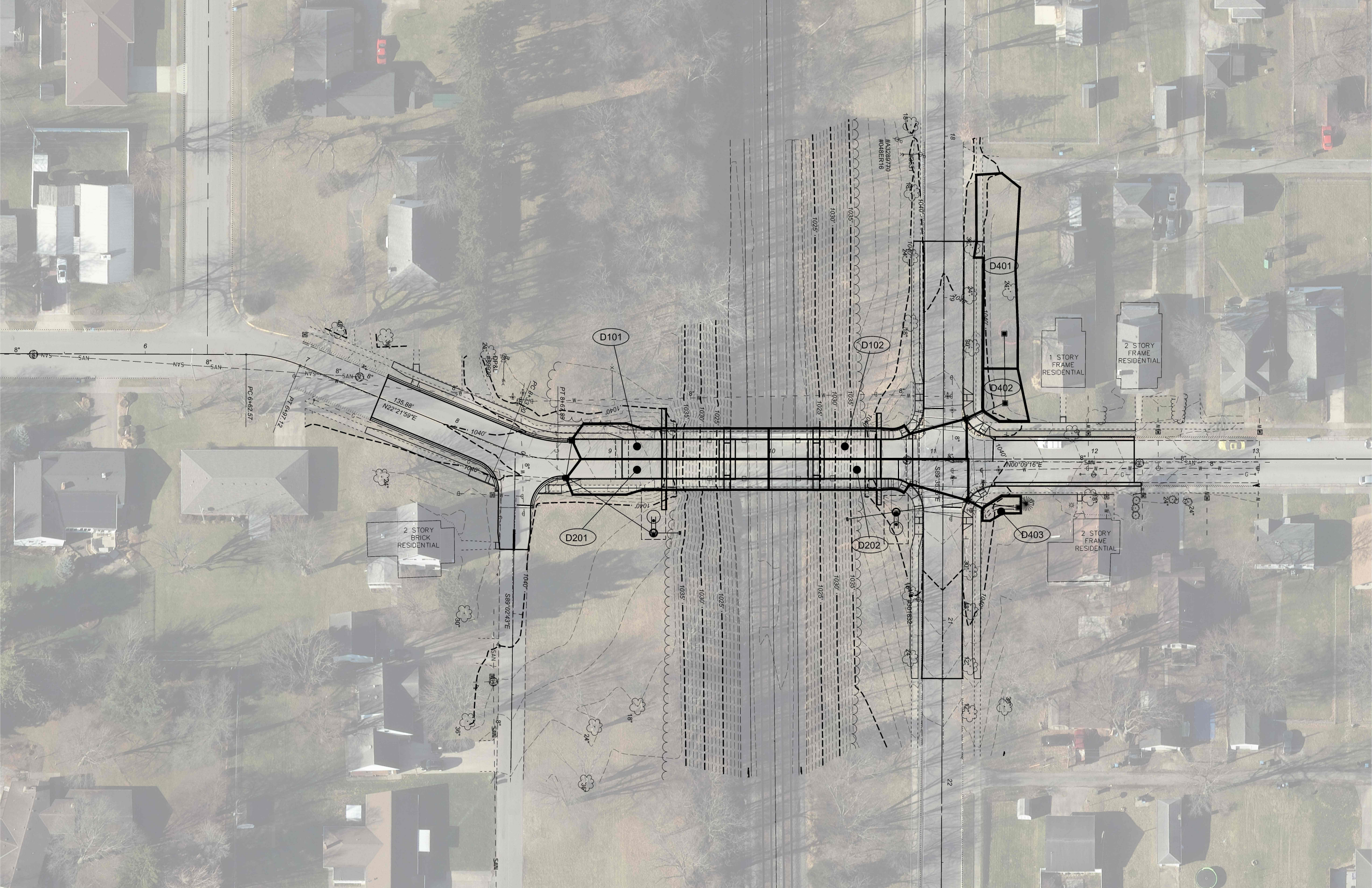


**DRAINAGE AREA SUMMARY SHEET**  
**SPRUCE AVE**

**PROJECT SHE-SPRUC-0227**  
 PROJECT: PID 114201  
 DESIGNER: BMG  
 REVIEWER: JRE  
 DATE: 9/28/2021

<b>RATIONAL "c" for</b> Pavement 0.9 Grass 0.5								<b>INTERCEPT COEFFICIENT k (Table 1101-1)</b> Forest 0.076 Min Tillage cultivated; woodland 0.152 short grass pasture 0.213 cultivated straight row 0.274 grassed waterways 0.457 unpaved area; bare soil 0.491 paved area 0.619 poor grass, untilled 0.305								Sheet Flow = overland flow for the first 300' Shallow Concentrated Flow = overland flow after the first 300'							
DITCH AREA SUMMARY												OVERLAND TIME OF CONCENTRATION											
^Area								Total Area				Sheet Flow				Shallow Concentrated Flow				Total Overland Tc (min)			
Area Ref	Begin Sta.	End Sta.	Side	Paved (Ac)	Grass (Ac)	^ Area (Ac)	Weighted Runoff	Sum Paved	Sum Grass Areas	Sum Total	Total C	Area Ref No.	C	Length (ft)	overland slope (%)	To (min)	Length (ft)	k (intercept Coefficient)	Velocity (fps)		Ts (min)		
D101	8+77	9+98	LT	0.050	0.004	0.054	0.87	0.050	0.004	0.054	0.87	D101	0.87	12	2	1.14	0	0.213	0.99	0.00	1.14		
D102	9+98	11+21	LT	0.055	0.000	0.055	0.90	0.055	0.000	0.055	0.90	D102	0.90	12	2	0.99	0	0.213	0.99	0.00	0.99		
D201	8+77	9+98	RT	0.051	0.005	0.056	0.86	0.051	0.005	0.056	0.86	D201	0.86	12	2	1.17	0	0.213	0.99	0.00	1.17		
D202	9+98	11+21	RT	0.055	0.000	0.055	0.90	0.055	0.000	0.055	0.90	D202	0.90	12	2	0.99	0	0.213	0.99	0.00	0.99		
D301	9+98	11+21	LT	0.000	0.022	0.022	0.50	0.000	0.022	0.022	0.50	D301	0.50	12	2	2.97	0	0.213	0.99	0.00	2.97		
D401	9+98	11+21	LT	0.002	0.061	0.063	0.51	0.002	0.061	0.063	0.51	D401	0.51	12	2	2.91	0	0.213	0.99	0.00	2.91		
D402	9+98	11+21	LT	0.000	0.018	0.018	0.50	0.000	0.018	0.018	0.50	D402	0.50	12	2	2.97	0	0.213	0.99	0.00	2.97		
D403	9+98	11+21	LT	0.000	0.006	0.006	0.50	0.000	0.006	0.006	0.50	D403	0.50	12	2	2.97	0	0.213	0.99	0.00	2.97		









# INLET SPACING DESIGN

**PID :** 114201      **Date :** 09/28/2021      **Project :** SHE-SPRUC-0227

**Location :** City of Sidney

**Description :** Spread Calcs Sta. 8+77 to Sta. 9+98 LT (allowable spread = 6')

**Designer :** BMG

**Rainfall Area:** B

**Storm Frequency (yr.) :** 2

**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.)
9+98	Begin																	
8+77	CB-3A	121.00	0.87	0.05	1.91	1.07	10.00	0.0485	0.0200	0.0200	0.00	0.0420	3.80	0.18	0.00	0.18	0.055	2.74



# INLET SPACING DESIGN

**PID :** 114201      **Date :** 09/28/2021      **Project :** SHE-SPRUC-0227

**Location :** City of Sidney

**Description :** Spread Calcs Sta. 8+77 to Sta. 9+98 RT (allowable spread = 6')

**Designer :** BMG

**Rainfall Area:** B

**Storm Frequency (yr.) :** 2

**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.)
9+98	Begin																	
8+77	CB-3A	121.00	0.86	0.06	1.91	1.06	10.00	0.0485	0.0200	0.0200	0.00	0.0420	3.80	0.18	0.00	0.18	0.055	2.77



# INLET SPACING DESIGN

**PID :** 114201      **Date :** 09/28/2021      **Project :** SHE-SPRUC-0227

**Location :** City of Sidney

**Description :** Spread Calcs Sta. 9+98 to Sta. 11+21 LT (allowable spread = 6')

**Designer :** BMG

**Rainfall Area:** B

**Storm Frequency (yr.) :** 2

**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.)
9+98	Begin																	
11+21	CB-3A	123.00	0.90	0.06	1.91	0.95	10.00	0.0661	0.0200	0.0200	0.00	0.0420	3.80	0.18	0.00	0.19	0.053	2.64



# INLET SPACING DESIGN

**PID :** 114201      **Date :** 09/28/2021      **Project :** SHE-SPRUC-0227

**Location :** City of Sidney

**Description :** Spread Calcs Sta. 9+98 to Sta. 11+22 RT (allowable spread = 6')

**Designer :** BMG

**Rainfall Area:** B

**Storm Frequency (yr.) :** 2

**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.)
9+98	Begin																	
11+22	CB-3A	124.00	0.90	0.06	1.91	0.96	10.00	0.0661	0.0200	0.0200	0.00	0.0420	3.80	0.18	0.00	0.19	0.053	2.64

JOB NAME:

114201

DESIGNED BY:

BMG

REVIEWED BY:

JRE

PROJECT TYPE:

Highway

ODOT RAIN INTENSITY REGION:

B

DATE: 

9/21/2021

DATE: 

9/24/2021

DESIGN FREQUENCY:

STORM SEWERS, FULL FLOW =

10

YEAR

HYDRAULIC GRADIENT CHK =

25

YEAR

RUNOFF COEF. "C":

0.9

PAVED

0.7

GRADED AREAS

0.5

OVERLAND

MANNING'S "n":

0.015

PAVED

0.015

PIPE

TIME TO FIRST INLET:

10 MIN

MINIMUM VELOCITY :

3.0 FPS

MAX LENGTH BETWEEN MH:

300 FT

STORM SEWER DRAINAGE COMPUTATION SHEET

																														HYDRAULIC GRADIENT DESIGN CHECK			
			AREA (ac.)				TIME OF CONC. (min)			INTENSITY		C	CA		DISCHARGE (cfs)		(in)	(ft)	(ft)	(%)	(ft)	(ft)	(fps)	Tc. (min)	(cfs)	(ft)	(ft)	(ft)	(%)				
REFERENCE NUMBER	MH/CB TYPE	STATION	OFFSET	PAVED	GRADED	OVERLAND	^A	SUM A	OVERLAND	PIPE FLOW	SUM T	10 YR	25 YR	Cw	^ CA	SUM CxA	Q10	Q25	PIPE SIZE	PIPE LENGTH	NORMAL DEPTH IN PIPE	SLOPE	INLET FLOW LINE	OUTLET FLOW LINE	VELOCITY	PIPE FLOW	JUST FULL CAPACITY	GRATE/T/C ELEVATION	HGL ELEVATION @ INLET	HGL ELEVATION @ OUTLET	HGL SLOPE	REMARKS	
	Road Name (if applicable)																																
DR101	CB-3A	8+77.00	12.00' LT	0.050		0.004	0.054	0.054	10.00		10.00	5.08	5.69	0.87	0.05	0.05	0.24	0.27	12	24	0.13	5.21%	1039.25	1038.00	4.47	0.09	7.00	1042.52	1039.38	1038.21	0.01%		
DR201	CB-3A	8+73.00	12.00' RT	0.055		0.000	0.055	0.109	10.00	0.09	10.09	5.06	5.69	0.90	0.05	0.10	0.49	0.55	12	63	0.21	2.83%	1038.00	1036.22	4.37	0.24	5.15	1042.36	1038.21	1036.51	0.03%		
DR301	MH-3	9+27.00	45.75' RT					0.109		0.24	10.33	5.01	5.69			0.10	0.48	0.55	12	17	0.26	1.29%	1036.22	1036.00	3.15	0.09	3.49	1038.50	1036.51	1036.50	0.03%		
HW001	HW-2.2	9+43.69	45.75' RT							0.09	10.42		5.69										1036.00					1036.75	1036.50			Outlet to Railroad Ditch	
DR401	CB-2-2B	19+22.25	37.50' LT	0.002		0.061	0.063	0.063	15.00		15.00	4.25	4.75	0.51	0.03	0.03	0.14	0.15	12	43	0.11	2.65%	1036.64	1035.50	2.92	0.25	4.99	1038.14	1036.75	1035.64	0.00%		
DR402	CB-2-2B	11+44.75	34.50' LT	0.000		0.018	0.018	0.081	15.00	0.25	15.25	4.22	4.75	0.50	0.01	0.04	0.17	0.20	12	25	0.14	2.00%	1035.50	1035.00	2.91	0.14	4.34	1038.68	1035.64	1035.30	0.00%		
DR102	CB-3A	11+21.00	25.08' LT	0.051		0.005	0.056	0.137	10.00	0.14	15.39	4.20	4.75	0.86	0.05	0.09	0.38	0.43	12	51	0.30	0.49%	1035.00	1034.75	2.09	0.41	2.15	1041.16	1035.30	1035.12	0.02%	Outlet to DR202	
DR403	CB-2-2B	11+53.00	30.00' RT	0.000		0.006	0.006	0.006	15.00		15.00	4.25	4.75	0.50	0.00	0.00	0.01	0.01	12	31	0.03	6.45%	1036.75	1034.75	1.85	0.28	7.79	1038.75	1036.78	1035.12	0.00%		
DR202	CB-3A	11+22.00	25.77' RT	0.055		0.000	0.055	0.198	10.00	0.41	15.79	4.15	4.75	0.90	0.05	0.14	0.59	0.68	12	45	0.37	0.56%	1034.75	1034.50	2.51	0.30	2.29	1041.00	1035.12	1034.87	0.05%		
MH001	MH-3	20+33.00	29.00' RT					0.198		0.30	15.79	4.15	4.75			0.14	0.59	0.68	12	31	0.23	3.23%	1034.50	1033.50	4.92								



# Ohio Department of Transportation - Office of Hydraulic Engineering

## Post-Construction BMP Calculation Spreadsheet

### Post Construction - Project Summary

#### Project Data

Project EDA	1.12	acres
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2	No	
BMPs Required?	BMPs Required	NA
Ain (New Impervious Area in New Permanent R/W	0.01	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	No	
Water Quality Treatment Required	Yes	
Water Quantity Treatment Required	No	

#### Treatment Percent and Treatment Requirement

Aix (Project EDA that is inside the existing right-of-way)	0.984	acres
Ain (New Impervious Area in New Permanent R/W)	0.01	acres
T% (Treatment Percent)	20.80	%
Treatment Requirement	0.23	acres

#### BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
VFS1	Manufactured System	0.11	0.11
VFS2	Manufactured System	0.2	0.18
VFS3			
VBF1			
VBF2			
BMP6			
BMP7			
BMP8			
BMP9			
BMP10			

#### Treatment Provided

Total Area with ODOT R/W Treated (acres)	0.29
Treatment Requirements (acres)	0.23
Treatment Check	Good

#### 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





# Ohio Department of Transportation - Office of Hydraulic Engineering

## Post-Construction BMP Calculation Spreadsheet

### Water Quality Flow Rate (WQ<sub>F</sub>)

Drainage Area #1	Area (acres)	Coefficient of Runoff (C)
Tributary Area within Existing R/W	0.11	0.9
Impervious Trib. Area Outside Existing R/W		0.9
Tributary Area Land Use #3		0.5
Tributary Area Land Use #4		0.3
Total Tributary Area	0.11	0.900
BMP Type	Manufactured System	
Time of Concentration (minutes)	10	
Intensity, i (in/hr)	1.85	
Water Quality Flow (WQ <sub>F</sub> )	0.181	cfs

Drainage Area #2	Area (acres)	Coefficient of Runoff (C)
Tributary Area within Existing R/W	0.18	0.9
Impervious Trib. Area Outside Existing R/W		0.9
Tributary Area Land Use #3	0.02	0.5
Tributary Area Land Use #4		
Total Tributary Area	0.20	0.860
BMP Type	Manufactured System	
Time of Concentration (minutes)	15	
Intensity, i (in/hr)	1.51	
Water Quality Flow (WQ <sub>F</sub> )	0.260	cfs

Drainage Area #3	Area (acres)	Coefficient of Runoff (C)
Tributary Area within Existing R/W		0.9
Impervious Trib. Area Outside Existing R/W		0.9
Tributary Area Land Use #3		
Tributary Area Land Use #4		
Total Tributary Area	0.00	
BMP Type		
Time of Concentration (minutes)		
Intensity, i (in/hr)		
Water Quality Flow (WQ <sub>F</sub> )		cfs

Drainage Area #4	Area (acres)	Coefficient of Runoff (C)
Tributary Area within Existing R/W		0.9
Impervious Trib. Area Outside Existing R/W		0.9
Tributary Area Land Use #3		
Tributary Area Land Use #4		
Total Tributary Area	0.00	
BMP Type		
Time of Concentration (minutes)		
Intensity, i (in/hr)		
Water Quality Flow (WQ <sub>F</sub> )		cfs

**Manufactured Systems**

Drainage Area #	Total Tributary Area (acres)	Tributary Area within R/W (acres)	WQ <sub>F</sub> (cfs)	Required Manufactured System Type	Manufactured System Type Provided
A1	0.11	0.11	0.181	1	1
A2	0.20	0.18	0.260	1	1
A3					
A4					
A5					

Yellow: Requires Input (See instructions tab)

Total Area Treated by Manufactured Systems (within the right-of-way)

0.29 acres

(Treatment is for quality only, not quantity)

**BMP Design Considerations**

1. Does the Water Quality flow rate match the system type in L&D Table 1117-1?	Yes	Good
2. Is the Water Quality flow rate greater than 6 cfs including all contributing area?	No	Good
3. Is the manufactured system located under a traffic lane?	No	Good
4. Is the storm sewer draining to the manufactured system deeper than 10 feet?	No	Good
5. Is there clear maintenance access to the manufactured system?	Yes	Good