

APPENDIX III-2A-3
HEC-RAS Input and Output



GOLDER ASSOCIATES INC.
Professional Engineering Firm
Registration Number F-2578

INTENDED FOR PERMITTING
PURPOSES ONLY

For Part III, Attachment 2, Appendix III-2A-3:
HEC-RAS modeling inputs and outputs dated
November 10, 2020

HEC-RAS INPUTS

HAWTHORN PARK RDF

PERIMETER DITCH MODEL

HEC-RAS INPUTS MODEL V. 2020_1110

HEC-RAS 5.0.7

File Edit Run View Options GIS Tools Help

Project: Hawthorn C:\Users\jetat\Documents_DS-DITCH HECRAS\Hawthorn.prj

Plan: Plan 15 C:\Users\jetat\Documents_DS-DITCH HECRAS\Hawthorn.p15

Geometry: 2020_1110 C:\Users\jetat\Documents_DS-DITCH HECRAS\Hawthorn.g09

Steady Flow: 2020_1110 C:\Users\jetat\Documents_DS-DITCH HECRAS\Hawthorn.f08

Unsteady Flow:

Description : Hawthorn Park Recycling and Disposal Facility US Customary Units

Steady Flow Data - 2020_1110

File Options Help

Description : 2020_1110

Enter/Edit Number of Profiles (32000 max): 2 Reach Boundary Conditions ...

Locations of Flow Data Changes

River: Hawthorn Add Multiple...

Reach: NORTH River Sta.: 5958.3 Add A Flow Change Location

Flow Change Location			Profile Names and Flow Rates		
	River	Reach	RS	4%	1%
1	Hawthorn	NORTH	5958.3	4.8	6
2	Hawthorn	NORTH	5175	91.7	113.3
3	Hawthorn	NORTH	4370	105.2	130.6
4	Hawthorn	NORTH	3340	156.3	196.1
5	Hawthorn	NORTH	2990	165.6	208.1
6	Hawthorn	NORTH	1900	259.7	329.5
7	Hawthorn	SOUTH	7765.5	18.6	23.2
8	Hawthorn	SOUTH	7125.5	42.8	53.4
9	Hawthorn	SOUTH	6200	58.2	73.3
10	Hawthorn	SOUTH	5000	137.8	176.3
11	Hawthorn	SOUTH	3225	139.8	178.8
12	Hawthorn	SOUTH	2865	256.6	323.6
13	Hawthorn	SOUTH	1470	282.1	357.3
14	Hawthorn	EAST-S	1147.4	4	5
15	Hawthorn	EAST-S	546.5	45.3	56.1
16	Hawthorn	EAST-S	1.5	126.2	156.1
17	Hawthorn	EAST-N	944.2	5.5	6.8
18	Hawthorn	EAST-N	300	81.8	101.5
19	Hawthorn	EAST-N	1.5	126.2	156.1
20	Hawthorn	EAST	1.5	126.2	156.1

Steady Flow Boundary Conditions

Set boundary for all profiles Set boundary for one profile at a time

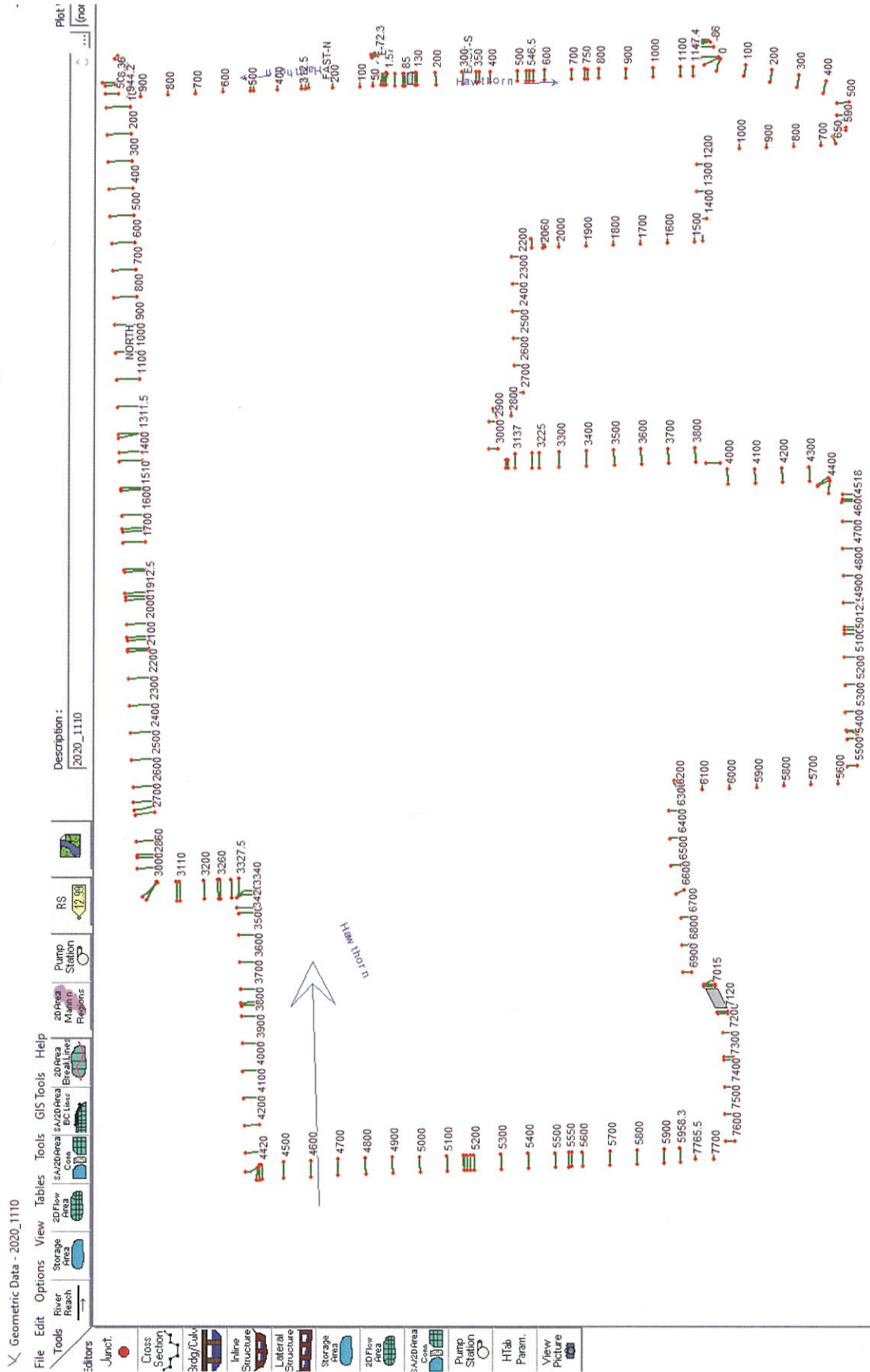
Available External Boundary Condition Types

Known W.S. Critical Depth Normal Depth Rating Curve Delete

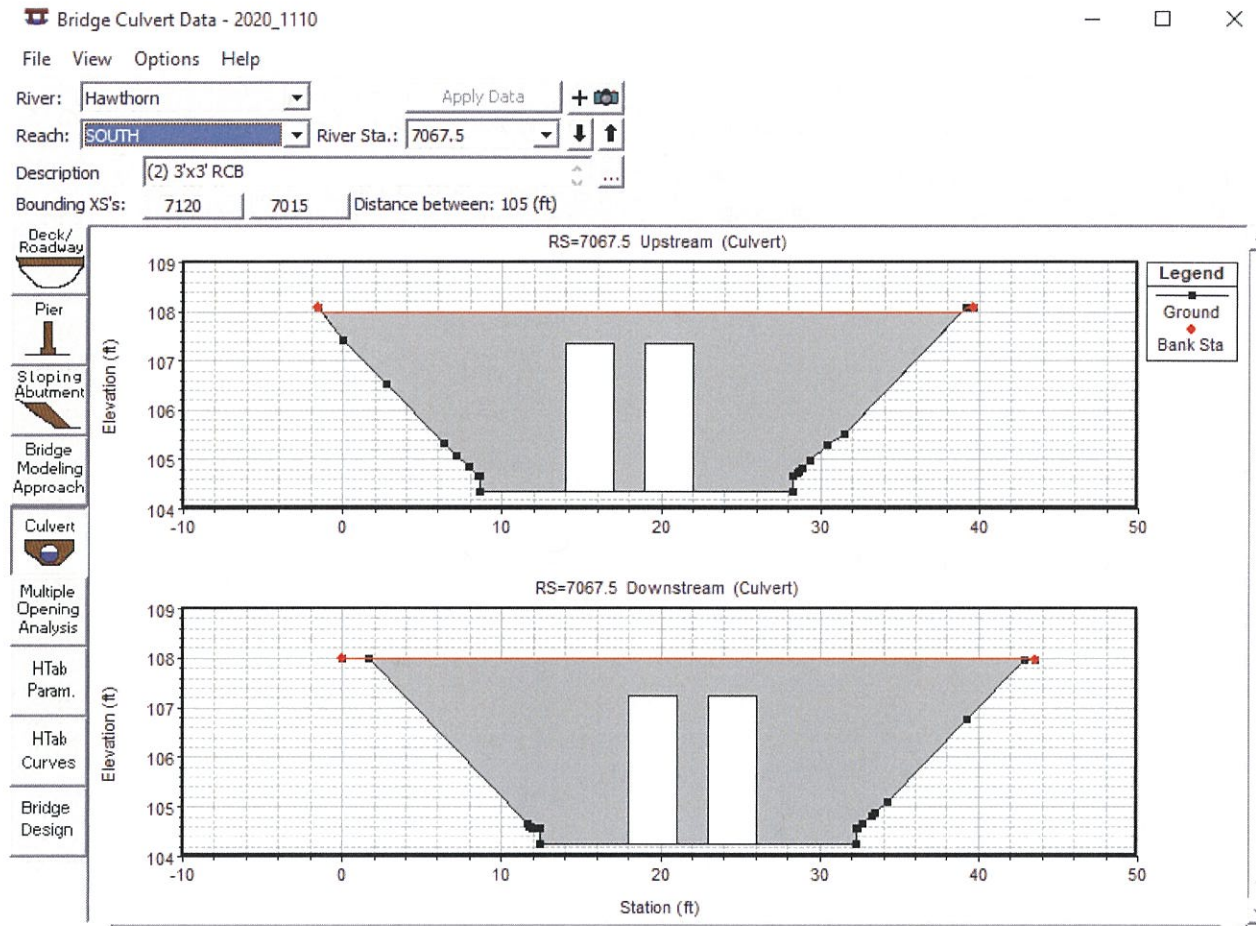
Selected Boundary Condition Locations and Types

River	Reach	Profile	Upstream	Downstream
Hawthorn	NORTH	all		Normal Depth S = 0.001
Hawthorn	SOUTH	all		Normal Depth S = 0.0025
Hawthorn	EAST-S	all		Known WS
Hawthorn	EAST-N	all		Known WS
Hawthorn	EAST	all	Normal Depth S = 0.013	Normal Depth S = 0.013

HEC-RAS INPUTS
MODEL V. 2020_1110



HEC-RAS INPUTS
MODEL V. 2020_1110



HEC-RAS INPUTS
MODEL V. 2020_1110

Culvert Data Editor

Add ... Copy Delete ... Culvert Group: (2) 3x3 rcb

Solution Criteria: Computed Flow Co Rename ...

Shape: Box Span: 3 Rise: 3

Chart #: 8 - flared wingwalls

Scale #: 1 - Wingwall flared 30 to 75 deg.

Distance to Upstrm XS: 8

Culvert Length: 89

Entrance Loss Coeff: 0.5

Exit Loss Coeff: 1

Manning's n for Top: 0.013

Manning's n for Bottom: 0.013

Depth to use Bottom n: 0

Depth Blocked: 0

Upstream Invert Elev: 104.34

Downstream Invert Elev: 104.24

Culvert Barrel Data

Barrel Centerline Stations # Barrels: 2

Barrel Name	US Sta	DS Sta
1 (1) 3'x3' RCB	15.5	19.5
2 (1) 3'x3' RCB	20.5	24.5

Barrel GIS Data: (1) 3'x3' RCB
Length: 0

X	Y
1	
2	

Deck/Roadway Data Editor

Distance	Width	Weir Coef
13.25	78.5	2.6

Clear Del Row Ins Row Copy US to DS

Upstream				Downstream		
	Station	high chord	low chord	Station	high chord	low chord
1	-50	108		0	108	
2	40	108		50	108	
3						
4						
5						
6						
7						
8						

U.S Embankment SS 3. D.S Embankment SS 3.

Weir Data

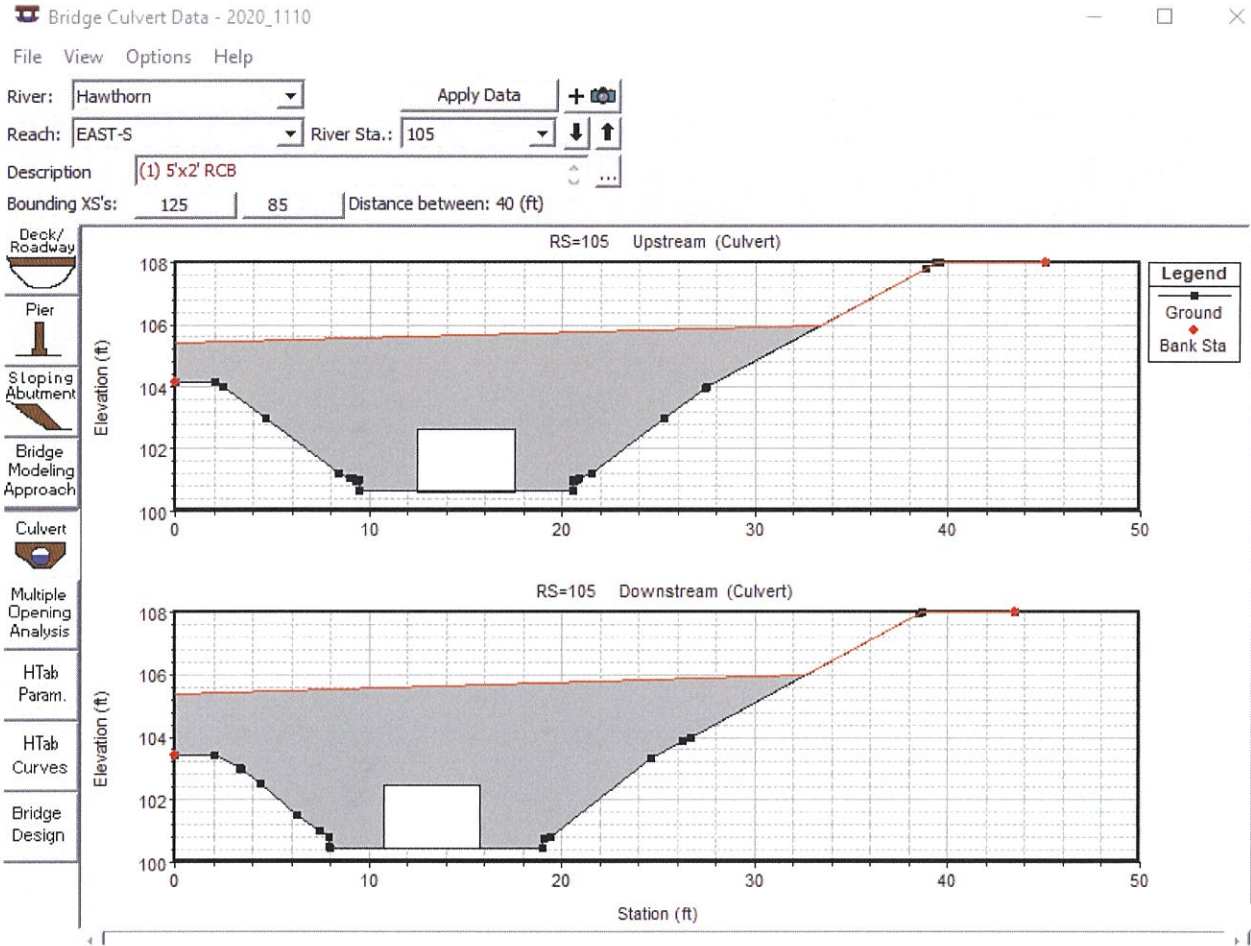
Max Submergence: 0.98 Min Weir Flow El:

Weir Crest Shape

Broad Crested

Ogee

HEC-RAS INPUTS
MODEL V. 2020_1110



HEC-RAS INPUTS
MODEL V. 2020_1110

Culvert Data Editor

Add ... Copy Delete ... Culvert Group: (1)5x2

Solution Criteria: Computed Flow Co

Shape: Box Span: 5 Rise: 2

Chart #: 8 - flared wingwalls

Scale #: 1 - Wingwall flared 30 to 75 deg.

Distance to Upstrm XS: 4

Culvert Length: 32

Entrance Loss Coeff: 0.5

Exit Loss Coeff: 1

Manning's n for Top: 0.013

Manning's n for Bottom: 0.013

Depth to use Bottom n: 0

Depth Blocked: 0

Upstream Invert Elev: 100.62

Downstream Invert Elev: 100.46

Culvert Barrel Data

Barrel Centerline Stations	# Barrels :
1 (1) 5'x2' RCB	15 13.25

Barrel GIS Data: (1) 5'x2' RCB
Length: 0

X	Y
1	

Deck/Roadway Data Editor

Distance	Width	Weir Coef
10.7	18.6	2.6

Clear Del Row Ins Row Copy US to DS

Upstream				Downstream		
	Station	high chord	low chord	Station	high chord	low chord
1	0	105.4		0	105.4	
2	34	106		34	106	
3						
4						
5						
6						
7						
8						

U.S Embankment SS 2. D.S Embankment SS 2.

Weir Data

Max Submergence: 0.98 Min Weir Flow El:

Weir Crest Shape

Broad Crested

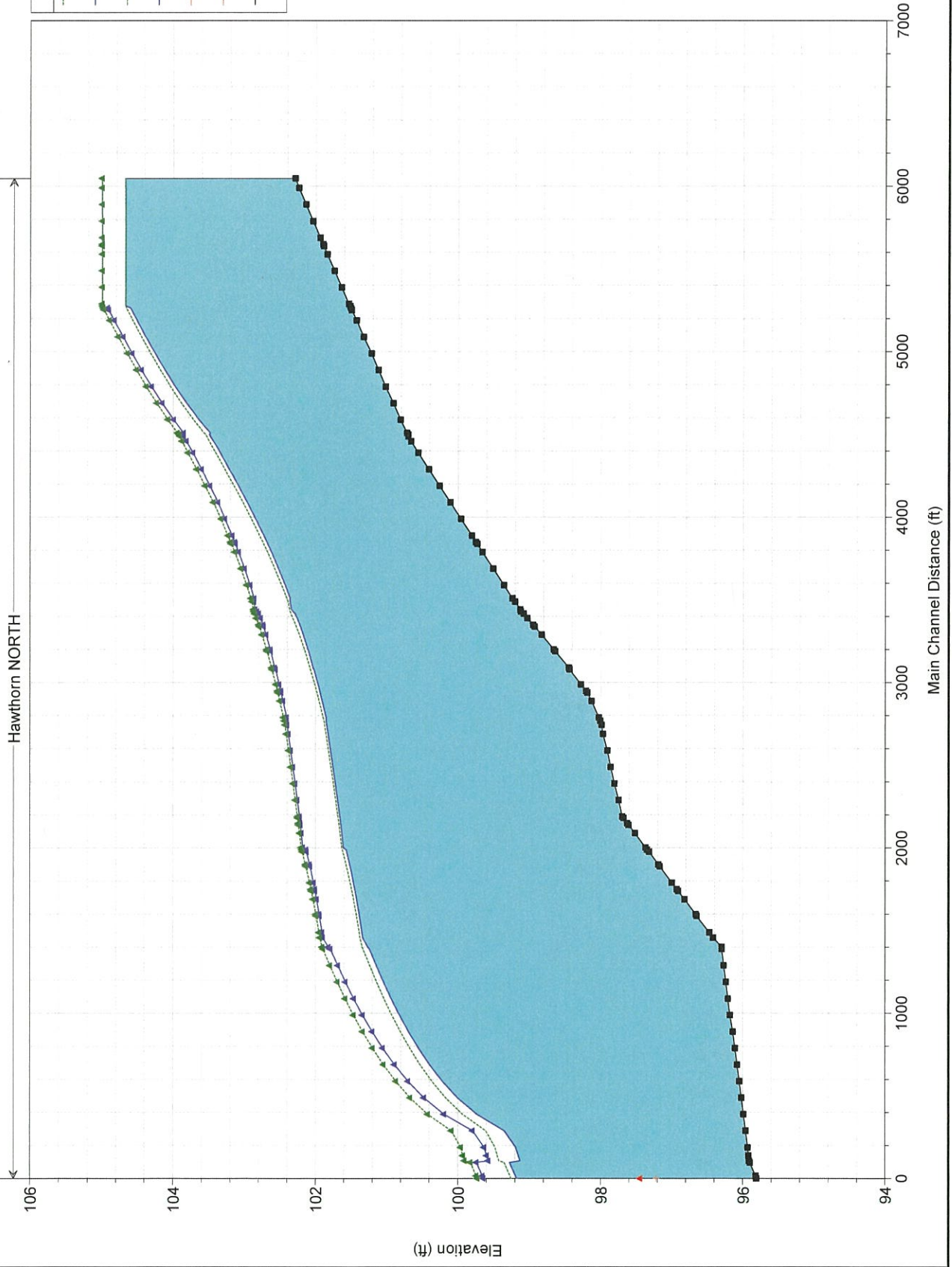
Ogee

HEC-RAS OUTPUTS

HAWTHORN PARK RDF
NORTH PERIMETER DITCH

Hawthorn

Geom: 2020_1110 Flow: 2020_1110



Legend	
EG 1%	Green line with triangles
WS 1%	Blue line with triangles
EG 4%	Green line with triangles
WS 4%	Blue line with triangles
Crit 1%	Red line with triangles
Crit 4%	Orange line with triangles
Ground	Black line with squares

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: NORTH

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NORTH	5958.3	4%	4.80	102.29	104.67		104.68	0.000010	0.15	31.37	20.31	0.02
NORTH	5958.3	1%	6.00	102.29	105.00		105.00	0.000009	0.16	38.32	22.27	0.02
NORTH	5900	4%	4.80	102.24	104.67		104.67	0.000009	0.15	32.42	20.63	0.02
NORTH	5900	1%	6.00	102.24	105.00		105.00	0.000008	0.15	39.47	22.59	0.02
NORTH	5800	4%	4.80	102.14	104.67		104.67	0.000008	0.14	34.50	21.20	0.02
NORTH	5800	1%	6.00	102.14	105.00		105.00	0.000007	0.14	41.75	23.17	0.02
NORTH	5700	4%	4.80	102.04	104.67		104.67	0.000007	0.13	36.63	21.81	0.02
NORTH	5700	1%	6.00	102.04	105.00		105.00	0.000006	0.14	44.08	23.77	0.02
NORTH	5600	4%	4.80	101.94	104.67		104.67	0.000006	0.12	38.83	22.42	0.02
NORTH	5600	1%	6.00	101.94	105.00		105.00	0.000005	0.13	46.48	24.38	0.02
NORTH	5560	4%	4.80	101.90	104.67		104.67	0.000005	0.12	39.70	22.64	0.02
NORTH	5560	1%	6.00	101.90	105.00		105.00	0.000005	0.13	47.42	24.61	0.02
NORTH	5550	4%	4.80	101.89	104.67		104.67	0.000005	0.12	39.93	22.70	0.02
NORTH	5550	1%	6.00	101.89	105.00		105.00	0.000005	0.13	47.67	24.66	0.02
NORTH	5500	4%	4.80	101.84	104.67		104.67	0.000005	0.12	41.10	23.01	0.02
NORTH	5500	1%	6.00	101.84	105.00		105.00	0.000005	0.12	48.94	24.96	0.02
NORTH	5400	4%	4.80	101.74	104.67		104.67	0.000004	0.11	43.43	23.61	0.01
NORTH	5400	1%	6.00	101.74	105.00		105.00	0.000004	0.12	51.47	25.57	0.01
NORTH	5300	4%	4.80	101.64	104.67		104.67	0.000004	0.10	45.79	24.20	0.01
NORTH	5300	1%	6.00	101.64	105.00		105.00	0.000004	0.11	54.02	26.15	0.01
NORTH	5200	4%	4.80	101.54	104.67		104.67	0.000003	0.10	48.19	24.79	0.01
NORTH	5200	1%	6.00	101.54	105.00		105.00	0.000003	0.11	56.61	26.75	0.01
NORTH	5187.5	4%	4.80	101.52	104.67		104.67	0.000003	0.10	48.66	24.89	0.01
NORTH	5187.5	1%	6.00	101.52	105.00		105.00	0.000003	0.11	57.12	26.85	0.01
NORTH	5175	4%	91.70	101.51	104.60		104.66	0.001203	1.94	47.26	24.57	0.25
NORTH	5175	1%	113.30	101.51	104.92		104.99	0.001195	2.04	55.42	26.49	0.25
NORTH	5163.9	4%	91.70	101.50	104.59		104.65	0.001211	1.95	47.13	24.53	0.25
NORTH	5163.9	1%	113.30	101.50	104.91		104.97	0.001203	2.05	55.28	26.45	0.25
NORTH	5162.5	4%	91.70	101.50	104.59		104.65	0.001213	1.95	47.11	24.52	0.25
NORTH	5162.5	1%	113.30	101.50	104.91		104.97	0.001204	2.05	55.26	26.44	0.25
NORTH	5100	4%	91.70	101.43	104.51		104.57	0.001225	1.95	46.93	24.47	0.25
NORTH	5100	1%	113.30	101.43	104.83		104.90	0.001214	2.06	55.08	26.39	0.25
NORTH	5000	4%	91.70	101.33	104.38		104.44	0.001271	1.98	46.30	24.32	0.25
NORTH	5000	1%	113.30	101.33	104.71		104.77	0.001253	2.08	54.44	26.25	0.25
NORTH	4900	4%	91.70	101.22	104.25		104.32	0.001310	2.00	45.78	24.18	0.26
NORTH	4900	1%	113.30	101.22	104.58		104.65	0.001285	2.10	53.93	26.13	0.26
NORTH	4800	4%	91.70	101.12	104.12		104.18	0.001382	2.04	44.89	23.97	0.26
NORTH	4800	1%	113.30	101.12	104.44		104.51	0.001344	2.14	53.06	25.94	0.26
NORTH	4700	4%	91.70	101.02	103.97		104.04	0.001473	2.09	43.85	23.72	0.27
NORTH	4700	1%	113.30	101.02	104.30		104.38	0.001414	2.18	52.06	25.71	0.27
NORTH	4600	4%	91.70	100.91	103.81		103.89	0.001582	2.15	42.70	23.42	0.28
NORTH	4600	1%	113.30	100.91	104.15		104.23	0.001493	2.22	51.02	25.46	0.28
NORTH	4500	4%	91.70	100.81	103.64		103.72	0.001754	2.23	41.10	23.01	0.29
NORTH	4500	1%	113.30	100.81	103.99		104.08	0.001611	2.28	49.60	25.12	0.29
NORTH	4420	4%	91.70	100.72	103.49		103.57	0.001953	2.32	39.49	22.56	0.31
NORTH	4420	1%	113.30	100.72	103.86		103.94	0.001737	2.35	48.23	24.78	0.30
NORTH	4410	4%	91.70	100.70	103.50		103.55	0.001025	1.79	51.12	26.70	0.23
NORTH	4410	1%	113.30	100.70	103.87		103.92	0.000947	1.85	61.41	28.92	0.22
NORTH	4400	4%	91.70	100.70	103.49		103.53	0.001006	1.78	51.59	26.95	0.23
NORTH	4400	1%	113.30	100.70	103.86		103.91	0.000928	1.83	62.00	29.19	0.22
NORTH	4370	4%	105.20	100.66	103.44		103.50	0.001195	1.94	54.23	28.36	0.25

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: NORTH (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W/S Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Cntrl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NORTH	4370	1%	130.60	100.66	103.81		103.88	0.001110	2.00	65.22	30.73	0.24
NORTH	4300	4%	105.20	100.56	103.35		103.41	0.001350	2.06	51.11	26.70	0.26
NORTH	4300	1%	130.60	100.56	103.72		103.79	0.001245	2.12	61.65	28.97	0.26
NORTH	4200	4%	105.20	100.41	103.21		103.28	0.001315	2.04	51.62	26.82	0.26
NORTH	4200	1%	130.60	100.41	103.60		103.67	0.001197	2.09	62.54	29.16	0.25
NORTH	4100	4%	105.20	100.26	103.09		103.15	0.001277	2.02	52.16	26.93	0.26
NORTH	4100	1%	130.60	100.26	103.49		103.55	0.001148	2.06	63.51	29.35	0.25
NORTH	4000	4%	105.20	100.11	102.96		103.02	0.001228	1.99	52.90	27.09	0.25
NORTH	4000	1%	130.60	100.11	103.38		103.44	0.001090	2.02	64.71	29.69	0.24
NORTH	3900	4%	105.20	99.96	102.84		102.90	0.001181	1.96	53.67	27.28	0.25
NORTH	3900	1%	130.60	99.96	103.27		103.33	0.001034	1.98	65.98	29.86	0.23
NORTH	3800	4%	105.20	99.81	102.73		102.79	0.001120	1.92	54.71	27.50	0.24
NORTH	3800	1%	130.60	99.81	103.18		103.23	0.000968	1.93	67.58	30.18	0.23
NORTH	3760	4%	105.20	99.75	102.69		102.74	0.001098	1.91	55.11	27.59	0.24
NORTH	3760	1%	130.60	99.75	103.14		103.20	0.000945	1.91	68.21	30.31	0.23
NORTH	3750	4%	105.20	99.73	102.67		102.73	0.001090	1.90	55.26	27.63	0.24
NORTH	3750	1%	130.60	99.73	103.13		103.19	0.000936	1.91	68.43	30.35	0.22
NORTH	3700	4%	105.20	99.66	102.62		102.68	0.001059	1.88	55.85	27.76	0.23
NORTH	3700	1%	130.60	99.66	103.08		103.14	0.000904	1.88	69.32	30.53	0.22
NORTH	3600	4%	105.20	99.51	102.52		102.57	0.000994	1.84	57.14	28.02	0.23
NORTH	3600	1%	130.60	99.51	103.00		103.05	0.000839	1.83	71.23	30.90	0.21
NORTH	3500	4%	105.20	99.36	102.43		102.48	0.000924	1.79	58.69	28.37	0.22
NORTH	3500	1%	130.60	99.36	102.92		102.97	0.000773	1.78	73.43	31.33	0.20
NORTH	3420	4%	105.20	99.24	102.36		102.40	0.000862	1.75	60.21	28.68	0.21
NORTH	3420	1%	130.60	99.24	102.86		102.91	0.000716	1.73	75.48	31.71	0.20
NORTH	3400	4%	105.20	99.20	102.36		102.39	0.000473	1.37	76.91	33.87	0.16
NORTH	3400	1%	130.60	99.20	102.86		102.89	0.000407	1.38	94.84	36.91	0.15
NORTH	3352.5	4%	105.20	99.13	102.34		102.36	0.000409	1.29	81.83	35.58	0.15
NORTH	3352.5	1%	130.60	99.13	102.85		102.87	0.000354	1.30	100.77	38.76	0.14
NORTH	3340	4%	156.30	99.12	102.31		102.36	0.000675	1.66	94.37	41.08	0.19
NORTH	3340	1%	196.10	99.12	102.82		102.87	0.000596	1.69	116.21	44.75	0.18
NORTH	3327.5	4%	156.30	99.08	102.29		102.35	0.000890	1.90	82.45	35.86	0.22
NORTH	3327.5	1%	196.10	99.08	102.80		102.86	0.000786	1.93	101.54	39.06	0.21
NORTH	3300	4%	156.30	99.03	102.26		102.32	0.000966	1.98	79.03	34.19	0.23
NORTH	3300	1%	196.10	99.03	102.77		102.83	0.000853	2.01	97.33	37.26	0.22
NORTH	3260	4%	156.30	98.95	102.22		102.28	0.000910	1.94	80.75	34.51	0.22
NORTH	3260	1%	196.10	98.95	102.74		102.80	0.000806	1.97	99.38	37.60	0.21
NORTH	3250	4%	156.30	98.93	102.21		102.27	0.000897	1.92	81.20	34.61	0.22
NORTH	3250	1%	196.10	98.93	102.73		102.79	0.000795	1.96	99.91	37.71	0.21
NORTH	3200	4%	156.30	98.83	102.17		102.23	0.000837	1.86	83.26	34.97	0.21
NORTH	3200	1%	196.10	98.83	102.69		102.75	0.000744	1.92	102.35	38.10	0.21
NORTH	3110	4%	156.30	98.66	102.11		102.16	0.000737	1.79	87.19	35.66	0.20
NORTH	3110	1%	196.10	98.66	102.64		102.69	0.000660	1.83	106.94	38.84	0.19
NORTH	3100	4%	156.30	98.64	102.10		102.15	0.000726	1.78	87.63	35.72	0.20
NORTH	3100	1%	196.10	98.64	102.63		102.68	0.000651	1.83	107.44	38.91	0.19
NORTH	3000	4%	156.30	98.45	102.03		102.08	0.000626	1.69	92.64	36.71	0.19
NORTH	3000	1%	196.10	98.45	102.57		102.62	0.000566	1.73	113.25	39.97	0.18
NORTH	2990	4%	165.60	98.44	102.02		102.07	0.000701	1.79	92.77	36.77	0.20
NORTH	2990	1%	208.10	98.44	102.56		102.61	0.000636	1.83	113.41	40.04	0.19
NORTH	2900	4%	165.60	98.28	101.97		102.01	0.000627	1.72	96.55	37.39	0.19
NORTH	2900	1%	208.10	98.28	102.51		102.56	0.000573	1.77	117.75	40.68	0.18

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: NORTH (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NORTH	2860	4%	165.60	98.21	101.94		101.99	0.000598	1.69	98.17	37.59	0.18
NORTH	2860	1%	208.10	98.21	102.49		102.53	0.000549	1.74	119.56	40.89	0.18
NORTH	2850	4%	165.60	98.19	101.94		101.98	0.000590	1.68	98.62	37.65	0.18
NORTH	2850	1%	208.10	98.19	102.48		102.53	0.000542	1.73	120.06	40.95	0.18
NORTH	2800	4%	165.60	98.13	101.91		101.95	0.000575	1.66	99.46	37.77	0.18
NORTH	2800	1%	208.10	98.13	102.46		102.50	0.000529	1.72	121.06	41.06	0.18
NORTH	2700	4%	165.60	98.03	101.85		101.89	0.000540	1.63	101.87	38.21	0.18
NORTH	2700	1%	208.10	98.03	102.41		102.45	0.000498	1.68	123.90	41.55	0.17
NORTH	2680	4%	165.60	98.01	101.85		101.88	0.000362	1.38	119.98	42.67	0.15
NORTH	2680	1%	208.10	98.01	102.41		102.44	0.000340	1.44	144.49	45.95	0.14
NORTH	2655	4%	165.60	97.99	101.84		101.87	0.000354	1.37	121.17	43.06	0.14
NORTH	2655	1%	208.10	97.99	102.40		102.43	0.000333	1.43	145.93	46.38	0.14
NORTH	2600	4%	165.60	97.97	101.82		101.85	0.000351	1.36	121.57	43.11	0.14
NORTH	2600	1%	208.10	97.97	102.38		102.41	0.000330	1.42	146.41	46.45	0.14
NORTH	2500	4%	165.60	97.91	101.79		101.82	0.000343	1.35	122.50	43.24	0.14
NORTH	2500	1%	208.10	97.91	102.35		102.38	0.000323	1.41	147.51	46.57	0.14
NORTH	2400	4%	165.60	97.86	101.76		101.78	0.000336	1.34	123.39	43.34	0.14
NORTH	2400	1%	208.10	97.86	102.32		102.35	0.000317	1.40	148.55	46.69	0.14
NORTH	2300	4%	165.60	97.81	101.72		101.75	0.000330	1.33	124.21	43.48	0.14
NORTH	2300	1%	208.10	97.81	102.28		102.31	0.000311	1.39	149.54	46.85	0.14
NORTH	2200	4%	165.60	97.75	101.69		101.72	0.000323	1.32	125.16	43.63	0.14
NORTH	2200	1%	208.10	97.75	102.25		102.28	0.000305	1.38	150.67	47.01	0.14
NORTH	2100	4%	165.60	97.70	101.66		101.69	0.000317	1.31	126.00	43.71	0.14
NORTH	2100	1%	208.10	97.70	102.22		102.25	0.000299	1.37	151.64	47.10	0.13
NORTH	2092	4%	165.60	97.68	101.66		101.68	0.000316	1.31	126.13	43.73	0.14
NORTH	2092	1%	208.10	97.68	102.22		102.25	0.000298	1.37	151.78	47.12	0.13
NORTH	2060	4%	165.60	97.63	101.65		101.67	0.000299	1.29	128.78	44.11	0.13
NORTH	2060	1%	208.10	97.63	102.21		102.24	0.000283	1.35	154.67	47.51	0.13
NORTH	2050	4%	165.60	97.61	101.64		101.67	0.000294	1.28	129.52	44.20	0.13
NORTH	2050	1%	208.10	97.61	102.21		102.24	0.000279	1.34	155.47	47.59	0.13
NORTH	2000	4%	165.60	97.52	101.63		101.66	0.000273	1.25	132.98	44.68	0.13
NORTH	2000	1%	208.10	97.52	102.20		102.22	0.000261	1.31	159.23	48.07	0.13
NORTH	1912.5	4%	165.60	97.37	101.61		101.63	0.000242	1.19	139.77	45.45	0.12
NORTH	1912.5	1%	208.10	97.37	102.18		102.20	0.000235	1.26	165.50	48.85	0.12
NORTH	1900	4%	259.70	97.35	101.57		101.62	0.000607	1.88	137.86	45.33	0.19
NORTH	1900	1%	329.50	97.35	102.13		102.19	0.000601	2.01	164.26	48.70	0.19
NORTH	1887.5	4%	259.70	97.32	101.56		101.62	0.000596	1.87	138.78	45.44	0.19
NORTH	1887.5	1%	329.50	97.32	102.12		102.19	0.000591	1.99	165.25	48.82	0.19
NORTH	1810	4%	259.70	97.19	101.52		101.57	0.000551	1.82	142.79	45.97	0.18
NORTH	1810	1%	329.50	97.19	102.08		102.14	0.000550	1.94	169.57	49.34	0.18
NORTH	1800	4%	259.70	97.17	101.51		101.57	0.000543	1.81	143.51	46.07	0.18
NORTH	1800	1%	329.50	97.17	102.08		102.13	0.000544	1.93	170.34	49.44	0.18
NORTH	1700	4%	259.70	97.00	101.47		101.51	0.000487	1.74	149.20	46.81	0.17
NORTH	1700	1%	329.50	97.00	102.03		102.08	0.000493	1.87	176.44	50.18	0.18
NORTH	1660	4%	259.70	96.93	101.45		101.49	0.000466	1.71	151.58	47.11	0.17
NORTH	1660	1%	329.50	96.93	102.01		102.06	0.000474	1.84	178.97	50.48	0.17
NORTH	1650	4%	259.70	96.91	101.44		101.49	0.000461	1.71	152.27	47.19	0.17
NORTH	1650	1%	329.50	96.91	102.00		102.06	0.000469	1.83	179.71	50.56	0.17
NORTH	1600	4%	259.70	96.82	101.42		101.47	0.000434	1.67	155.54	47.61	0.16
NORTH	1600	1%	329.50	96.82	101.98		102.03	0.000445	1.80	183.20	50.98	0.17

HEC-RAS Plan, Plan 15 River: Hawthorn Reach: NORTH (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NORTH	1510	4%	259.70	96.66	101.39		101.43	0.000391	1.61	161.55	48.35	0.16
NORTH	1510	1%	329.50	96.66	101.95		101.99	0.000405	1.74	189.57	51.71	0.16
NORTH	1500	4%	259.70	96.65	101.38		101.42	0.000399	1.60	161.92	48.42	0.15
NORTH	1500	1%	329.50	96.65	101.94		101.99	0.000402	1.73	189.97	51.78	0.16
NORTH	1400	4%	259.70	96.47	101.35		101.39	0.000345	1.54	168.99	49.27	0.15
NORTH	1400	1%	329.50	96.47	101.91		101.95	0.000362	1.67	197.45	52.62	0.15
NORTH	1368.5	4%	259.70	96.42	101.34		101.38	0.000333	1.52	171.22	49.59	0.14
NORTH	1368.5	1%	329.50	96.42	101.90		101.94	0.000350	1.65	199.83	52.94	0.15
NORTH	1311.5	4%	259.70	96.30	101.27		101.34	0.000761	2.19	118.32	35.69	0.21
NORTH	1311.5	1%	329.50	96.30	101.82		101.91	0.000795	2.38	138.66	38.32	0.22
NORTH	1300	4%	259.70	96.30	101.25		101.33	0.000907	2.37	109.37	33.14	0.23
NORTH	1300	1%	329.50	96.30	101.79		101.89	0.000953	2.57	128.21	35.78	0.24
NORTH	1200	4%	259.70	96.27	101.15		101.24	0.000944	2.45	108.15	31.52	0.24
NORTH	1200	1%	329.50	96.27	101.69		101.80	0.000999	2.66	123.73	33.67	0.24
NORTH	1100	4%	259.70	96.24	101.05		101.14	0.001001	2.50	103.90	31.24	0.24
NORTH	1100	1%	329.50	96.24	101.58		101.69	0.001059	2.72	121.12	33.36	0.25
NORTH	1000	4%	259.70	96.21	100.94		101.04	0.001068	2.56	101.49	30.93	0.25
NORTH	1000	1%	329.50	96.21	101.46		101.58	0.001129	2.79	118.31	33.02	0.26
NORTH	900	4%	259.70	96.18	100.82		100.93	0.001150	2.63	98.77	30.57	0.26
NORTH	900	1%	329.50	96.18	101.34		101.47	0.001216	2.86	115.16	32.64	0.27
NORTH	800	4%	259.70	96.14	100.69		100.81	0.001246	2.71	95.92	30.19	0.27
NORTH	800	1%	329.50	96.14	101.20		101.34	0.001316	2.95	111.85	32.22	0.28
NORTH	700	4%	259.70	96.11	100.55		100.68	0.001372	2.80	92.61	29.75	0.28
NORTH	700	1%	329.50	96.11	101.05		101.20	0.001447	3.05	108.04	31.75	0.29
NORTH	600	4%	259.70	96.08	100.40		100.53	0.001532	2.92	89.99	29.26	0.29
NORTH	600	1%	329.50	96.08	100.89		101.05	0.001612	3.17	103.87	31.22	0.31
NORTH	500	4%	259.70	96.05	100.22		100.36	0.001756	3.07	84.68	28.66	0.31
NORTH	500	1%	329.50	96.05	100.70		100.87	0.001843	3.33	98.93	30.58	0.33
NORTH	400	4%	259.70	96.02	100.01		100.17	0.002085	3.26	79.57	27.94	0.34
NORTH	400	1%	329.50	96.02	100.47		100.67	0.002177	3.54	93.12	29.81	0.35
NORTH	300	4%	259.70	95.99	99.74		99.93	0.002649	3.56	72.97	26.97	0.38
NORTH	300	1%	329.50	95.99	100.19		100.42	0.002737	3.85	85.68	28.79	0.39
NORTH	200	4%	259.70	95.96	99.35		99.61	0.003884	4.08	63.59	25.54	0.46
NORTH	200	1%	329.50	95.96	99.79		100.09	0.003911	4.38	75.29	27.31	0.46
NORTH	100	4%	259.70	95.93	99.19		99.48	0.000631	4.30	60.38	25.04	0.49
NORTH	100	1%	329.50	95.93	99.63		99.96	0.000626	4.59	71.84	26.80	0.49
NORTH	50	4%	259.70	95.92	99.15		99.45	0.000651	4.35	59.72	24.95	0.50
NORTH	50	1%	329.50	95.92	99.60		99.93	0.000644	4.63	71.15	26.72	0.50
NORTH	18.36	4%	259.70	95.91	99.13		99.43	0.000662	4.37	59.37	24.90	0.50
NORTH	18.36	1%	329.50	95.91	99.57		99.91	0.000653	4.65	70.79	26.68	0.50
NORTH	8.36	4%	259.70	95.90	99.28		99.35	0.000993	2.19	118.59	45.26	0.24
NORTH	8.36	1%	329.50	95.90	99.74		99.82	0.000994	2.35	140.17	48.04	0.24
NORTH	-73.45	4%	259.70	95.82	99.19		99.27	0.000996	2.19	118.47	45.22	0.24
NORTH	-73.45	1%	329.50	95.82	99.66		99.74	0.000996	2.35	140.03	47.99	0.24
NORTH	-88.45	4%	259.70	95.81	99.18	97.22	99.25	0.001001	2.20	118.27	45.20	0.24
NORTH	-88.45	1%	329.50	95.81	99.64	97.44	99.73	0.001000	2.36	139.83	47.98	0.24

HEC-RAS OUTPUTS

HAWTHORN PARK RDF
EAST-N PERIMETER DITCH

HEC-RAS Plan Plan 15 River: Hawthorn Reach: EAST-N

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
EAST-N	944.2	4%	5.50	105.75	106.30		106.34	0.005013	1.50	3.66	8.30	0.40
EAST-N	944.2	1%	6.80	105.75	106.37		106.41	0.004949	1.60	4.26	8.73	0.40
EAST-N	900	4%	5.50	105.53	106.08		106.12	0.005012	1.50	3.66	8.30	0.40
EAST-N	900	1%	6.80	105.53	106.15		106.19	0.004844	1.58	4.29	8.75	0.40
EAST-N	800	4%	5.50	105.03	105.58		105.61	0.005072	1.51	3.65	8.30	0.40
EAST-N	800	1%	6.80	105.03	105.63		105.67	0.005656	1.67	4.07	8.59	0.43
EAST-N	700	4%	5.50	104.53	105.09		105.12	0.004778	1.48	3.72	8.36	0.39
EAST-N	700	1%	6.80	104.53	105.27		105.30	0.002548	1.26	5.38	9.47	0.30
EAST-N	600	4%	5.50	104.03	104.95		104.96	0.000752	0.77	7.13	10.51	0.17
EAST-N	600	1%	6.80	104.03	105.19		105.20	0.000463	0.69	9.88	11.98	0.13
EAST-N	500	4%	5.50	103.53	104.93		104.93	0.000147	0.43	12.82	13.38	0.08
EAST-N	500	1%	6.80	103.53	105.18		105.18	0.000115	0.42	16.38	14.89	0.07
EAST-N	490	4%	5.50	103.48	104.92		104.93	0.000128	0.41	13.49	13.67	0.07
EAST-N	490	1%	6.80	103.48	105.18		105.18	0.000102	0.40	17.12	15.18	0.07
EAST-N	400	4%	5.50	103.03	104.92		104.92	0.000043	0.27	20.14	16.34	0.04
EAST-N	400	1%	6.80	103.03	105.17		105.17	0.000039	0.28	24.46	17.85	0.04
EAST-N	312.5	4%	5.50	102.59	104.92		104.92	0.000018	0.20	27.88	18.96	0.03
EAST-N	312.5	1%	6.80	102.59	105.17		105.17	0.000017	0.21	32.67	20.48	0.03
EAST-N	300	4%	81.80	102.53	104.73		104.89	0.005026	3.21	25.46	18.19	0.48
EAST-N	300	1%	101.50	102.53	104.96		105.14	0.005042	3.40	29.83	19.58	0.49
EAST-N	287.5	4%	81.80	102.47	104.66		104.82	0.005070	3.22	25.38	18.16	0.48
EAST-N	287.5	1%	101.50	102.47	104.89		105.07	0.005086	3.41	29.74	19.55	0.49
EAST-N	200	4%	81.80	102.03	104.21		104.38	0.005130	3.24	25.27	18.12	0.48
EAST-N	200	1%	101.50	102.03	104.44		104.63	0.005176	3.44	29.54	19.49	0.49
EAST-N	100	4%	81.80	101.53	103.65		103.83	0.005847	3.40	24.08	17.72	0.51
EAST-N	100	1%	101.50	101.53	103.86		104.07	0.005974	3.62	26.01	19.00	0.53
EAST-N	50	4%	81.80	101.28	103.29		103.50	0.007337	3.69	22.14	17.05	0.57
EAST-N	50	1%	101.50	101.28	103.48		103.73	0.007606	3.96	25.62	18.24	0.59
EAST-N	20.7	4%	81.80	101.13	102.61	102.61	103.11	0.024957	5.67	14.43	14.64	1.01
EAST-N	20.7	1%	101.50	101.13	102.79	102.79	103.33	0.024846	5.87	17.28	16.37	1.01
EAST-N	11.1	4%	81.80	100.38	101.85		102.17	0.017694	4.50	18.19	20.59	0.84
EAST-N	11.1	1%	101.50	100.38	102.18		102.42	0.010875	3.99	25.41	23.83	0.68
EAST-N	1.5	4%	126.20	99.66	101.69	101.37	102.03	0.011521	4.69	26.90	20.50	0.72
EAST-N	1.5	1%	156.10	99.66	101.95	101.57	102.31	0.010579	4.81	32.47	22.36	0.70

HEC-RAS OUTPUTS

HAWTHORN PARK RDF

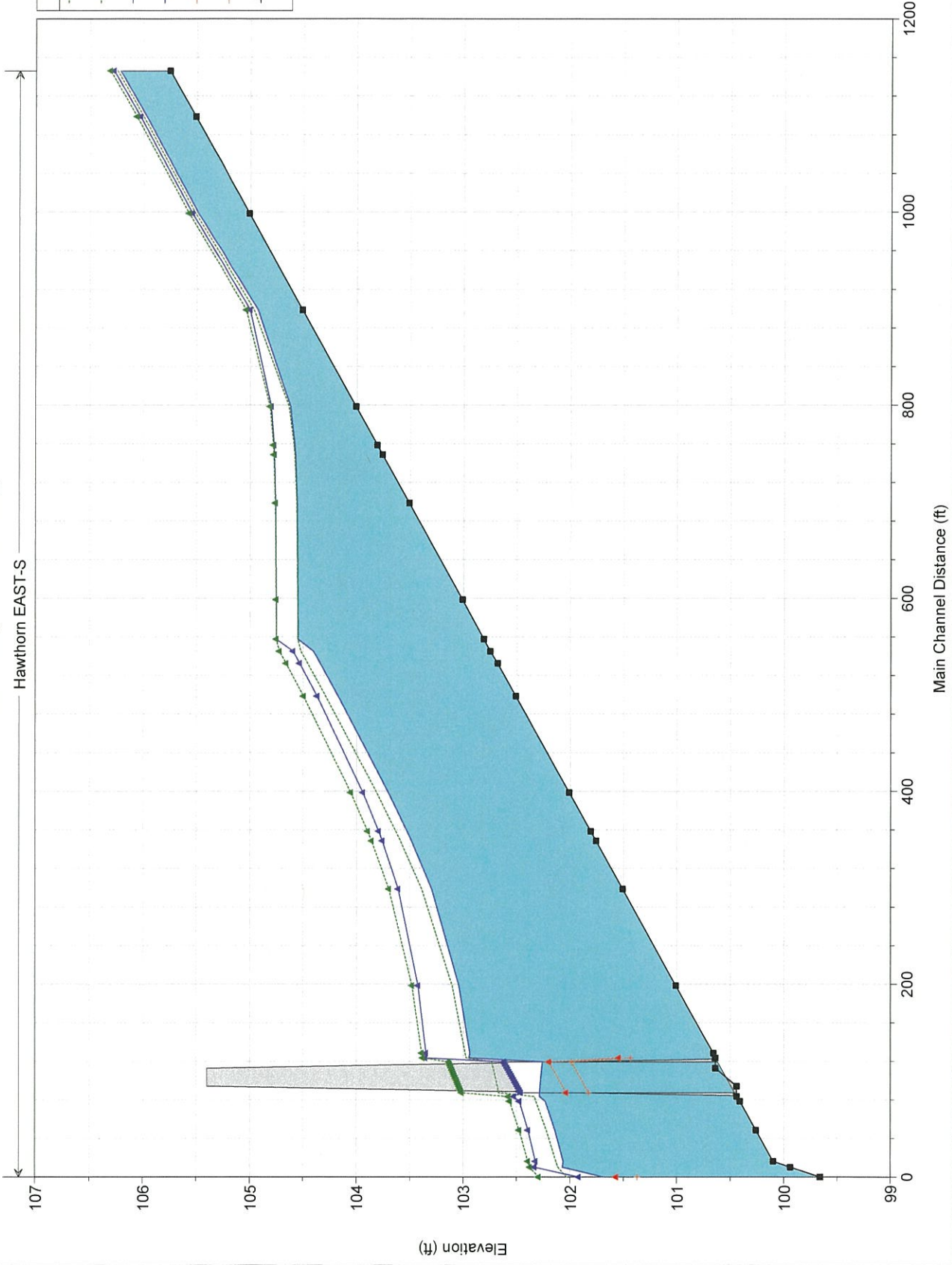
EAST-S PERIMETER DITCH

Hawthorn

Geom: 2020_1110 Flow: 2020_1110

Hawthorn EAST-S

Legend	
EG 1%	
EG 4%	
WS 1%	
WS 4%	
Crit 1%	
Crit 4%	
Ground	



HEC-RAS Plan: Plan 15 River Hawthorn Reach: EAST-S

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
EAST-S	1147.4	4%	4.00	105.75	106.22		106.25	0.005027	1.36	2.94	7.78	0.39
EAST-S	1147.4	1%	5.00	105.75	106.28		106.31	0.005034	1.46	3.43	8.15	0.40
EAST-S	1100	4%	4.00	105.51	105.97		106.00	0.005141	1.37	2.92	7.74	0.39
EAST-S	1100	1%	5.00	105.51	106.03		106.06	0.005178	1.48	3.39	8.09	0.40
EAST-S	1000	4%	4.00	105.01	105.49		105.51	0.004465	1.31	3.06	7.84	0.37
EAST-S	1000	1%	5.00	105.01	105.54		105.57	0.004697	1.43	3.50	8.18	0.38
EAST-S	900	4%	4.00	104.51	104.93		104.96	0.007126	1.53	2.61	7.49	0.46
EAST-S	900	1%	5.00	104.51	105.00		105.04	0.006255	1.58	3.17	7.92	0.44
EAST-S	800	4%	4.00	104.01	104.62		104.64	0.001830	0.96	4.16	8.63	0.24
EAST-S	800	1%	5.00	104.01	104.80		104.81	0.001102	0.86	5.81	9.72	0.20
EAST-S	760	4%	4.00	103.81	104.58		104.59	0.000773	0.71	5.63	9.61	0.16
EAST-S	760	1%	5.00	103.81	104.78		104.78	0.000515	0.66	7.62	10.78	0.14
EAST-S	750	4%	4.00	103.76	104.57		104.58	0.000630	0.66	6.05	9.88	0.15
EAST-S	750	1%	5.00	103.76	104.77		104.78	0.000432	0.62	8.12	11.06	0.13
EAST-S	700	4%	4.00	103.51	104.58		104.56	0.000240	0.47	8.53	11.27	0.10
EAST-S	700	1%	5.00	103.51	104.76		104.76	0.000189	0.46	10.93	12.48	0.09
EAST-S	600	4%	4.00	103.01	104.55		104.55	0.000053	0.27	14.80	14.22	0.05
EAST-S	600	1%	5.00	103.01	104.75		104.75	0.000050	0.28	17.80	15.44	0.05
EAST-S	559	4%	4.00	102.81	104.55		104.55	0.000032	0.23	17.75	15.43	0.04
EAST-S	559	1%	5.00	102.81	104.75		104.75	0.000032	0.24	21.00	16.64	0.04
EAST-S	546.5	4%	45.30	102.75	104.40		104.52	0.005012	2.74	16.51	14.96	0.46
EAST-S	546.5	1%	56.10	102.75	104.59		104.72	0.004914	2.88	19.45	16.09	0.46
EAST-S	534	4%	45.30	102.68	104.34		104.46	0.004963	2.74	16.56	14.94	0.46
EAST-S	534	1%	56.10	102.68	104.53		104.66	0.004863	2.87	19.51	16.09	0.46
EAST-S	500	4%	45.30	102.51	104.17		104.29	0.004925	2.73	16.60	14.97	0.46
EAST-S	500	1%	56.10	102.51	104.37		104.50	0.004772	2.85	19.65	16.14	0.46
EAST-S	400	4%	45.30	102.01	103.70		103.81	0.004602	2.66	17.02	15.13	0.44
EAST-S	400	1%	56.10	102.01	103.94		104.05	0.004087	2.70	20.80	16.56	0.42
EAST-S	360	4%	45.30	101.81	103.53		103.63	0.004306	2.60	17.44	15.31	0.43
EAST-S	360	1%	56.10	101.81	103.79		103.90	0.003642	2.58	21.71	16.90	0.40
EAST-S	350	4%	45.30	101.76	103.49		103.59	0.004235	2.58	17.55	15.34	0.43
EAST-S	350	1%	56.10	101.76	103.76		103.86	0.003531	2.56	21.95	16.97	0.40
EAST-S	300	4%	45.30	101.51	103.30		103.39	0.003672	2.45	18.49	15.71	0.40
EAST-S	300	1%	56.10	101.51	103.61		103.70	0.002863	2.37	23.72	17.59	0.36
EAST-S	200	4%	45.30	101.01	103.04		103.10	0.002154	2.01	22.50	17.17	0.31
EAST-S	200	1%	56.10	101.01	103.42		103.48	0.001586	1.90	29.50	19.47	0.27
EAST-S	130	4%	45.30	100.66	102.94		102.98	0.001327	1.68	26.91	18.65	0.25
EAST-S	130	1%	56.10	100.66	103.35		103.39	0.000996	1.60	35.06	21.11	0.22
EAST-S	125	4%	45.30	100.64	102.95	101.43	102.97	0.000611	1.27	35.66	20.37	0.17
EAST-S	125	1%	56.10	100.64	103.35	101.54	103.38	0.000508	1.26	44.35	22.17	0.16
EAST-S	105		Culvert									
EAST-S	85	4%	45.30	100.44	102.29		102.33	0.001486	1.76	25.79	17.66	0.26
EAST-S	85	1%	56.10	100.44	102.53		102.58	0.001460	1.86	30.13	18.62	0.26
EAST-S	80	4%	45.30	100.41	102.23		102.32	0.003397	2.38	19.03	15.91	0.38
EAST-S	80	1%	56.10	100.41	102.47		102.57	0.003093	2.43	23.06	17.37	0.37
EAST-S	50	4%	45.30	100.26	102.14		102.22	0.002977	2.27	19.97	16.27	0.36
EAST-S	50	1%	56.10	100.26	102.39		102.48	0.002697	2.31	24.25	17.78	0.35
EAST-S	17.7	4%	45.30	100.10	102.06		102.13	0.002441	2.10	21.53	16.92	0.33
EAST-S	17.7	1%	56.10	100.10	102.32		102.39	0.002218	2.15	26.13	18.50	0.32
EAST-S	11.7	4%	45.30	99.94	102.07		102.11	0.001279	1.62	27.99	20.19	0.24
EAST-S	11.7	1%	56.10	99.94	102.33		102.38	0.001212	1.68	33.48	22.01	0.24

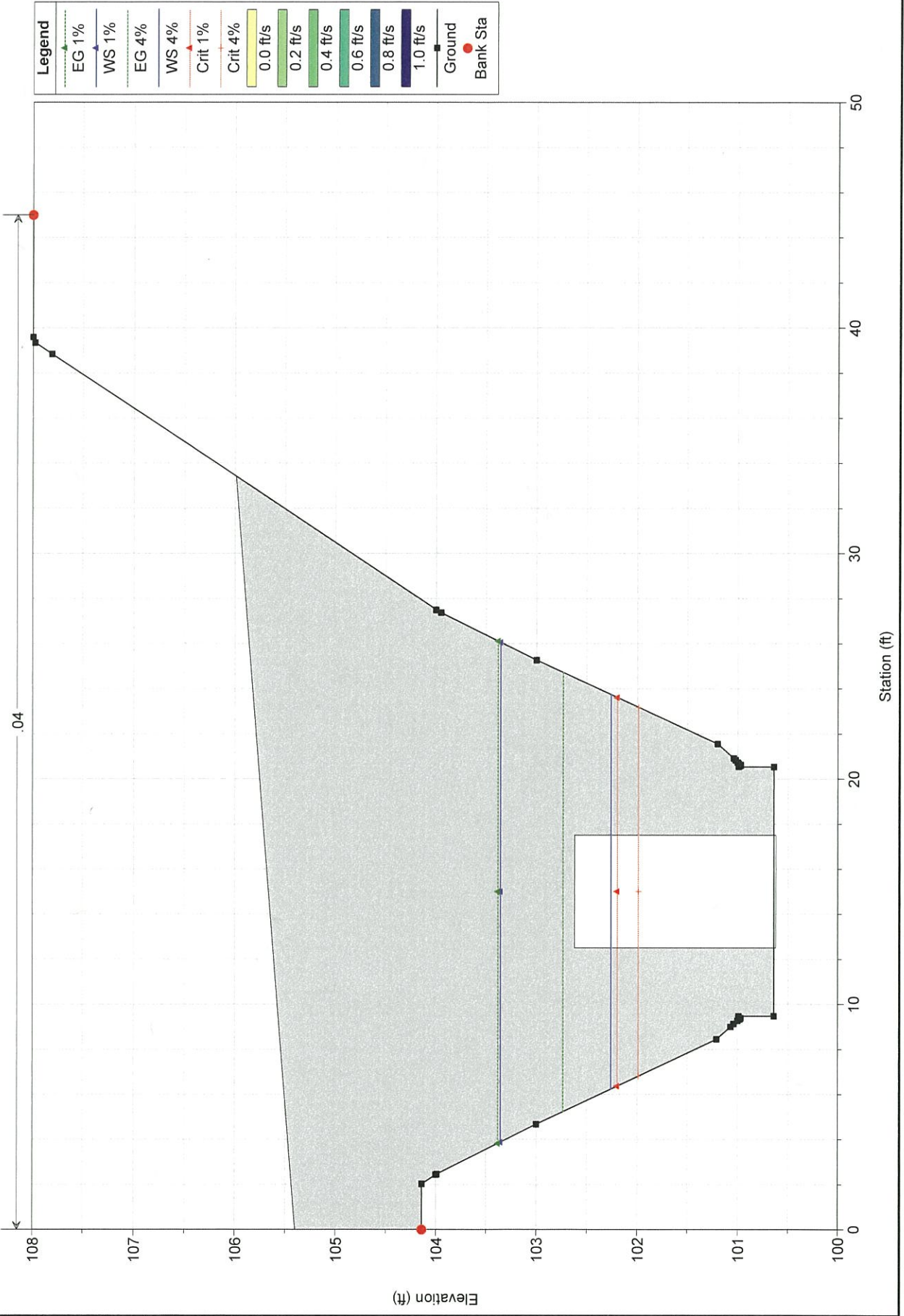
HEC-RAS Plan: Plan 15 River: Hawthorn Reach: EAST-S (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
EAST-S	1.5	4%	125.20	99.66	101.69	101.37	102.03	0.011521	4.69	26.90	20.50	0.72
EAST-S	1.5	1%	156.10	99.66	101.92	101.57	102.29	0.011191	4.91	31.80	22.14	0.72

Hawthorn

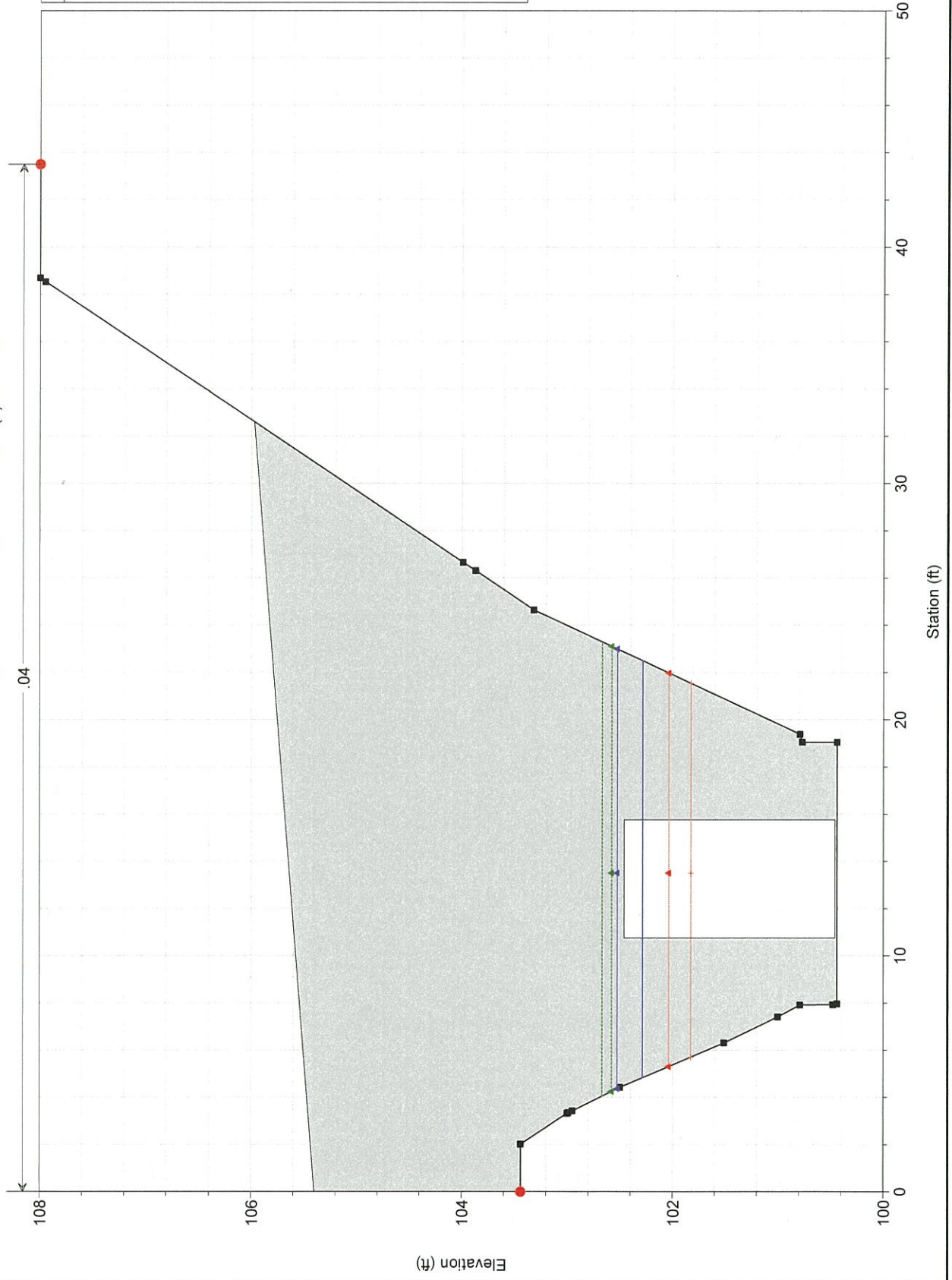
Geom: 2020_1110 Flow: 2020_1110

River = Hawthorn Reach = EAST-S RS = 105 Culiv (1) 5x2' RCB



Hawthorn

Geom: 2020_1110 Flow: 2020_1110
River = Hawthorn Reach = EAST-S RS = 105 Culv (1) 5'x2' RCB



Plan: Plan 15 Hawthorn EAST-S RS: 105 Culv Group: (1)5x2 Profile: 4%

Q Culv Group (cfs)	45.30	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.53
Q Barrel (cfs)	45.30	Culv Vel DS (ft/s)	4.96
E.G. US. (ft)	102.97	Culv Inv El Up (ft)	100.62
W.S. US. (ft)	102.95	Culv Inv El Dn (ft)	100.46
E.G. DS (ft)	102.33	Culv Frctn Ls (ft)	0.07
W.S. DS (ft)	102.29	Culv Exit Loss (ft)	0.33
Delta EG (ft)	0.64	Culv Entr Loss (ft)	0.24
Delta WS (ft)	0.66	Q Weir (cfs)	
E.G. IC (ft)	102.83	Weir Sta Lft (ft)	
E.G. OC (ft)	102.97	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	102.26	Weir Max Depth (ft)	
Culv WS Outlet (ft)	102.29	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.26	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.37	Min El Weir Flow (ft)	105.41

Plan: Plan 15 Hawthorn EAST-S RS: 105 Culv Group: (1)5x2 Profile: 1%

Q Culv Group (cfs)	56.10	Culv Full Len (ft)	32.00
# Barrels	1	Culv Vel US (ft/s)	5.61
Q Barrel (cfs)	56.10	Culv Vel DS (ft/s)	5.61
E.G. US. (ft)	103.38	Culv Inv El Up (ft)	100.62
W.S. US. (ft)	103.35	Culv Inv El Dn (ft)	100.46
E.G. DS (ft)	102.58	Culv Frctn Ls (ft)	0.12
W.S. DS (ft)	102.53	Culv Exit Loss (ft)	0.44
Delta EG (ft)	0.80	Culv Entr Loss (ft)	0.24
Delta WS (ft)	0.83	Q Weir (cfs)	
E.G. IC (ft)	103.41	Weir Sta Lft (ft)	
E.G. OC (ft)	103.38	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	102.62	Weir Max Depth (ft)	
Culv WS Outlet (ft)	102.46	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.47	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.58	Min El Weir Flow (ft)	105.41

HEC-RAS OUTPUTS

HAWTHORN PARK RDF

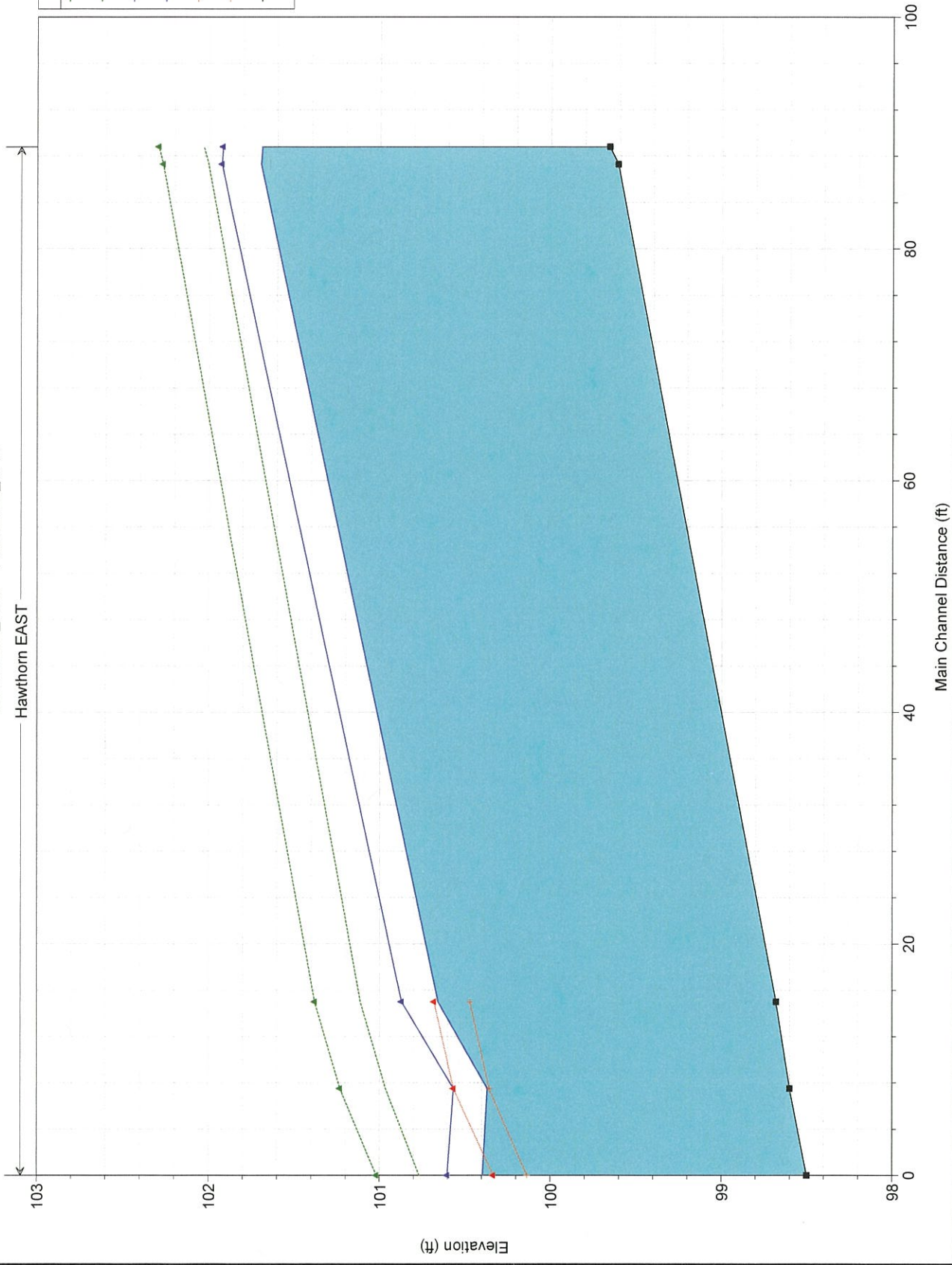
EAST PERIMETER DITCH

Hawthorn

Geom: 2020_1110 Flow: 2020_1110

Hawthorn EAST

Legend	
EG 1%	
EG 4%	
WS 1%	
WS 4%	
Crit 1%	
Crit 4%	
Ground	



HEC-RAS Plan: Plan 15 River: Hawthorn Reach: EAST

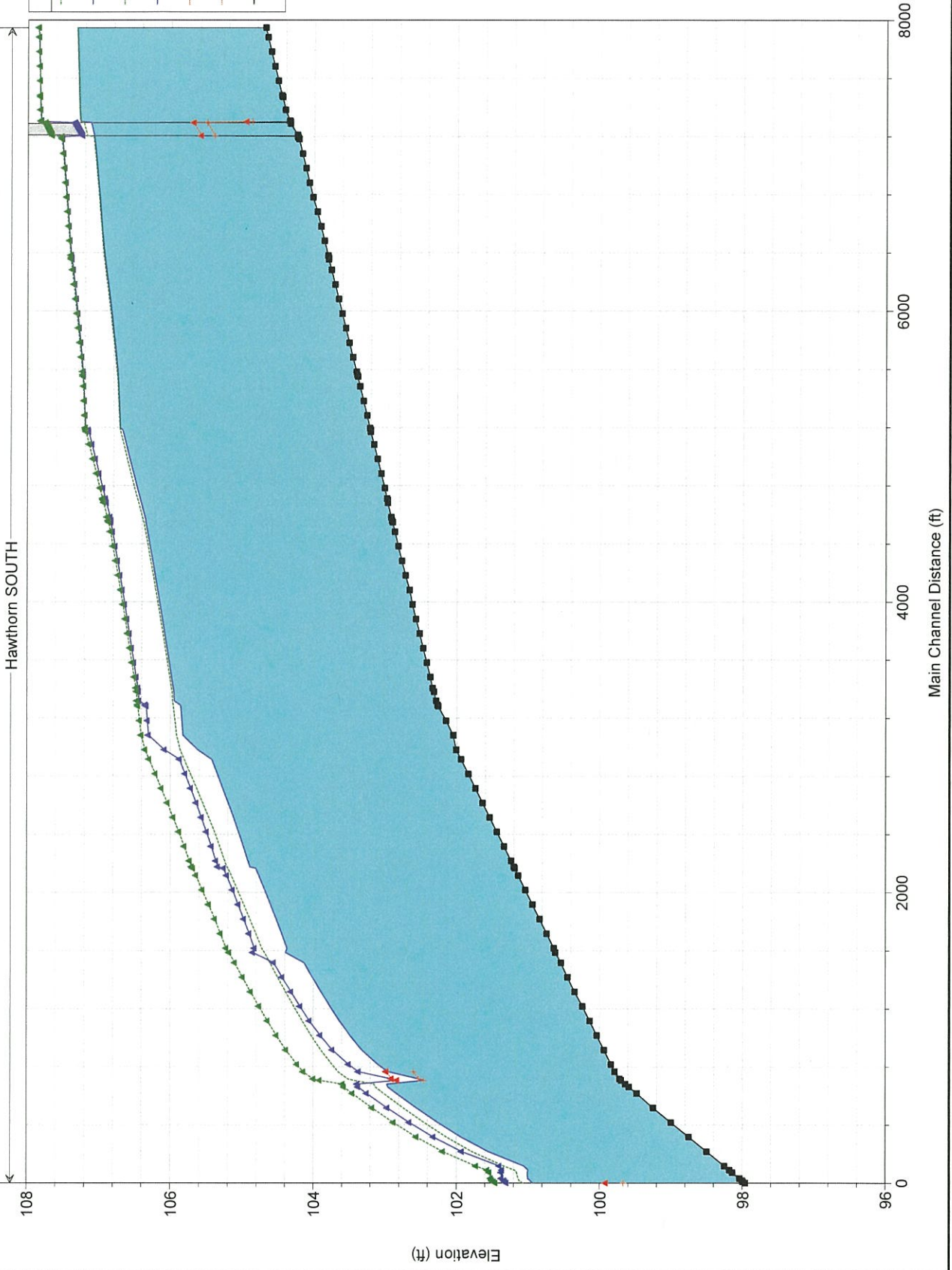
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
EAST	1.5	4%	126.20	99.66	101.69		102.03	0.011498	4.69	26.92	20.51	0.72
EAST	1.5	1%	156.10	99.66	101.92		102.30	0.011151	4.90	31.84	22.16	0.72
EAST	0	4%	126.20	99.61	101.70		102.01	0.009815	4.45	28.36	20.72	0.67
EAST	0	1%	156.10	99.61	101.93		102.27	0.009692	4.69	33.30	22.28	0.68
EAST	-72.3	4%	126.20	98.68	100.66	100.47	101.11	0.015482	5.41	23.32	17.78	0.83
EAST	-72.3	1%	156.10	98.68	100.87	100.68	101.38	0.015472	5.73	27.26	19.06	0.84
EAST	-79.8	4%	126.20	98.60	100.37	100.36	100.96	0.022756	6.20	20.36	16.94	1.00
EAST	-79.8	1%	156.10	98.60	100.56	100.56	101.23	0.022634	6.55	23.83	18.15	1.01
EAST	-87.3	4%	126.20	98.50	100.40	100.14	100.77	0.013016	4.89	25.81	20.29	0.76
EAST	-87.3	1%	156.10	98.50	100.60	100.33	101.02	0.013020	5.18	30.15	21.74	0.78

HEC-RAS OUTPUTS

HAWTHORN PARK RDF
SOUTH PERIMETER DITCH

Hawthorn

Geom: 2020_1110 Flow: 2020_1110



Legend	
EG 1%	Green triangle
WS 1%	Blue triangle
EG 4%	Green square
WS 4%	Blue square
Crit 1%	Red triangle
Crit 4%	Red square
Ground	Black square

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: SOUTH

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SOUTH	7765.5	4%	18.60	104.69	107.31		107.32	0.000072	0.45	41.63	23.74	0.06
SOUTH	7765.5	1%	23.20	104.69	107.85		107.85	0.000052	0.42	55.16	26.94	0.05
SOUTH	7700	4%	18.60	104.66	107.31		107.31	0.000069	0.44	42.28	23.91	0.06
SOUTH	7700	1%	23.20	104.66	107.84		107.85	0.000050	0.41	55.93	27.11	0.05
SOUTH	7600	4%	18.60	104.61	107.30		107.31	0.000064	0.43	43.32	24.17	0.06
SOUTH	7600	1%	23.20	104.61	107.84		107.84	0.000047	0.41	57.16	27.39	0.05
SOUTH	7500	4%	18.60	104.56	107.30		107.30	0.000060	0.42	44.39	24.43	0.05
SOUTH	7500	1%	23.20	104.56	107.83		107.84	0.000044	0.40	58.42	27.65	0.05
SOUTH	7400	4%	18.60	104.51	107.29		107.29	0.000056	0.41	45.48	24.70	0.05
SOUTH	7400	1%	23.20	104.51	107.83		107.83	0.000042	0.39	59.69	27.93	0.05
SOUTH	7300	4%	18.60	104.46	107.29		107.29	0.000053	0.40	46.54	24.95	0.05
SOUTH	7300	1%	23.20	104.46	107.83		107.83	0.000040	0.38	60.93	28.20	0.05
SOUTH	7290	4%	18.60	104.45	107.28		107.29	0.000052	0.40	46.78	25.01	0.05
SOUTH	7290	1%	23.20	104.45	107.83		107.83	0.000039	0.38	61.20	28.26	0.05
SOUTH	7200	4%	18.60	104.41	107.28		107.28	0.000049	0.39	47.70	25.24	0.05
SOUTH	7200	1%	23.20	104.41	107.82		107.82	0.000037	0.37	62.28	28.50	0.04
SOUTH	7125.5	4%	42.80	104.35	107.27		107.27	0.000164	0.71	59.95	31.91	0.09
SOUTH	7125.5	1%	53.40	104.35	107.81		107.82	0.000122	0.68	78.40	35.82	0.08
SOUTH	7120	4%	42.80	104.34	107.27	104.87	107.27	0.000076	0.54	79.88	36.17	0.06
SOUTH	7120	1%	53.40	104.34	107.81	104.95	107.82	0.000062	0.53	100.43	39.21	0.06
SOUTH	7067.5		Culvert									
SOUTH	7015	4%	42.80	104.24	107.08		107.08	0.000084	0.55	77.33	35.78	0.07
SOUTH	7015	1%	53.40	104.24	107.52		107.53	0.000075	0.57	93.89	38.45	0.06
SOUTH	7009.5	4%	42.80	104.23	107.07		107.08	0.000147	0.68	62.51	32.70	0.09
SOUTH	7009.5	1%	53.40	104.23	107.52		107.53	0.000125	0.69	77.81	35.84	0.08
SOUTH	7000	4%	42.80	104.22	107.07		107.08	0.000204	0.81	52.81	27.09	0.10
SOUTH	7000	1%	53.40	104.22	107.52		107.53	0.000176	0.82	65.51	29.77	0.10
SOUTH	6900	4%	42.80	104.17	107.05		107.06	0.000195	0.80	53.67	27.28	0.10
SOUTH	6900	1%	53.40	104.17	107.50		107.51	0.000169	0.80	66.54	29.97	0.09
SOUTH	6800	4%	42.80	104.12	107.03		107.04	0.000187	0.78	54.56	27.47	0.10
SOUTH	6800	1%	53.40	104.12	107.48		107.49	0.000162	0.79	67.59	30.18	0.09
SOUTH	6700	4%	42.80	104.07	107.01		107.02	0.000179	0.77	55.48	27.69	0.10
SOUTH	6700	1%	53.40	104.07	107.47		107.48	0.000155	0.78	68.68	30.41	0.09
SOUTH	6600	4%	42.80	104.02	107.00		107.00	0.000171	0.76	56.34	27.87	0.09
SOUTH	6600	1%	53.40	104.02	107.45		107.46	0.000149	0.77	69.69	30.62	0.09
SOUTH	6500	4%	42.80	103.96	106.98		106.99	0.000163	0.75	57.35	28.06	0.09
SOUTH	6500	1%	53.40	103.96	107.44		107.45	0.000142	0.75	70.85	30.81	0.09
SOUTH	6400	4%	42.80	103.91	106.96		106.97	0.000155	0.73	58.44	28.31	0.09
SOUTH	6400	1%	53.40	103.91	107.42		107.43	0.000136	0.74	72.12	31.07	0.09
SOUTH	6300	4%	42.80	103.86	106.95		106.96	0.000148	0.72	59.43	28.51	0.09
SOUTH	6300	1%	53.40	103.86	107.41		107.42	0.000130	0.73	73.26	31.29	0.08
SOUTH	6200	4%	58.20	103.81	106.93		106.94	0.000210	0.87	67.22	31.99	0.11
SOUTH	6200	1%	73.30	103.81	107.39		107.40	0.000188	0.89	82.79	35.09	0.10
SOUTH	6184	4%	58.20	103.80	106.92		106.93	0.000263	0.97	60.25	28.66	0.12
SOUTH	6184	1%	73.30	103.80	107.38		107.40	0.000236	0.99	74.20	31.44	0.11
SOUTH	6174	4%	58.20	103.80	106.92		106.93	0.000262	0.96	60.36	28.71	0.12
SOUTH	6174	1%	73.30	103.80	107.38		107.40	0.000235	0.99	74.34	31.49	0.11
SOUTH	6100	4%	58.20	103.76	106.90		106.91	0.000256	0.96	60.86	28.81	0.12
SOUTH	6100	1%	73.30	103.76	107.36		107.38	0.000230	0.98	74.95	31.61	0.11
SOUTH	6000	4%	58.20	103.71	106.87		106.89	0.000248	0.95	61.57	28.96	0.11
SOUTH	6000	1%	73.30	103.71	107.34		107.36	0.000223	0.97	75.82	31.77	0.11

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: SOUTH (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SOUTH	5900	4%	58.20	103.66	106.85		106.86	0.000240	0.93	62.28	29.11	0.11
SOUTH	5900	1%	73.30	103.66	107.32		107.33	0.000216	0.96	76.68	31.94	0.11
SOUTH	5800	4%	58.20	103.61	106.83		106.84	0.000233	0.92	63.04	29.26	0.11
SOUTH	5800	1%	73.30	103.61	107.30		107.31	0.000209	0.94	77.58	32.11	0.11
SOUTH	5700	4%	58.20	103.56	106.80		106.82	0.000224	0.91	63.89	29.42	0.11
SOUTH	5700	1%	73.30	103.56	107.28		107.29	0.000202	0.93	78.57	32.28	0.11
SOUTH	5600	4%	58.20	103.51	106.78		106.79	0.000216	0.90	64.75	29.61	0.11
SOUTH	5600	1%	73.30	103.51	107.26		107.27	0.000195	0.92	79.59	32.48	0.10
SOUTH	5500	4%	58.20	103.46	106.76		106.77	0.000209	0.89	65.60	29.78	0.11
SOUTH	5500	1%	73.30	103.46	107.24		107.25	0.000189	0.91	80.60	32.66	0.10
SOUTH	5400	4%	58.20	103.41	106.74		106.75	0.000201	0.88	66.51	29.97	0.10
SOUTH	5400	1%	73.30	103.41	107.22		107.23	0.000182	0.90	81.66	32.86	0.10
SOUTH	5378	4%	58.20	103.40	106.74		106.75	0.000182	0.84	69.67	31.33	0.10
SOUTH	5378	1%	73.30	103.40	107.22		107.23	0.000165	0.86	85.52	34.36	0.10
SOUTH	5368	4%	58.20	103.39	106.74		106.75	0.000104	0.67	88.97	36.08	0.08
SOUTH	5368	1%	73.30	103.39	107.22		107.23	0.000098	0.70	105.07	38.95	0.07
SOUTH	5300	4%	58.20	103.36	106.73		106.74	0.000101	0.66	87.90	36.21	0.07
SOUTH	5300	1%	73.30	103.36	107.21		107.22	0.000095	0.69	106.10	39.11	0.07
SOUTH	5200	4%	58.20	103.31	106.72		106.73	0.000097	0.65	89.36	36.44	0.07
SOUTH	5200	1%	73.30	103.31	107.21		107.21	0.000091	0.68	107.69	39.35	0.07
SOUTH	5100	4%	58.20	103.26	106.71		106.72	0.000092	0.64	90.83	36.67	0.07
SOUTH	5100	1%	73.30	103.26	107.20		107.20	0.000088	0.67	109.28	39.57	0.07
SOUTH	5012.5	4%	58.20	103.22	106.70		106.71	0.000089	0.63	92.11	36.89	0.07
SOUTH	5012.5	1%	73.30	103.22	107.19		107.20	0.000085	0.66	110.69	39.80	0.07
SOUTH	5000	4%	137.80	103.21	106.67		106.70	0.000515	1.51	91.02	36.71	0.17
SOUTH	5000	1%	176.30	103.21	107.15		107.19	0.000507	1.61	109.33	39.59	0.17
SOUTH	4987.5	4%	137.80	103.21	106.66		106.70	0.000516	1.51	90.99	36.71	0.17
SOUTH	4987.5	1%	176.30	103.21	107.14		107.18	0.000508	1.61	109.31	39.59	0.17
SOUTH	4900	4%	137.80	103.16	106.62		106.65	0.000516	1.52	90.96	36.71	0.17
SOUTH	4900	1%	176.30	103.16	107.10		107.14	0.000508	1.61	109.30	39.59	0.17
SOUTH	4800	4%	137.80	103.11	106.57		106.60	0.000518	1.52	90.82	36.67	0.17
SOUTH	4800	1%	176.30	103.11	107.05		107.09	0.000509	1.61	109.18	39.56	0.17
SOUTH	4700	4%	137.80	103.06	106.51		106.55	0.000520	1.52	90.69	36.65	0.17
SOUTH	4700	1%	176.30	103.06	107.00		107.04	0.000511	1.62	109.08	39.56	0.17
SOUTH	4600	4%	137.80	103.01	106.46		106.50	0.000522	1.52	90.62	36.65	0.17
SOUTH	4600	1%	176.30	103.01	106.94		106.99	0.000511	1.62	109.06	39.54	0.17
SOUTH	4528	4%	137.80	102.98	106.42		106.46	0.000523	1.52	90.50	36.62	0.17
SOUTH	4528	1%	176.30	102.98	106.91		106.95	0.000512	1.62	108.95	39.53	0.17
SOUTH	4518	4%	137.80	102.97	106.42		106.45	0.000522	1.52	90.58	36.62	0.17
SOUTH	4518	1%	176.30	102.97	106.90		106.94	0.000511	1.62	109.01	39.52	0.17
SOUTH	4500	4%	137.80	102.97	106.41		106.44	0.000524	1.52	90.50	36.62	0.17
SOUTH	4500	1%	176.30	102.97	106.89		106.93	0.000512	1.62	108.96	39.53	0.17
SOUTH	4400	4%	137.80	102.92	106.36		106.39	0.000522	1.52	90.68	36.73	0.17
SOUTH	4400	1%	176.30	102.92	106.84		106.88	0.000510	1.61	109.25	39.66	0.17
SOUTH	4376	4%	137.80	102.91	106.34		106.38	0.000515	1.51	91.26	36.99	0.17
SOUTH	4376	1%	176.30	102.91	106.83		106.87	0.000503	1.60	109.98	39.94	0.17
SOUTH	4366	4%	137.80	102.90	106.35		106.37	0.000373	1.32	104.35	40.65	0.15
SOUTH	4366	1%	176.30	102.90	106.83		106.86	0.000369	1.41	124.86	43.57	0.15
SOUTH	4300	4%	137.80	102.87	106.32		106.35	0.000369	1.32	104.76	40.70	0.14
SOUTH	4300	1%	176.30	102.87	106.81		106.84	0.000365	1.41	125.30	43.62	0.15

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: SOUTH (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S Elev (ft)	Crit W.S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SOUTH	4200	4%	137.80	102.82	106.29		106.31	0.000363	1.31	105.35	40.80	0.14
SOUTH	4200	1%	176.30	102.82	106.77		106.80	0.000360	1.40	125.95	43.73	0.15
SOUTH	4100	4%	137.80	102.77	106.25		106.28	0.000358	1.30	105.92	40.89	0.14
SOUTH	4100	1%	176.30	102.77	106.74		106.77	0.000355	1.39	126.58	43.82	0.14
SOUTH	4000	4%	137.80	102.72	106.21		106.24	0.000352	1.29	106.51	40.99	0.14
SOUTH	4000	1%	176.30	102.72	106.70		106.73	0.000350	1.39	127.23	43.92	0.14
SOUTH	3900	4%	137.80	102.66	106.18		106.21	0.000345	1.29	107.22	41.05	0.14
SOUTH	3900	1%	176.30	102.66	106.67		106.70	0.000344	1.38	127.97	43.98	0.14
SOUTH	3800	4%	137.80	102.62	106.15		106.17	0.000340	1.28	107.83	41.18	0.14
SOUTH	3800	1%	176.30	102.62	106.63		106.66	0.000339	1.37	128.65	44.11	0.14
SOUTH	3700	4%	137.80	102.57	106.11		106.14	0.000334	1.27	108.51	41.27	0.14
SOUTH	3700	1%	176.30	102.57	106.60		106.63	0.000334	1.36	129.37	44.20	0.14
SOUTH	3600	4%	137.80	102.52	106.08		106.10	0.000328	1.26	109.17	41.34	0.14
SOUTH	3600	1%	176.30	102.52	106.57		106.60	0.000329	1.36	130.06	44.27	0.14
SOUTH	3500	4%	137.80	102.47	106.05		106.07	0.000322	1.25	109.89	41.45	0.14
SOUTH	3500	1%	176.30	102.47	106.53		106.56	0.000324	1.35	130.84	44.38	0.14
SOUTH	3400	4%	137.80	102.42	106.02		106.04	0.000316	1.25	110.65	41.56	0.13
SOUTH	3400	1%	176.30	102.42	106.50		106.53	0.000318	1.34	131.64	44.49	0.14
SOUTH	3300	4%	137.80	102.37	105.98		106.01	0.000310	1.24	111.37	41.66	0.13
SOUTH	3300	1%	176.30	102.37	106.47		106.50	0.000313	1.33	132.40	44.59	0.14
SOUTH	3225	4%	139.80	102.34	105.96		105.98	0.000316	1.25	111.76	41.74	0.13
SOUTH	3225	1%	178.80	102.34	106.45		106.48	0.000319	1.35	132.81	44.66	0.14
SOUTH	3200	4%	139.80	102.32	105.95		105.98	0.000313	1.25	112.15	41.77	0.13
SOUTH	3200	1%	178.80	102.32	106.44		106.47	0.000317	1.34	133.21	44.68	0.14
SOUTH	3137	4%	139.80	102.29	105.95		105.97	0.000043	1.23	113.22	41.93	0.13
SOUTH	3137	1%	178.80	102.29	106.43		106.46	0.000043	1.33	134.36	44.85	0.14
SOUTH	3109	4%	139.80	102.27	105.87		105.96	0.000208	2.45	57.06	23.85	0.28
SOUTH	3109	1%	178.80	102.27	106.35		106.45	0.000206	2.59	69.03	26.30	0.28
SOUTH	3100	4%	139.80	102.26	105.86		105.96	0.000223	2.56	54.67	22.39	0.29
SOUTH	3100	1%	178.80	102.26	106.33		106.45	0.000221	2.72	65.80	24.30	0.29
SOUTH	3000	4%	139.80	102.15	105.84		105.94	0.000202	2.46	56.75	22.75	0.27
SOUTH	3000	1%	178.80	102.15	106.32		106.43	0.000201	2.63	68.06	24.66	0.28
SOUTH	2900	4%	139.80	102.05	105.83		105.91	0.000184	2.38	58.70	23.10	0.26
SOUTH	2900	1%	178.80	102.05	106.30		106.40	0.000204	2.55	70.16	27.00	0.28
SOUTH	2865	4%	256.60	102.01	105.62		105.86	0.000519	3.95	64.88	26.48	0.45
SOUTH	2865	1%	323.60	102.01	106.08		106.35	0.000508	4.17	77.53	28.64	0.45
SOUTH	2800	4%	256.60	101.94	105.43		105.81	0.000856	4.92	52.15	21.93	0.56
SOUTH	2800	1%	323.60	101.94	105.87		106.29	0.000841	5.20	62.22	23.69	0.57
SOUTH	2700	4%	256.60	101.84	105.35		105.72	0.000835	4.87	52.65	22.04	0.55
SOUTH	2700	1%	323.60	101.84	105.80		106.21	0.000821	5.15	62.82	23.82	0.55
SOUTH	2600	4%	256.60	101.74	105.27		105.64	0.000816	4.83	53.09	22.12	0.55
SOUTH	2600	1%	323.60	101.74	105.72		106.12	0.000802	5.11	63.34	23.91	0.55
SOUTH	2500	4%	256.60	101.64	105.19		105.55	0.000795	4.79	53.59	22.21	0.54
SOUTH	2500	1%	323.60	101.64	105.64		106.04	0.000783	5.06	63.91	24.00	0.55
SOUTH	2400	4%	256.60	101.54	105.12		105.47	0.000774	4.74	54.14	22.31	0.54
SOUTH	2400	1%	323.60	101.54	105.57		105.96	0.000763	5.01	64.53	24.10	0.54
SOUTH	2300	4%	256.60	101.44	105.05		105.39	0.000747	4.68	54.84	22.43	0.53
SOUTH	2300	1%	323.60	101.44	105.50		105.88	0.000738	4.95	65.33	24.24	0.53
SOUTH	2200	4%	256.60	101.34	104.98		105.31	0.000720	4.62	55.57	22.56	0.52
SOUTH	2200	1%	323.60	101.34	105.43		105.81	0.000713	4.89	66.14	24.37	0.52
SOUTH	2100	4%	256.60	101.24	104.92		105.24	0.000694	4.56	56.32	22.68	0.51

HEC-RAS Plan: Plan 15 River: Hawthorn Reach: SOUTH (Continued)

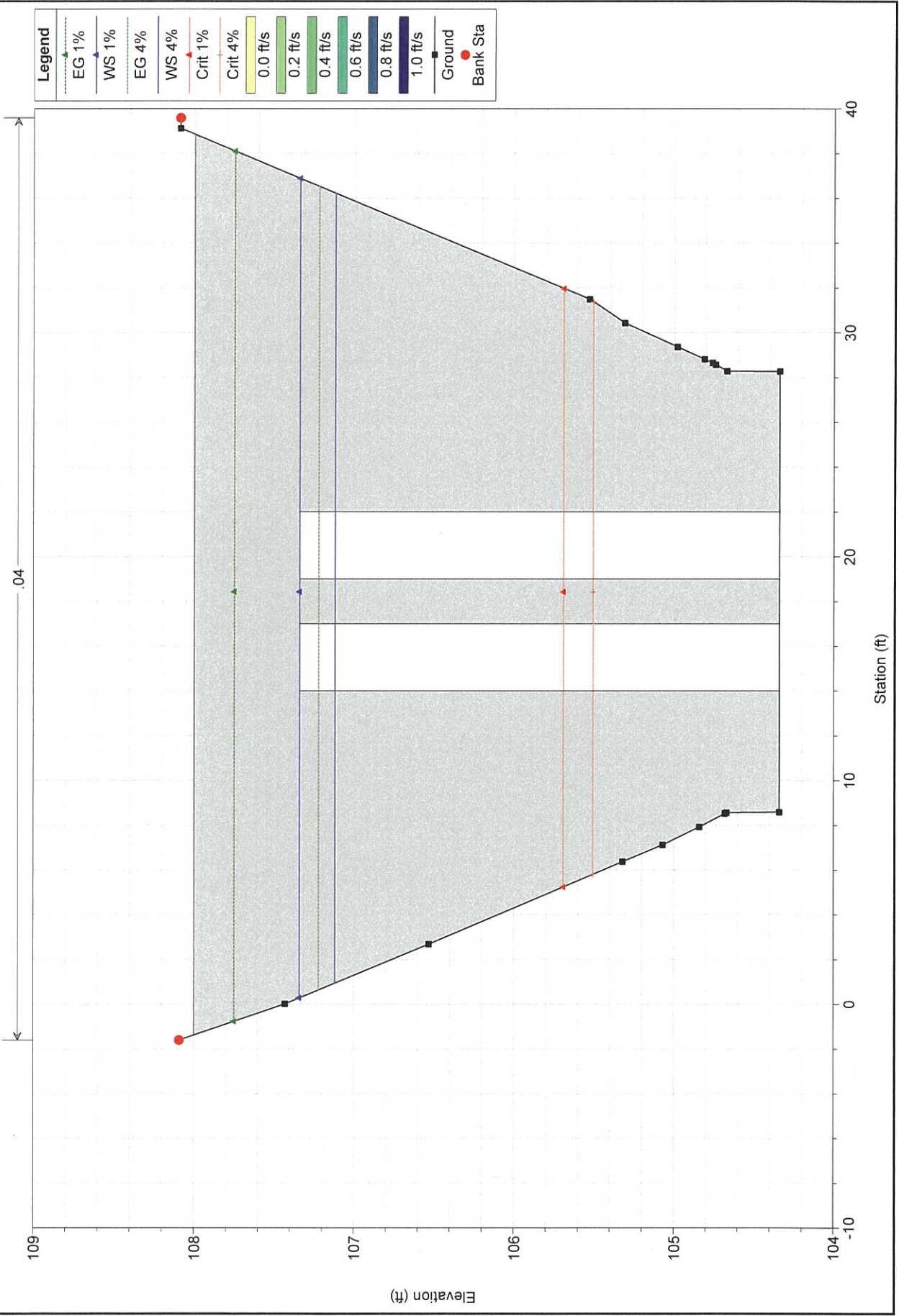
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E G Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SOUTH	2100	1%	323.60	101.24	105.37		105.73	0.000689	4.83	66.96	24.48	0.52
SOUTH	2060	4%	256.60	101.20	104.89		105.21	0.000690	4.55	56.45	22.71	0.51
SOUTH	2060	1%	323.60	101.20	105.34		105.70	0.000685	4.82	67.12	24.51	0.51
SOUTH	2050	4%	256.60	101.19	104.81		105.20	0.000875	4.99	51.46	21.47	0.57
SOUTH	2050	1%	323.60	101.19	105.26		105.69	0.000859	5.27	61.46	23.25	0.57
SOUTH	2000	4%	256.60	101.14	104.77		105.15	0.000870	4.98	51.56	21.48	0.57
SOUTH	2000	1%	323.60	101.14	105.21		105.64	0.000855	5.26	61.57	23.27	0.57
SOUTH	1900	4%	256.60	101.04	104.68		105.06	0.000854	4.94	51.91	21.54	0.56
SOUTH	1900	1%	323.60	101.04	105.13		105.56	0.000839	5.22	61.99	23.34	0.56
SOUTH	1800	4%	256.60	100.94	104.60		104.98	0.000834	4.90	52.36	21.63	0.56
SOUTH	1800	1%	323.60	100.94	105.05		105.47	0.000820	5.18	62.52	23.43	0.56
SOUTH	1700	4%	256.60	100.84	104.52		104.89	0.000818	4.86	52.75	21.71	0.55
SOUTH	1700	1%	323.60	100.84	104.98		105.39	0.000804	5.14	62.98	23.52	0.55
SOUTH	1600	4%	256.60	100.74	104.45		104.81	0.000797	4.82	53.24	21.78	0.54
SOUTH	1600	1%	323.60	100.74	104.90		105.30	0.000785	5.09	63.54	23.59	0.55
SOUTH	1500	4%	256.60	100.64	104.37		104.72	0.000775	4.77	53.79	21.88	0.54
SOUTH	1500	1%	323.60	100.64	104.83		105.22	0.000764	5.04	64.17	23.70	0.54
SOUTH	1470	4%	282.10	100.62	104.39		104.69	0.000623	4.36	64.68	26.05	0.49
SOUTH	1470	1%	357.30	100.62	104.85		105.18	0.000620	4.63	77.11	28.22	0.49
SOUTH	1400	4%	282.10	100.54	104.13		104.61	0.001094	5.55	50.82	21.35	0.63
SOUTH	1400	1%	357.30	100.54	104.56		105.10	0.001105	5.93	60.27	23.05	0.65
SOUTH	1300	4%	282.10	100.45	104.01		104.50	0.001122	5.60	50.35	21.27	0.64
SOUTH	1300	1%	357.30	100.45	104.44		104.99	0.001133	5.98	59.72	22.96	0.65
SOUTH	1200	4%	282.10	100.35	103.89		104.39	0.001152	5.66	49.85	21.16	0.65
SOUTH	1200	1%	357.30	100.35	104.31		104.88	0.001163	6.04	59.12	22.85	0.66
SOUTH	1100	4%	282.10	100.24	103.77		104.27	0.001176	5.71	49.44	21.05	0.66
SOUTH	1100	1%	357.30	100.24	104.19		104.76	0.001189	6.10	58.61	22.72	0.67
SOUTH	1000	4%	282.10	100.14	103.63		104.15	0.001219	5.78	48.81	20.94	0.67
SOUTH	1000	1%	357.30	100.14	104.05		104.64	0.001231	6.17	57.89	22.61	0.68
SOUTH	900	4%	282.10	100.04	103.49		104.03	0.001292	5.90	47.78	20.74	0.69
SOUTH	900	1%	357.30	100.04	103.90		104.52	0.001302	6.30	56.71	22.40	0.70
SOUTH	800	4%	282.10	99.94	103.32		103.89	0.001395	6.07	46.47	20.50	0.71
SOUTH	800	1%	357.30	99.94	103.73		104.38	0.001397	6.47	55.26	22.15	0.72
SOUTH	700	4%	282.10	99.84	103.10		103.74	0.001627	6.43	43.91	19.99	0.76
SOUTH	700	1%	357.30	99.84	103.50		104.23	0.001614	6.82	52.39	21.62	0.77
SOUTH	650	4%	282.10	99.79	102.96	102.60	103.65	0.001815	6.69	42.19	19.67	0.80
SOUTH	650	1%	357.30	99.79	103.37	102.98	104.14	0.001775	7.06	50.61	21.31	0.81
SOUTH	600	4%	282.10	99.72	102.53	102.53	103.51	0.002926	7.96	35.42	18.22	1.01
SOUTH	600	1%	357.30	99.72	102.90	102.90	104.00	0.002840	8.39	42.57	19.73	1.01
SOUTH	590	4%	282.10	99.70	102.46	102.46	103.43	0.002926	7.91	35.64	18.60	1.01
SOUTH	590	1%	357.30	99.70	102.83	102.83	103.91	0.002839	8.34	42.83	20.13	1.01
SOUTH	565	4%	282.10	99.64	102.97		103.15	0.000384	3.39	63.17	34.98	0.39
SOUTH	565	1%	357.30	99.64	103.39		103.59	0.000389	3.64	98.20	37.45	0.40
SOUTH	545	4%	282.10	99.59	102.96		103.13	0.002613	3.34	84.55	35.21	0.38
SOUTH	545	1%	357.30	99.59	103.37		103.57	0.002658	3.58	99.68	37.70	0.39
SOUTH	500	4%	282.10	99.48	102.84		103.01	0.002643	3.35	84.20	35.15	0.38
SOUTH	500	1%	357.30	99.48	103.25		103.45	0.002693	3.60	99.20	37.62	0.39
SOUTH	400	4%	282.10	99.25	102.56		102.74	0.002810	3.43	82.36	34.84	0.39
SOUTH	400	1%	357.30	99.25	102.95		103.17	0.002869	3.68	96.96	37.27	0.40
SOUTH	300	4%	282.10	99.00	102.26		102.45	0.002971	3.49	80.72	34.54	0.40
SOUTH	300	1%	357.30	99.00	102.66		102.88	0.003045	3.77	94.87	36.91	0.41

HEC-RAS Plan: Plan 15 River Hawthom Reach SOUTH (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SOUTH	200	4%	282.10	98.75	101.94		102.14	0.003246	3.61	78.18	34.08	0.42
SOUTH	200	1%	357.30	98.75	102.32		102.56	0.003343	3.90	91.71	36.38	0.43
SOUTH	100	4%	282.10	98.50	101.56		101.78	0.003806	3.82	73.84	33.32	0.45
SOUTH	100	1%	357.30	98.50	101.93		102.19	0.003932	4.13	86.51	35.53	0.47
SOUTH	0	4%	282.10	98.25	101.05		101.34	0.005235	4.27	66.04	32.06	0.52
SOUTH	0	1%	357.30	98.25	101.40		101.73	0.005383	4.61	77.43	34.14	0.54
SOUTH	-27.8	4%	282.10	98.18	101.00		101.18	0.003756	3.46	81.57	43.01	0.44
SOUTH	-27.8	1%	357.30	98.18	101.36		101.57	0.003662	3.65	97.86	46.64	0.44
SOUTH	-45	4%	282.10	98.14	101.01		101.16	0.000411	3.09	91.27	47.24	0.39
SOUTH	-45	1%	357.30	98.14	101.37		101.54	0.000403	3.27	109.30	51.24	0.39
SOUTH	-86	4%	282.10	98.04	101.00		101.14	0.000357	2.93	96.37	48.70	0.37
SOUTH	-86	1%	357.30	98.04	101.37		101.52	0.000353	3.11	114.97	52.70	0.37
SOUTH	-100	4%	282.10	98.00	100.97		101.12	0.002916	3.14	89.90	45.38	0.39
SOUTH	-100	1%	357.30	98.00	101.33		101.51	0.002900	3.34	107.10	49.08	0.40
SOUTH	-107.8	4%	282.10	97.99	100.95		101.10	0.002697	3.02	93.39	47.11	0.38
SOUTH	-107.8	1%	357.30	97.99	101.32		101.48	0.002679	3.21	111.29	50.95	0.38
SOUTH	-116.58	4%	282.10	97.96	100.94	99.67	101.07	0.002501	2.94	95.82	47.47	0.37
SOUTH	-116.58	1%	357.30	97.96	101.30	99.91	101.45	0.002501	3.14	113.84	51.20	0.37

Hawthorn

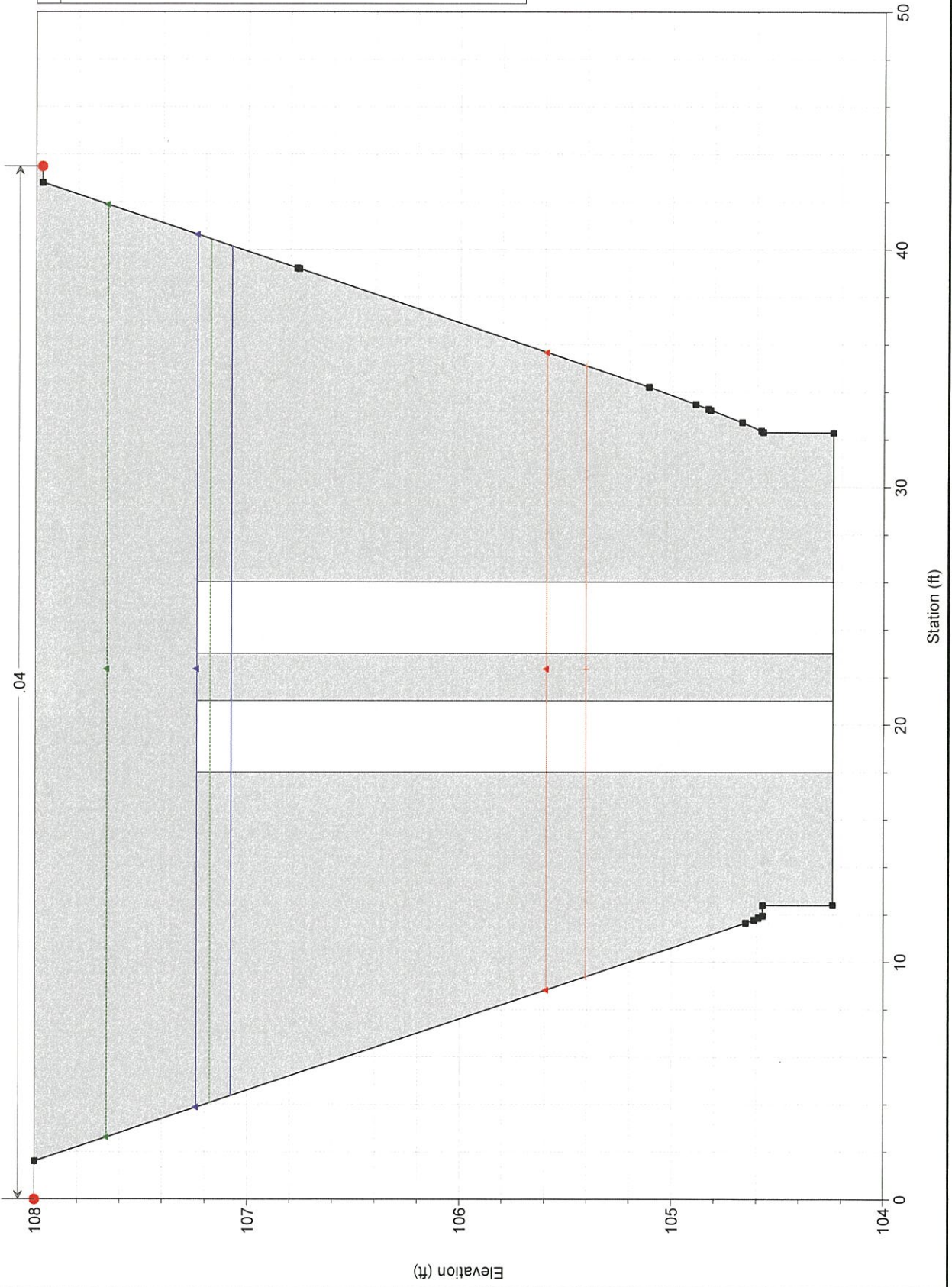
Geom: 2020_1110 Flow: 2020_1110
River = Hawthorn Reach = SOUTH RS = 7067.5 Culv (2) 3'x3' RCB



Hawthorn

Geom: 2020_1110 Flow: 2020_1110

River = Hawthorn Reach = SOUTH RS = 7067.5 Culv (2) 3'x3' RCB

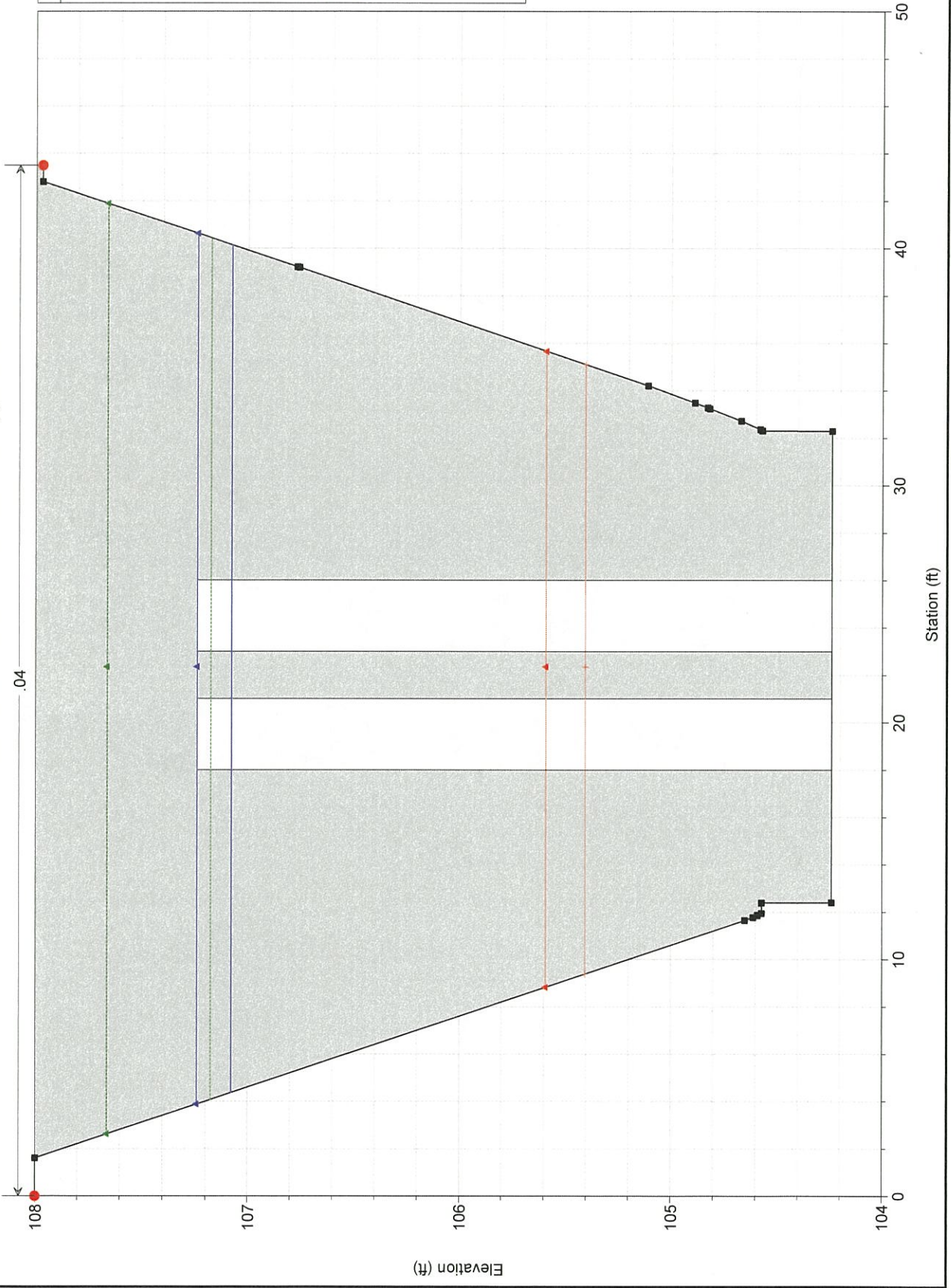


Plan: Plan 15 Hawthorn SOUTH RS: 7067.5 Culv Group: (2) 3x3 rcb Profile: 4%

Q Culv Group (cfs)	42.80	Culv Full Len (ft)	
# Barrels	2	Culv Vel US (ft/s)	2.57
Q Barrel (cfs)	21.40	Culv Vel DS (ft/s)	2.51
E.G. US. (ft)	107.27	Culv Inv El Up (ft)	104.34
W.S. US. (ft)	107.27	Culv Inv El Dn (ft)	104.24
E.G. DS (ft)	107.08	Culv Frctn Ls (ft)	0.05
W.S. DS (ft)	107.08	Culv Exit Loss (ft)	0.09
Delta EG (ft)	0.19	Culv Entr Loss (ft)	0.05
Delta WS (ft)	0.19	Q Weir (cfs)	
E.G. IC (ft)	106.19	Weir Sta Lft (ft)	
E.G. OC (ft)	107.27	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	107.12	Weir Max Depth (ft)	
Culv WS Outlet (ft)	107.08	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.05	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.17	Min El Weir Flow (ft)	108.01

Hawthorn

Geom: 2020_1110 Flow: 2020_1110
River = Hawthorn Reach = SOUTH RS = 7067.5 Culv (2) 3'x3' RCB



Legend

- EG 1%
- WS 1%
- EG 4%
- WS 4%
- Crit 1%
- Crit 4%
- 0.0 ft/s
- 0.2 ft/s
- 0.4 ft/s
- 0.6 ft/s
- 0.8 ft/s
- 1.0 ft/s
- Ground
- Bank Sta