

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-2	MH-110	100	2441	3055	129669	132724	165.91	0.0116	165.917	3	2.25	9.154	373.312	DWC NP3	0.8
2	MH-110	MH-109	592.84	12031	15056	132724	147781	184.73	0.0116	184.737	3	2.25	45.115	415.659	DWC NP3	0.8
3	MH-109	MH-108	1646.4	25719	32187	147781	179967	224.96	0.0116	224.971	2.5	2.25	80.370	506.184	DWC NP3	0.8
4	MH-108	MH-107	1932.66	6988	8745	179967	188713	235.89	0.0116	235.902	3	2.25	26.205	530.780	DWC NP3	0.8
5	MH-107	MH-106	2245.53	7637	9558	188713	198271	247.84	0.0116	247.850	3	2.25	28.641	557.663	DWC NP3	0.8
6	MH-106	MH-105	2302.09	1381	1728	198271	199999	250.00	0.0116	250.010	3	2.25	5.178	562.523	DWC NP3	0.8
7	MH-105	MH-104	2374.08	1757	2199	199999	202198	252.75	0.0116	252.759	3	2.25	6.590	568.708	DWC NP3	0.8
8	MH-104	MH-103	2465.19	2224	2783	202198	204982	256.23	0.0116	256.239	3	2.25	8.340	576.537	DWC NP3	0.8
9	MH-103	MH-102	2583.3	2883	3608	204982	208590	260.74	0.0116	260.749	3	2.25	10.812	586.685	DWC NP3	0.8
10	MH-102	MH-101	2652.17	1681	2104	208590	210694	263.37	0.0116	263.379	3	2.25	6.304	592.603	DWC NP3	0.8
11	MH-101	MH-100	2714.58	1523	1907	210694	212601	265.75	0.0116	265.762	3	2.25	5.713	597.965	DWC NP3	0.8
12	MH-100	MH-99	2855.37	3437	4301	212601	216902	271.13	0.0116	271.139	3	2.25	12.888	610.062	DWC NP3	0.8
13	MH-99	MH-98	2956.84	2477	3100	216902	220002	275.00	0.0116	275.014	3	2.25	9.289	618.781	DWC NP3	0.8
14	MH-98	MH-97	3020.47	1553	1944	220002	221946	277.43	0.0116	277.444	3	2.25	5.825	624.248	DWC NP3	0.8
15	MH-97	MH-96	3127.78	2620	3278	221946	225224	281.53	0.0116	281.542	3	2.25	9.823	633.469	DWC NP3	0.8
16	MH-96	MH-95	3233.38	2578	3226	225224	228450	285.56	0.0116	285.574	3	2.25	9.667	642.542	DWC NP3	0.8
17	MH-95	MH-94	3393.96	3920	4906	228450	233356	291.69	0.0116	291.707	3	2.25	14.700	656.340	DWC NP3	0.8
18	MH-94	MH-93	3535.45	3454	4323	233356	237679	297.10	0.0116	297.110	3	2.25	12.952	668.497	DWC NP3	0.8
19	MH-93	MH-92	3708.83	4232	5297	237679	242975	303.72	0.0116	303.731	3	2.25	15.871	683.394	DWC NP3	0.8
20	MH-92	MH-91	3892.2	4476	5602	242975	248577	310.72	0.0116	310.733	3	2.25	16.786	699.150	DWC NP3	0.8
21	MH-91	MH-90	3937.79	1113	1393	248577	249970	312.46	0.0116	312.474	3	2.25	4.173	703.067	DWC NP3	0.8
22	MH-90	MH-89	3980.14	1034	1294	249970	251264	314.08	0.0116	314.092	3	2.25	3.877	706.706	DWC NP3	0.8
23	MH-89	MH-88	4158.87	4363	5460	251264	256724	320.91	0.0116	320.917	3	2.25	16.361	722.063	DWC NP3	0.8
24	MH-88	MH-87	4426.91	6543	8189	256724	264913	331.14	0.0116	331.153	3	2.25	24.537	745.094	DWC NP3	1
25	MH-87	MH-86	4681.69	6219	7784	264913	272697	340.87	0.0116	340.882	3	2.25	23.323	766.985	DWC NP3	1
26	MH-86	MH-85	4894.08	5185	6489	272697	279185	348.98	0.0116	348.993	3	2.25	19.443	785.235	DWC NP3	1
27	MH-85	MH-84	4959.63	1600	2003	279185	281188	351.48	0.0116	351.496	3	2.25	6.001	790.867	DWC NP3	1
28	MH-84	MH-83	5035.2	1845	2309	281188	283497	354.37	0.0116	354.382	3	2.25	6.918	797.360	DWC NP3	1
29	MH-83	MH-82	5136.12	2464	3083	283497	286580	358.22	0.0116	358.236	3	2.25	9.238	806.031	DWC NP3	1
30	MH-82	MH-81	5249.75	2774	3471	286580	290051	362.56	0.0116	362.576	3	2.25	10.402	815.795	DWC NP3	1
31	MH-81	MH-80	5377.79	3126	3912	290051	293963	367.45	0.0116	367.465	3	2.25	11.721	826.797	DWC NP3	1
32	MH-80	MH-79	5562.01	4497	5628	293963	299591	374.49	0.0116	374.500	3	2.25	16.864	842.625	DWC NP3	1
33	MH-79	MH-78	5782.24	5376	6728	299591	306319	382.90	0.0116	382.910	3	2.25	20.160	861.548	DWC NP3	1
34	MH-78	MH-77	5981.82	4872	6097	306319	312416	390.52	0.0116	390.532	3	2.25	18.270	878.697	DWC NP3	1.2
35	MH-77	MH-76	6085.93	2541	3181	312416	315597	394.50	0.0116	394.508	3	2.25	9.530	887.642	DWC NP3	1.2
36	MH-76	MH-75	6191.5	2577	3225	315597	318822	398.53	0.0116	398.539	3	2.25	9.664	896.713	DWC NP3	1.2
37	MH-75	MH-74	6256.77	1593	1994	318822	320816	401.02	0.0116	401.032	3	2.25	5.975	902.321	DWC NP3	1.2
38	MH-74	MH-73	6339.74	2025	2535	320816	323351	404.19	0.0116	404.200	3	2.25	7.595	909.450	DWC NP3	1.2
39	MH-73	MH-72	6442.24	2502	3131	323351	326482	408.10	0.0116	408.114	3	2.25	9.383	918.257	DWC NP3	1.2
40	MH-72	MH-71	6574.98	3240	4055	326482	330538	413.17	0.0116	413.183	3	2.25	12.151	929.663	DWC NP3	1.2

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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	JM-2	MH-110	922.94	0.010	0.404	1.678	0.401	0.954	0.67	1.60	0.10	
2	MH-110	MH-109	1191.51	0.038	0.349	2.166	0.517	0.954	1.12	2.07	0.15	
3	MH-109	MH-108	652.62	0.123	0.776	1.187	0.701	1.107	0.83	1.31	0.25	
4	MH-108	MH-107	652.62	0.040	0.813	1.187	0.517	1.12	0.61	1.33	0.15	
5	MH-107	MH-106	922.94	0.031	0.604	1.678	0.517	1.072	0.87	1.80	0.15	
6	MH-106	MH-105	922.94	0.006	0.609	1.678	0.401	1.072	0.67	1.80	0.15	
7	MH-105	MH-104	505.51	0.013	1.125	0.919	0.401	1	0.37	0.92	0.10	
8	MH-104	MH-103	461.47	0.018	1.249	0.839	0.401	1	0.34	0.84	0.10	
9	MH-103	MH-102	461.47	0.023	1.271	0.839	0.517	1	0.43	0.84	0.15	
10	MH-102	MH-101	461.47	0.014	1.284	0.839	0.401	1	0.34	0.84	0.10	
11	MH-101	MH-100	461.47	0.012	1.296	0.839	0.401	1	0.34	0.84	0.10	
12	MH-100	MH-99	461.47	0.028	1.322	0.839	0.517	1	0.43	0.84	0.15	
13	MH-99	MH-98	461.47	0.020	1.341	0.839	0.401	1	0.34	0.84	0.10	
14	MH-98	MH-97	461.47	0.013	1.353	0.839	0.401	1	0.34	0.84	0.10	
15	MH-97	MH-96	461.47	0.021	1.373	0.839	0.401	1	0.34	0.84	0.10	
16	MH-96	MH-95	461.47	0.021	1.392	0.839	0.401	1	0.34	0.84	0.10	
17	MH-95	MH-94	461.47	0.032	1.422	0.839	0.517	1	0.43	0.84	0.15	
18	MH-94	MH-93	461.47	0.028	1.449	0.839	0.517	1	0.43	0.84	0.15	
19	MH-93	MH-92	461.47	0.034	1.481	0.839	0.517	1	0.43	0.84	0.15	
20	MH-92	MH-91	461.47	0.036	1.515	0.839	0.517	1	0.43	0.84	0.15	
21	MH-91	MH-90	461.47	0.009	1.524	0.839	0.401	1	0.34	0.84	0.10	
22	MH-90	MH-89	461.47	0.008	1.531	0.839	0.401	1	0.34	0.84	0.10	
23	MH-89	MH-88	461.47	0.035	1.565	0.839	0.517	1	0.43	0.84	0.15	
24	MH-88	MH-87	837.32	0.029	0.890	0.978	0.517	1.133	0.51	1.11	0.15	
25	MH-87	MH-86	837.32	0.028	0.916	0.978	0.517	1.14	0.51	1.12	0.15	
26	MH-86	MH-85	837.32	0.023	0.938	0.978	0.517	1.14	0.51	1.12	0.15	
27	MH-85	MH-84	837.32	0.007	0.945	0.978	0.401	1.14	0.39	1.12	0.10	
28	MH-84	MH-83	837.32	0.008	0.952	0.978	0.401	1.14	0.39	1.12	0.10	
29	MH-83	MH-82	837.32	0.011	0.963	0.978	0.401	1.14	0.39	1.12	0.10	
30	MH-82	MH-81	775.21	0.013	1.052	0.906	0.401	1.124	0.36	1.02	0.10	
31	MH-81	MH-80	775.21	0.015	1.067	0.906	0.401	1.095	0.36	0.99	0.10	
32	MH-80	MH-79	775.21	0.022	1.087	0.906	0.517	1	0.47	0.91	0.10	
33	MH-79	MH-78	775.21	0.026	1.111	0.906	0.517	1	0.47	0.91	0.15	
34	MH-78	MH-77	1261.34	0.014	0.697	1.032	0.401	1.099	0.41	1.13	0.10	
35	MH-77	MH-76	1261.34	0.008	0.704	1.032	0.401	1.099	0.41	1.13	0.10	
36	MH-76	MH-75	1261.34	0.008	0.711	1.032	0.401	1.099	0.41	1.13	0.10	
37	MH-75	MH-74	1261.34	0.005	0.715	1.032	0.257	1.099	0.27	1.13	0.05	
38	MH-74	MH-73	1261.34	0.006	0.721	1.032	0.401	1.099	0.41	1.13	0.10	
39	MH-73	MH-72	1261.34	0.007	0.728	1.032	0.401	1.099	0.41	1.13	0.10	
40	MH-72	MH-71	1261.34	0.010	0.737	1.032	0.401	1.099	0.41	1.13	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	JM-2	485.14	0.0276	0.0000	483.640	0.8	0.05	484.490	483.390	1.750	0.250	0.650	1.500
2	MH-110	482.381	0.0064	0.0056	480.902	0.8	0.05	481.752	480.652	1.729	0.250	0.629	1.479
3	MH-109	485.53	0.0002	0.0017	479.146	0.8	0.05	479.996	478.896	6.634	0.250	5.534	6.384
4	MH-108	485.781	0.0192	0.0017	478.669	0.8	0.05	479.519	478.419	7.362	0.250	6.262	7.112
5	MH-107	480.276	0.0035	0.0033	477.626	0.8	0.05	478.476	477.376	2.900	0.250	1.800	2.650
6	MH-106	479.178	0.0124	0.0033	477.438	0.8	0.05	478.288	477.188	1.990	0.250	0.890	1.740
7	MH-105	479.878	0.0043	0.0010	477.366	0.8	0.05	478.216	477.116	2.762	0.250	1.662	2.512
8	MH-104	480.188	0.0250	0.0008	477.290	0.8	0.05	478.140	477.040	3.148	0.250	2.048	2.898
9	MH-103	482.468	0.0216	0.0008	477.191	0.8	0.05	478.041	476.941	5.527	0.250	4.427	5.277
10	MH-102	479.918	0.0139	0.0008	477.134	0.8	0.05	477.984	476.884	3.034	0.250	1.934	2.784
11	MH-101	480.878	0.0053	0.0008	477.082	0.8	0.05	477.932	476.832	4.046	0.250	2.946	3.796
12	MH-100	480.548	0.0112	0.0008	476.964	0.8	0.05	477.814	476.714	3.834	0.250	2.734	3.584
13	MH-99	478.968	0.0172	0.0008	476.880	0.8	0.05	477.730	476.630	2.338	0.250	1.238	2.088
14	MH-98	480.718	0.0229	0.0008	476.827	0.8	0.05	477.677	476.577	4.141	0.250	3.041	3.891
15	MH-97	479.258	0.0014	0.0008	476.737	0.8	0.05	477.587	476.487	2.771	0.250	1.671	2.521
16	MH-96	479.408	0.0092	0.0008	476.649	0.8	0.05	477.499	476.399	3.009	0.250	1.909	2.759
17	MH-95	480.378	0.0006	0.0008	476.516	0.8	0.05	477.366	476.266	4.112	0.250	3.012	3.862
18	MH-94	480.288	0.0011	0.0008	476.398	0.8	0.05	477.248	476.148	4.140	0.250	3.040	3.890
19	MH-93	480.438	0.0074	0.0008	476.253	0.8	0.05	477.103	476.003	4.435	0.250	3.335	4.185
20	MH-92	479.158	0.0045	0.0008	476.100	0.8	0.05	476.950	475.850	3.308	0.250	2.208	3.058
21	MH-91	478.328	0.0022	0.0008	476.062	0.8	0.05	476.912	475.712	2.616	0.350	1.416	2.266
22	MH-90	478.228	0.0198	0.0008	476.027	0.8	0.05	476.877	475.677	2.551	0.350	1.351	2.201
23	MH-89	479.068	0.0030	0.0008	475.878	0.8	0.05	476.728	475.528	3.540	0.350	2.340	3.190
24	MH-88	479.598	0.0014	0.0008	475.655	1	0.06	476.715	475.295	4.303	0.360	2.883	3.943
25	MH-87	479.968	0.0010	0.0008	475.443	1	0.06	476.503	475.083	4.885	0.360	3.465	4.525
26	MH-86	479.718	0.0007	0.0008	475.266	1	0.06	476.326	474.906	4.812	0.360	3.392	4.452
27	MH-85	479.578	0.0053	0.0008	475.211	1	0.06	476.271	474.851	4.727	0.360	3.307	4.367
28	MH-84	479.228	0.0071	0.0008	475.148	1	0.06	476.208	474.788	4.440	0.360	3.020	4.080
29	MH-83	479.768	0.0028	0.0008	475.064	1	0.06	476.124	474.704	5.064	0.360	3.644	4.704
30	MH-82	480.048	0.0026	0.0007	474.983	1	0.06	476.043	474.623	5.425	0.360	4.005	5.065
31	MH-81	480.338	0.0070	0.0007	474.891	1	0.06	475.951	474.531	5.807	0.360	4.387	5.447
32	MH-80	479.448	0.0052	0.0007	474.760	1	0.06	475.820	474.400	5.048	0.360	3.628	4.688
33	MH-79	478.488	0.0078	0.0007	474.602	1	0.06	475.662	474.242	4.246	0.360	2.826	3.886
34	MH-78	480.208	0.0057	0.0007	474.460	1.2	0.065	475.725	474.095	6.113	0.365	4.483	5.748
35	MH-77	481.348	0.0128	0.0007	474.385	1.2	0.065	475.650	474.020	7.328	0.365	5.698	6.963
36	MH-76	480.011	0.0078	0.0007	474.310	1.2	0.065	475.575	473.945	6.066	0.365	4.436	5.701
37	MH-75	480.838	0.0216	0.0007	474.263	1.2	0.065	475.528	473.898	6.940	0.365	5.310	6.575
38	MH-74	479.428	0.0182	0.0007	474.204	1.2	0.065	475.469	473.839	5.589	0.365	3.959	5.224
39	MH-73	480.938	0.0032	0.0007	474.131	1.2	0.065	475.396	473.766	7.172	0.365	5.542	6.807
40	MH-72	480.608	0.0034	0.0007	474.036	1.2	0.065	475.301	473.671	6.937	0.365	5.307	6.572

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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-71	MH-70	6638.98	1562	1955	330538	332493	415.62	0.0116	415.627	3	2.25	5.859	935.162	DWC NP3	1.2
42	MH-70	MH-69	6753.36	2792	3494	332493	335987	419.98	0.0116	419.995	3	2.25	10.471	944.990	DWC NP3	1.2
43	MH-69	MH-68	6893.87	3430	4293	335987	340280	425.35	0.0116	425.361	3	2.25	12.863	957.063	DWC NP3	1.2
44	MH-68	MH-67	6943.95	1223	1530	340280	341810	427.26	0.0116	427.274	3	2.25	4.584	961.366	DWC NP3	1.2
45	MH-67	MH-66	7000.64	1384	1732	341810	343542	429.43	0.0116	429.439	3	2.25	5.189	966.237	DWC NP3	1.2
46	MH-66	MH-65	7102.01	2475	3097	343542	346639	433.30	0.0116	433.310	3	2.25	9.280	974.947	DWC NP3	1.2
47	MH-65	MH-64	7206.16	2542	3182	346639	349820	437.28	0.0116	437.287	3	2.25	9.534	983.896	DWC NP3	1.2
48	MH-64	MH-63	7321.67	2820	3529	349820	353349	441.69	0.0116	441.698	3	2.25	10.574	993.821	DWC NP3	1.2
49	MH-63	MH-62	7453.03	3207	4013	353349	357362	446.70	0.0116	446.714	3	2.25	12.025	1005.108	DWC NP3	1.6
50	MH-62	MH-61	7630.35	4329	5417	357362	362780	453.47	0.0116	453.486	3	2.25	16.232	1020.343	DWC NP3	1.6
51	MH-61	MH-60	7684.37	1319	1650	362780	364430	455.54	0.0116	455.549	3	2.25	4.945	1024.985	DWC NP3	1.6
52	MH-60	MH-59	7748.2	1558	1950	364430	366380	457.97	0.0116	457.986	3	2.25	5.843	1030.469	DWC NP3	1.6
53	MH-59	MH-58	7854.27	2589	3240	366380	369620	462.03	0.0116	462.037	3	2.25	9.710	1039.583	DWC NP3	1.6
54	MH-58	MH-57	8007.03	3729	4667	369620	374287	467.86	0.0116	467.871	3	2.25	13.984	1052.709	DWC NP3	1.6
55	MH-57	MH-56	8149.77	3484	4361	374287	378648	473.31	0.0116	473.322	3	2.25	13.067	1064.974	DWC NP3	1.6
56	MH-56	MH-55	8319	4131	5170	378648	383818	479.77	0.0116	479.784	3	2.25	15.492	1079.514	DWC NP3	1.6
57	MH-55	MH-54	8448.33	3157	3951	383818	387769	484.71	0.0116	484.723	3	2.25	11.839	1090.627	DWC NP3	1.6
58	MH-54	MH-53	8556.46	2640	3303	387769	391073	488.84	0.0116	488.852	3	2.25	9.898	1099.918	DWC NP3	1.6
59	MH-53	MH-52	8632.47	1855	2322	391073	393395	491.74	0.0116	491.755	3	2.25	6.958	1106.449	DWC NP3	1.6
60	MH-52	MH-51	8688.51	1368	1712	393395	395107	493.88	0.0116	493.895	3	2.25	5.130	1111.264	DWC NP3	1.6
61	MH-51	MH-50	8779.78	2228	2788	395107	397895	497.37	0.0116	497.380	3	2.25	8.355	1119.106	DWC NP3	1.6
62	MH-50	MH-49	8850.98	1738	2175	397895	400070	500.09	0.0116	500.099	3	2.25	6.518	1125.224	DWC NP3	1.6
63	MH-49	MH-48	8964.79	2778	3477	400070	403547	504.43	0.0116	504.446	3	2.25	10.418	1135.003	DWC NP3	1.6
64	MH-48	MH-47	9022.08	1399	1750	403547	405297	506.62	0.0116	506.633	3	2.25	5.244	1139.925	DWC NP3	1.6
65	MH-47	MH-46	9065.9	1070	1339	405297	406636	508.30	0.0116	508.307	3	2.25	4.011	1143.690	DWC NP3	1.6
66	MH-46	MH-45	9093.92	684	856	406636	407492	509.37	0.0116	509.377	3	2.25	2.565	1146.098	DWC NP3	1.6
67	MH-45	MH-44	9122.19	690	864	407492	408356	510.44	0.0116	510.456	3	2.25	2.588	1148.527	DWC NP3	1.6
68	MH-44	MH-43	9169.21	1148	1436	408356	409792	512.24	0.0116	512.252	3	2.25	4.304	1152.567	DWC NP3	1.6
69	MH-43	MH-42	9246.08	1876	2348	409792	412141	515.18	0.0116	515.188	3	2.25	7.037	1159.172	DWC NP3	1.6
70	MH-42	MH-41	9285.63	965	1208	412141	413349	516.69	0.0116	516.698	3	2.25	3.620	1162.570	DWC NP3	1.6
71	MH-41	MH-40	9326.69	1002	1254	413349	414603	518.25	0.0116	518.266	3	2.25	3.759	1166.098	DWC NP3	1.6
72	MH-40	MH-39	9368.67	1025	1283	414603	415886	519.86	0.0116	519.869	3	2.25	3.843	1169.705	DWC NP3	1.6
73	MH-39	MH-38	9420.84	1274	1594	415886	417480	521.85	0.0116	521.861	3	2.25	4.776	1174.188	DWC NP3	1.6
74	MH-38	MH-37	9472.01	1249	1563	417480	419043	523.80	0.0116	523.815	3	2.25	4.684	1178.585	DWC NP3	1.6
75	MH-37	MH-36	9530.67	1432	1792	419043	420835	526.04	0.0116	526.055	3	2.25	5.370	1183.625	DWC NP3	1.6
76	MH-36	MH-35	9591.23	1478	1850	420835	422685	528.36	0.0116	528.368	3	2.25	5.544	1188.828	DWC NP3	1.6
77	MH-35	MH-34	9675.95	2068	2588	422685	425274	531.59	0.0116	531.603	3	2.25	7.755	1196.108	DWC NP3	1.6
78	MH-34	MH-33	9749.13	1786	2236	425274	427509	534.39	0.0116	534.398	3	2.25	6.699	1202.396	DWC NP3	1.6
79	MH-33	MH-32	9790.42	1008	1261	427509	428771	535.96	0.0116	535.975	3	2.25	3.780	1205.943	DWC NP3	1.6
80	MH-32	MH-31	9845.01	1333	1668	428771	430438	538.05	0.0116	538.060	3	2.25	4.997	1210.634	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-71	MH-70	1261.34	0.005	0.741	1.032	0.257	1.099	0.27	1.13	0.05	
42	MH-70	MH-69	1261.34	0.008	0.749	1.032	0.401	1.099	0.41	1.13	0.10	
43	MH-69	MH-68	1261.34	0.010	0.759	1.032	0.401	1.107	0.41	1.14	0.10	
44	MH-68	MH-67	1261.34	0.004	0.762	1.032	0.257	1.107	0.27	1.14	0.05	
45	MH-67	MH-66	1261.34	0.004	0.766	1.032	0.257	1.107	0.27	1.14	0.05	
46	MH-66	MH-65	1261.34	0.007	0.773	1.032	0.401	1.107	0.41	1.14	0.10	
47	MH-65	MH-64	1261.34	0.008	0.780	1.032	0.401	1.107	0.41	1.14	0.10	
48	MH-64	MH-63	1261.34	0.008	0.788	1.032	0.401	1.12	0.41	1.16	0.10	
49	MH-63	MH-62	2274.93	0.005	0.442	1.064	0.257	1	0.27	1.06	0.10	
50	MH-62	MH-61	2274.93	0.007	0.449	1.064	0.401	1	0.43	1.06	0.10	
51	MH-61	MH-60	2274.93	0.002	0.451	1.064	0.257	1	0.27	1.06	0.05	
52	MH-60	MH-59	2274.93	0.003	0.453	1.064	0.257	1	0.27	1.06	0.05	
53	MH-59	MH-58	2274.93	0.004	0.457	1.064	0.257	1	0.27	1.06	0.05	
54	MH-58	MH-57	2274.93	0.006	0.463	1.064	0.401	1	0.43	1.06	0.10	
55	MH-57	MH-56	2274.93	0.006	0.468	1.064	0.401	1	0.43	1.06	0.10	
56	MH-56	MH-55	2274.93	0.007	0.475	1.064	0.401	1	0.43	1.06	0.10	
57	MH-55	MH-54	2274.93	0.005	0.479	1.064	0.257	1	0.27	1.06	0.10	
58	MH-54	MH-53	2274.93	0.004	0.483	1.064	0.257	1	0.27	1.06	0.05	
59	MH-53	MH-52	2274.93	0.003	0.486	1.064	0.257	1	0.27	1.06	0.05	
60	MH-52	MH-51	2274.93	0.002	0.488	1.064	0.257	1	0.27	1.06	0.05	
61	MH-51	MH-50	3217.24	0.003	0.348	1.504	0.257	0.954	0.39	1.43	0.05	
62	MH-50	MH-49	3217.24	0.002	0.350	1.504	0.257	0.954	0.39	1.43	0.05	
63	MH-49	MH-48	3217.24	0.003	0.353	1.504	0.257	0.954	0.39	1.43	0.05	
64	MH-48	MH-47	3217.24	0.002	0.354	1.504	0.257	0.954	0.39	1.43	0.05	
65	MH-47	MH-46	3217.24	0.001	0.355	1.504	0.257	0.954	0.39	1.43	0.05	
66	MH-46	MH-45	3217.24	0.001	0.356	1.504	0.257	0.954	0.39	1.43	0.05	
67	MH-45	MH-44	3217.24	0.001	0.357	1.504	0.257	0.954	0.39	1.43	0.05	
68	MH-44	MH-43	3217.24	0.001	0.358	1.504	0.257	0.954	0.39	1.43	0.05	
69	MH-43	MH-42	3217.24	0.002	0.360	1.504	0.257	0.954	0.39	1.43	0.05	
70	MH-42	MH-41	3217.24	0.001	0.361	1.504	0.257	0.954	0.39	1.43	0.05	
71	MH-41	MH-40	3217.24	0.001	0.362	1.504	0.257	0.954	0.39	1.43	0.05	
72	MH-40	MH-39	3217.24	0.001	0.364	1.504	0.257	0.954	0.39	1.43	0.05	
73	MH-39	MH-38	3217.24	0.001	0.365	1.504	0.257	0.954	0.39	1.43	0.05	
74	MH-38	MH-37	3217.24	0.001	0.366	1.504	0.257	0.954	0.39	1.43	0.05	
75	MH-37	MH-36	3217.24	0.002	0.368	1.504	0.257	0.954	0.39	1.43	0.05	
76	MH-36	MH-35	3217.24	0.002	0.370	1.504	0.257	0.954	0.39	1.43	0.05	
77	MH-35	MH-34	3217.24	0.002	0.372	1.504	0.257	0.954	0.39	1.43	0.05	
78	MH-34	MH-33	3217.24	0.002	0.374	1.504	0.257	0.954	0.39	1.43	0.05	
79	MH-33	MH-32	3217.24	0.001	0.375	1.504	0.257	0.954	0.39	1.43	0.05	
80	MH-32	MH-31	3217.24	0.002	0.376	1.504	0.257	0.954	0.39	1.43	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-71	481.058	0.0247	0.0007	473.990	1.2	0.065	475.255	473.625	7.433	0.365	5.803	7.068
42	MH-70	479.478	0.0093	0.0007	473.909	1.2	0.065	475.174	473.544	5.934	0.365	4.304	5.569
43	MH-69	478.418	0.0090	0.0007	473.808	1.2	0.065	475.073	473.443	4.975	0.365	3.345	4.610
44	MH-68	479.678	0.0038	0.0007	473.773	1.2	0.065	475.038	473.408	6.270	0.365	4.640	5.905
45	MH-67	479.868	0.0155	0.0007	473.732	1.2	0.065	474.997	473.367	6.501	0.365	4.871	6.136
46	MH-66	478.988	0.0132	0.0007	473.660	1.2	0.065	474.925	473.295	5.693	0.365	4.063	5.328
47	MH-65	477.648	0.0107	0.0007	473.585	1.2	0.065	474.850	473.220	4.428	0.365	2.798	4.063
48	MH-64	478.758	0.0019	0.0007	473.503	1.2	0.065	474.768	473.138	5.620	0.365	3.990	5.255
49	MH-63	478.978	0.0051	0.0005	473.437	1.6	0.07	475.107	473.067	5.911	0.370	3.871	5.541
50	MH-62	478.308	0.0030	0.0005	473.348	1.6	0.07	475.018	472.978	5.330	0.370	3.290	4.960
51	MH-61	478.838	0.0011	0.0005	473.321	1.6	0.07	474.991	472.951	5.887	0.370	3.847	5.517
52	MH-60	478.898	0.0017	0.0005	473.289	1.6	0.07	474.959	472.919	5.979	0.370	3.939	5.609
53	MH-59	479.008	0.0051	0.0005	473.236	1.6	0.07	474.906	472.866	6.142	0.370	4.102	5.772
54	MH-58	478.468	0.0055	0.0005	473.160	1.6	0.07	474.830	472.790	5.678	0.370	3.638	5.308
55	MH-57	479.306	0.0083	0.0005	473.089	1.6	0.07	474.759	472.719	6.587	0.370	4.547	6.217
56	MH-56	478.118	0.0116	0.0005	473.004	1.6	0.07	474.674	472.634	5.484	0.370	3.444	5.114
57	MH-55	476.148	0.0021	0.0005	472.939	1.6	0.07	474.609	472.569	3.579	0.370	1.539	3.209
58	MH-54	475.878	0.0040	0.0005	472.885	1.6	0.07	474.555	472.515	3.363	0.370	1.323	2.993
59	MH-53	476.308	0.0026	0.0005	472.847	1.6	0.07	474.517	472.477	3.831	0.370	1.791	3.461
60	MH-52	476.108	0.0227	0.0005	472.819	1.6	0.07	474.489	472.449	3.659	0.370	1.619	3.289
61	MH-51	477.378	0.0193	0.0010	472.728	1.6	0.07	474.398	472.358	5.020	0.370	2.980	4.650
62	MH-50	479.138	0.0138	0.0010	472.657	1.6	0.07	474.327	472.287	6.851	0.370	4.811	6.481
63	MH-49	480.12	0.0362	0.0010	472.543	1.6	0.07	474.213	472.173	7.947	0.370	5.907	7.577
64	MH-48	475.998	0.0209	0.0010	472.486	1.6	0.07	474.156	472.116	3.882	0.370	1.842	3.512
65	MH-47	474.798	0.0200	0.0010	472.442	1.6	0.07	474.112	472.072	2.726	0.370	0.686	2.356
66	MH-46	475.675	0.0162	0.0010	472.414	1.6	0.07	474.084	472.044	3.631	0.370	1.591	3.261
67	MH-45	476.128	0.0065	0.0010	472.386	1.6	0.07	474.056	472.016	4.112	0.370	2.072	3.742
68	MH-44	476.313	0.0003	0.0010	472.339	1.6	0.07	474.009	471.969	4.344	0.370	2.304	3.974
69	MH-43	476.328	0.0184	0.0010	472.262	1.6	0.07	473.932	471.892	4.436	0.370	2.396	4.066
70	MH-42	474.913	0.0011	0.0010	472.222	1.6	0.07	473.892	471.852	3.061	0.370	1.021	2.691
71	MH-41	474.958	0.0010	0.0010	472.181	1.6	0.07	473.851	471.811	3.147	0.370	1.107	2.777
72	MH-40	474.998	0.0016	0.0010	472.139	1.6	0.07	473.809	471.769	3.229	0.370	1.189	2.859
73	MH-39	474.932	0.0168	0.0010	472.087	1.6	0.07	473.757	471.717	3.215	0.370	1.175	2.845
74	MH-38	474.058	0.0188	0.0010	472.036	1.6	0.07	473.706	471.666	2.392	0.370	0.352	2.022
75	MH-37	475.022	0.0053	0.0010	471.977	1.6	0.07	473.647	471.607	3.415	0.370	1.375	3.045
76	MH-36	475.333	0.0010	0.0010	471.917	1.6	0.07	473.587	471.547	3.786	0.370	1.746	3.416
77	MH-35	475.393	0.0021	0.0010	471.832	1.6	0.07	473.502	471.462	3.931	0.370	1.891	3.561
78	MH-34	475.215	0.0022	0.0010	471.759	1.6	0.07	473.429	471.389	3.826	0.370	1.786	3.456
79	MH-33	475.373	0.0014	0.0010	471.717	1.6	0.07	473.387	471.347	4.026	0.370	1.986	3.656
80	MH-32	475.432	0.0042	0.0010	471.663	1.6	0.07	473.333	471.293	4.139	0.370	2.099	3.769

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)
81	MH-31	MH-30	9894.33	1204	1507	430438	431945	539.93	0.0116	539.943	3	2.25	4.515	1214.872	DWC NP3	1.6
82	MH-30	MH-29	9990.97	2359	2952	431945	434897	543.62	0.0116	543.633	3	2.25	8.847	1223.175	DWC NP3	1.6
83	MH-29	MH-28	10087.79	2363	2958	434897	437855	547.32	0.0116	547.331	3	2.25	8.863	1231.494	DWC NP3	1.8
84	MH-28	MH-27	10217.42	3164	3960	437855	441816	552.27	0.0116	552.281	3	2.25	11.867	1242.633	DWC NP3	1.8
85	MH-27	MH-26	10348.21	3193	3996	441816	445811	557.26	0.0116	557.276	3	2.25	11.973	1253.870	DWC NP3	1.8
86	MH-26	MH-25	10407.23	1441	1803	445811	447614	559.52	0.0116	559.530	3	2.25	5.403	1258.942	DWC NP3	1.8
87	MH-25	MH-24	10563.43	3813	4772	447614	452386	565.48	0.0116	565.495	3	2.25	14.299	1272.363	DWC NP3	1.8
88	MH-24	MH-23	10712.31	3634	4548	452386	456935	571.17	0.0116	571.180	3	2.25	13.629	1285.155	DWC NP3	1.8
89	MH-23	MH-22	10822.2	2683	3357	456935	460292	575.36	0.0116	575.376	3	2.25	10.060	1294.597	DWC NP3	1.8
90	MH-22	MH-21	10997.64	4283	5360	460292	465652	582.06	0.0116	582.076	3	2.25	16.060	1309.671	DWC NP3	1.8
91	MH-21	MH-20	11258.85	6376	7980	465652	473632	592.04	0.0116	592.051	3	2.25	23.912	1332.115	DWC NP3	1.8
92	MH-20	MH-19	11558.22	7308	9146	473632	482778	603.47	0.0116	603.484	3	2.25	27.405	1357.838	DWC NP3	1.8
93	MH-19	MH-18	11800.13	5905	7390	482778	490168	612.71	0.0116	612.722	3	2.25	22.145	1378.624	DWC NP3	1.8
94	MH-18	MH-17	12068.12	6542	8187	490168	498355	622.94	0.0116	622.956	3	2.25	24.532	1401.650	DWC NP3	1.8
95	MH-17	MH-16	12335.88	6536	8180	498355	506536	633.17	0.0116	633.181	3	2.25	24.511	1424.657	DWC NP3	1.8
96	MH-16	MH-15	12591.16	6232	7799	506536	514334	642.92	0.0116	642.930	3	2.25	23.369	1446.592	DWC NP3	1.8
97	MH-15	MH-14	12905.76	7680	9611	514334	523946	654.93	0.0116	654.944	3	2.25	28.799	1473.623	DWC NP3	1.8
98	MH-14	MH-13	13137.43	5655	7078	523946	531023	663.78	0.0116	663.791	3	2.25	21.207	1493.529	DWC NP3	1.8
99	MH-13	MH-12	13280.56	3494	4373	531023	535396	669.24	0.0116	669.256	3	2.25	13.102	1505.827	DWC NP3	1.8
100	MH-12	MH-11	13514.97	5722	7161	535396	542557	678.20	0.0116	678.208	3	2.25	21.458	1525.968	DWC NP3	1.8
101	MH-11	MH-10	13698.24	4474	5599	542557	548156	685.20	0.0116	685.207	3	2.25	16.777	1541.715	DWC NP3	1.8
102	MH-10	MH-9	13965.5	6524	8165	548156	556321	695.40	0.0116	695.413	3	2.25	24.465	1564.679	DWC NP3	2
103	MH-9	MH-8	14200.82	5744	7189	556321	563510	704.39	0.0116	704.399	3	2.25	21.542	1584.899	DWC NP3	2
104	MH-8	MH-7	14381.53	4411	5521	563510	569031	711.29	0.0116	711.300	3	2.25	16.542	1600.426	DWC NP3	2
105	MH-7	MH-6	14817.9	10652	13331	569031	582362	727.95	0.0116	727.964	3	2.25	39.946	1637.920	DWC NP3	2
106	MH-6	MH-5	15332.29	12557	15715	582362	598077	747.60	0.0116	747.608	3	2.25	47.088	1682.118	DWC NP3	2
107	MH-5	MH-4	15519.75	4576	5727	598077	603804	754.76	0.0116	754.767	3	2.25	17.160	1698.225	DWC NP3	2
108	MH-4	MH-3	15820.9	7351	9200	603804	613004	766.26	0.0116	766.267	3	2.25	27.568	1724.101	DWC NP3	2
109	MH-3	MH-2	15965.86	3539	4429	613004	617433	771.79	0.0116	771.803	3	2.25	13.270	1736.556	DWC NP3	2
110	MH-2	MH-1	16307.37	8337	10433	617433	627866	784.83	0.0116	784.844	3	2.25	31.262	1765.900	DWC NP3	2
111	MH-1	JM-0	16345.56	932	1167	627866	629033	786.29	0.0116	786.303	3	2.25	3.496	1769.181	DWC NP3	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
81	MH-31	MH-30	3217.24	0.001	0.378	1.504	0.257	0.954	0.39	1.43	0.05	
82	MH-30	MH-29	3217.24	0.003	0.380	1.504	0.257	0.954	0.39	1.43	0.05	
83	MH-29	MH-28	4406.17	0.002	0.279	1.613	0.257	0.902	0.41	1.45	0.05	
84	MH-28	MH-27	4406.17	0.003	0.282	1.613	0.257	0.902	0.41	1.45	0.05	
85	MH-27	MH-26	4406.17	0.003	0.285	1.613	0.257	0.902	0.41	1.45	0.05	
86	MH-26	MH-25	4406.17	0.001	0.286	1.613	0.257	0.902	0.41	1.45	0.05	
87	MH-25	MH-24	3723.89	0.004	0.342	1.363	0.257	0.954	0.35	1.30	0.05	
88	MH-24	MH-23	3723.89	0.004	0.345	1.363	0.257	0.954	0.35	1.30	0.05	
89	MH-23	MH-22	3723.89	0.003	0.348	1.363	0.257	0.954	0.35	1.30	0.05	
90	MH-22	MH-21	2203.08	0.007	0.594	0.806	0.401	1.072	0.32	0.86	0.10	
91	MH-21	MH-20	2203.08	0.011	0.605	0.806	0.401	1.072	0.32	0.86	0.10	
92	MH-20	MH-19	2203.08	0.012	0.616	0.806	0.401	1.072	0.32	0.86	0.10	
93	MH-19	MH-18	2203.08	0.010	0.626	0.806	0.401	1.072	0.32	0.86	0.10	
94	MH-18	MH-17	2203.08	0.011	0.636	0.806	0.401	1.072	0.32	0.86	0.10	
95	MH-17	MH-16	2203.08	0.011	0.647	0.806	0.401	1.072	0.32	0.86	0.10	
96	MH-16	MH-15	2203.08	0.011	0.657	0.806	0.401	1.072	0.32	0.86	0.10	
97	MH-15	MH-14	2203.08	0.013	0.669	0.806	0.401	1.072	0.32	0.86	0.10	
98	MH-14	MH-13	2203.08	0.010	0.678	0.806	0.401	1.099	0.32	0.89	0.10	
99	MH-13	MH-12	2203.08	0.006	0.684	0.806	0.401	1.099	0.32	0.89	0.10	
100	MH-12	MH-11	2203.08	0.010	0.693	0.806	0.401	1.099	0.32	0.89	0.10	
101	MH-11	MH-10	2203.08	0.008	0.700	0.806	0.401	1.099	0.32	0.89	0.10	
102	MH-10	MH-9	2918.79	0.008	0.536	0.869	0.401	1.039	0.35	0.90	0.10	
103	MH-9	MH-8	2918.79	0.007	0.543	0.869	0.401	1.039	0.35	0.90	0.10	
104	MH-8	MH-7	2918.79	0.006	0.548	0.869	#N/A	1.039	#N/A	0.90	#N/A	
105	MH-7	MH-6	2918.79	0.014	0.561	0.869	0.401	1.039	0.35	0.90	0.10	
106	MH-6	MH-5	2918.79	0.016	0.576	0.869	0.401	1.039	0.35	0.90	0.10	
107	MH-5	MH-4	2918.79	0.006	0.582	0.869	0.257	1.039	0.22	0.90	0.10	
108	MH-4	MH-3	2918.79	0.009	0.591	0.869	0.401	1.072	0.35	0.93	0.10	
109	MH-3	MH-2	2918.79	0.005	0.595	0.869	0.257	1.072	0.22	0.93	0.05	
110	MH-2	MH-1	2918.79	0.011	0.605	0.869	0.401	1.072	0.35	0.93	0.10	
111	MH-1	JM-0	2918.79	0.001	0.606	0.869	0.257	1.072	0.22	0.93	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
81	MH-31	475.202	0.0003	0.0010	471.613	1.6	0.07	473.283	471.243	3.959	0.370	1.919	3.589
82	MH-30	475.217	0.0011	0.0010	471.517	1.6	0.07	473.187	471.147	4.070	0.370	2.030	3.700
83	MH-29	475.326	0.0179	0.0010	471.420	1.8	0.09	473.310	471.030	4.296	0.390	2.016	3.906
84	MH-28	477.061	0.0041	0.0010	471.290	1.8	0.09	473.180	470.900	6.161	0.390	3.881	5.771
85	MH-27	476.533	0.0112	0.0010	471.160	1.8	0.09	473.050	470.770	5.763	0.390	3.483	5.373
86	MH-26	475.073	0.0034	0.0010	471.101	1.8	0.09	472.991	470.711	4.362	0.390	2.082	3.972
87	MH-25	475.274	0.0018	0.0007	470.9890	1.8	0.09	472.8790	470.5990	4.6750	0.390	2.395	4.2850
88	MH-24	475.548	0.0014	0.0007	470.8827	1.8	0.09	472.773	470.493	5.055	0.390	2.775	4.665
89	MH-23	475.751	0.0121	0.0007	470.804	1.8	0.09	472.694	470.414	5.337	0.390	3.057	4.947
90	MH-22	477.086	0.0047	0.0003	470.760	1.8	0.09	472.650	470.370	6.716	0.390	4.436	6.326
91	MH-21	477.905	0.0072	0.0003	470.695	1.8	0.09	472.585	470.305	7.600	0.390	5.320	7.210
92	MH-20	476.016	0.0047	0.0003	470.620	1.8	0.09	472.510	470.230	5.786	0.390	3.506	5.396
93	MH-19	477.437	0.0063	0.0003	470.560	1.8	0.09	472.450	470.170	7.267	0.390	4.987	6.877
94	MH-18	475.922	0.0010	0.0003	470.493	1.8	0.09	472.383	470.103	5.819	0.390	3.539	5.429
95	MH-17	475.662	0.0012	0.0003	470.426	1.8	0.09	472.316	470.036	5.626	0.390	3.346	5.236
96	MH-16	475.976	0.0007	0.0003	470.362	1.8	0.09	472.252	469.972	6.004	0.390	3.724	5.614
97	MH-15	476.16	0.0026	0.0003	470.283	1.8	0.09	472.173	469.893	6.267	0.390	3.987	5.877
98	MH-14	476.993	0.0014	0.0003	470.225	1.8	0.09	472.115	469.835	7.158	0.390	4.878	6.768
99	MH-13	476.66	0.0245	0.0003	470.190	1.8	0.09	472.080	469.800	6.860	0.390	4.580	6.470
100	MH-12	480.171	0.0037	0.0003	470.131	1.8	0.09	472.021	469.741	10.430	0.390	8.150	10.040
101	MH-11	481.037	0.0166	0.0003	470.085	1.8	0.09	471.975	469.695	11.342	0.390	9.062	10.952
102	MH-10	477.987	0.0003	0.0003	470.018	2	0.095	472.113	469.623	8.364	0.395	5.874	7.969
103	MH-9	478.065	0.0060	0.0003	469.960	2	0.095	472.055	469.565	8.500	0.395	6.010	8.105
104	MH-8	476.656	0.0007	0.0003	469.914	2	0.095	472.009	469.519	7.137	0.395	4.647	6.742
105	MH-7	476.781	0.0033	0.0003	469.805	2	0.095	471.900	469.410	7.371	0.395	4.881	6.976
106	MH-6	478.225	0.0005	0.0003	469.677	2	0.095	471.772	469.282	8.943	0.395	6.453	8.548
107	MH-5	477.981	0.0015	0.0003	469.630	2	0.095	471.725	469.235	8.746	0.395	6.256	8.351
108	MH-4	477.694	0.0040	0.0003	469.555	2	0.095	471.650	469.160	8.534	0.395	6.044	8.139
109	MH-3	478.9	0.0032	0.0003	469.518	2	0.095	471.613	469.123	9.777	0.395	7.287	9.382
110	MH-2	478.437	0.0066	0.0003	469.433	2	0.095	471.528	469.038	9.399	0.395	6.909	9.004
111	MH-1	480.694	0.0591	0.0003	469.423	2	0.095	471.518	469.028	11.666	0.395	9.176	11.271