.06	495.433	494.013	3.687	0.360	2.267	3.327
26	MH-57	496.8	0.0006	0.0010	494.218	1	0.06	495.278	493.858	2.942	0.360	1.522	2.582
27	MH-56	496.7	0.0055	0.0010	494.072	1	0.06	495.132	493.712	2.988	0.360	1.568	2.628
28	MH-55	497.5	0.0099	0.0010	493.951	1	0.06	495.011	493.591	3.909	0.360	2.489	3.549
29	MH-54	496.3	0.0069	0.0010	493.835	1	0.06	494.895	493.475	2.825	0.360	1.405	2.465
30	MH-53	495.5	0.0069	0.0033	493.450	1	0.06	494.510	493.090	2.410	0.360	0.990	2.050
31	MH-52	494.7	0.0027	0.0033	493.083	1	0.06	494.143	492.723	1.977	0.360	0.557	1.617
32	MH-51	494.4	0.0022	0.0033	492.775	1	0.06	493.835	492.415	1.985	0.360	0.565	1.625
33	MH-50	494.2	0.0017	0.0033	492.580	1	0.06	493.640	492.220	1.980	0.360	0.560	1.620
34	MH-49	494.1	0.0034	0.0013	492.507	1.2	0.065	493.772	492.142	1.958	0.365	0.328	1.593
35	MH-48	494.3	0.0007	0.0013	492.331	1.2	0.065	493.596	491.966	2.334	0.365	0.704	1.969
36	MH-47	494.2	0.0135	0.0013	492.173	1.2	0.065	493.438	491.808	2.392	0.365	0.762	2.027
37	MH-46	492.5	0.0055	0.0100	489.988	1.2	0.065	491.253	489.623	2.877	0.365	1.247	2.512
38	MH-45	491.3	0.0000	0.0100	489.500	1.2	0.065	490.765	489.135	2.165	0.365	0.535	1.800
39	MH-44	491.3	0.0086	0.0100	488.682	1.2	0.065	489.947	488.317	2.983	0.365	1.353	2.618
40	MH-43	490.6	0.0013	0.0100	487.894	1.2	0.065	489.159	487.529	3.071	0.365	1.441	2.706

**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)
41	MH-42	MH-41	4339.52	514	654	89453	90107	112.63	0.0116	112.645	3	2.25	1.929	253.451	DWC NP3	1.2
42	MH-41	MH-40	4394.4	896	1140	90107	91246	114.06	0.0116	114.069	3	2.25	3.361	256.656	DWC NP3	1.2
43	MH-40	MH-39	4436.61	689	876	91246	92123	115.15	0.0116	115.165	3	2.25	2.585	259.121	DWC NP3	1.2
44	MH-39	MH-38	4498.82	1016	1292	92123	93414	116.77	0.0116	116.780	3	2.25	3.809	262.754	DWC NP3	1.2
45	MH-38	MH-37	4581.63	1352	1719	93414	95134	118.92	0.0116	118.929	3	2.25	5.071	267.590	DWC NP3	1.2
46	MH-37	MH-36	4702.39	1972	2507	95134	97641	122.05	0.0116	122.063	3	2.25	7.395	274.642	DWC NP3	1.2
47	MH-36	MH-35	4870.05	2738	3481	97641	101123	126.40	0.0116	126.415	3	2.25	10.267	284.433	DWC NP3	1.2
48	MH-35	MH-34	5077.81	3393	4314	101123	105437	131.80	0.0116	131.807	3	2.25	12.722	296.566	DWC NP3	1.2
49	MH-34	MH-33	5203.47	2052	2609	105437	108046	135.06	0.0116	135.069	3	2.25	7.695	303.905	DWC NP3	1.2
50	MH-33	MH-32	5294.09	1480	1882	108046	109927	137.41	0.0116	137.421	3	2.25	5.549	309.197	DWC NP3	1.2
51	MH-32	MH-31	5381.23	1423	1809	109927	111737	139.67	0.0116	139.683	3	2.25	5.336	314.286	DWC NP3	1.2
52	MH-31	MH-30	5437.91	926	1177	111737	112914	141.14	0.0116	141.154	3	2.25	3.471	317.596	DWC NP3	1.2
53	MH-30	MH-29	5503.83	1076	1369	112914	114283	142.85	0.0116	142.865	3	2.25	4.037	321.446	DWC NP3	1.2
54	MH-29	MH-28	5606.37	1674	2129	114283	116412	145.51	0.0116	145.526	3	2.25	6.279	327.434	DWC NP3	1.2
55	MH-28	MH-27	5827.44	3610	4590	116412	121002	151.25	0.0116	151.264	3	2.25	13.537	340.344	DWC NP3	1.2
56	MH-27	MH-26	5985.12	2575	3274	121002	124276	155.35	0.0116	155.357	3	2.25	9.656	349.553	DWC NP3	1.2
57	MH-26	MH-25	6246.31	4265	5423	124276	129700	162.12	0.0116	162.136	3	2.25	15.994	364.806	DWC NP3	1.2
58	MH-25	MH-24	6403.26	2563	3259	129700	132958	166.20	0.0116	166.210	3	2.25	9.611	373.972	DWC NP3	1.2
59	MH-24	MH-23	6561.74	2588	3291	132958	136249	170.31	0.0116	170.323	3	2.25	9.705	383.227	DWC NP3	1.2
60	MH-23	MH-22	6752.31	3112	3957	136249	140206	175.26	0.0116	175.269	3	2.25	11.670	394.356	DWC NP3	1.6
61	MH-22	MH-21	6902.28	2449	3114	140206	143320	179.15	0.0116	179.162	3	2.25	9.184	403.114	DWC NP3	1.6
62	MH-21	MH-20	7136.08	3818	4855	143320	148175	185.22	0.0116	185.230	3	2.25	14.317	416.768	DWC NP3	1.6
63	MH-20	MH-19	7477.44	5574	7088	148175	155263	194.08	0.0116	194.090	3	2.25	20.903	436.703	DWC NP3	1.6
64	MH-19	MH-18	7776.2	4879	6204	155263	161466	201.83	0.0116	201.845	3	2.25	18.295	454.151	DWC NP3	1.6
65	MH-18	MH-17	7889.02	1842	2343	161466	163809	204.76	0.0116	204.773	3	2.25	6.909	460.739	DWC NP3	1.6
66	MH-17	MH-16	8035.25	2388	3036	163809	166845	208.56	0.0116	208.568	3	2.25	8.954	469.279	DWC NP3	1.6
67	MH-16	MH-15	8324.28	4720	6001	166845	172847	216.06	0.0116	216.070	3	2.25	17.699	486.158	DWC NP3	1.6
68	MH-15	MH-14	8633.08	5043	6412	172847	179259	224.07	0.0116	224.085	3	2.25	18.910	504.192	DWC NP3	1.6
69	MH-14	MH-13	8858.38	3679	4678	179259	183937	229.92	0.0116	229.933	3	2.25	13.796	517.349	DWC NP3	1.6
70	MH-13	MH-12	8949.5	1488	1892	183937	185829	232.29	0.0116	232.298	3	2.25	5.580	522.670	DWC NP3	1.6
71	MH-12	MH-11	9016.67	1097	1395	185829	187224	234.03	0.0116	234.041	3	2.25	4.113	526.593	DWC NP3	1.6
72	MH-11	MH-10	9321.34	4975	6326	187224	193550	241.94	0.0116	241.949	3	2.25	18.657	544.386	DWC NP3	1.6
73	MH-10	MH-9	9583.97	4289	5453	193550	199003	248.75	0.0116	248.766	3	2.25	16.082	559.723	DWC NP3	1.6
74	MH-9	MH-8	10003.14	6845	8704	199003	207707	259.63	0.0116	259.645	3	2.25	25.668	584.202	DWC NP3	1.6
75	MH-8	MH-7	10183.56	2946	3746	207707	211453	264.32	0.0116	264.328	3	2.25	11.048	594.739	DWC NP3	1.6
76	MH-7	MH-6	10468.01	4645	5906	211453	217360	271.70	0.0116	271.711	3	2.25	17.418	611.350	DWC NP3	1.6
77	MH-6	MH-5	10548.3	1311	1667	217360	219027	273.78	0.0116	273.795	3	2.25	4.917	616.039	DWC NP3	1.6
78	MH-5	MH-4	10764.04	3523	4480	219027	223507	279.38	0.0116	279.395	3	2.25	13.211	628.638	DWC NP3	1.6
79	MH-4	MH-3	10837.83	1205	1532	223507	225039	281.30	0.0116	281.310	3	2.25	4.519	632.947	DWC NP3	1.6

**Ujjain Underground Sewerage Scheme-Sewer Network Design 2/3**

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
41	MH-42	MH-41	4719.51	0.000	0.054	3.862	0.257	0.615	0.99	2.38	0.05	
42	MH-41	MH-40	2724.81	0.001	0.094	2.230	0.257	0.701	0.57	1.56	0.05	
43	MH-40	MH-39	2724.81	0.001	0.095	2.230	0.257	0.701	0.57	1.56	0.05	
44	MH-39	MH-38	2724.81	0.001	0.096	2.230	0.257	0.701	0.57	1.56	0.05	
45	MH-38	MH-37	2724.81	0.002	0.098	2.230	0.257	0.701	0.57	1.56	0.05	
46	MH-37	MH-36	1926.73	0.004	0.143	1.577	0.257	0.776	0.41	1.22	0.05	
47	MH-36	MH-35	1362.41	0.008	0.209	1.115	0.401	0.822	0.45	0.92	0.10	
48	MH-35	MH-34	1362.41	0.009	0.218	1.115	0.401	0.822	0.45	0.92	0.10	
49	MH-34	MH-33	1362.41	0.006	0.223	1.115	0.401	0.822	0.45	0.92	0.10	
50	MH-33	MH-32	1362.41	0.004	0.227	1.115	0.257	0.822	0.29	0.92	0.05	
51	MH-32	MH-31	1362.41	0.004	0.231	1.115	0.257	0.822	0.29	0.92	0.05	
52	MH-31	MH-30	1362.41	0.003	0.233	1.115	0.257	0.822	0.29	0.92	0.05	
53	MH-30	MH-29	1362.41	0.003	0.236	1.115	0.257	0.822	0.29	0.92	0.05	
54	MH-29	MH-28	1362.41	0.005	0.240	1.115	0.257	0.822	0.29	0.92	0.05	
55	MH-28	MH-27	1179.88	0.011	0.288	0.966	0.401	0.902	0.39	0.87	0.10	
56	MH-27	MH-26	1179.88	0.008	0.296	0.966	0.401	0.902	0.39	0.87	0.10	
57	MH-26	MH-25	1055.32	0.015	0.346	0.864	0.401	0.954	0.35	0.82	0.10	
58	MH-25	MH-24	1055.32	0.009	0.354	0.864	0.401	0.954	0.35	0.82	0.10	
59	MH-24	MH-23	1055.32	0.009	0.363	0.864	0.401	0.954	0.35	0.82	0.10	
60	MH-23	MH-22	2274.93	0.005	0.173	1.064	0.257	0.776	0.27	0.83	0.05	
61	MH-22	MH-21	2274.93	0.004	0.177	1.064	0.257	0.776	0.27	0.83	0.05	
62	MH-21	MH-20	2274.93	0.006	0.183	1.064	0.401	0.776	0.43	0.83	0.10	
63	MH-20	MH-19	2274.93	0.009	0.192	1.064	0.401	0.776	0.43	0.83	0.10	
64	MH-19	MH-18	2274.93	0.008	0.200	1.064	0.401	0.822	0.43	0.87	0.10	
65	MH-18	MH-17	2274.93	0.003	0.203	1.064	0.257	0.822	0.27	0.87	0.05	
66	MH-17	MH-16	2274.93	0.004	0.206	1.064	0.257	0.822	0.27	0.87	0.05	
67	MH-16	MH-15	2274.93	0.008	0.214	1.064	0.401	0.822	0.43	0.87	0.10	
68	MH-15	MH-14	2274.93	0.008	0.222	1.064	0.401	0.822	0.43	0.87	0.10	
69	MH-14	MH-13	2274.93	0.006	0.227	1.064	0.401	0.822	0.43	0.87	0.10	
70	MH-13	MH-12	2274.93	0.002	0.230	1.064	0.257	0.822	0.27	0.87	0.05	
71	MH-12	MH-11	2274.93	0.002	0.231	1.064	0.257	0.822	0.27	0.87	0.05	
72	MH-11	MH-10	4153.44	0.004	0.131	1.942	0.257	0.701	0.50	1.36	0.05	
73	MH-10	MH-9	4153.44	0.004	0.135	1.942	0.257	0.701	0.50	1.36	0.05	
74	MH-9	MH-8	10173.81	0.003	0.057	4.757	0.257	0.615	1.22	2.93	0.05	
75	MH-8	MH-7	10173.81	0.001	0.058	4.757	0.257	0.615	1.22	2.93	0.05	
76	MH-7	MH-6	10173.81	0.002	0.060	4.757	0.257	0.615	1.22	2.93	0.05	
77	MH-6	MH-5	2274.93	0.002	0.271	1.064	0.257	0.902	0.27	0.96	0.05	
78	MH-5	MH-4	2274.93	0.006	0.276	1.064	0.401	0.902	0.43	0.96	0.05	
79	MH-4	MH-3	3217.24	0.001	0.197	1.504	0.257	0.822	0.39	1.24	0.05	

**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
41	MH-42	490.7	0.0159	0.0100	487.579	1.2	0.065	488.844	487.214	3.486	0.365	1.856	3.121
42	MH-41	490.2	0.0000	0.0033	487.396	1.2	0.065	488.661	487.031	3.169	0.365	1.539	2.804
43	MH-40	490.2	0.0142	0.0033	487.255	1.2	0.065	488.520	486.890	3.310	0.365	1.680	2.945
44	MH-39	489.6	0.0080	0.0033	487.048	1.2	0.065	488.313	486.683	2.917	0.365	1.287	2.552
45	MH-38	489.1	0.0085	0.0033	486.772	1.2	0.065	488.037	486.407	2.693	0.365	1.063	2.328
46	MH-37	488.4	0.0091	0.0017	486.571	1.2	0.065	487.836	486.206	2.194	0.365	0.564	1.829
47	MH-36	489.5	0.0006	0.0008	486.431	1.2	0.065	487.696	486.066	3.434	0.365	1.804	3.069
48	MH-35	489.4	0.0005	0.0008	486.258	1.2	0.065	487.523	485.893	3.507	0.365	1.877	3.142
49	MH-34	489.5	0.0024	0.0008	486.153	1.2	0.065	487.418	485.788	3.712	0.365	2.082	3.347
50	MH-33	489.2	0.0011	0.0008	486.078	1.2	0.065	487.343	485.713	3.487	0.365	1.857	3.122
51	MH-32	489.1	0.0011	0.0008	486.005	1.2	0.065	487.270	485.640	3.460	0.365	1.830	3.095
52	MH-31	489	0.0018	0.0008	485.958	1.2	0.065	487.223	485.593	3.407	0.365	1.777	3.042
53	MH-30	488.9	0.0015	0.0008	485.903	1.2	0.065	487.168	485.538	3.362	0.365	1.732	2.997
54	MH-29	488.8	0.0002	0.0008	485.817	1.2	0.065	487.082	485.452	3.348	0.365	1.718	2.983
55	MH-28	488.775	0.0022	0.0006	485.679	1.2	0.065	486.944	485.314	3.461	0.365	1.831	3.096
56	MH-27	489.254	0.0074	0.0006	485.581	1.2	0.065	486.846	485.216	4.038	0.365	2.408	3.673
57	MH-26	490.416	0.0020	0.0005	485.450	1.2	0.065	486.715	485.085	5.331	0.365	3.701	4.966
58	MH-25	490.927	0.0049	0.0005	485.371	1.2	0.065	486.636	485.006	5.921	0.365	4.291	5.556
59	MH-24	491.703	0.0015	0.0005	485.292	1.2	0.065	486.557	484.927	6.776	0.365	5.146	6.411
60	MH-23	491.471	0.0055	0.0005	485.197	1.6	0.07	486.867	484.827	6.644	0.370	4.604	6.274
61	MH-22	490.432	0.0052	0.0005	485.122	1.6	0.07	486.792	484.752	5.680	0.370	3.640	5.310
62	MH-21	489.645	0.0009	0.0005	485.005	1.6	0.07	486.675	484.635	5.010	0.370	2.970	4.640
63	MH-20	489.858	0.0054	0.0005	484.834	1.6	0.07	486.504	484.464	5.394	0.370	3.354	5.024
64	MH-19	488.015	0.0002	0.0005	484.685	1.6	0.07	486.355	484.315	3.700	0.370	1.660	3.330
65	MH-18	488.087	0.0005	0.0005	484.629	1.6	0.07	486.299	484.259	3.828	0.370	1.788	3.458
66	MH-17	488.14	0.0006	0.0005	484.556	1.6	0.07	486.226	484.186	3.954	0.370	1.914	3.584
67	MH-16	488.053	0.0036	0.0005	484.411	1.6	0.07	486.081	484.041	4.012	0.370	1.972	3.642
68	MH-15	489.092	0.0009	0.0005	484.257	1.6	0.07	485.927	483.887	5.205	0.370	3.165	4.835
69	MH-14	489.384	0.0060	0.0005	484.144	1.6	0.07	485.814	483.774	5.610	0.370	3.570	5.240
70	MH-13	488.038	0.0163	0.0005	484.098	1.6	0.07	485.768	483.728	4.310	0.370	2.270	3.940
71	MH-12	486.553	0.0032	0.0005	484.065	1.6	0.07	485.735	483.695	2.858	0.370	0.818	2.488
72	MH-11	486.768	0.0012	0.0017	483.557	1.6	0.07	485.227	483.187	3.581	0.370	1.541	3.211
73	MH-10	486.4	0.0167	0.0017	483.119	1.6	0.07	484.789	482.749	3.651	0.370	1.611	3.281
74	MH-9	482.011	0.0030	0.0100	478.928	1.6	0.07	480.598	478.558	3.453	0.370	1.413	3.083
75	MH-8	480.762	0.0012	0.0100	477.123	1.6	0.07	478.793	476.753	4.009	0.370	1.969	3.639
76	MH-7	480.971	0.0018	0.0100	474.279	1.6	0.07	475.949	473.909	7.062	0.370	5.022	6.692
77	MH-6	480.462	0.0029	0.0005	474.239	1.6	0.07	475.909	473.869	6.593	0.370	4.553	6.223
78	MH-5	480.694	0.0028	0.0005	474.131	1.6	0.07	475.801	473.761	6.933	0.370	4.893	6.563
79	MH-4	480.095	0.0501	0.0010	474.057	1.6	0.07	475.727	473.687	6.408	0.370	4.368	6.038

**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)
80	MH-3	MH-2	10943.01	1718	2184	225039	227223	284.03	0.0116	284.040	3	2.25	6.441	639.090	DWC NP3	1.6
81	MH-2	MH-1	10966.51	384	488	227223	227711	284.64	0.0116	284.650	3	2.25	1.439	640.462	DWC NP3	1.6
82	MH-1	JM-0	11055.14	1447	1840	227711	229551	286.94	0.0116	286.950	3	2.25	5.427	645.638	DWC NP3	1.6

**Ujjain Underground Sewerage Scheme-Sewer Network Design 2/3**

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
80	MH-3	MH-2	10173.81	0.001	0.063	4.757	0.257	0.615	1.22	2.93	0.05	
81	MH-2	MH-1	10173.81	0.000	0.063	4.757	0.257	0.615	1.22	2.93	0.05	
82	MH-1	JM-0	2543.45	0.002	0.254	1.189	0.257	0.843	0.31	1.00	0.05	



**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
80	MH-3	476.4	0.0071	0.0100	473.005	1.6	0.07	474.675	472.635	3.765	0.370	1.725	3.395
81	MH-2	477.147	0.0463	0.0100	472.770	1.6	0.07	474.440	472.400	4.747	0.370	2.707	4.377
82	MH-1	478.235	0.0123	0.0006	472.715	1.6	0.07	474.385	472.345	5.890	0.370	3.850	5.520