

DRAINAGE CALCULATIONS

ATB-20-8.28

Final Tracings Submission
August 2019
CT Consultants, Inc.

HYDRAULIC NARRATIVE

The existing drainage along U.S. 20, within the project limits, consists of a closed/curbed system within the pavement area and swales flowing towards Indian Creek beyond the curb.

The proposed drainage along U.S. 20 will be identical to the existing drainage. Additional curb inlets were added to account for flat longitudinal slopes. While the spread exceeds the maximum allowed, the additional inlets are an improvement over the current conditions. Furthermore, there are no know existing ponding problems in the project area.

Since the E.D.A. for this project is under 1 acre, BMP's are not necessary.



INLET SPACING DESIGN

PID : 101798 **Date :** 07/31/2019 **Project :** ATB-20-0828

Location : ASHTABULA COUNTY, OHIO

Description : Spread Calc South Side

Designer : jre

Rainfall Area: A

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 4.00

Allowable Depth (ft.) : 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
55+40	Begin																	
58+25	CB-3A	285.00	0.90	0.16	10.00	6.15	16.15	0.0020	0.0300	0.0300	0.00	0.0400	3.49	0.44	0.07	0.50	0.171	5.71
58+75	CB-3A	50.00	0.90	0.07	10.00	0.90	10.90	0.0043	0.0302	0.0302	0.00	0.0400	4.16	*****	*****	0.33	0.127	4.20 Sag
59+15	Begin																	
58+75	CB-3A	40.00	0.90	0.03	10.00	0.94	10.94	0.0043	0.0302	0.0302	0.00	0.0000	4.15	*****	*****	0.11	0.085	2.80 End
59+15	Begin																	
59+50	CB-3A	35.00	0.90	0.03	10.00	0.77	10.77	0.0057	0.0256	0.0256	0.00	0.0400	4.18	*****	*****	0.11	0.076	2.96 Sag
61+38	Begin																	
60+60	CB-3A	78.00	0.90	0.05	10.00	1.50	11.50	0.0060	0.0250	0.0250	0.00	0.0400	4.07	0.18	0.00	0.18	0.089	3.56
59+50	CB-3A	110.00	0.90	0.08	10.00	1.90	11.90	0.0058	0.0256	0.0256	0.00	0.0400	4.01	*****	*****	0.29	0.108	4.20 End

SUMP DATA

Total Flow (cfs) : 0.40

Ponded Depth (ft.) : 0.034

Spread on Pavement (ft.) : 1.71



INLET SPACING DESIGN

PID : 101798 **Date :** 07/31/2019 **Project :** ATB-20-0828

Location : ASHTABULA COUNTY, OHIO

Description : Spread Calc North Side

Designer : jre

Rainfall Area: A

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 4.00

Allowable Depth (ft.) : 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
55+40	Begin																	
58+25	CB-3A	285.00	0.90	0.16	10.00	6.15	16.15	0.0020	0.0300	0.0300	0.00	0.0400	3.49	0.44	0.07	0.50	0.171	5.71
58+75	CB-3A	50.00	0.90	0.07	10.00	1.20	11.20	0.0018	0.0356	0.0356	0.00	0.0400	4.12	*****	*****	0.33	0.158	4.45 Sag
59+15	Begin																	
58+75	CB-3A	40.00	0.90	0.03	10.00	1.02	11.02	0.0035	0.0296	0.0296	0.00	0.0000	4.14	*****	*****	0.11	0.087	2.95 End
59+15	Begin																	
59+50	CB-3A	35.00	0.90	0.03	10.00	0.95	11.17	0.0036	0.0300	0.0227	0.00	0.0400	4.12	*****	*****	0.11	0.078	3.46 Sag
61+38	Begin																	
60+85	CB-3A	53.00	0.90	0.04	10.00	1.33	11.33	0.0034	0.0250	0.0250	0.00	0.0400	4.10	0.15	0.00	0.15	0.091	3.65
59+50	CB-3A	135.00	0.90	0.09	10.00	2.88	12.88	0.0034	0.0227	0.0227	0.00	0.0400	3.88	*****	*****	0.31	0.117	5.16 End

SUMP DATA

Total Flow (cfs) : 0.43

Ponded Depth (ft.) : 0.037

Spread on Pavement (ft.) : 1.74



STORM SEWER SYSTEM

PID : 101798 **Date :** 07/31/2019 **Project :** ATB-20-8.28

Location : Bridge over Indian Creek, west of SR 45

Description : Eastern System

Designer : J.R.E.

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 667.40

JUNCTION From	STATION To	From To	ΔAREA Σ AREA (acres)	ΔCA Σ CA	BEGIN TIME (min.)	RAINFALL		DISCHARGE		PIPE			F/L PIPE IN / OUT (ft.)	MEAN VEL (fps.)	JUST FULL CAPACITY (cfs.)	FRICT SLOPE (ft./ft.)	HYGR EL. IN / OUT (ft.)	COVER IN / OUT (ft.)	COVER MINUS HY GR	COVER MINUS CROWN	INLET TYPE MANNING'S 'n'
						(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)									
1	2	59+50	0.35	0.32	10.00	5.10	6.14	1.6	1.9	12	46.0	0.0068	664.25	3.43	2.74	0.0039	667.82	672.43	4.61	7.18	CB 3A
	begin	59+50	0.35	0.32									663.94				667.63	672.50			0.015
2	3	59+50	0.35	0.32	10.22	5.05	6.14	3.2	3.9	12	15.0	0.0147	663.94	5.35	4.03	0.0157	667.63	672.50	4.87	7.56	CB 3A
	final	59+44	0.70	0.63									663.72				667.40	668.60			0.015



STORM SEWER SYSTEM

PID : 101798 Date : 07/31/2019 Project : ATB-20-8.28

Location : Bridge over Indian Creek, west of SR 45

Description : Western System

Designer : J.R.E.

Rainfall Area: A

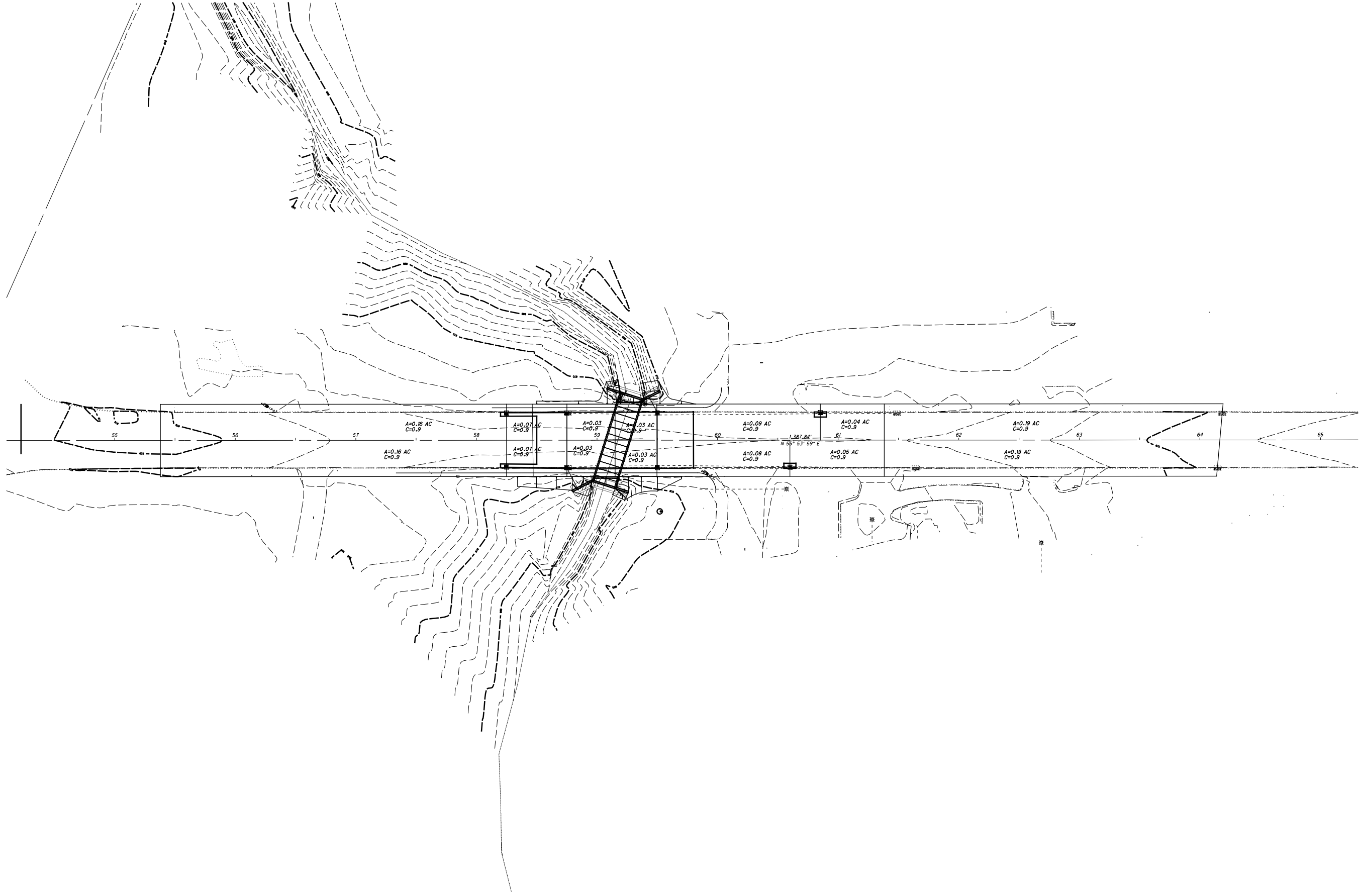
Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 667.36

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
		(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
1	2	0.16	0.14	10.00	5.10	6.16	0.7	0.9	12	50.0	0.0200	668.45	4.15	4.70	0.0008	668.76	672.45	3.69	3.00	CB 3A
	begin	0.16	0.14									667.45				668.15	672.47			0.015
3	4	0.16	0.14	10.00	5.10	6.14	0.7	0.9	12	50.0	0.0100	668.38	3.23	3.32	0.0008	668.75	672.38	3.63	3.00	CB 3A
	begin	0.32	0.29									667.88				668.58	672.48			0.015
4	2	0.07	0.06	10.26	5.04	6.09	1.0	1.3	12	46.0	0.0100	667.88	3.54	3.32	0.0017	668.32	672.48	4.16	3.60	CB 3A
		0.39	0.35									667.42				668.16	672.47			0.015
2	5	0.10	0.09	10.47	4.99	6.08	2.2	2.7	12	19.0	0.0547	667.42	8.10	7.77	0.0075	667.84	672.47	4.63	4.05	CB 3A
	final	0.49	0.44									666.38				667.36	669.50			0.015



ATB - 20 - 8 . 28

DRAINAGE MAP

CALCULATED
JRE
CHECKED
EJT

