

Attachment 7 – WSPG Calculations

WATER SURFACE PROFILE LISTING
RELATED BRISTOL HYDRAULICS-SUNFLOWER
10-YEAR STORM EVENT
EXISTING CONDITION

Date: 1-19-2023 Time: 1:50:56

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	20.200	5.000	25.200	118.09	4.69	.34	25.54	.00	2.94	4.47	6.000	.000	.00	1 .0
59.795	.0044					.0008	.05	5.00	.35	2.71	.013	.00	.00	PIPE
59.795	20.464	4.750	25.213	118.09	4.92	.38	25.59	.00	2.94	4.87	6.000	.000	.00	1 .0
52.315	.0044					.0009	.05	4.75	.39	2.71	.013	.00	.00	PIPE
112.110	20.694	4.527	25.222	118.09	5.16	.41	25.63	.00	2.94	5.16	6.000	.000	.00	1 .0
46.727	.0044					.0010	.05	4.53	.43	2.71	.013	.00	.00	PIPE
158.837	20.900	4.325	25.226	118.09	5.41	.45	25.68	.00	2.94	5.38	6.000	.000	.00	1 .0
42.252	.0044					.0011	.05	4.33	.47	2.71	.013	.00	.00	PIPE
201.089	21.087	4.140	25.226	118.09	5.68	.50	25.73	.00	2.94	5.55	6.000	.000	.00	1 .0
38.414	.0044					.0012	.05	4.14	.52	2.71	.013	.00	.00	PIPE
239.504	21.256	3.967	25.223	118.09	5.95	.55	25.77	.00	2.94	5.68	6.000	.000	.00	1 .0
14.496	.0044					.0013	.02	3.97	.56	2.71	.013	.00	.00	PIPE
254.000	21.320	3.901	25.221	118.09	6.07	.57	25.79	.00	2.94	5.72	6.000	.000	.00	1 .0
40.645	.0039					.0014	.06	3.90	.58	2.81	.013	.00	.00	PIPE
294.645	21.479	3.744	25.223	118.09	6.36	.63	25.85	.00	2.94	5.81	6.000	.000	.00	1 .0
37.331	.0039					.0016	.06	3.74	.63	2.81	.013	.00	.00	PIPE
331.976	21.624	3.596	25.221	118.09	6.67	.69	25.91	.00	2.94	5.88	6.000	.000	.00	1 .0
34.084	.0039					.0018	.06	3.60	.68	2.81	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
RELATED BRISTOL HYDRAULICS-SUNFLOWER
10-YEAR STORM EVENT
EXISTING CONDITION

Date: 1-19-2023 Time: 1:50:56

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
366.060	21.757	3.457	25.214	118.09	7.00	.76	25.98	.00	2.94	5.93	6.000	.000	.00	1 .0
30.744	.0039					.0021	.06	3.46	.73	2.81	.013	.00	.00	PIPE
396.804	21.877	3.325	25.202	118.09	7.34	.84	26.04	.00	2.94	5.96	6.000	.000	.00	1 .0
26.912	.0039					.0024	.06	3.33	.79	2.81	.013	.00	.00	PIPE
423.716	21.982	3.200	25.182	118.09	7.70	.92	26.10	.00	2.94	5.99	6.000	.000	.00	1 .0
22.041	.0039					.0027	.06	3.20	.85	2.81	.013	.00	.00	PIPE
445.757	22.068	3.081	25.149	118.09	8.08	1.01	26.16	.00	2.94	6.00	6.000	.000	.00	1 .0
2.909	.0039					.0028	.01	3.08	.91	2.81	.013	.00	.00	PIPE
448.665	22.079	3.081	25.160	118.09	8.08	1.01	26.17	.00	2.94	6.00	6.000	.000	.00	1 .0
HYDRAULIC JUMP														
448.665	22.079	2.809	24.888	118.09	9.09	1.28	26.17	.00	2.94	5.99	6.000	.000	.00	1 .0
313.970	.0039					.0039	1.22	2.81	1.09	2.81	.013	.00	.00	PIPE
762.635	23.304	2.809	26.113	118.09	9.09	1.28	27.40	.00	2.94	5.99	6.000	.000	.00	1 .0
71.179	.0039					.0039	.27	2.81	1.09	2.81	.013	.00	.00	PIPE
833.814	23.582	2.827	26.409	118.09	9.01	1.26	27.67	.00	2.94	5.99	6.000	.000	.00	1 .0
25.186	.0039					.0036	.09	2.83	1.07	2.81	.013	.00	.00	PIPE
859.000	23.680	2.935	26.615	118.09	8.59	1.15	27.76	.00	2.94	6.00	6.000	.000	.00	1 .0
3.743	.0011					.0032	.01	2.94	1.00	4.20	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
RELATED BRISTOL HYDRAULICS-SUNFLOWER
10-YEAR STORM EVENT
EXISTING CONDITION

Date: 1-19-2023 Time: 1:50:56

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	No ZL	Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
862.743	23.684	3.047	26.731	118.09	8.19	1.04	27.77	.00	2.94	6.00	6.000	.000	.00	1 .0
13.638	.0011					.0028	.04	3.05	.93	4.20	.013	.00	.00	PIPE
876.382	23.699	3.164	26.864	118.09	7.81	.95	27.81	.00	2.94	5.99	6.000	.000	.00	1 .0
27.845	.0011					.0024	.07	3.16	.87	4.20	.013	.00	.00	PIPE
904.227	23.730	3.288	27.018	118.09	7.45	.86	27.88	.00	2.94	5.97	6.000	.000	.00	1 .0
49.326	.0011					.0022	.11	3.29	.81	4.20	.013	.00	.00	PIPE
953.554	23.785	3.418	27.203	118.09	7.10	.78	27.99	.00	2.94	5.94	6.000	.000	.00	1 .0
13.446	.0011					.0020	.03	3.42	.75	4.20	.013	.00	.00	PIPE
967.000	23.800	3.445	27.245	118.09	7.03	.77	28.01	.00	2.94	5.93	6.000	.000	.00	1 .0
45.472	.0003					.0019	.08	3.44	.74	6.00	.013	.00	.00	PIPE
1012.472	23.816	3.583	27.399	118.09	6.70	.70	28.10	.00	2.94	5.89	6.000	.000	.00	1 .0
64.230	.0003					.0016	.11	3.58	.68	6.00	.013	.00	.00	PIPE
1076.702	23.838	3.730	27.568	118.09	6.39	.63	28.20	.00	2.94	5.82	6.000	.000	.00	1 .0
88.499	.0003					.0015	.13	3.73	.63	6.00	.013	.00	.00	PIPE
1165.201	23.869	3.886	27.755	118.09	6.09	.58	28.33	.00	2.94	5.73	6.000	.000	.00	1 .0
120.346	.0003					.0013	.16	3.89	.58	6.00	.013	.00	.00	PIPE
1285.547	23.911	4.053	27.964	118.09	5.81	.52	28.49	.00	2.94	5.62	6.000	.000	.00	1 .0
162.770	.0003					.0012	.19	4.05	.54	6.00	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING
RELATED BRISTOL HYDRAULICS-SUNFLOWER
10-YEAR STORM EVENT
EXISTING CONDITION

Date: 1-19-2023 Time: 1:50:56

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
1448.317	23.967	4.232	28.199	118.09	5.54	.48	28.68	.00	2.94	5.47	6.000	.000	.00	1 .0
151.683	.0003					.0010	.16	4.23	.49	6.00	.013	.00	.00	PIPE
1600.000	24.020	4.369	28.389	118.09	5.35	.45	28.83	.00	2.94	5.34	6.000	.000	.00	1 .0
JUNCT STR	.0000					.0007	.00	4.37	.46		.013	.00	.00	PIPE
1600.001	24.020	4.794	28.814	87.49	3.61	.20	29.02	.00	2.51	4.81	6.000	.000	.00	1 .0
178.092	.0016					.0005	.08	4.79	.28	3.04	.013	.00	.00	PIPE
1778.093	24.311	4.567	28.877	87.49	3.79	.22	29.10	.00	2.51	5.12	6.000	.000	.00	1 .0
165.136	.0016					.0005	.09	4.57	.31	3.04	.013	.00	.00	PIPE
1943.229	24.580	4.361	28.942	87.49	3.97	.25	29.19	.00	2.51	5.35	6.000	.000	.00	1 .0
156.747	.0016					.0006	.09	4.36	.35	3.04	.013	.00	.00	PIPE
2099.976	24.836	4.173	29.009	87.49	4.17	.27	29.28	.00	2.51	5.52	6.000	.000	.00	1 .0
131.024	.0016					.0007	.09	4.17	.38	3.04	.013	.00	.00	PIPE
2231.000	25.050	4.021	29.071	87.49	4.34	.29	29.36	.00	2.51	5.64	6.000	.000	.00	1 .0

T1	Related Bristol Project											0			
T2	Plaza Drive Storm Drain														
T3	Existing 10-year condition														
SO	.000	24.450	1									28.470			
R	193.850	24.690	1								.013	.000	0		
R	319.670	24.720	1								.013	12.015	.000	0	
JX	319.690	24.720	1	1	2.013				12.750	12.750	25.600	26.410-90.0	90.0	.002	
R	470.000	24.940	3								.013	14.354	.000	0	
JX	470.020	24.940	3	1	2.013				7.200	7.200	25.820	26.440-90.0	90.0	.002	
R	619.000	25.120	4								.013	14.227	.000	0	
R	855.000	25.410	4								.013	-21.635	.000	0	
JX	855.020	25.410	4	1	2.013				8.750	8.750	26.150	26.900-90.0	90.0	-.002	
R	906.260	25.460	4								.013	-4.697	.000	0	
R	1059.510	25.620	4								.013	-15.893	.000	0	
JX	1062.000	27.100	4	1	.013				2.000				27.100	-45.0	.000
R	1149.430	28.050	2								.013	.000	.000	0	
SH	1149.430	28.050	2											28.050	
CD	1	4	1				.000	4.000	.000	.000	.000	.000	.00		
CD	2	4	1				.000	1.500	.000	.000	.000	.00			
CD	3	4	1				.000	3.250	.000	.000	.000	.00			
CD	4	4	1				.000	3.000	.000	.000	.000	.00			
Q	2.000													.0	

Related Bristol Project
Plaza Drive Storm Drain
Existing 10-year condition

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	No Wth ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	24.450	4.020	28.470	61.40	4.89	.37	28.84	.00	2.36	.00	4.000	.000	.00	1 .0
193.850	.0012					.0018	.35	4.02	.00	4.00	.013	.00	.00	PIPE
193.850	24.690	4.134	28.824	61.40	4.89	.37	29.19	.00	2.36	.00	4.000	.000	.00	1 .0
125.820	.0002					.0018	.23	.00	.00	4.00	.013	.00	.00	PIPE
319.670	24.720	4.361	29.081	61.40	4.89	.37	29.45	.00	2.36	.00	4.000	.000	.00	1 .0
JUNCT STR	.0000					.0012	.00	.00	.00		.013	.00	.00	PIPE
319.690	24.720	4.849	29.569	35.90	4.33	.29	29.86	.00	1.90	.00	3.250	.000	.00	1 .0
150.310	.0015					.0019	.28	.00	.00	3.25	.013	.00	.00	PIPE
470.000	24.940	4.937	29.877	35.90	4.33	.29	30.17	.00	1.90	.00	3.250	.000	.00	1 .0
JUNCT STR	.0000					.0013	.00	.00	.00		.013	.00	.00	PIPE
470.020	24.940	5.310	30.250	21.50	3.04	.14	30.39	.00	1.49	.00	3.000	.000	.00	1 .0
148.980	.0012					.0010	.15	.00	.00	2.28	.013	.00	.00	PIPE
619.000	25.120	5.296	30.416	21.50	3.04	.14	30.56	.00	1.49	.00	3.000	.000	.00	1 .0
236.000	.0012					.0010	.25	.00	.00	2.27	.013	.00	.00	PIPE
855.000	25.410	5.265	30.675	21.50	3.04	.14	30.82	.00	1.49	.00	3.000	.000	.00	1 .0
JUNCT STR	.0000					.0005	.00	.00	.00		.013	.00	.00	PIPE
855.020	25.410	5.542	30.952	4.00	.57	.00	30.96	.00	.62	.00	3.000	.000	.00	1 .0
51.240	.0010					.0000	.00	.00	.00	.89	.013	.00	.00	PIPE

Related Bristol Project
Plaza Drive Storm Drain
Existing 10-year condition

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	No ZL	Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
906.260	25.460	5.495	30.955	4.00	.57	.00	30.96	.00	.62	.00	3.000	.000	.00	1 .0
153.250	.0010					.0000	.01	.00	.00	.88	.013	.00	.00	PIPE
1059.510	25.620	5.340	30.960	4.00	.57	.00	30.97	.00	.62	.00	3.000	.000	.00	1 .0
JUNCT STR	.5944					.0000	.00	5.34	.00		.013	.00	.00	PIPE
1062.000	27.100	3.867	30.967	2.00	1.13	.02	30.99	.00	.53	.00	1.500	.000	.00	1 .0
87.430	.0109					.0004	.03	3.87	.00	.43	.013	.00	.00	PIPE
1149.430	28.050	2.949	30.999	2.00	1.13	.02	31.02	.00	.53	.00	1.500	.000	.00	1 .0

RELATED BRISTOL PROJECT
MACARTHUR BLVD STORM DRAIN
EXISTING 10-YEAR CONDITION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/ I.D.	No Wth ZL	Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
.000	22.040	5.410	27.450	108.40	5.01	.39	27.84	.00	2.92	.00	5.250	.000	.00	1 .0
221.910	.0020					.0013	.30	5.41	.00	3.62	.013	.00	.00	PIPE
221.910	22.480	5.289	27.769	108.40	5.01	.39	28.16	.00	2.92	.00	5.250	.000	.00	1 .0
JUNCT STR	.0000					.0012	.00	5.29	.00	.013	.00	.00	.00	PIPE
221.921	22.480	5.489	27.969	93.40	4.31	.29	28.26	.00	2.70	.00	5.250	.000	.00	1 .0
399.125	.0016					.0010	.39	5.49	.00	3.52	.013	.00	.00	PIPE
621.046	23.115	5.250	28.365	93.40	4.31	.29	28.65	.00	2.70	.00	5.250	.000	.00	1 .0
47.124	.0016					.0010	.04	5.25	.00	3.52	.013	.00	.00	PIPE
668.170	23.190	5.219	28.409	93.40	4.32	.29	28.70	.00	2.70	.81	5.250	.000	.00	1 .0
JUNCT STR	.0000					.0008	.00	5.22	.15	.013	.00	.00	.00	PIPE
668.180	23.190	5.417	28.607	75.80	3.50	.19	28.80	.00	2.42	.00	5.250	.000	.00	1 .0

T1	RELATED BRISTOL PROJECT									0
T2	MACARTHUR 30" LATERAL									
T3	EXISTING 10-YEAR CONDITION									
SO	.000	23.850	1					28.000		
R	68.000	25.550	1	.013					.000	.000 0
SH	68.000	25.550	1					25.550		
CD	1 4 1	.000	2.500	.000	.000	.000	.000	.00		
Q		15.000	.0							

RELATED BRISTOL PROJECT

MACARTHUR 30" LATERAL

EXISTING 10-YEAR CONDITION

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*****
| Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
Station | Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
| | | | | | | | | | | | | | | |
.000 23.850 4.150 28.000 15.00 3.06 .14 28.14 .00 1.31 .00 2.500 .000 .00 1 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
68.000 .0250 | | | | | .0013 .09 4.15 .00 .82 .013 .00 .00 PIPE
| | | | | | | | | | | | | | | |
68.000 25.550 2.541 28.091 15.00 3.06 .14 28.24 .00 1.31 .00 2.500 .000 .00 1 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-

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T1	RELATED	BRISTOL-BRISTOL	STREET								0
T2	10-YEAR	STORM	EVENT								
T3	EXISTING	CONDITION									
SO		.000	21.760	1						26.000	
R		184.000	23.340	1		.013				.000	.000 0
TS		184.010	23.340	2		.013				.000	
R		240.000	26.010	2		.013				.000	80.000 0
SH		240.000	26.010	2						26.010	
CD	1	4	1		.000	2.500	.000	.000	.000	.00	
CD	2	4	1		.000	2.000	.000	.000	.000	.00	
Q			31.000	.0							

RELATED BRISTOL-BRISTOL STREET
 10-YEAR STORM EVENT
 EXISTING CONDITION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/I.D.	No ZL	Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
.000	21.760	4.240	26.000	31.00	6.32	.62	26.62	.00	1.90	.00	2.500	.000	.00	1 .0
184.000	.0086					.0057	1.05	4.24	.00	1.72	.013	.00	.00	PIPE
184.000	23.340	3.711	27.051	31.00	6.32	.62	27.67	.00	1.90	.00	2.500	.000	.00	1 .0
TRANS STR	.0000					.0122	.00	3.71	.00		.013	.00	.00	PIPE
184.010	23.340	3.265	26.605	31.00	9.87	1.51	28.12	.00	1.88	.00	2.000	.000	.00	1 .0
55.990	.0477					.0188	1.05	3.26	.00	1.15	.013	.00	.00	PIPE
240.000	26.010	2.045	28.055	31.00	9.87	1.51	29.57	.00	1.88	.00	2.000	.000	.00	1 .0