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**HARVEST HOPEWELL, LLC**  
 5097 New Baumgartner Road  
 St. Louis, Missouri 63129

**STORM SEWER HYDRAULICS**

P+Z No. 21-004994  
 City No. 21-011444  
 Date: 05-20-2024  
 Job No. 20-09-327  
 Page No.

ISSUE REMARKS/DATE  
 1 2023-09-28, INITIAL SUBMITTAL  
 2 2024-02-01, CITY COMMENTS  
 3 2024-04-17, CITY COMMENTS  
 4 2024-05-20, FOR APPROVAL

**Phase 1B Basin L, 100 year, 20 Minute Pipe Hydraulics**

LineID	Pipe Dia (in)	Flow Rate (cfs)	FL Dwnstrm (ft)	FL Upstrm (ft)	Pipe Length (ft)	Pipe Slope (%)	Ave Vel (ft/s)	Top/Sill Elev Dwnstrm (ft)	Top/Sill Elev Upstrm (ft)	HGL Dwnstrm (ft)	HGL Upstrm (ft)	FreeBoard (ft)	Critical Depth (ft)	EGLDn (ft)	EGLUp (ft)	Energy Loss (ft)	Capacity Full (cfs)	n-value Pipe	Note: All inlet tops are set at the sill elevation
FE X50-MH X51	54	204.86	572.00	574.06	205.74	1.00	12.88	577.04	584.50	576.50	578.73	3.52	4.07	579.08	581.31	2.233	196.79	0.013	Starting HGL Inside top of Pipe
MH X51-FE X52	36	53.05	574.06	575.21	28.87	3.98	7.51	584.50	578.63	580.98	581.16	-3.41	2.36	581.85	582.04	0.183	133.12	0.013	
MH X51-OS L1	48	151.81	574.06	575.50	96.17	1.50	12.08	584.50	584.00	580.98	582.05	-0.32	3.61	583.25	584.32	1.074	175.78	0.013	
FE L3-MH L4	15	4.78	581.00	581.90	45.00	2.00	3.90	582.52	592.60	586.81	587.06	5.51	0.89	587.05	587.29	0.247	9.13	0.013	Starting HGL 100yr 20min Block- 586.81
MH L4-DCI L5	12	4.78	587.58	597.50	122.50	8.10	9.56	592.60	602.36	588.06	598.40	3.96	0.90	588.70	599.04	0	10.13	0.013	
FE L7-MH L8	42	92.67	581.00	582.26	63.00	2.00	9.63	584.96	592.30	586.81	587.35	4.28	2.98	588.25	588.79	0.535	142.28	0.013	Starting HGL 100yr 20min Block- 586.81
MH L8-AI L9	42	92.67	582.26	590.61	111.30	7.50	10.13	592.30	598.70	588.02	593.59	5.11	2.98	589.47	595.34	0.917	275.56	0.013	
AI L9-MH L10	42	90.73	590.61	594.50	141.62	2.75	10.44	598.70	602.40	593.59	597.45	4.95	2.95	595.30	599.16	0	166.74	0.013	
MH L10-MH L11	42	90.73	594.50	596.10	159.97	1.00	10.48	602.40	605.30	597.45	599.05	6.25	2.95	599.16	600.76	0	100.62	0.013	
MH L11-MH L12	24	24.17	598.13	601.81	122.53	3.00	10.73	605.30	609.60	599.27	603.55	6.05	1.74	600.35	604.63	0	39.2	0.013	
MH L12-AI L13	18	15.14	601.81	606.02	52.59	8.01	8.68	609.60	612.40	603.55	607.43	4.97	1.41	604.69	608.63	1.019	29.71	0.013	
AI L13-AI L14	18	12.59	606.02	615.46	285.00	3.31	7.44	612.40	621.70	607.43	616.80	4.90	1.34	608.32	617.69	0	19.11	0.013	
AI L14-AI L15	18	8.71	615.46	616.18	72.38	0.99	5.64	621.70	623.00	616.80	617.32	5.68	1.14	617.36	617.89	0	10.47	0.013	
AI L15-AI L16	15	7.56	616.18	621.68	109.96	5.00	6.54	623.00	631.12	617.32	622.77	8.35	1.09	618.01	623.46	0	14.44	0.013	
CI L16-CI L17	15	7.24	623.26	624.68	35.00	3.49	8.36	631.12	631.12	623.96	625.55	5.57	1.07	624.61	626.20	0	12.06	0.013	
CI L17-CI L18	15	6.44	624.48	629.37	139.59	3.50	5.87	631.12	636.07	625.55	630.39	5.68	1.02	626.11	630.95	0	12.09	0.013	
CI L18-CI L19	15	5.18	630.79	631.14	35.00	1.00	5.59	636.07	636.07	631.64	632.06	4.01	0.92	632.08	632.51	0	6.46	0.013	
CI L19-CI L20	15	3.91	631.14	631.66	52.00	1.00	4.38	636.07	636.23	632.06	632.46	3.77	0.80	632.41	632.81	0	6.46	0.013	
CI L20-CI L21	12	0.62	631.66	632.01	35.00	1.00	1.85	636.23	636.23	632.46	632.46	3.89	0.33	632.58	632.46	0	3.56	0.013	
MH L11-FE L22	42	66.56	596.10	597.01	21.00	4.33	8.27	605.30	600.97	599.05	599.57	1.40	2.56	600.27	600.78	0	209.44	0.013	
MH L12-DCI L23	15	5.22	601.81	606.84	125.83	4.00	4.81	609.60	612.53	603.55	607.77	4.76	0.93	603.83	608.21	0.921	12.91	0.013	
DCI L23-DCI L24	12	3.30	606.84	608.24	35.00	4.00	3.65	612.53	612.53	607.77	608.89	3.64	0.65	608.05	609.17	0	7.12	0.013	
MH L12-MH L25	12	2.81	601.81	602.84	102.64	1.00	4.85	609.60	612.80	603.55	604.72	7.73	0.83	603.91	605.09	1.175	3.57	0.013	
MH L25-CI L26	12	3.81	602.84	614.14	122.80	9.20	5.16	612.80	619.05	605.07	614.97	4.08	0.83	605.44	615.43	1.391	10.8	0.013	
CI L26-CI L27	12	2.95	615.46	618.86	169.80	2.00	4.26	621.70	627.81	616.80	619.60	8.21	0.74	617.02	619.95	1.316	5.04	0.013	
CI L27-CI L28	12	1.63	622.86	623.56	35.00	2.00	4.74	627.81	627.81	623.25	624.10	3.71	0.54	623.47	624.32	0	5.04	0.013	
CI L20-AI L20.1	12	1.63	631.66	632.99	133.00	1.00	3.09	636.23	637.60	632.46	633.53	4.07	0.54	632.68	633.75	0	3.56	0.013	
FE L29-MH L30	36	58.75	603.00	603.20	20.00	1.00	8.33	606.42	610.00	606.00	606.14	2.78	2.48	607.07	607.22	0.147	66.7	0.013	Starting HGL Inside top of Pipe
MH L30-AI L31	24	27.43	603.20	606.93	138.24	2.70	8.73	610.00	613.50	607.22	609.26	4.07	1.82	608.41	610.44	2.034	37.15	0.013	
AI L31-AI L32	24	25.12	606.93	612.37	201.65	2.70	8.28	613.50	619.00	609.43	614.13	4.87	1.76	610.43	615.27	2.361	37.15	0.013	
AI L32-AI L33	24	23.84	612.37	618.11	114.83	5.00	8.19	619.00	625.80	614.13	619.84	5.96	1.73	615.19	620.90	0	50.57	0.013	
AI L33-DCI L34	18	21.26	618.11	619.75	40.92	4.01	12.03	625.80	628.30	619.84	621.52	5.77	1.47	622.09	623.77	1.677	21.02	0.013	
DCI L34-DCI L35	18	19.67	619.75	621.67	48.00	4.00	11.13	628.30	628.30	622.53	624.22	2.24	1.47	624.46	626.14	1.685	21.02	0.013	
DCI L35-MH L36	18	12.92	621.67	626.65	124.62	4.00	7.52	628.30	633.20	628.00	628.56	6.30	1.35	628.92	629.48	0	12.86	0.013	
MH L36-DCI L37	18	12.92	626.65	627.21	37.32	1.50	7.72	633.20	634.86	628.00	628.56	6.30	1.35	628.92	629.48	0	12.86	0.013	
DCI L37-DCI L38	18	8.98	627.21	627.74	35.00	1.51	5.75	634.86	634.86	628.56	628.90	5.96	1.16	629.14	629.48	0	12.92	0.013	
DCI L38-AI L39	15	6.00	627.74	628.30	37.01	1.51	5.41	634.86	636.60	628.90	629.29	7.31	0.99	629.41	629.81	0	7.94	0.013	
AI L39-AI L40	12	1.71	628.30	630.03	170.68	5.70	3.00	636.60	643.00	629.29	638.59	4.41	0.56	629.52	638.81	0	8.5	0.013	
MH L30-MH L41	24	31.32	603.20	604.17	49.58	2.00	9.97	610.00	612.50	607.22	608.15	2.83	1.88	608.77	609.70	0.932	31.96	0.013	
MH L41-CI L42	24	31.32	604.17	609.49	105.00	5.07	9.97	612.50	617.95	609.67	611.68	6.04	1.88	611.21	613.23	2.014	50.91	0.013	
CI L42-CI L43	24	29.47	609.49	609.84	35.00	1.00	9.38	617.95	617.95	611.92	612.51	4.15	1.85	613.28	613.88	0.594	22.62	0.013	
CI L43-DCI L44	24	23.21	609.84	610.45	60.93	1.00	7.39	617.95	619.85	613.80	614.44	4.84	1.71	614.64	615.89	0.642	22.63	0.013	
DCI L44-DCI L45	24	20.97	611.95	612.30	35.00	1.00	6.68	619.85	619.85	615.01	615.31	3.87	1.64	615.70	616.00	0.301	22.62	0.013	
DCI L45-AI L46	24	15.92	612.30	613.15	85.03	1.00	5.07	619.85	620.70	615.98	616.40	4.18	1.44	616.38	616.80	0.421	22.61	0.013	
AI L46-MH L47	24	12.40	613.15	622.70	115.00	8.30	4.93	620.70	629.80	616.53	623.97	5.84	1.26	616.77	624.51	0.5	65.18	0.013	
MH L47-DCI L48	24	12.40	622.69	622.94	25.30	0.99	5.89	629.80	631.09	623.97	624.21	6.83	1.26	624.51	624.75	0	22.48	0.013	
DCI L48-DCI L49	24	10.51	622.94	623.29	35.00	1.00	5.29	631.03	631.03	624.21	624.45	6.58	1.16	624.69	624.93	0	22.62	0.013	
DCI L49-CI L50	18	8.62	623.29	623.83	53.74	1.00	5.94	631.03	633.31	624.45	624.97	8.34	1.14	625.01	625.53	0	10.53	0.013	
CI L50-AI L51	15	8.44	624.98	625.75	76.91	1.00	6.88	633.31	631.30	626.23	627.54	3.02	1.13	626.97	628.28	1.314	6.46	0.013	
AI L51-AI L52	12	2.04	625.75	632.81	78.47	9.00	3.33	631.30	638.10	628.28	633.42	4.68	0.61	628.38	633.68	0.401	10.68	0.013	
CI L43-AI L52	1																		