

S.R. 4 DRAINAGE CALCULATIONS

BUT IR 75/VAR/5.22/VAR
STATE OF OHIO
BETHEL TOWNSHIP
COUNTY OF MIAMI

DATE: 08/29/2025
PREPARED FOR

Ohio Department of Transportation – District 8
505 S. State Route 741
Lebanon, Ohio 45036

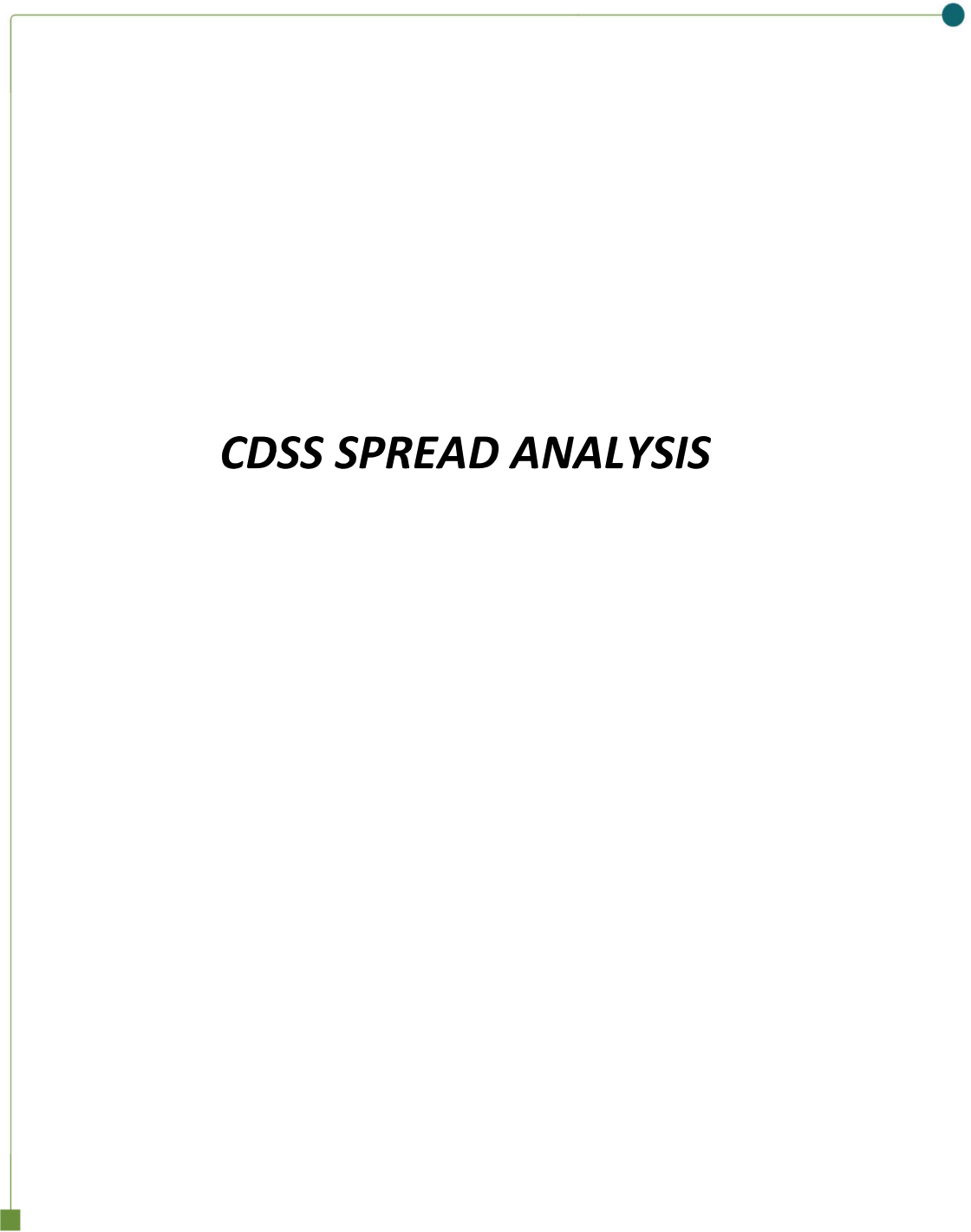


Creative Engineers. Intelligent Solutions.

22999 Forbes Road, Suite B
Cleveland, OH 44146
Phone: 440-439-1999
www.cvelimited.com

- add some information from the feasibility study to document the flap gate removal
- add some information from the feasibility study to document the retention pond cleanout
- add some information from the feasibility study to document flow direction of pipes (where it goes to the pond but also to the GMR)
- add some information from the email from August 2025 documenting why the pipes are being downsized

REVIEW COMPLETE	
PM	
BRIDGES	
CONSTRUCT	
DRAINAGE	
ENVIRON	
GEOTECH	
ITS	
MOT	
PAVEMENT	
ROADWAY	
R/W	
SURVEY	
TRAFFIC	
UTILITIES	
OTHER	
OTHER	

A thin green line runs horizontally across the top of the page, ending in a small teal circle. A vertical green line runs down the left side of the page, ending in a small green square.

CDSS SPREAD ANALYSIS



INLET SPACING DESIGN

PID : 117275 Date : 04/25/2024 Project : BUT IR 75/VAR/5.22/VAR Location : SR-4

Description : Existing BUT-04 East Inlet Spacing

Designer : SAF

Rainfall Area: C

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 6.00 *

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.)	
1301+71	Begin																		
1298+53	CB-3	318.00	0.75	0.60	10.00	4.36	14.36	0.0043	0.0160	0.0160	0.00	0.0000	4.09	*****	*****	1.84	0.191	11.92	Sag **
1288+43	Begin																		
1289+94	CB-3	151.00	0.68	0.18	10.00	2.47	12.47	0.0032	0.0830	0.0160	2.00	0.1670	4.38	0.54	0.00	0.54	0.225	5.71	
1291+45	CB-3	151.00	0.67	0.13	10.00	2.51	12.51	0.0032	0.0830	0.0160	2.00	0.1670	4.37	0.38	0.00	0.38	0.203	4.32	
1293+63	CB-3	218.00	0.69	0.19	10.00	3.51	13.51	0.0033	0.0830	0.0160	2.00	0.1670	4.21	0.55	0.00	0.55	0.226	5.77	
1296+05	CB-3	242.00	0.75	0.19	10.00	4.13	14.13	0.0029	0.0830	0.0160	2.00	0.1670	4.12	0.59	0.00	0.59	0.235	6.29	***
1298+43	CB-3	238.00	0.60	0.47	10.00	2.72	12.72	0.0060	0.0830	0.0160	2.00	0.1670	4.34	1.22	0.00	1.22	0.260	7.86	***
1298+53	CB-3	10.00	0.76	0.01	10.00	0.20	10.20	0.0060	0.0830	0.0160	2.00	0.1670	4.78	*****	*****	0.05	0.086	1.04	End

SUMP DATA

Total Flow (cfs) : 1.89

Ponded Depth (ft.) : 0.154

Spread on Pavement (ft.) : 2.83

*2 ft was added to spread limit since a 14' lane is proposed

**Existing conditions violate spread within reconstruction limits

***Existing conditions violate spread within resurfacing limits



confirm if CB3A for continuous grades makes a difference in the calculations. CB3A should be for continuous grades and CB3 for sag

In CDSS, the "Total Allowable Spread (Ft.)" is equal to the allowable spread (L&D Volume 2 Table 1103-1) into the traveled lane, measured from the face of curb. If there is a 2' gutter, plus 14' lanes, then the allowable spread would be 2' + 2' + 4' = 8'

INLET SPACING DESIGN

PID : 117275 Date : 08/05/2024 Project : BUT IR 75/VAR/5.22/VAR

Location : SR-4

Description :BUT-04 East Inlet Spacing

Designer : SAF

Rainfall Area: C

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 6.00*

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.)
1302+05	Begin																	
1301+71	CB-3	31.00	0.90	0.02	10.00	0.68	10.68	0.0094	0.0160	0.0160	0.00	0.0000	4.69	0.08	0.00	0.08	0.052	3.24
1301+25	CB-3	46.00	0.78	0.06	10.00	0.80	10.80	0.0094	0.0160	0.0160	0.00	0.0000	4.67	0.20	0.02	0.22	0.074	4.63
1300+75	CB-3	50.00	0.79	0.07	10.00	0.35	10.35	0.0940	0.0160	0.0160	0.00	0.0000	4.75	0.25	0.03	0.28	0.053	3.29
1300+25	CB-3	50.00	0.80	0.06	10.00	0.35	10.35	0.0940	0.0160	0.0160	0.00	0.0000	4.75	0.23	0.02	0.26	0.051	3.18
1299+75	CB-3	50.00	0.75	0.06	10.00	0.86	10.86	0.0094	0.0160	0.0160	0.00	0.0000	4.66	0.21	0.02	0.23	0.076	4.73
1299+25	CB-3	50.00	0.71	0.16	10.00	0.69	10.69	0.0094	0.0160	0.0160	0.00	0.0000	4.69	0.43	0.13	0.55	0.105	6.54 **
1298+53	CB-3	72.00	0.72	0.20	10.00	0.80	10.80	0.0094	0.0830	0.0160	1.38	0.1670	4.67	*****	*****	0.80	0.196	6.49 Sag **
1288+43	Begin																	
1289+94	CB-3	151.00	0.68	0.18	10.00	2.47	12.47	0.0032	0.0830	0.0160	2.00	0.1670	4.38	0.54	0.00	0.54	0.225	5.71
1291+45	CB-3	151.00	0.67	0.13	10.00	2.51	12.51	0.0032	0.0830	0.0160	2.00	0.1670	4.37	0.38	0.00	0.38	0.203	4.32
1293+63	CB-3	218.00	0.69	0.19	10.00	3.57	13.57	0.0032	0.0830	0.0160	2.00	0.1670	4.21	0.55	0.00	0.55	0.227	5.83
1296+05	CB-3	242.00	0.75	0.19	10.00	2.47	12.47	0.0085	0.0830	0.0160	2.00	0.1670	4.38	0.62	0.00	0.62	0.203	4.34
1297+50	CB-3	145.00	0.63	0.23	10.00	1.48	11.48	0.0085	0.0830	0.0160	2.00	0.1670	4.54	0.66	0.00	0.66	0.207	4.56
1298+43	CB-3	68.00	0.73	0.24	10.00	0.69	10.69	0.0085	0.0830	0.0160	2.00	0.1670	4.69	0.82	0.00	0.82	0.221	5.45
1298+53	CB-3	10.00	0.76	0.01	10.00	0.17	10.17	0.0085	0.0830	0.0160	2.00	0.1670	4.79	*****	*****	0.05	0.081	0.98 End

*2 ft was added to spread limit since a 14' lane is proposed

**Note that catch basins have been added every 50' where feasible and in this area needed additional distance to avoid elliptical pipe crossing. Cannot add any additional basins



INLET SPACING DESIGN

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF (ft.)	CONC. AREA (acres)	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.)
---------	--------------	---------------------------	-------------------------	--------------------------	--------------------------	------------------------	-----------------------------	-----------------------------	-----------------------------	-------------------------	----------------------------	----------------------------	-----------------------------	--------------------------	-------------------------	------------------------	--------------------------

SUMP DATA

Total Flow (cfs) : 0.85

Ponded Depth (ft.) : 0.074

Spread on Pavement (ft.) : 2.09



INLET SPACING DESIGN

In CDSS, the "Total Allowable Spread (Ft.)" is equal to the allowable spread (L&D Volume 2 Table 1103-1) into the traveled lane, measured from the face of curb. If there is a 2' gutter, plus 14' lanes, then the allowable spread would be 2' + 2' + 4' = 8'

PID : 117275 Date : 04/25/2024 Project : BUT IR 75/VAR/5.22/VAR Location : SR-4

Description : Existing BUT-04 West Inlet Spacing

Designer : SAF

Rainfall Area: C

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 6.00 *

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.)
1301+71	Begin																	
1298+75	CB-3	296.00	0.79	0.32	10.00	4.70	14.70	0.0043	0.0160	0.0160	0.00	0.0000	4.04	0.69	0.33	1.02	0.153	9.55 **
1298+32	CB-3	43.00	0.77	0.06	10.00	0.61	10.68	0.0043	0.0830	0.0160	2.00	0.1670	4.69	*****	*****	0.55	0.217	5.20 Sag
1288+33	Begin																	
1290+00	CB-3	167.00	0.81	0.17	10.00	2.72	12.72	0.0032	0.0830	0.0160	2.00	0.1670	4.34	0.60	0.00	0.60	0.232	6.16 ***
1291+45	CB-3	145.00	0.83	0.20	10.00	2.32	12.32	0.0032	0.0830	0.0160	2.00	0.1670	4.40	0.73	0.00	0.73	0.246	7.00 ***
1293+63	CB-3	218.00	0.71	0.33	10.00	3.32	13.32	0.0033	0.0830	0.0160	2.00	0.1670	4.24	0.99	0.00	0.99	0.266	8.27 ***
1294+75	CB-3A	112.00	0.65	0.18	10.00	1.87	11.87	0.0031	0.0830	0.0160	2.00	0.1670	4.48	0.52	0.00	0.52	0.225	5.68
1296+05	CB-3	130.00	0.90	0.25	10.00	2.09	12.09	0.0029	0.0830	0.0160	2.00	0.1670	4.44	1.00	0.00	1.00	0.271	8.58 ***
1298+32	CB-3	248.00	0.61	0.39	10.00	2.89	12.89	0.0060	0.0830	0.0160	2.00	0.1670	4.31	*****	*****	1.03	0.248	7.10 End **

SUMP DATA

Total Flow (cfs) : 1.57

Ponded Depth (ft.) : 0.132

Spread on Pavement (ft.) : 2.63

*2 ft was added to spread limit since a 14' lane is proposed
**Existing conditions violate spread within reconstruction limits
***Existing conditions violate spread within resurfacing limits



INLET SPACING DESIGN

In CDSS, the "Total Allowable Spread (Ft.)" is equal to the allowable spread (L&D Volume 2 Table 1103-1) into the traveled lane, measured from the face of curb. If there is a 2' gutter, plus 14' lanes, then the allowable spread would be 2' + 2' + 4' = 8'

PID : 117275 Date : 08/06/2024 Project : BUT IR 75/VAR/5.22/VAR Location : SR-4

Description : BUT-04 West Inlet Spacing

Designer : SAF

Rainfall Area: C

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 6.00*

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.)
1301+71	Begin																	
1301+25	CB-3	46.00	0.79	0.05	10.00	0.84	10.84	0.0094	0.0160	0.0160	0.00	0.0000	4.66	0.18	0.01	0.18	0.069	4.34
1300+75	CB-3	50.00	0.78	0.05	10.00	0.90	10.90	0.0094	0.0160	0.0160	0.00	0.0000	4.65	0.18	0.01	0.19	0.070	4.39
1300+25	CB-3	50.00	0.78	0.05	10.00	0.90	10.90	0.0094	0.0160	0.0160	0.00	0.0000	4.65	0.18	0.01	0.19	0.070	4.40
1299+75	CB-3	50.00	0.78	0.05	10.00	0.38	10.38	0.0940	0.0160	0.0160	0.00	0.0000	4.75	0.19	0.01	0.20	0.046	2.88
1299+25	CB-3	50.00	0.78	0.05	10.00	0.90	10.90	0.0094	0.0160	0.0160	0.00	0.0000	4.65	0.18	0.01	0.19	0.070	4.40
1298+53	CB-3	72.00	0.83	0.08	10.00	1.14	11.14	0.0094	0.0160	0.0160	0.00	0.0000	4.60	*****	*****	0.32	0.085	5.31 Sag
1288+33	Begin																	
1290+00	CB-3	167.00	0.81	0.17	10.00	2.72	12.72	0.0032	0.0830	0.0160	2.00	0.1670	4.34	0.60	0.00	0.60	0.232	6.16 **
1291+45	CB-3	145.00	0.83	0.20	10.00	2.32	12.32	0.0032	0.0830	0.0160	2.00	0.1670	4.40	0.73	0.00	0.73	0.246	7.00 **
1293+63	CB-3	218.00	0.71	0.33	10.00	3.37	13.37	0.0032	0.0830	0.0160	2.00	0.1670	4.24	0.99	0.00	0.99	0.267	8.33 **
1294+75	CB-3A	112.00	0.65	0.18	10.00	1.84	11.84	0.0032	0.0830	0.0160	2.00	0.1670	4.48	0.52	0.00	0.52	0.224	5.62
1296+05	CB-3	130.00	0.90	0.25	10.00	1.29	11.29	0.0085	0.0830	0.0160	2.00	0.1670	4.58	1.03	0.00	1.03	0.236	6.39 **
1297+50	CB-3	145.00	0.62	0.26	10.00	1.47	11.47	0.0085	0.0830	0.0160	2.00	0.0000	4.54	0.73	0.00	0.73	0.214	4.98
1298+32	CB-3	82.00	0.63	0.13	10.00	0.86	10.86	0.0085	0.0830	0.0160	2.00	0.0000	4.66	0.39	0.00	0.39	0.173	2.43
1298+53	CB-3	21.00	0.63	0.03	10.00	0.31	10.31	0.0085	0.0830	0.0160	2.00	0.1670	4.76	*****	*****	0.09	0.100	1.21 End



INLET SPACING DESIGN

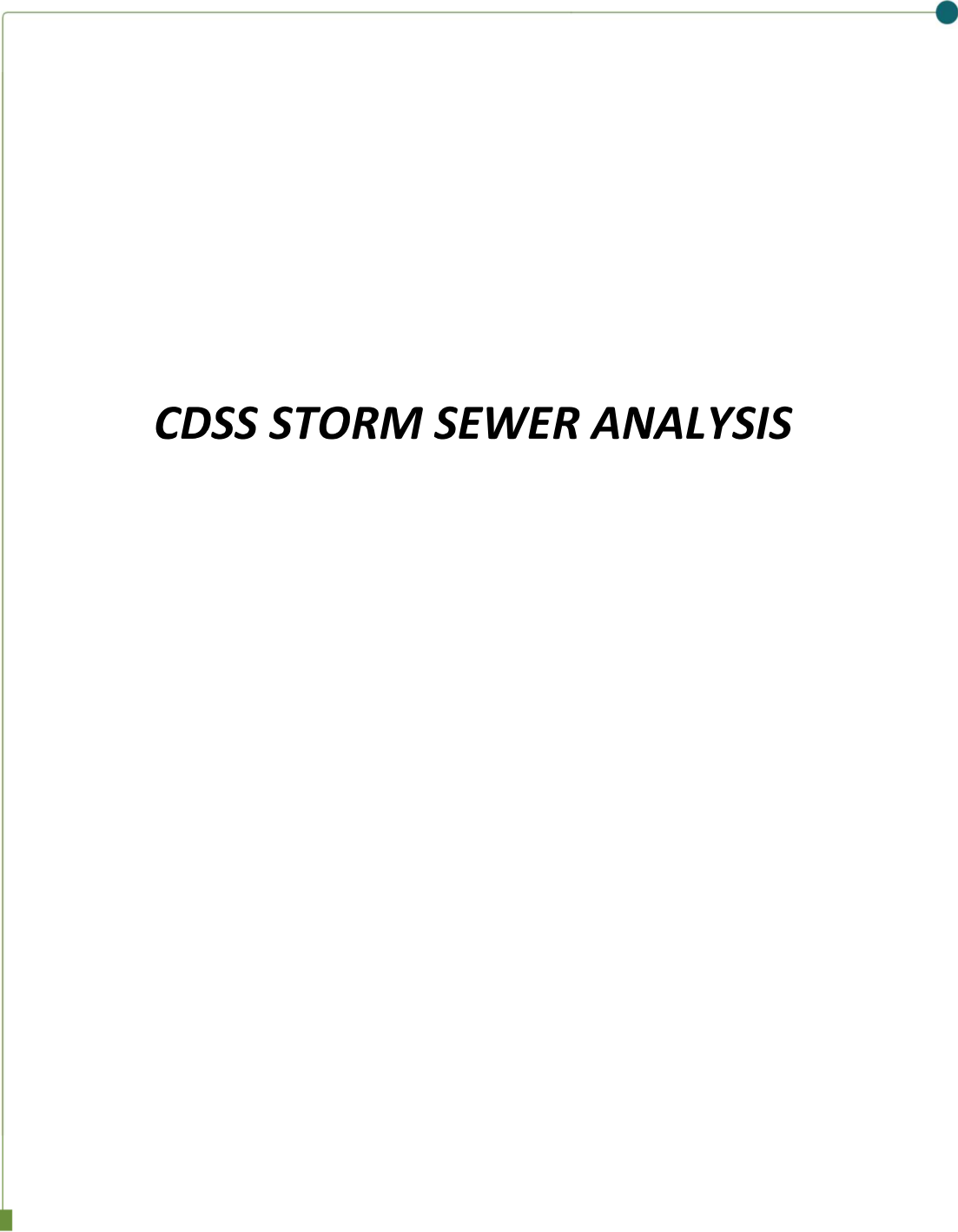
STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF (ft.)	CONC. AREA (acres)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
---------	--------------	---------------------------	-------------------------	--------------------------	--------------------------	------------------------	-----------------------------	-----------------------------	-----------------------------	-------------------------	----------------------------	----------------------------	-----------------------------	--------------------------	-------------------------	------------------------	--------------------------

SUMP DATA

Total Flow (cfs) : 0.41

Ponded Depth (ft.) : 0.028

Spread on Pavement (ft.) : 1.66



CDSS STORM SEWER ANALYSIS



STORM SEWER SYSTEM

PID : 117275 Date : 04/25/2024 Project : BUT IR 75/VAR/5.22/VAR Location : SR-4

Description : Existing BUT-04 North Storm Sewer

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 50

25

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 644.65

JUNCTION		STATION	Δ AREA	Δ CA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(50 yrs.)	(10 yrs.)	(50 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
N1	N3	1301+71	0.56	0.46	15.00	4.47	5.49	2.0	2.5	12	61.0	0.0120	650.59	4.51	3.63	0.0066	651.46	652.27	0.81	0.68	CB 2-5
	begin	1301+71	0.56	0.46									649.86				651.06	653.22			0.015
N3	N4	1301+71	8.30	6.37	15.23	4.44	5.49	30.3	37.5	27	7.0	0.0186	648.90	10.29	39.35	0.0195	651.06	653.22	2.16	2.07	MH 3
		1301+72	8.86	6.82									648.77				650.92	652.58			0.015
N4	N7	1301+72	1.17	0.85	15.24	4.44	5.36	34.1	41.1	48	257.0	0.0025	646.76	5.09	67.35	0.0011	649.35	652.58	3.23	1.82	CB 2-2B
		1299+15	10.03	7.67									646.11				649.07	652.64			0.015
N7	N8	1299+15	0.00	0.00	16.08	4.33	5.31	33.2	40.8	54 *	89.0	0.0019	645.64	4.55	80.12	0.0006	648.69	652.64	3.95	2.50	MH 1
		1298+53	10.03	7.67									645.47				648.64	655.37			0.015
N15	N16	1298+51	0.01	0.01	10.00	5.32	6.37	0.1	0.1	24	9.0	0.0533	647.70	2.42	48.71	0.0000	649.10	651.91	2.81	2.21	CB 3
	begin	1298+42	10.04	7.69									647.22				649.10	651.80			0.015
S1	N16	1298+32	0.39	0.24	10.00	5.32	6.37	1.3	1.5	24	44.0	0.0009	647.26	1.50	6.36	0.0001	649.10	652.00	2.90	2.74	CB 3
	begin	1298+42	10.43	7.92									647.22				649.10	651.80			0.015
N16	N8	1298+42	0.47	0.28	10.49	5.22	6.37	2.8	3.4	36	19.0	0.0095	647.49	4.14	60.52	0.0000	649.10	651.80	2.70	1.31	CB 3
		1298+53	10.90	8.21									647.31				649.10	655.37			0.015
N8	N9	1298+53	0.00	0.00	16.40	4.29	5.22	35.2	42.8	60	232.0	0.0039	645.55	5.95	151.23	0.0004	648.15	655.37	7.22	4.82	MH 1
	final	1299+53	10.90	8.21									644.65				648.06	649.65			0.015

**54" pipe size was used as an equivalent size to represent the 68"x43" elliptical pipe since it has the same approximate cross sectional area



STORM SEWER SYSTEM

PID : 117275 **Date :** 08/29/2025 **Project :** BUT IR 75/VAR/5.22/VAR **Location :** SR-4

Description : Proposed BUT-04 North Storm Sewer

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 50

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 644.65

JUNCTION From	STATION To	From To	ΔAREA	ΔCA	BEGIN	RAINFALL				DISCHARGE			PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
			Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(50 yrs.)	(10 yrs.)	(50 yrs.)	(cfs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'		
N1	N2	1301+71	0.56	0.46	15.00	4.47	5.49	2.0	2.5	12	16.0	0.0119	650.59	4.49	3.62	0.0066	651.50	653.23	1.73	1.64	CB 2-5			
	begin	1301+71	0.56	0.46									650.40				651.39	653.19			0.015			
N2	N3	1301+71	0.02	0.02	15.06	4.47	5.49	2.1	2.6	12	45.0	0.0120	650.40	4.55	3.64	0.0072	651.39	653.19	1.80	1.79	CB 3			
		1301+71	0.58	0.48									649.86				651.07	653.12			0.015			
N3	N4	1301+71	8.47	6.51	15.22	4.44	5.49	31.0	38.4	27	7.0	0.0186	648.90	10.32	39.35	0.0204	651.07	653.12	2.05	1.97	CB 3			
		1301+72	9.05	6.98									648.77				650.93	653.90			0.015			
N4	N5	1301+72	1.00	0.71	15.24	4.44	5.47	34.2	42.1	48	47.0	0.0026	646.76	5.11	67.67	0.0011	649.66	653.90	4.24	3.14	MH 3			
		1300+25	10.05	7.69									646.64				649.61	653.71			0.015			
N13	N14	1301+25	0.06	0.05	10.00	5.32	5.31	0.2	0.2	12	43.0	0.0100	647.14	2.35	3.32	0.0001	648.97	652.87	3.90	4.73	CB 3			
	begin	1301+25	10.11	7.74									646.71				648.97	652.99			0.015			
N14	N5	1301+25	0.05	0.04	10.30	5.26	5.31	0.5	0.5	12	6.5	0.0108	646.71	2.88	3.45	0.0002	648.97	652.99	4.02	5.28	CB 3			
		1301+25	10.16	7.78									646.64				648.97	653.71			0.015			
N5	N6	1301+25	0.00	0.00	15.39	4.42	5.31	34.4	41.3	48	50.0	0.0024	643.64	5.00	65.60	0.0011	648.97	653.71	4.74	6.07	MH BC			
		1300+75	10.16	7.78									643.52				648.91	653.29			0.015			
N15	N16	1300+75	0.07	0.06	10.00	5.32	5.31	0.3	0.3	12	43.0	0.0100	647.02	2.49	3.32	0.0001	648.92	652.48	3.56	4.46	CB 3			
	begin	1300+75	10.23	7.83									646.59				648.92	652.49			0.015			



STORM SEWER SYSTEM

JUNCTION		STATION	Δ AREA	Δ CA	BEGIN	RAINFALL				DISCHARGE		PIPE		F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(50 yrs.)	(10 yrs.)	(50 yrs.)	(cfs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
N16	N6	1300+75 1300+75	0.05 10.28	0.04 7.87	10.29	5.26	5.31	0.5	0.5	12	6.5	0.0108	646.59 646.52	2.95	3.45	0.0003	648.92 648.91	652.49 653.29	3.57	4.90	CB 3 0.015	
N6	N7	1300+75 1300+25	0.00 10.28	0.00 7.87	15.56	4.40	5.31	34.6	41.8	48	50.0	0.0026	643.52 643.39	5.16	68.28	0.0011	648.91 648.86	653.29 652.91	4.38	5.77	MH BC 0.015	
N17	N18 begin	1300+25 1300+25	0.06 10.34	0.05 7.92	10.00	5.32	5.31	0.3	0.3	12	43.0	0.0100	646.89 646.46	2.38	3.32	0.0001	648.86 648.86	652.01 652.02	3.15	4.12	CB 3 0.015	
N18	N7	1300+25 1300+25	0.05 10.39	0.04 7.96	10.30	5.26	5.31	0.5	0.5	12	6.5	0.0108	646.46 646.39	2.90	3.45	0.0002	648.86 648.86	652.02 652.91	3.16	4.56	CB 3 0.015	
N7	N8	1300+25 1299+75	0.00 10.39	0.00 7.96	15.72	4.38	5.31	34.8	42.3	48	50.0	0.0024	643.39 643.27	5.01	65.60	0.0012	648.86 648.80	652.91 653.05	4.05	5.52	MH BC 0.015	
N19	N20 begin	1299+75 1299+75	0.06 10.45	0.05 8.01	10.00	5.32	5.31	0.2	0.2	12	42.0	0.0100	646.76 646.34	2.33	3.32	0.0001	648.80 648.80	651.55 651.55	2.75	3.79	CB 3 0.015	
N20	N8	1299+75 1299+75	0.05 10.50	0.04 8.04	10.30	5.26	5.31	0.4	0.4	12	6.5	0.0108	646.34 646.27	2.86	3.45	0.0002	648.80 648.80	651.55 653.05	2.75	4.21	CB 3 0.015	
N8	N9	1299+75 1299+25	0.00 10.50	0.00 8.04	15.88	4.35	5.31	35.0	42.7	48	50.0	0.0026	643.27 643.14	5.18	68.28	0.0012	648.80 648.74	653.05 652.62	4.25	5.78	MH BC 0.015	
N21	N22 begin	1299+25 1299+25	0.16 10.66	0.11 8.16	10.00	5.32	5.31	0.6	0.6	12	40.5	0.0099	646.61 646.21	3.03	3.30	0.0004	648.76 648.75	651.10 651.10	2.34	3.49	CB 3 0.015	
N22	N9	1299+25 1299+25	0.05 10.71	0.04 8.20	10.22	5.28	5.31	0.8	0.8	12	6.5	0.0108	646.21 646.14	3.41	3.45	0.0007	648.75 648.74	651.10 652.62	2.35	3.89	CB 3 0.015	
N9	N10	1299+25 1299+15	0.00 10.71	0.00 8.20	16.04	4.33	5.31	35.5	43.6	48	10.0	0.0030	643.14 643.11	5.48	73.35	0.0012	648.74 648.73	652.62 652.64	3.88	5.48	MH BC 0.015	



STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(50 yrs.)	(10 yrs.)	(50 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
N10	N11	1299+15 1298+53	0.00 10.71	0.00 8.20	16.07	4.33	5.31	35.5	43.6	54 *	89.0	0.0019	645.64 645.47	4.63	80.12	0.0007	648.73 648.67	652.64 655.37	3.91	2.50	MH 1 0.015
N23	N24	1298+53 begin 1298+43	0.21 10.92	0.15 8.35	10.00	5.32	6.49	0.8	1.0	12	10.0	0.0200	647.70 647.50	4.26	4.70	0.0010	648.22 648.21	650.66 650.64	2.44	1.96	CB 3 0.015
N24	N11	1298+43 1298+53	0.24 11.16	0.18 8.52	10.04	5.31	5.22	1.7	1.7	36	19.0	0.0100	646.00 645.81	3.66	62.18	0.0000	648.17 648.17	650.64 655.37	2.47	1.64	CB 3 0.015
N11	N12	1298+53 final 1299+53	0.00 11.16	0.00 8.52	16.40	4.29	5.22	36.5	44.5	60	232.0	0.0039	645.55 644.65	6.02	151.23	0.0004	648.17 648.08	655.37 649.65	7.20	4.82	MH 1 0.015



STORM SEWER SYSTEM

PID : 117275 **Date :** 08/29/2025 **Project :** BUT IR 75/VAR/5.22/VAR **Location :** SR-4

Description : Existing BUT-04 South Storm Sewer with 649.50 Tailwater

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 649.50

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE	PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE			
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.) (25 yrs.)	(cfs.) (10 yrs.) (25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'		
S1	S2	1298+32	0.00	0.00	10.00	5.32	3.94	0.0	0.0	27	227.0	0.0011	647.29	0.00	9.39	0.0000	650.34	652.02	1.68	2.48	MH 3
	begin	1296+05	0.00										647.05				650.34	653.43			0.015
S2	S3	1296+05	0.44	0.37	10.00	5.32	3.94	2.0	1.4	36	131.0	0.0037	647.03	2.67	37.64	0.0000	650.34	653.43	3.09	3.40	MH 3
		1294+75	0.44	0.37									646.55				650.34	653.35			0.015
S21	S22	1296+05	0.19	0.14	10.00	5.32	3.94	0.8	0.6	12	44.0	0.0150	648.90	3.76	4.07	0.0003	650.36	652.55	2.19	2.65	CB 3
	begin	1296+05	0.63	0.51									648.24				650.34	652.55			0.015
S22	S3	1296+05	0.25	0.23	10.19	5.28	3.94	1.9	1.4	12	4.0	0.0025	648.21	2.47	1.66	0.0022	650.34	652.55	2.21	3.34	CB 3
		1296+05	0.88	0.74				Warning									650.34	653.10			0.015
S3	S4	1294+75	0.18	0.12	10.82	5.16	3.94	4.4	3.4	36	112.0	0.0037	646.55	3.38	37.62	0.0000	650.34	653.35	3.01	3.80	MH 3
		1293+63	1.06	0.85									646.14				650.33	653.65			0.015
S4	S5	1293+63	0.52	0.36	11.37	5.06	3.94	6.2	4.8	36	219.0	0.0032	646.07	3.54	35.16	0.0001	650.33	653.65	3.32	4.58	MH 3
		1291+45	1.58	1.22									645.37				650.32	654.31			0.015
S5	S6	1291+45	0.33	0.25	12.40	4.88	3.94	7.2	5.8	36	144.0	0.0023	645.36	3.28	29.77	0.0001	650.32	654.31	3.99	5.95	MH 3
		1290+02	1.91	1.47									645.03				650.30	657.63			0.015
S6	S7	1290+02	0.35	0.26	13.13	4.76	3.94	8.2	6.8	36	135.0	0.0023	645.03	3.42	29.80	0.0001	650.30	657.63	7.33	9.60	MH 3
		1288+67	2.26	1.73									644.72				650.28	658.06			0.015



STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL				DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(cfs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S7	S8	1288+67 1287+85	0.00 2.26	0.00 1.73	13.79	4.65	3.94	8.0	6.8	36	82.0	0.0023	644.72 644.53	3.41	29.93	0.0001	650.28 650.27	658.06 658.28	7.78	10.34		MH 3 0.015	
S8	S9	1287+85 1286+98	0.34 2.60	0.27 2.00	14.19	4.59	3.94	9.2	7.9	36	87.0	0.0023	644.53 644.33	3.52	29.81	0.0002	650.27 650.26	658.28 656.65	8.01	10.75		MH 2 0.015	
S9	S10	1286+98 1283+87	0.00 2.60	0.00 2.00	14.60	4.53	3.94	9.0	7.9	36	312.0	0.0023	644.33 643.61	3.51	29.87	0.0002	650.26 650.20	656.64 657.31	6.38	9.31		MH 2 0.015	
S10	S11	1283+87 1280+70	0.72 3.32	0.44 2.43	16.08	4.33	3.94	10.5	9.6	36	317.0	0.0023	643.61 642.88	3.65	29.84	0.0003	650.20 650.11	657.31 656.60	7.11	10.70		MH 2 0.015	
S11	S12	1280+70 1278+84	0.00 3.32	0.00 2.43	17.53	4.15	3.94	10.1	9.6	36	187.0	0.0023	642.88 642.45	3.61	29.82	0.0003	650.11 650.06	656.60 645.45	6.49	10.72		MH 2 0.015	
S12	S13	1278+84 1277+13	0.15 3.47	0.14 2.57	18.39	4.05	3.94	10.4	10.1	36	173.0	0.0041	642.45 641.74	4.50	39.84	0.0003	650.06 650.01	645.45 655.71	-4.61	0.00		MH BC 0.015	
S13	S14	1277+13 1273+26	0.08 3.55	0.07 2.64	19.03	3.97	3.94	10.5	10.4	36	386.0	0.0026	641.73 640.74	3.80	31.49	0.0003	650.01 649.88	655.71 657.62	5.70	10.98		MH 2 0.015	
S14	S15	1273+26 1269+41	0.27 3.82	0.24 2.88	20.72	3.80	3.94	10.9	11.3	36	385.0	0.0026	640.73 639.74	3.85	31.53	0.0004	649.88 649.74	657.62 660.31	7.74	13.89		MH 2 0.015	
S15	S16	1269+41 1265+69	0.00 3.82	0.00 2.88	22.39	3.64	3.94	10.5	11.3	36	373.0	0.0028	639.73 638.70	3.90	32.68	0.0004	649.74 649.59	660.31 662.63	10.57	17.58		MH 2 0.015	
S16	S17 final	1265+69 1263+32	0.00 3.82	0.00 2.88	23.99	3.50	3.94	10.1	11.3	36	238.0	0.0029	638.20 637.50	3.95	33.72	0.0004	649.59 649.50	662.63 640.50	13.04	21.43		MH 2 0.015	

BC = BLIND CONNECTION (existing concrete collar)

S14 is shown as being at a MH for existing calculations. There is a positive number. There is a big change with proposed conditions



STORM SEWER SYSTEM

PID : 117275 **Date :** 08/29/2025 **Project :** BUT IR 75/VAR/5.22/VAR **Location :** SR-4

Description : Existing BUT-04 South Storm Sewer with 652.50 Tailwater

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 652.50

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.)	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.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
S1	S2	1298+32	0.00	10.00	5.32	3.94	27	227.0	0.0011	647.29	0.00	9.39	0.0000	653.34	652.02	-1.32	2.48	MH 3
begin		1296+05	0.00							647.05				653.34	653.43			0.015
S2	S3	1296+05	0.44	10.00	5.32	3.94	36	131.0	0.0037	647.03	2.67	37.64	0.0000	653.34	653.43	0.09	3.40	MH 3
		1294+75	0.44							646.55				653.34	653.35			0.015
S21	S22	1296+05	0.19	10.00	5.32	3.94	12	44.0	0.0150	648.90	3.76	4.07	0.0003	653.36	652.55	-0.81	2.65	CB 3
begin		1296+05	0.63							648.24				653.34	652.55			0.015
S22	S3	1296+05	0.25	10.19	5.28	3.94	12	4.0	0.0025	648.21	2.47	1.66	0.0022	653.34	652.55	-0.79	3.34	CB 3
		1296+05	0.88				Warning			648.20				653.34	653.10			0.015
S3	S4	1294+75	0.18	10.82	5.16	3.94	36	112.0	0.0037	646.55	3.38	37.62	0.0000	653.34	653.35	0.01	3.80	MH 3
		1293+63	1.06							646.14				653.33	653.65			0.015
S4	S5	1293+63	0.52	11.37	5.06	3.94	36	219.0	0.0032	646.07	3.54	35.16	0.0001	653.33	653.65	0.32	4.58	MH 3
		1291+45	1.58							645.37				653.32	654.31			0.015
S5	S6	1291+45	0.33	12.40	4.88	3.94	36	144.0	0.0023	645.36	3.28	29.77	0.0001	653.32	654.31	0.99	5.95	MH 3
		1290+02	1.91							645.03				653.30	657.63			0.015
S6	S7	1290+02	0.35	13.13	4.76	3.94	36	135.0	0.0023	645.03	3.42	29.80	0.0001	653.30	657.63	4.33	9.60	MH 3
		1288+67	2.26							644.72				653.28	658.06			0.015



STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL				DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(cfs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S7	S8	1288+67 1287+85	0.00 2.26	0.00 1.73	13.79	4.65	3.94	8.0	6.8	36	82.0	0.0023	644.72 644.53	3.41	29.93	0.0001	653.28 653.27	658.06 658.28	4.78	10.34		MH 3 0.015	
S8	S9	1287+85 1286+98	0.34 2.60	0.27 2.00	14.19	4.59	3.94	9.2	7.9	36	87.0	0.0023	644.53 644.33	3.52	29.81	0.0002	653.27 653.26	658.28 656.65	5.01	10.75		MH 2 0.015	
S9	S10	1286+98 1283+87	0.00 2.60	0.00 2.00	14.60	4.53	3.94	9.0	7.9	36	312.0	0.0023	644.33 643.61	3.51	29.87	0.0002	653.26 653.20	656.64 657.31	3.38	9.31		MH 2 0.015	
S10	S11	1283+87 1280+70	0.72 3.32	0.44 2.43	16.08	4.33	3.94	10.5	9.6	36	317.0	0.0023	643.61 642.88	3.65	29.84	0.0003	653.20 653.11	657.31 656.60	4.11	10.70		MH 2 0.015	
S11	S12	1280+70 1278+84	0.00 3.32	0.00 2.43	17.53	4.15	3.94	10.1	9.6	36	187.0	0.0023	642.88 642.45	3.61	29.82	0.0003	653.11 653.06	656.60 645.45	3.49	10.72		MH 2 0.015	
S12	S13	1278+84 1277+13	0.15 3.47	0.14 2.57	18.39	4.05	3.94	10.4	10.1	36	173.0	0.0041	642.45 641.74	4.50	39.84	0.0003	653.06 653.01	645.45 655.71	-7.61	0.00		MH BC 0.015	
S13	S14	1277+13 1273+26	0.08 3.55	0.07 2.64	19.03	3.97	3.94	10.5	10.4	36	386.0	0.0026	641.73 640.74	3.80	31.49	0.0003	653.01 652.88	655.71 657.62	2.70	10.98		MH 2 0.015	
S14	S15	1273+26 1269+41	0.27 3.82	0.24 2.88	20.72	3.80	3.94	10.9	11.3	36	385.0	0.0026	640.73 639.74	3.85	31.53	0.0004	652.88 652.74	657.62 660.31	4.74	13.89		MH 2 0.015	
S15	S16	1269+41 1265+69	0.00 3.82	0.00 2.88	22.39	3.64	3.94	10.5	11.3	36	373.0	0.0028	639.73 638.70	3.90	32.68	0.0004	652.74 652.59	660.31 662.63	7.57	17.58		MH 2 0.015	
S16	S17 final	1265+69 1263+32	0.00 3.82	0.00 2.88	23.99	3.50	3.94	10.1	11.3	36	238.0	0.0029	638.20 637.50	3.95	33.72	0.0004	652.59 652.50	662.63 640.50	10.04	21.43		MH 2 0.015	

BC = BLIND CONNECTION (existing concrete collar)



STORM SEWER SYSTEM

PID : 117275 **Date :** 08/29/2025 **Project :** BUT IR 75/VAR/5.22/VAR **Location :** SR-4

Description : Existing BUT-04 South Storm Sewer with Program Sizing Pipes

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 637.50

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE	PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE			
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S1	S2	1298+32	0.00	0.00	10.00	5.32	5.84	0.0	0.0	12	227.0	0.0011	648.54	0.00	1.08	0.0000	650.03	652.02	1.99	2.48	MH 3
	begin	1296+05	0.00										648.30				650.03	653.43			0.015
S2	S3	1296+05	0.44	0.37	10.00	5.32	5.84	2.0	2.1	12	131.0	0.0037	649.03	2.70	2.01	0.0048	650.03	653.43	3.40	3.40	MH 3
		1294+75	0.44	0.37									648.55				649.36	653.35			0.015
S21	S22	1296+05	0.19	0.14	10.00	5.32	5.73	0.8	0.8	12	44.0	0.0150	648.90	3.76	4.07	0.0007	649.22	652.55	3.33	2.65	CB 3
	begin	1296+05	0.63	0.51									648.24				649.16	652.55			0.015
S22	S3	1296+05	0.25	0.23	10.19	5.28	5.73	1.9	2.1	15	4.0	0.0025	647.96	2.46	3.01	0.0014	649.16	652.55	3.39	3.34	CB 3
		1296+05	0.88	0.74									647.95				649.15	653.10			0.015
S3	S4	1294+75	0.18	0.12	10.81	5.16	5.73	4.4	4.9	18	112.0	0.0037	648.05	3.46	5.93	0.0029	649.15	653.35	4.20	3.80	MH 3
		1293+63	1.06	0.85									647.64				648.82	653.65			0.015
S4	S5	1293+63	0.52	0.36	11.35	5.06	5.54	6.2	6.7	21	219.0	0.0032	647.32	3.58	8.35	0.0024	648.58	653.65	5.07	4.58	MH 3
		1291+45	1.58	1.22									646.62				647.97	654.31			0.015
S5	S6	1291+45	0.33	0.25	12.37	4.88	4.93	7.2	7.3	24	144.0	0.0023	646.36	3.29	10.10	0.0014	647.89	654.31	6.42	5.95	MH 3
		1290+02	1.91	1.47									646.03				647.69	657.63			0.015
S6	S7	1290+02	0.35	0.26	13.10	4.76	4.93	8.2	8.5	24	135.0	0.0023	646.03	3.37	10.11	0.0019	647.69	657.63	9.94	9.60	MH 3
		1288+67	2.26	1.73									645.72				647.44	658.06			0.015



STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL				DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(cfs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S7	S8	1288+67 1287+85	0.00 2.26	0.00 1.73	13.76	4.66	4.93	8.1	8.5	24	82.0	0.0023	645.72 645.53	3.37	10.15	0.0019	647.44 647.28	658.06 658.28	10.62	10.34		MH 3 0.015	
S8	S9	1287+85 1286+98	0.34 2.60	0.27 2.00	14.17	4.59	4.93	9.2	9.8	24	87.0	0.0023	645.53 645.33	3.41	10.11	0.0025	647.28 647.06	658.28 656.65	11.00	10.75		MH 2 0.015	
S9	S10	1286+98 1283+87	0.00 2.60	0.00 2.00	14.59	4.53	4.93	9.0	9.8	24	312.0	0.0023	645.33 644.61	3.41	10.13	0.0025	647.06 646.17	656.64 657.31	9.58	9.31		MH 2 0.015	
S10	S11	1283+87 1280+70	0.72 3.32	0.44 2.43	16.12	4.32	4.73	10.5	11.5	27	317.0	0.0023	644.36 643.63	3.61	13.86	0.0018	646.02 645.34	657.31 656.60	11.29	10.70		MH 2 0.015	
S11	S12	1280+70 1278+84	0.00 3.32	0.00 2.43	17.58	4.14	4.62	10.1	11.2	27	187.0	0.0023	643.63 643.20	3.58	13.85	0.0017	645.26 644.90	656.60 645.45	11.34	10.72		MH 2 0.015	
S12	S13	1278+84 1277+13	0.15 3.47	0.14 2.57	18.45	4.04	4.54	10.4	11.7	27	173.0	0.0041	643.20 642.49	4.52	18.50	0.0019	644.56 644.21	645.45 655.71	0.89	0.00		MH BC 0.015	
S13	S14	1277+13 1273+26	0.08 3.55	0.07 2.64	19.09	3.97	4.35	10.5	11.5	27	386.0	0.0026	642.48 641.49	3.77	14.62	0.0018	644.06 643.20	655.71 657.62	11.65	10.98		MH 2 0.015	
S14	S15	1273+26 1269+41	0.27 3.82	0.24 2.88	20.79	3.79	4.17	10.9	12.0	27	385.0	0.0026	641.48 640.49	3.81	14.64	0.0020	643.12 642.22	657.62 660.31	14.50	13.89		MH 2 0.015	
S15	S16	1269+41 1265+69	0.00 3.82	0.00 2.88	22.48	3.63	4.02	10.5	11.6	27	373.0	0.0028	640.48 639.45	3.88	15.17	0.0019	642.03 641.16	660.31 662.63	18.28	17.58		MH 2 0.015	
S16	S17 final	1265+69 1263+32	0.00 3.82	0.00 2.88	24.08	3.49	3.93	10.1	11.3	27	238.0	0.0029	638.95 638.25	3.95	15.66	0.0018	640.44 639.96	662.63 640.50	22.19	21.43		MH 2 0.015	

BC = BLIND CONNECTION (existing concrete collar)



Please document the different
tailwaters for this same run.

STORM SEWER SYSTEM

PID : 117275 **Date :** 08/29/2025 **Project :** BUT IR 75/VAR/5.22/VAR **Location :** SR-4

Description : Prop BUT 4 South Storm Sewer with 649.50 Tailwater.pdf

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 649.50

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE	PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE			
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.) (25 yrs.)	(cfs.) (10 yrs.) (25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'		
S1	S2	1298+53	0.11	0.09	10.00	5.32	3.80	0.5	0.3	12	21.0	0.0195	647.70	3.58	4.64	0.0001	650.73	650.78	0.05	2.08	CB 3
	begin	1298+32	0.11	0.09									647.29				650.72	650.80			0.015
S2	S3	1298+32	0.13	0.08	10.10	5.30	3.80	0.9	0.6	12	82.0	0.0009	647.29	1.31	0.97	0.0004	650.72	650.80	0.08	2.51	CB 3
		1297+50	0.24	0.17									647.22				650.69	651.32			0.015
S20	S3	1297+50	0.22	0.14	10.00	5.32	3.80	0.7	0.5	12	43.0	0.0100	648.90	3.23	3.32	0.0003	650.70	651.31	0.61	1.41	CB 3
	begin	1297+50	0.46	0.30									648.47				650.69	651.32			0.015
S3	S4	1297+50	0.32	0.19	11.14	5.10	3.80	2.5	1.9	18	145.0	0.0010	647.22	1.81	3.04	0.0004	650.69	651.32	0.63	2.60	CB 3
		1296+05	0.78	0.49									647.08				650.63	653.10			0.015
S21	S22	1296+05	0.19	0.14	10.00	5.32	3.80	0.8	0.5	12	44.0	0.0150	648.90	3.76	4.07	0.0003	650.64	652.55	1.91	2.65	CB 3
	begin	1296+05	0.97	0.63									648.24				650.63	652.55			0.015
S22	S4	1296+05	0.25	0.23	10.19	5.28	3.80	1.9	1.4	15	4.0	0.0025	647.96	2.46	3.01	0.0006	650.63	652.55	1.92	3.34	CB 3
		1296+05	1.22	0.86									647.95				650.63	653.10			0.015
S4	S5	1296+05	0.44	0.37	12.48	4.86	3.80	6.0	4.7	36	131.0	0.0037	647.03	3.69	37.64	0.0001	650.63	653.10	2.47	3.07	MH 3
		1294+75	1.66	1.23									646.55				650.62	653.35			0.015
S5	S6	1294+75	0.18	0.12	13.07	4.77	3.80	6.4	5.1	36	112.0	0.0037	646.55	3.77	37.62	0.0001	650.62	653.35	2.73	3.80	MH 3
		1293+63	1.84	1.34									646.14				650.61	653.65			0.015



STORM SEWER SYSTEM

JUNCTION	STATION		ΔAREA Σ AREA (acres)	ΔCA Σ CA	BEGIN TIME (min.)	RAINFALL		DISCHARGE		PIPE DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	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'
	From	To				(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)												
S6	S7	1293+63	0.52	0.36	13.56	4.69	3.80	8.0	6.5	36	219.0	0.0032	646.07 645.37	3.82	35.16	0.0001	650.61 650.58	653.65 654.31	3.04	4.58	MH 3 0.015
		1291+45	2.36	1.71																	
S7	S8	1291+45	0.33	0.25	14.52	4.54	3.80	8.9	7.5	36	144.0	0.0023	645.36 645.03	3.49	29.77	0.0002	650.58 650.56	654.31 657.63	3.73	5.95	MH 3 0.015
		1290+02	2.69	1.96																	
S8	S9	1290+02	0.35	0.26	15.21	4.45	3.80	9.9	8.4	36	135.0	0.0023	645.03 644.72	3.59	29.80	0.0002	650.56 650.53	657.63 658.06	7.07	9.60	MH 3 0.015
		1288+67	3.04	2.22																	
S9	S10	1288+67	0.00	0.00	15.83	4.36	3.80	9.7	8.4	36	82.0	0.0023	644.72 644.53	3.58	29.93	0.0002	650.53 650.51	658.06 658.28	7.53	10.34	MH 3 0.015
		1287+85	3.04	2.22																	
S10	S11	1287+85	0.34	0.27	16.22	4.31	3.80	10.7	9.4	36	87.0	0.0023	644.53 644.33	3.67	29.81	0.0002	650.51 650.49	658.28 656.65	7.77	10.75	MH 2 0.015
		1286+98	3.38	2.49																	
S11	S12	1286+98	0.00	0.00	16.61	4.26	3.80	10.6	9.4	36	312.0	0.0023	644.33 643.61	3.66	29.87	0.0002	650.49 650.41	656.65 657.31	6.15	9.31	MH 2 0.015
		1283+87	3.38	2.49																	
S12	S13	1283+87	0.72	0.44	18.03	4.09	3.80	11.9	11.1	36	317.0	0.0023	643.61 642.88	3.78	29.84	0.0004	650.41 650.29	657.31 656.60	6.90	10.70	MH 2 0.015
		1280+70	4.10	2.92																	
S13	S14	1280+70	0.00	0.00	19.43	3.93	3.80	11.5	11.1	36	187.0	0.0023	642.88 642.45	3.74	29.82	0.0004	650.29 650.22	656.60 645.45	6.31	10.72	MH 2 0.015
		1278+84	4.10	2.92																	
S14	S15	1278+84	0.15	0.14	20.26	3.84	3.80	11.8	11.6	36	173.0	0.0041	642.45 641.74	4.65	39.84	0.0004	650.22 650.15	645.45 655.71	-4.77	0.00	MH BC 0.015
		1277+13	4.25	3.06																	
S15	S16	1277+13	0.08	0.07	20.88	3.78	3.80	11.8	11.9	36	386.0	0.0026	641.73 640.74	3.92	31.49	0.0004	650.15 649.99	655.71 657.62	5.56	10.98	MH 2 0.015
		1273+26	4.33	3.13																	
S16	S17	1273+26	0.27	0.24	22.52	3.63	3.80	12.2	12.8	36	385.0	0.0026	640.73 639.74	3.96	31.53	0.0005	649.99 649.80	657.62 660.31	7.63	13.89	MH 2 0.015
		1269+41	4.60	3.37																	

The existing data show this as a Manhole. The proposed calculations show this as a BC. Please confirm. The negative here means the proposed system has negatively affected the system at this location. The water technically isn't popping up through the grate since it is a BC, but this is a big change from existing conditions. CDSS won't be able to integrate blind connections so the upstream MH like will have issues due to the surcharge

-4.77



STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S17	S18	1269+41	0.00	0.00	24.14	3.49	3.80	11.8	12.8	36	373.0	0.0028	639.73	4.02	32.68	0.0005	649.80	660.31	10.51	17.58	MH 2
		1265+69	4.60	3.37									638.70				649.62	662.63			0.015
S18	S19	1265+69	0.00	0.00	25.69	3.36	3.80	11.3	12.8	36	238.0	0.0029	638.20	4.08	33.72	0.0005	649.62	662.63	13.01	21.43	MH 2
	final	1263+32	4.60	3.37									637.50				649.50	640.50			0.015



Please document the different
tailwaters for this same run.

STORM SEWER SYSTEM

PID : 117275 Date : 08/29/2025 Project : BUT IR 75/VAR/5.22/VAR Location : SR-4

Description : Prop BUT 4 South Storm Sewer with 652.50 Tailwater.pdf

Designer : SAF

Rainfall Area: C

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 0.00

Tailwater Elevation (ft.): 652.50

JUNCTION From To	STATION From To	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE MANNING'S 'n'	
		ΣAREA (acres)	ΣCA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN		
S1 begin	S2	1298+53 1298+32	0.11 0.11	0.09 0.09	10.00	5.32	3.80	0.5	0.3	12	21.0	0.0195	647.70 647.29	3.58	4.64	0.0001	653.73 653.72	650.78 650.80	-2.95	2.08	CB 3 0.015
S2	S3	1298+32 1297+50	0.13 0.24	0.08 0.17	10.10	5.30	3.80	0.9	0.6	12	32.0	0.0009	647.29 647.22	1.31	0.97	0.0004	653.72 653.69	650.60 651.62	-2.92	2.51	CB 3 0.015
S20 begin	S3	1297+50 1297+50	0.22 0.46	0.14 0.30	10.00	5.32	3.80	0.7	0.5	12	43.0	0.0100	648.90 648.47	3.23	3.32	0.0003	653.70 653.69	651.34 651.32	-2.39	1.41	CB 3 0.015
S3	S4	1297+50 1296+05	0.32 0.78	0.19 0.49	11.14	5.10	3.80	2.5	1.9	18	145.0	0.0010	647.22 647.08	1.81	3.04	0.0004	653.69 653.63	651.62 653.70	-2.37	2.60	CB 3 0.015
S21 begin	S22	1296+05 1296+05	0.19 0.97	0.14 0.63	10.00	5.32	3.80	0.8	0.5	12	44.0	0.0150	648.90 648.24	3.76	4.07	0.0003	653.64 653.63	652.55 652.55	-1.09	2.65	CB 3 0.015
S22	S4	1296+05 1296+05	0.25 1.22	0.23 0.86	10.19	5.28	3.80	1.9	1.4	15	4.0	0.0025	647.96 647.95	2.46	3.01	0.0006	653.63 653.63	652.55 653.70	-1.08	3.34	CB 3 0.015
S4	S5	1296+05 1294+75	0.44 1.66	0.37 1.23	12.48	4.86	3.80	6.0	4.7	36	131.0	0.0037	647.03 646.55	3.69	37.64	0.0001	653.63 653.62	653.10 653.65	-0.53	3.07	MH 3 0.015
S5	S6	1294+75 1293+63	0.18 1.84	0.12 1.34	13.07	4.77	3.80	6.4	5.1	36	112.0	0.0037	646.55 646.14	3.77	37.62	0.0001	653.62 653.61	653.65 653.65	-0.27	3.80	MH 3 0.015



STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE			PIPE		F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S6	S7	1293+63 1291+45	0.52 2.36	0.36 1.71	13.56	4.69	3.80	8.0	6.5	36	219.0	0.0032	646.07 645.37	3.82	35.16	0.0001	653.61 653.58	653.65 654.31	0.04	4.58	MH 3 0.015
S7	S8	1291+45 1290+02	0.33 2.69	0.25 1.96	14.52	4.54	3.80	8.9	7.5	36	144.0	0.0023	645.36 645.03	3.49	29.77	0.0002	653.58 653.56	654.00 657.63	0.07	9.60	MH 3 0.015
S8	S9	1290+02 1288+67	0.35 3.04	0.26 2.22	15.21	4.45	3.80	9.9	8.4	36	135.0	0.0023	645.03 644.72	3.59	29.80	0.0002	653.56 653.53	657.68 659.03	0.07	9.60	MH 3 0.015
S9	S10	1288+67 1287+85	0.00 3.04	0.00 2.22	15.83	4.36	3.80	9.7	8.4	36	82.0	0.0023	644.72 644.53	3.58	29.93	0.0002	653.53 653.51	658.06 659.41	4.53	10.34	MH 3 0.015
S10	S11	1287+85 1286+98	0.34 3.38	0.27 2.49	16.22	4.31	3.80	10.7	9.4	36	87.0	0.0023	644.53 644.33	3.67	29.81	0.0003	653.51 653.49	658.28 656.65	4.77	10.75	MH 2 0.015
S11	S12	1286+98 1283+87	0.00 3.38	0.00 2.49	16.61	4.26	3.80	10.6	9.4	36	312.0	0.0023	644.33 643.61	3.66	29.87	0.0003	653.49 653.41	656.64 657.31	3.15	9.31	MH 2 0.015
S12	S13	1283+87 1280+70	0.72 4.10	0.44 2.92	18.03	4.09	3.80	11.9	11.1	36	317.0	0.0023	643.61 642.88	3.78	29.84	0.0004	653.41 653.29	657.31 656.60	3.90	10.70	MH 2 0.015
S13	S14	1280+70 1278+84	0.00 4.10	0.00 2.92	19.43	3.93	3.80	11.5	11.1	36	187.0	0.0023	642.88 642.45	3.74	29.82	0.0004	653.29 653.22	656.60 645.45	3.31	10.72	MH 2 0.015
S14	S15	1278+84 1277+13	0.15 4.25	0.14 3.06	20.26	3.84	3.80	11.8	11.6	36	173.0	0.0041	642.45 641.74	4.65	39.84	0.0004	653.22 653.15	645.45 655.71	-7.77	0.00	MH BC 0.015
S15	S16	1277+13 1273+26	0.08 4.33	0.07 3.13	20.88	3.78	3.80	11.8	11.9	36	386.0	0.0026	641.73 640.74	3.92	31.49	0.0004	653.15 652.99	655.71 657.62	2.56	10.98	MH 2 0.015
S16	S17	1273+26 1269+41	0.27 4.60	0.24 3.37	22.52	3.63	3.80	12.2	12.8	36	385.0	0.0026	640.73 639.74	3.96	31.53	0.0005	652.99 652.80	657.62 660.31	4.63	13.89	MH 2 0.015

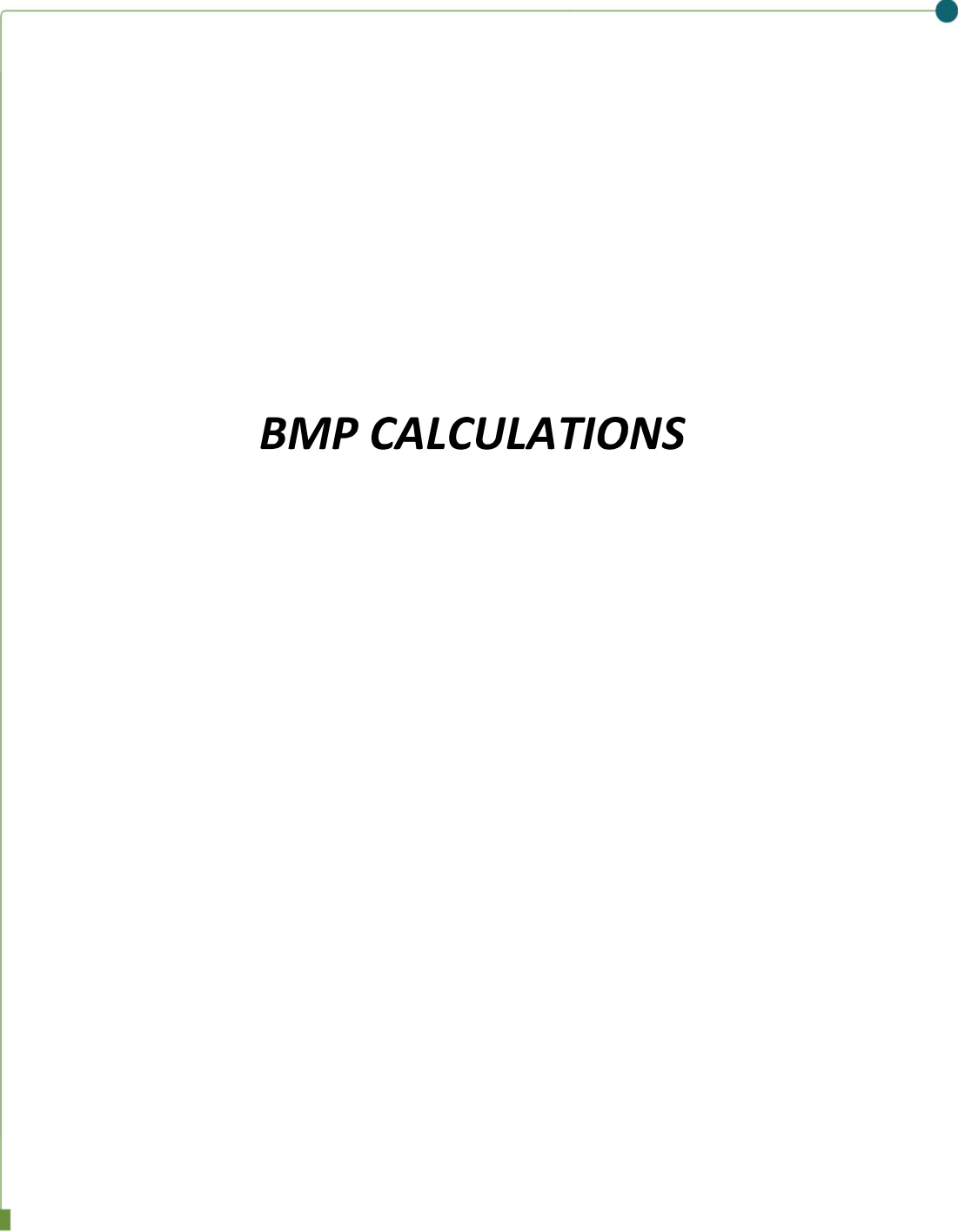
The existing calcs show this as a Manhole. The proposed calculations show this as a BC - Please confirm. The negative here means the proposed system has negatively affected the system at this location. The water technically isn't popping up through the grate since it is a BC, but this is a big change from existing conditions. CDSS went be able to interpret blind connections so the upstream MH like will have issues due to the surcharge





STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
S17	S18	1269+41	0.00	0.00	24.14	3.49	3.80	11.8	12.8	36	373.0	0.0028	639.73	4.02	32.68	0.0005	652.80	660.31	7.51	17.58	MH 2
		1265+69	4.60	3.37									638.70				652.62	662.63			0.015
S18	S19	1265+69	0.00	0.00	25.69	3.36	3.80	11.3	12.8	36	238.0	0.0029	638.20	4.08	33.72	0.0005	652.62	662.63	10.01	21.43	MH 2
	final	1263+32	4.60	3.37									637.50				652.50	640.50			0.015

A thin green line starts at a small green square in the bottom-left corner, extends vertically upwards, then horizontally to the right, ending at a small teal circle.

BMP CALCULATIONS



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Post Construction - Project Summary

Please confirm the contractor EDA

Project Data

Project EDA	0.986	Units
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2	No	acres
BMPs Required?	BMPs and NOI not required	NA
Ain (New Impervious Area in New Permanent R/W	0	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	No	
Water Quality Treatment Required	No	
Water Quantity Treatment Required	No	

Treatment Percent and Treatment Requirement

Aix (Project EDA that is inside the existing right-of-way)		acres
Ain (New Impervious Area in New Permanent R/W)	0	acres
T% (Treatment Percent)	#DIV/0!	%
Treatment Requirement	#DIV/0!	acres

BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)

Treatment Provided

Total Area with ODOT R/W Treated (acres)	0.00
Treatment Requirements (acres)	#DIV/0!
Treatment Check	#DIV/0!

BMP Submittal Requirements (Per L&D, Vol. 2, Sec. 1116.2)

1. Estimated Project Earth Disturbed Area	Yes	Good
2. Treatment Percent Calculation	Yes	Good
3. BMP Selected for use	Yes	Good
4. Drainage area mapping for post-construction BMPs that show the total contributing drainage area and the amount of contributing area within ODOT right-of-way	Yes	Good
5. Plan sheets showing locations of post-construction BMP	Yes	Good
6. Calculations for each BMP	Yes	Good
7. Explanation for any area that is not treated	Yes	Good