

**HAM-Columbia Connector
PID# 114496
Final Drainage Report**



Prepared for: ODOT
District 8

Prepared by:
Stantec Consulting Services Inc.

August 4, 2025

HAM-Columbia Connector

PID # 114496

Final Drainage Report

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1.0 Ditch Calculations

Ditch Analysis

PID: 114496
Date: 6/26/2024
Project: Columbia Connector
Location: Sta. 87+00 to 88+40 Left
Designer: ZTM
Checker: SNS
Rainfall Area: C
Depth Storm Frequency: 10
Shear Stress Storm Frequency: 5
Pickup Flow (cfs): 0

Ditch Lining	Manning's "n"	Allowable Shear Stress
Seed	0.04	0.40
Jute Mat	0.04	0.45
Temporary Mat	0.04	1.00
Permanent Mat, Type 1	0.04	2.00
Permanent Mat, Type 2	0.04	3.00
Permanent Mat, Type 3	0.04	5.00
RCP, Type B	0.06	6.00

* Grade Steeper than Allowable



Station			Dimension					Rainfall				Lining Type		Discharge								
Ref. No.	Begin	End	Side	Length (ft.)	Radius/Width (ft.)	Inslope (ft./ft.)	Backslope (ft./ft.)	Grade (ft./ft.)	Area (acres)	Total Area (acres)	Runoff Coefficient	CA (sum)	Protection Type	Intensity (in./hr.)	Storm Freq. (Yrs.)	Mann. Coef.	Time Flow (min.)	Velocity Flow (fps)	Shear (lbs./sq.ft)	Design Flow (cfs.)	Depth Flow (ft.)	Width Flow (ft.)
1	87+00.00	87+50.00	L	50	6	3	4	0.0058	0.037	0.037	0.450	0.017	Seed	4.82	5	0.040	10.00	0.19	0.02	0.08	0.069	6.48
2	87+50.00	88+00.00	L	50	11	2	4	0.1164	0.064	0.101	0.500	0.049	Seed	5.32	10	0.040	10.00	0.20	0.03	0.09	0.072	6.51
														4.08	5	0.040	14.46	0.47	0.27	0.20	0.038	11.23
														4.58	10	0.040	14.25	0.50	0.29	0.22	0.040	11.24
3	88+00.00	88+40.00	L	40	11	2	4	0.1298	0.040	0.141	0.680	0.076	Seed	3.85	5	0.040	16.22	0.59	0.36	0.29	0.045	11.27
														4.35	10	0.040	15.92	0.62	0.38	0.33	0.047	11.28

Ditch Analysis

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Depth Storm Frequency: 10
Shear Stress Storm Frequency: 5
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Station					Dimension			Rainfall				Lining Type		Discharge								
Ref. No.	Begin	End	Side	Length (ft.)	Radius/Width (ft.)	Inslope (ft./ft.)	Backslope (ft./ft.)	Grade (ft./ft.)	Area (acres)	Total Area (acres)	Runoff Coefficient	CA (sum)	Protection Type	Intensity (in./hr.)	Storm Freq. (Yrs.)	Mann. Coef.	Time Flow (min.)	Velocity Flow (fps)	Shear (lbs./sq.ft)	Design Flow (cfs.)	Depth Flow (ft.)	Width Flow (ft.)
1	87+50.00	88+00.00	L	50	2	2	2	0.0296	0.033	0.033	0.700	0.023	Seed	4.82	5	0.040	10.00	0.54	0.17	0.11	0.094	2.38
														5.32	10	0.040	10.00	0.57	0.18	0.12	0.099	2.39
2	88+00.00	88+40.00	L	40	11	2	4	0.1855	0.032	0.065	0.700	0.046	Seed	4.53	5	0.040	11.54	0.54	0.40	0.21	0.034	11.21
														5.04	10	0.040	11.47	0.57	0.42	0.23	0.036	11.22

2.0 Storm Calculations

MANNING'S N

DESIGN YEAR
0.01510

CHECK YEAR
25

CALC BY: ZTM
LAST REV: 5/15/2024 - ZTM

CHECK BY: S. Shadix

PROJECT:
PROJECT NO.:

HAM - Columbia Connector
173620147

HYDRUALIC GRADIENT CONDITION, K =

1: NORMAL DEPTH
2: FULL DEPTH
3: TAILWATER

#	STA.	a	A	t	T	i	C	AC	Q	SZ	L	IN	INV	OUT	So	Vm	Qfull	i	Q	dn	Sf	H	K	H'	HY GR	GRATE	STRUCT
	COLUMBIA CONNECTOR, A, STA. 11+14.00, 11.6' LT	0.14	0.14	10.0	10.0	5.3	0.35	0.05	0.27								6.0	0.30	0.15	0.0001	0.01	1	-2.00	593.15	593.00	INLET	
D1	COLUMBIA CONNECTOR,A, STA. 11+61.45, 15.5' RT		0.14		10.2			0.05		12	52	593.00	591.00		0.0385	4.04	6.06								591.13	593.13	EX. CB2-2B

MANNING'S N
0.015DESIGN YEAR
10CHECK YEAR
25CALC BY: ZTM
LAST REV: 2/18/2025

CHECK BY: SNS

PROJECT:
PROJECT NO.:HAM-COLUMBIA CONNECTOR HYDRUALIC GRADIENT CONDITION, K =
1736201471: NORMAL DEPTH
2: FULL DEPTH
3: TAILWATER

#	STA.	a	A	t	T	i	C	AC	Q	SZ	L	IN INV	OUT	So	Vm	Qfull	i	Q	dn	Sf	H	K	H'	HY GR	GRATE	STRUCT
D3	C.C, STA. 71+50.37, 7.9' RT	0.32	0.32	10.0	40.8	5.3	0.90	0.29	1.54								9.6	2.78	0.39	0.0082	0.26	1	-2.23	509.38	512.23	SLOTTED
	C.C, STA. 71+70.15, 9.0' RT		32.74	0.0	51.0			0.29		12	32	510.73	508.24	0.0778	8.56	8.61								507.01	510.00	CB-2-2B
D2	C.C, STA. 71+31.33, 10.1' RT	0.15	32.29	10.0	50.8	2.2	0.90	0.14	6.41 <== (12" FULL)	12	37	509.52	506.00	0.0951	13.03	9.52	9.6	7.44	0.66	0.0589	2.18	1	-1.34	510.18	512.10	EX. CB-2-2B
D3	C.C, STA. 71+70.15, 9.0' RT	0.07	32.36	0.1	50.8	2.2	0.90	0.49	2.62	12	31	506.00	504.50	0.0484	8.11	6.79	9.6	7.48	1.00	0.0595	1.84	3	0.34	507.97	510.00	CB-2-2B
	C.C, STA. 72+03.40, 12.6' RT		32.36	10.0	60.9	1.9	0.90	0.49	7.03 <== (12" FULL)	12	44	503.99	501.17	0.0641	11.28	7.81	9.6	10.80	1.00	0.1240	5.46	2	2.64	507.63	510.66	EX. MH-3
D4	C.C, STA. 72+47.77, 7.6' RT	0.15	32.51	0.0	60.9	1.9	0.90	0.63	1.20	12	25	501.17	500.63	0.0216	4.90	4.54	9.6	6.05	1.00	0.0389	0.97	3	0.43	502.60	504.12	EX. CB-3
	C.C, STA. 72+71.75, 7.3' RT	0.04	32.55	10.0	71.0	1.7	0.90	0.67	1.14	12	31	500.63	499.50	0.0365	6.03	5.90	9.6	6.43	1.00	0.0440	1.36	2	0.23	501.86	504.15	EX. CB-3
D7	C.C, STA. 73+05.05, 7.0' RT		32.55	0.0	71.0			0.67															492.98	502.78	MH-3	
	US 50 Sta. 1673+91, Rt,	0.18	0.18	10.0	10.0	5.3	0.80	0.14	0.74	12	206	554.07	542.55	0.0559	6.17	7.30	5.9	0.83	0.22	0.0007	0.14	1	-11.37	554.29	557.24	CB-3
	US 50 Sta. 1675+75, Lt,	2.73	2.91	0.6	10.6	5.2	0.80	2.32	26.06 <== added 8" & 12"	24	195	542.55	533.37	0.0471	14.39	42.54	5.6	26.99	1.14	0.0192	3.74	1	-5.44	516.65	548.07	CB-3
	US 50 Sta. 1677+75, Lt,	0.94	3.85	0.2	10.8	5.2	0.80	3.07	22.96 <== 12"	24	194	533.37	523.50	0.0509	14.25	44.22	5.6	24.19	1.04	0.0154	2.99	1	-6.89	534.41	538.47	CB-3
	US 50 Sta. 1679+75, Lt,	0.90	4.75	0.2	11.0	5.1	0.80	3.79	34.33 <== 12"	24	169	523.50	515.75	0.0459	15.09	41.99	5.6	36.22	1.42	0.0346	5.85	1	-1.91	524.92	528.55	CB-3
	US 50 Sta. 1681+30, Lt,	0.78	5.53	0.0	11.2	5.1	0.80	4.41	22.49	36	25	515.75	514.63	0.0448	13.22	122.31	5.6	24.70	0.90	0.0019	0.05	1	-1.07	516.65	520.73	CB-3
	US 50 Sta. 1681+60, Lt,		5.53	0.1	11.2	5.1	0.80	4.41	37.49 <== 12"	24	50	514.63	512.08	0.0510	15.96	44.26	5.6	39.70	1.46	0.0416	2.08	1	-0.47	516.09	517.58	MH-3
	US 50 Sta. 1682+10, Lt,		5.53	0.2	11.3	5.1	0.80	4.41	37.49 <== 12"	36	213	512.08	502.51	0.0449	15.77	122.44	5.6	39.70	1.17	0.0048	1.02	1	-8.54	513.25	516.78	MH-3
	US 50 Sta. 1684+25, Lt,	4.18	9.71	0.0	11.5	5.0	0.80	7.75	38.75	36	6	502.51	501.51	0.1667	25.16	235.93	5.6	43.40	0.87	0.0057	0.03	1	-0.97	503.38	506.73	CB-3
	US 50 Sta. 1684+30, Lt,		9.71	0.1	11.5	5.0	0.80	7.75	38.75	36	85	501.51	500.50	0.0119	9.51	63.04	5.6	43.40	1.80	0.0057	0.48	1	-0.53	503.31	506.01	MH-3
	US 50 Sta. 1684+50, Rt,		9.71	0.2	11.6	5.0	0.80	7.75	38.75	36	115	500.50	498.13	0.0206	11.55	82.94	5.6	43.40	1.53	0.0057	0.66	1	-1.71	502.03	506.00	MH-3
	US 50 Sta. 1684+50, Rt,		9.71	0.5	11.8	5.0	0.80	7.75	38.75	36	322	498.13	491.45	0.0207	11.87	83.14	5.6	43.40	1.53	0.0057	1.84	1	-4.83	499.66	504.83	MH-3
D7	C.C, STA. 73+05.05, 7.0' RT		9.71	0.0	12.3	4.9	0.80	8.42	42.40	36	27	491.45	490.61	0.0311	14.16	101.90	5.6	53.58	1.53	0.0087	0.23	1	-0.60	492.98	502.78	MH-3
D7	C.C, STA. 72+99.57, 33.5' RT		9.71		12.3			8.42															(Dc+D)/2 -->	491.34	490.61	HW

3.0 Post Construction Storm Water Best Management Practices

Post Construction Stormwater BMP Overview

The project earth disturbed area for the HAM-Columbia Connector project is 2.98 acres. Because the earth disturbed area is larger than the 1 acre threshold, Post Construction Stormwater Best Management Practices (BMP) will be required and a Notice of Intent (NOI) will need to be submitted to Ohio EPA. An overview of the BMP designed for this project is outlined below and has been included in the plans.

The purpose of HAM-Columbia Connector project is to construct 0.7 miles of shared use path from the future Mariemont Connector project to the Western terminus of the existing Columbia Connector trail. The calculated required treatment percentage is 86.67%. The total required water quality treatment for this project is 1.13 acres. The entire project is located within the Little Miami River watershed, therefore all treatment will also occur in this watershed.

1.68 acres of this project sheet flow out of the project area and have not been included in the BMP calculations or channelized for the sole purpose of BMP treatment. This sheet flow area is along the south side of US 50 and along the Little Miami River behind Kroger.

Narrow vegetated filter strip BMPs are being utilized on this project. This BMP has been selected because of the low initial cost and ease of maintenance. Vegetated filter strips are BMPs that filter storm water through vegetation on slopes of 3:1 or less. Vegetated filter strips have been provided offsite along the existing Columbia Connector just beyond the western terminus. A total of 1.16 acres is being treated by vegetated filter strips.

The total required treatment on this project is 1.13 acres. The 1.16 acres of BMPs being provided meet the treatment requirements. The calculations supporting this summary are found in the following pages.



Post Construction - Project Summary

Project Data

		Units
Project EDA	2.98	acres
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1109.2	No	
Sheet Flow (outside of right of way)	1.68	acres
BMPs Required?	BMPs Required	NA
Ain (New Impervious Area in New Permanent R/W	0.95	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	Yes	
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)	0.19	acres
Ain (New Impervious Area in New Permanent R/W)	0.95	acres
T% (Treatment Percent)	86.67	%
Treatment Requirement	1.13	acres

BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
VFS 3	Vegetated Filter Strip	1.16	1.16

Treatment Provided

Total Area with ODOT R/W Treated (acres)	1.16
Treatment Requirements (acres)	1.13
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

Vegetated Filter Strip

Filter Strip	Route	Begin Station	End Station	Side	Pavement Width (FT)	Filter Strip Width (FT)	Filter Strip Slope (z:1)	Filter Strip Length (FT)	Drainage Area (acres)	Filter Strip Area (SF)	Item 659 Topsoil Volume (CY)	Item 670 Erosion Protection Area (SY)
VFS 3	Columbia Connector, C	90+00	107+45	RT	14	15	3	1,745	1.16	26,175	323.1	2,908.3
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0

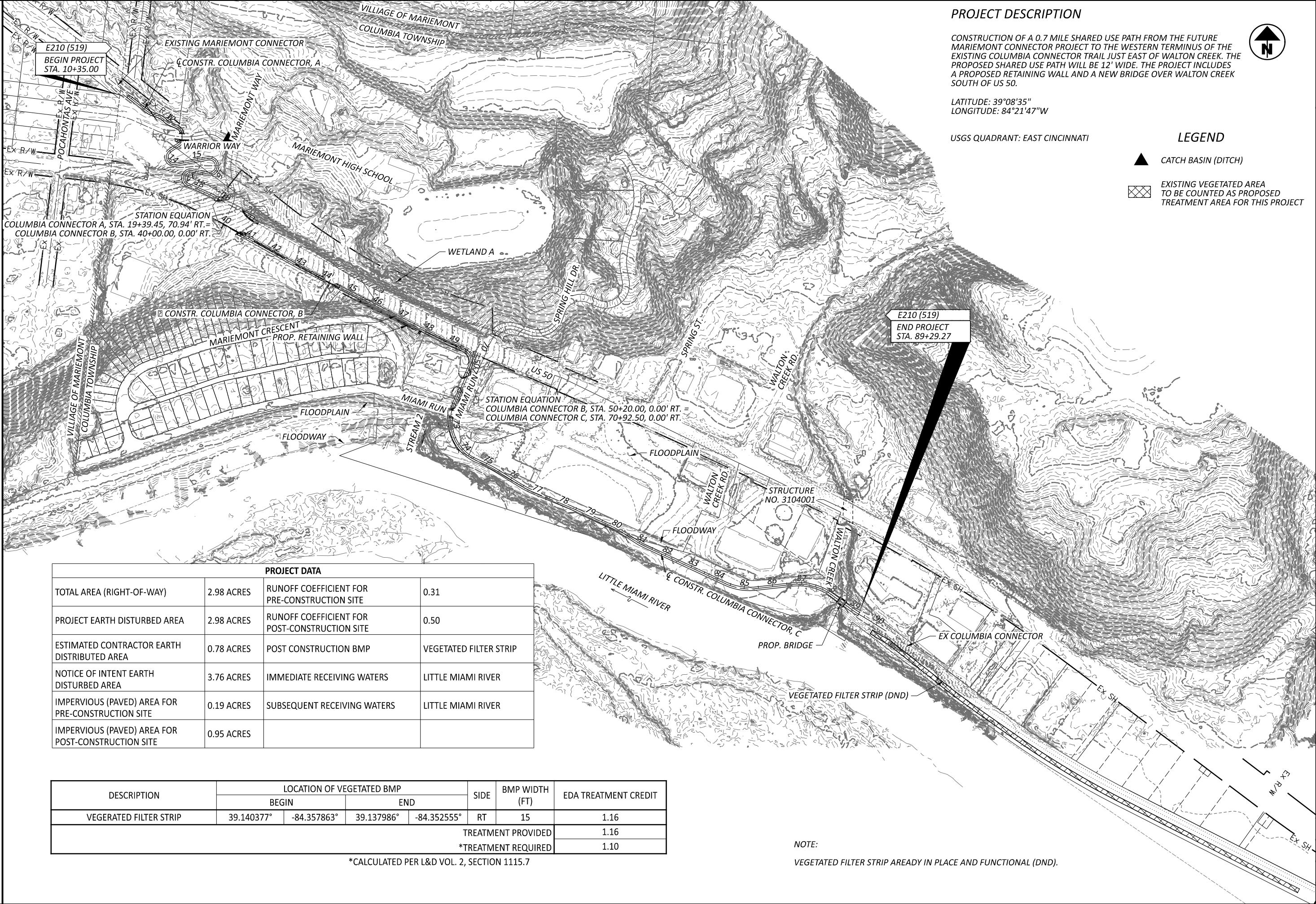
Total Treatment Credit Earned from Vegetated Filter Strips **1.16** acres
(Treatment is for quality only, not quantity)

BMP Design Considerations

		Answer	Design Check
1	Is the min. filter strip width 15-25 ft wide depending on L&D Table 1117-3?	Yes	Good
2	Is the slope 3:1 or flatter for 34 ft or narrower pavement drainage width	Yes	Good
3	Is the slope 6:1 or flatter for 35 - 48 ft pavement drainage width	Yes	Good
4	Is the only contributing drainage to the filter strip from the road and shoulder?	Yes	Good
5	Does any concentrated flow or any outlets discharge to the filter strip?	Yes	Good
6	Is 4" of Item 659, Topsoil, included for the filter strip?	Yes	Good
7	Is Item 670, Slope Erosion Protection, included for the filter strip?	Yes	Good

The image below depicts the Western terminus. Showing the current conditions of the shared use path that the HAM-Columbia Connector is connecting to. The path is 14' wide and has a shallow slope on the left hand side, when looking at the image, that drains to the Little Miami River. The area between the path and the river appears to be vegetated and therefore, can be counted as vegetated filter strip for this project. Approximately 3,369' of vegetated area along the existing shared use path will be counted towards this projects BMP's.





PROJECT DESCRIPTION

CONSTRUCTION OF A 0.7 MILE SHARED USE PATH FROM THE FUTURE MARIEMONT CONNECTOR PROJECT TO THE WESTERN TERMINUS OF THE EXISTING COLUMBIA CONNECTOR TRAIL JUST EAST OF WALTON CREEK. THE PROPOSED SHARED USE PATH WILL BE 12' WIDE. THE PROJECT INCLUDES A PROPOSED RETAINING WALL AND A NEW BRIDGE OVER WALTON CREEK SOUTH OF US 50.

LATITUDE: 39°08'35"
LONGITUDE: 84°21'47"W

USGS QUADRANT: EAST CINCINNATI

LEGEND

- CATCH BASIN (DITCH)
- EXISTING VEGETATED AREA TO BE COUNTED AS PROPOSED TREATMENT AREA FOR THIS PROJECT



PROJECT SITE PLAN

PROJECT DATA			
TOTAL AREA (RIGHT-OF-WAY)	2.98 ACRES	RUNOFF COEFFICIENT FOR PRE-CONSTRUCTION SITE	0.31
PROJECT EARTH DISTURBED AREA	2.98 ACRES	RUNOFF COEFFICIENT FOR POST-CONSTRUCTION SITE	0.50
ESTIMATED CONTRACTOR EARTH DISTRIBUTED AREA	0.78 ACRES	POST CONSTRUCTION BMP	VEGETATED FILTER STRIP
NOTICE OF INTENT EARTH DISTURBED AREA	3.76 ACRES	IMMEDIATE RECEIVING WATERS	LITTLE MIAMI RIVER
IMPERVIOUS (PAVED) AREA FOR PRE-CONSTRUCTION SITE	0.19 ACRES	SUBSEQUENT RECEIVING WATERS	LITTLE MIAMI RIVER
IMPERVIOUS (PAVED) AREA FOR POST-CONSTRUCTION SITE	0.95 ACRES		

DESCRIPTION	LOCATION OF VEGETATED BMP				SIDE	BMP WIDTH (FT)	EDA TREATMENT CREDIT
	BEGIN		END				
VEGERATED FILTER STRIP	39.140377°	-84.357863°	39.137986°	-84.352555°	RT	15	1.16
TREATMENT PROVIDED							1.16
*TREATMENT REQUIRED							1.10

*CALCULATED PER L&D VOL. 2, SECTION 1115.7

NOTE:
VEGETATED FILTER STRIP AREADY IN PLACE AND FUNCTIONAL (DND).

DESIGN AGENCY

10200 Alliance Road,
Suite 300
Cincinnati, OH 45242
(613) 842-8200

DESIGNER

ZTM

REVIEWER

SNS 08-04-25

PROJECT ID

114496

SHEET

P.17

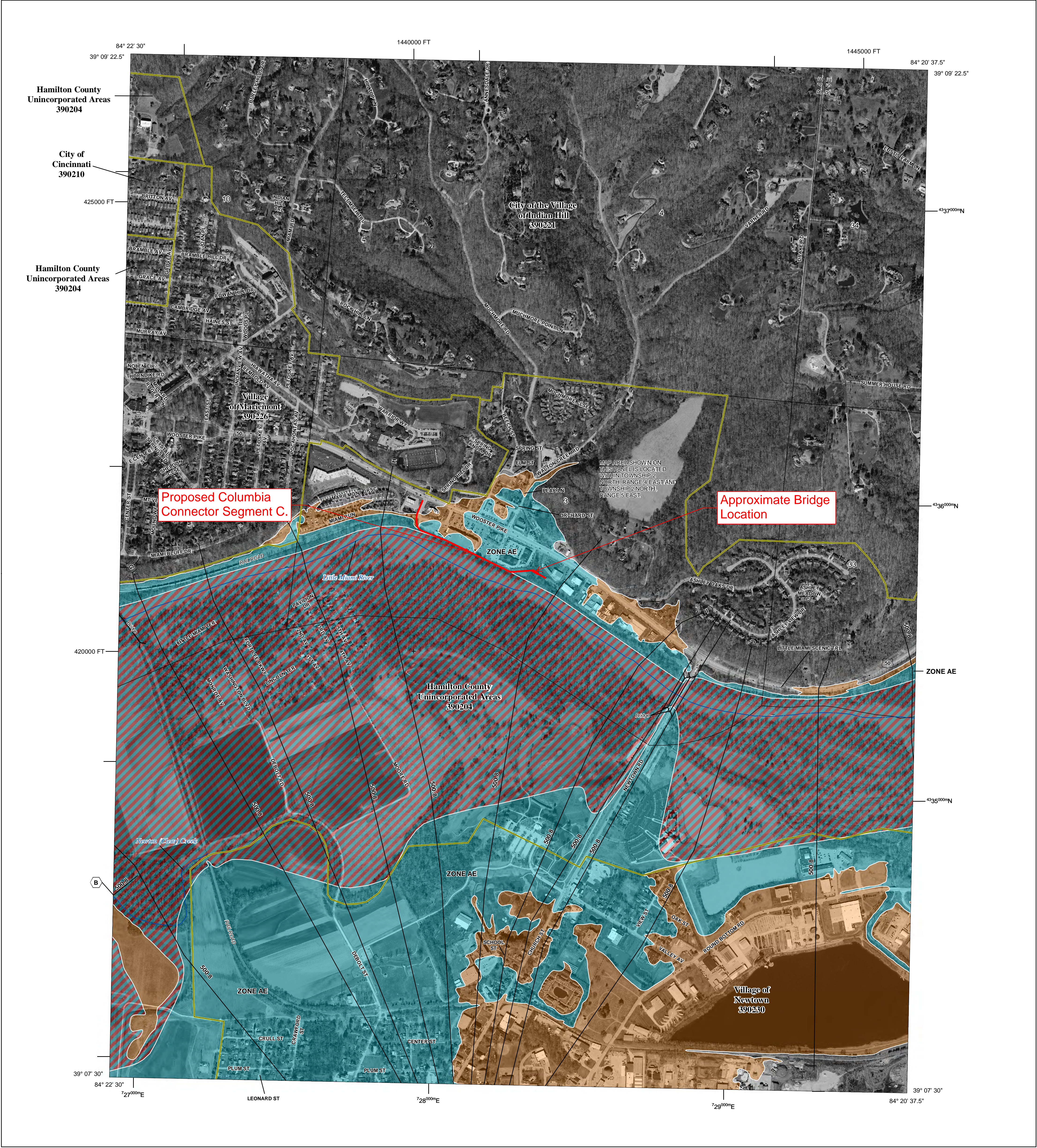
TOTAL

104

4.0 Floodplain Coordination

Floodplain Coordination

This project consists of the construction of a shared use path starting at the terminus of the Mariemont Connector and terminating to the existing Columbia Connector trail. Segments A and B, as seen on the schematic sheet in the plan set, are out of the floodway and floodplain. Segment C, running along Miami Run and behind Kroger's, is in Zone X, Zone AE, and within the regulatory Floodway. The portion of the trail in the regulatory floodway has approximately 550 cy of excavation and approximately 130 cy of embankment. This results in a net of approximately 420 cy of excavation in the regulatory floodway. The hydraulic analysis for the Little Miami River is provided under separate cover, illustrating a no-rise condition will result from the project. Please refer to the FIRMette on the following page.



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTPS://MSC.FEMA.GOV](https://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99 With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at <https://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

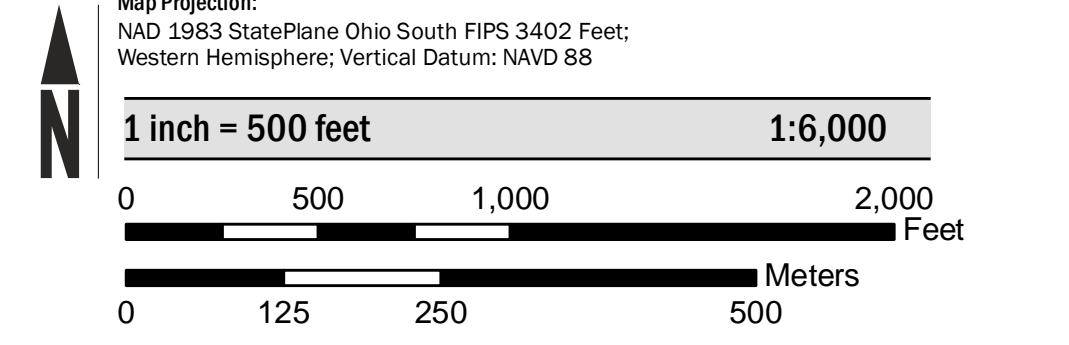
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

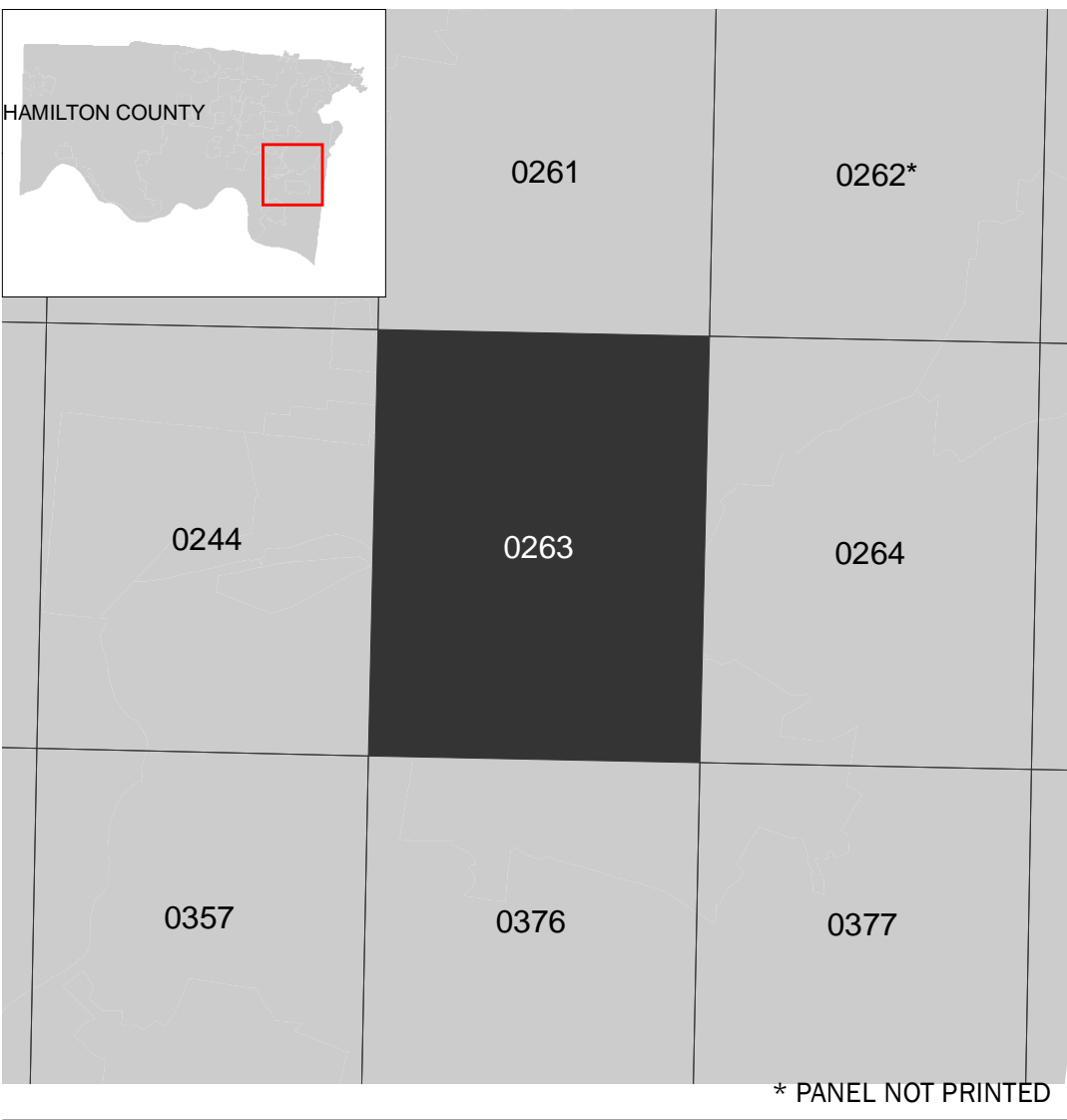
To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the United States Geological Survey (USGS), US Census Bureau, FEMA, State of Ohio and Cincinnati Area Geographic Information System (CAGIS). Orthophotography was obtained from the Ohio Statewide Imagery Program (OSIP III), dated 2018.

SCALE



PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

HAMILTON COUNTY, OHIO
And Incorporated Areas

PANEL 263 OF 390

Panel Contains:			
COMMUNITY	NUMBER	PANEL	SUFFIX
CINCINNATI, CITY OF	390210	0263	F
HILL CITY OF	390221	0263	F
HAMILTON COUNTY	390204	0263	F
MARIEMONT, VILLAGE OF	390226	0263	F
NEWTOWN, VILLAGE OF	390230	0263	F

PRELIMINARY
03/05/2021

VERSION NUMBER
2.5.3.5

MAP NUMBER
39061C0263F

MAP REVISED