



# DRAINAGE REPORT

ROS-23-6.87 (Turbo Lane)

PID 116137

**2LMN**

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# Drainage Narrative:

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## Project Description

2LMN, Inc. as a subconsultant to Jacobs has been retained by District 9 of the Ohio Department of Transportation (ODOT) to prepare plans for the intersection safety project, ROS-23-6.87 (Turbo Lane) in Ross County, Ohio at the intersection of US 23 and Trego Creek Road. The project includes construction a turbo lane. The turbo lane will allow for continuous flow in the northbound direction along US 23. The southern leg of the intersection, Trego Creek Road, will allow for normal right turns and a turbo lane implemented for left turning movements utilizing a left side merge lane onto US 23. The northern leg of the intersection, Trego Creek Road, will be converted into a right-in-right-out turning movement using a concrete median divider.

## Design Criteria

The drainage design criteria for this project will follow the design standards found within Location and Design Manual: Volume 2 and can be on form LD-35 located in [Appendix 1](#).

## Project Drainage Design and Drainage Area Maps

US 23 is a 4-lane divided highway where drainage contributes both towards the central grassed median as well as towards the outside to road side open water carrying ditches. At the intersection, a short run of trench drain is present. Presumably, the trench drain was installed within the intersection area at the existing turn lanes likely to minimize ponding and drainage spread where there is an “inverted crown” on the pavement surface. Throughout the entire project limits, the roadway geometry is along a curve. Therefore, the pavement is superelevated along the entire length of the project where the southbound US 23 lanes fully contribute to the central median area. The US 23 northbound lanes contribute to the outside portion of the roadway and only the inside shoulder contributes towards the central median.

For this project, proposed drainage design will be limited primarily to the central median area where the acceleration lane for the “turbo lane” widening takes place. Central median drainage already exists and will be reused as much as possible in order to reduce costs. However, because of the proposed design, the location of the low point that will be created by widening to the center (essentially an inverted crown area) a series of trench drains will be used in order to eliminate surface drainage so that the acceleration lane will not be encroached by ponding water. This low point is strategically placed outside of the driving area for the majority of the turbo lane, however, near the end the inverted crown location shifts back to the centralized area once the turbo lane ties back into existing. Existing outlets are being maintained as much as possible to reduce cost and new basins are being proposed with short runs of conduits connecting to existing ones via masonry collars. The project proposes no work outside of the central median area and thus no existing drainage outside of these limits will be changed.

Drainage area mapping and storm sewer designed via CDSS are provided in [Appendix 2](#).

## Post Construction Best Management Practices (BMPs) Calculations

For this project, there is greater than 1 acre of earth disturbed area (EDA). Therefore, this project will require post construction BMP's. This project is constrained entirely within existing R/W and thus can be considered a "Redevelopment Project" as defined in L&D Volume 2: section 1111.6. Due to this, only water quality treatment will be required (water quantity treatment will not be required). This limits the type of BMP to one of the following: 1) manufactured system 2) vegetated biofilter (widened ditches) and 3) vegetated filter strips (VFS). Typically, vegetation-based water quality BMPs are the preferred option, as they are cheaper and easier to maintain. To avoid the need to construct ditches with steeper slopes and widened ditch bottoms, VFS are the preferred vegetation-based water quality BMP options. In order to use VFS, the L&D Volume 2: section 1113.2.1 states that the following conditions must be satisfied:

- The minimum VFS width is equal to the width of the contributing impervious area
- The maximum slope of the VFS is 3:1
- All runoff must be sheet flow, with no concentrated flows to the VFS

These conditions are currently met in the southwest quadrant of the intersection where there is currently plenty of unused land within ODOT right-of-way to meet the minimum VFS width, roughly 4:1 ditch foreslopes, and where all runoff will be sheet flow. Because of the current state of this area, VFS present the most effective water quality treatment option for this project.

It has been determined that the project earth disturbed area (EDA) – as defined in the L&D Volume 2: section 1109.1 – is approximately 1.32 acres total.

Due to the project being considered "redevelopment project" – the treatment % (T%) for this project will be 20%. Table 1 below summarizes the overall project BMP treatment requirements.

<b>Table 1: BMP Treatment Requirements</b>		
<b>Description</b>	<b>Area</b>	<b>Unit</b>
ROS-23-6.87 – Earth Disturbed Area (EDA)	1.32	Acre
Required Treatment, T% (Redevelopment Project)	20%	
<b>Required Treatment Area</b>	<b>1.32 x 20% = 0.26</b>	<b>Acre</b>

Vegetated filter strips have been chosen as this project's BMP. The BMP calculations and treatment area location can all be found in [Appendix 3](#).

# Appendix 1

## (LD-35)

**PROJECT INFORMATION:**

COUNTY	ROUTE	SECTION	PID

**PIPE POLICY:**

The Pipe Policy of \_\_\_\_\_ will be used for this project.

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(Attach a copy of the written pipe policy or furnish a link to the policy. In lieu of a written policy, documentation of locally funded construction practices may be provided)

**POST CONSTRUCTION BMP POLICY:**

The Post Construction BMP Policy of \_\_\_\_\_ will be used for this project.

If a policy other than ODOT's is being used, the following BMP's are permitted:

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**DRAINAGE WATERSHED(S):**

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**PROJECT SPECIFIC INFORMATION AFFECTING DRAINAGE:**

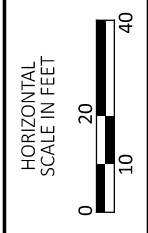
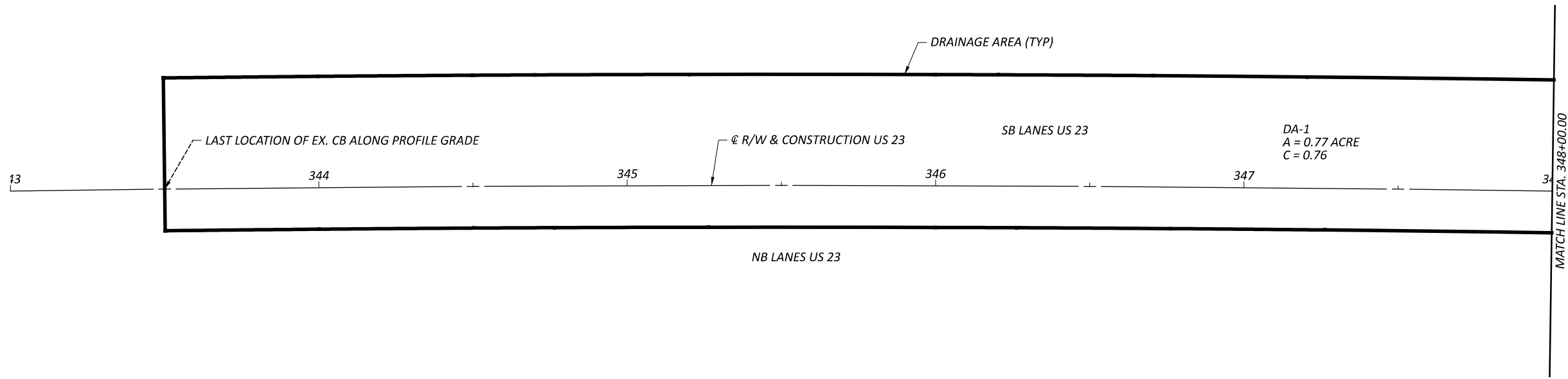
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# Appendix 2

## (Drainage Area Maps)



DRAINAGE AREA MAP

DESIGN AGENCY  
**2LMN**

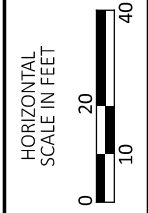
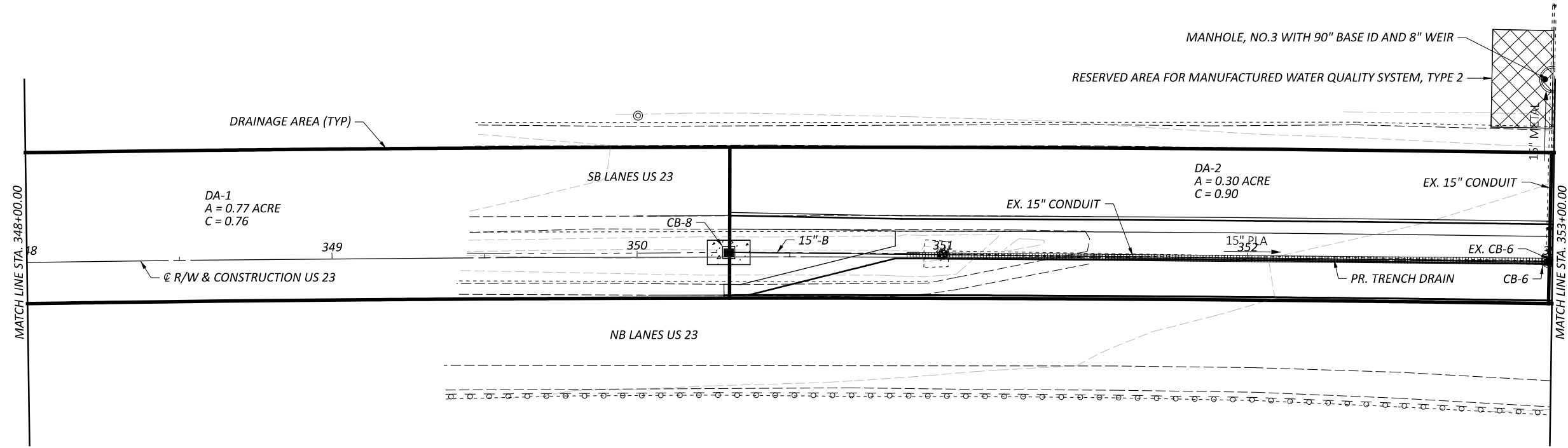
DESIGNER  
JJR

REVIEWER  
ALL 10/20/22

PROJECT ID  
116137

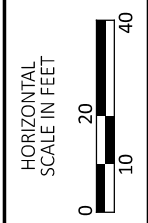
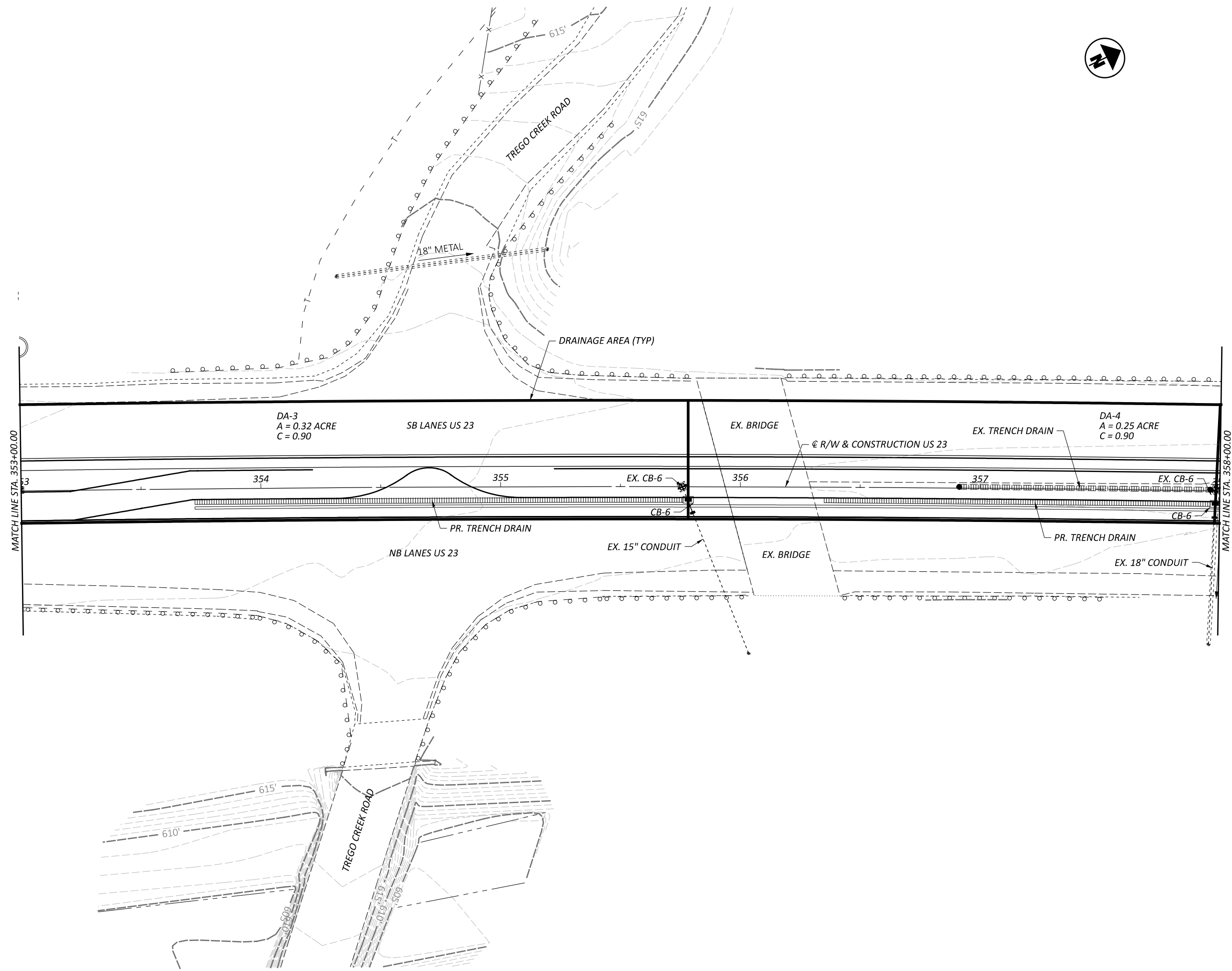
SHEET	TOTAL
201	999





DRAINAGE AREA MAP

DESIGN AGENCY	
<b>2LMN</b>	
DESIGNER	JJR
REVIEWER	ALL
PROJECT ID	10/20/22
SHEET	116137
TOTAL	999
202	999



DRAINAGE AREA  
MAP

DESIGN AGENCY

**2LMN**

DESIGNER

JJR

REVIEWER

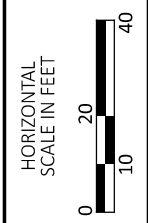
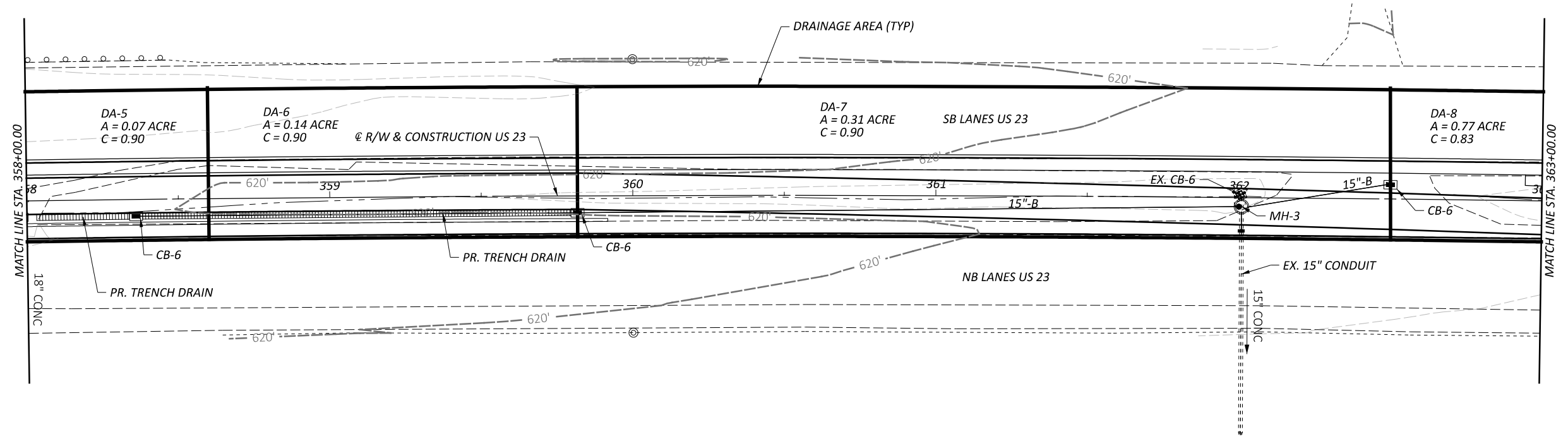
ALL 10/20/22

PROJECT ID

116137

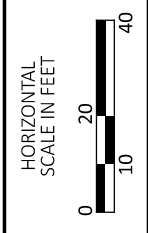
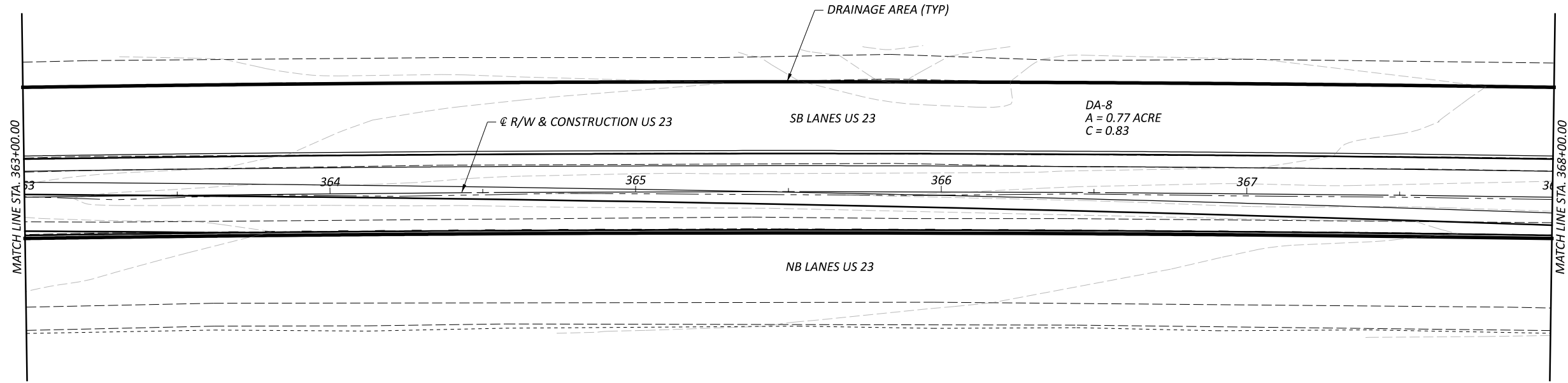
SHEET TOTAL

203 999



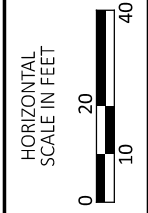
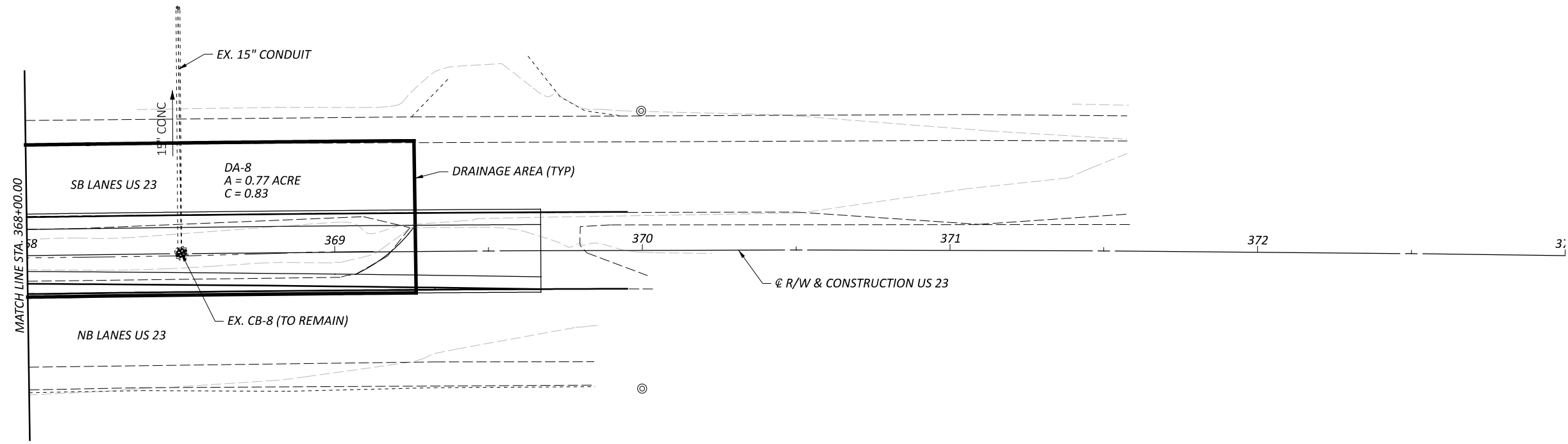
DRAINAGE AREA  
MAP

DESIGN AGENCY	
<b>2LMN</b>	
DESIGNER	JJR
REVIEWER	ALL
DATE	10/20/22
PROJECT ID	116137
SHEET	TOTAL
204	999



DRAINAGE AREA  
MAP

DESIGN AGENCY	
<b>2LMN</b>	
DESIGNER	JJR
REVIEWER	ALL 10/20/22
PROJECT ID	116137
SHEET	TOTAL
205	999



DRAINAGE AREA  
MAP

DESIGN AGENCY	
<b>2LMN</b>	
DESIGNER	JJR
REVIEWER	ALL 10/20/22
PROJECT ID	116137
SHEET	TOTAL
206	999

# Appendix 2

## (CDSS – 1 – Storm Sewer Design)



# STORM SEWER SYSTEM

**PID :** 116137      **Date :** 10/13/2022      **Project :** ROS-23-6.87

**Location :** Intx. US 23 and Trego Creek Road, Ross County Ohio

**Description :** Storm Design: Sta. 350+30 to Sta. 353+00

**Designer :**

**Rainfall Area:** C

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 612.60

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	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.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
DA1	DA2	350+30		0.77	0.59	15.00	4.47	4.91	2.6	2.9	15	269.0	0.0056	617.91	3.60	4.51	0.0026	618.67	621.60	2.93	2.44	CB 8
	begin	353+00		0.77	0.59									616.40				617.37	622.57			0.015
DA2	MH	353+00		0.30	0.27	16.24	4.31	4.90	3.7	4.2	15	62.0	0.0444	616.40	8.48	12.68	0.0056	616.91	622.57	5.66	4.92	CB 6
		353+00		1.07	0.86									613.65				614.69	621.50			0.015
MH	OUT	353+00		0.00	0.00	16.37	4.29	4.89	3.7	4.2	15	25.0	0.0452	613.65	8.53	12.80	0.0056	614.16	621.50	7.34	6.60	MH 3
	final	353+00		1.07	0.86									612.52				613.56	613.77			0.015

### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-1  
**STATION:** 350+30  
 CB-8

Total Area		acres
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	C value		Area (ac.)		CA
	0.3				
	0.35				
	0.4				
	0.45				
	0.5		0.26		0.13
	0.55				
	0.6				
	0.65				
	0.7				
	0.9		0.51		0.46
C avg. (Runoff coeff.)		0.76	Total Area	0.77	Total CA

Ditch Slope	
High Pt.	Low Pt.

	Sheet	Shallow	Ditch
L (Length of flow, ft.)	34		681
S [Slope (%)]	1.6		0.4
k (Intercept coeff.)			0.457
Velocity (fps)			0.95
<b>Time of Conc. (min)</b>	3.0		12.0
<b>Total time (min)</b>			15.0

Use Tc: 15.0 \*15 min. CB in ditch



### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-2  
**STATION:** 353+00  
 CB-6

Total Area		acres
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C value	Area (ac.)	CA
0.3		
0.35		
0.4		
0.45		
0.5		
0.55		
0.6		
0.65		
0.7		
0.9	0.30	0.27
C avg. (Runoff coeff.)	Total Area	Total CA
0.90	0.30	0.27

C avg. (Runoff coeff.)

0.90
Total Area
0.30
Total CA
0.27

Ditch Slope	
High Pt.	Low Pt.

	Sheet	Shallow	Ditch
L (Length of flow, ft.)	34		270
S [Slope (%)]	1.6		0.32
k (Intercept coeff.)			0.619
Velocity (fps)			1.15
<b>Time of Conc. (min)</b>	<b>1.8</b>		<b>3.9</b>
<b>Total time (min)</b>			<b>5.7</b>

Use Tc: 10.0 \*10 min. CB in pavement



# STORM SEWER SYSTEM

**PID :** 116137      **Date :** 10/13/2022      **Project :** ROS-23-6.87

**Location :** Intx. US 23 and Trego Creek Road, Ross County Ohio

**Description :** Storm Design: Sta. 355+78

**Designer :**

**Rainfall Area:** C

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 611.50

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	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(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'
DA3	OUT	355+78	0.32	0.29	10.00	5.32	5.98	1.5	1.7	15	68.0	0.0850	617.20	8.38	17.56	0.0009	617.47	621.13	3.66	2.68	CB 6
	begin	356+04	0.32	0.29									611.42				612.31	612.67			0.015

### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-3  
**STATION:** 355+78  
 CB-6

Total Area		acres
------------	--	-------

C value	Area (ac.)	CA
0.3		
0.35		
0.4		
0.45		
0.5		
0.55		
0.6		
0.65		
0.7		
0.9		
C avg. (Runoff coeff.)	0.90	0.29
Total Area	0.32	Total CA
Total CA	0.32	0.29

C avg. (Runoff coeff.)

0.90 Total Area 0.32 Total CA 0.29

Ditch Slope	
High Pt.	Low Pt.

Sheet	Shallow	Ditch
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L (Length of flow, ft.)	34		280
S [Slope (%)]	1.6		0.32
k (Intercept coeff.)			0.619
Velocity (fps)			1.15
Time of Conc. (min)	1.8		4.1
Total time (min)			5.9

Use Tc: 10.0 \*10 min. CB in pavement



# STORM SEWER SYSTEM

**PID :** 116137      **Date :** 10/13/2022      **Project :** ROS-23-6.87

**Location :** Intx. US 23 and Trego Creek Road, Ross County Ohio

**Description :** Storm Design: Sta. 357+98

**Designer :**

**Rainfall Area:** C

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 613.00

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	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(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'
DA4	OUT	357+98	0.25	0.23	10.00	5.32	5.97	1.2	1.3	18	58.0	0.0395	615.16	5.80	19.46	0.0002	615.44	620.53	5.09	3.87	CB 6
	begin	357+96	0.25	0.23									612.87				613.84	614.37			0.015

### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-4  
**STATION:** 358+00  
 CB-6

Total Area		acres
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		C value		Area (ac.)		CA
		0.3				
		0.35				
		0.4				
		0.45				
		0.5				
		0.55				
		0.6				
		0.65				
		0.7				
		0.9		0.25		0.23
C avg. (Runoff coeff.)	<b>0.90</b>		Total Area	<b>0.25</b>	Total CA	<b>0.23</b>

	Sheet	Shallow	Ditch
L (Length of flow, ft.)	34		222
S [Slope (%)]	1.6		0.32
k (Intercept coeff.)			0.619
Velocity (fps)			1.15
Time of Conc. (min)	1.8		3.2
Total time (min)			5.0

Ditch Slope	
High Pt.	Low Pt.

Use Tc: 10.0 \*10 min. CB in pavement



# STORM SEWER SYSTEM

**PID :** 116137      **Date :** 10/13/2022      **Project :** ROS-23-6.87

**Location :** Intx. US 23 and Trego Creek Road, Ross County Ohio

**Description :** Storm Design: Sta. 362+00

**Designer :**

**Rainfall Area:** C

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 610.75

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.)	(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'
DA5	DA6	358+36 begin	0.07 0.07	0.06 0.06	10.00	5.32	5.78	0.3	0.4	15	146.0	0.0066	617.42 616.45	2.18	4.91	0.0000	617.66 617.19	620.42 620.26	2.76	1.75	CB 6 0.015
DA6	MH	359+82 362+01	0.21 0.28	0.19 0.25	11.12	5.10	5.56	1.3	1.4	15	220.0	0.0067	616.45 614.98	3.20	4.92	0.0006	616.92 615.84	620.26 619.47	3.34	2.56	CB 6 0.015
DA7	MH	362+50 begin	0.31 0.59	0.28 0.53	10.00	5.32	5.97	1.5	1.7	15	50.0	0.0150	615.73 614.98	4.46	7.38	0.0009	616.15 615.86	619.18 619.47	3.03	2.20	CB 6 0.015
MH	OUT	362+01 final	0.00 0.59	0.00 0.53	12.26	4.90	5.53	2.6	2.9	15	75.0	0.0576	614.98 610.66	8.47	14.45	0.0027	615.38 611.63	619.47 611.91	4.09	3.24	MH 3 0.015

### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-5  
**STATION:** 358+36  
 CB-6

Total Area		acres
------------	--	-------

		C value		Area (ac.)		CA
		0.3				
		0.35				
		0.4				
		0.45				
		0.5				
		0.55				
		0.6				
		0.65				
		0.7				
		0.9		0.07		0.06
C avg. (Runoff coeff.)	<b>0.90</b>		Total Area	<b>0.07</b>	Total CA	<b>0.06</b>

	Sheet	Shallow	Ditch
L (Length of flow, ft.)	34		31
S [Slope (%)]	1.6		0.32
k (Intercept coeff.)			0.619
Velocity (fps)			1.15
Time of Conc. (min)	1.8		0.4
Total time (min)			2.2

Ditch Slope	
High Pt.	Low Pt.

Use Tc: 10.0 \*10 min. CB in pavement

### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-6  
**STATION:** 362+00  
 CB-6

Total Area		acres
------------	--	-------

		C value		Area (ac.)		CA
		0.3				
		0.35				
		0.4				
		0.45				
		0.5				
		0.55				
		0.6				
		0.65				
		0.7				
		0.9			0.14	
C avg. (Runoff coeff.)	<b>0.90</b>		Total Area	<b>0.14</b>	Total CA	<b>0.13</b>

Ditch Slope	
High Pt.	Low Pt.

	Sheet	Shallow	Ditch
L (Length of flow, ft.)	34		121
S [Slope (%)]	1.6		0.32
k (Intercept coeff.)			0.619
Velocity (fps)			1.15
<b>Time of Conc. (min)</b>	<b>1.8</b>		<b>1.8</b>
<b>Total time (min)</b>			<b>3.6</b>

Use Tc: **10.0** \*10 min. CB in pavement



### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-7  
**STATION:** 362+50  
 CB-6

Total Area		acres
------------	--	-------

C value	Area (ac.)	CA
0.3		
0.35		
0.4		
0.45		
0.5		
0.55		
0.6		
0.65		
0.7		
0.9		
C avg. (Runoff coeff.)	0.90	0.28
Total Area	0.31	Total CA
Total CA	0.31	0.28

C avg. (Runoff coeff.)

0.90 Total Area 0.31 Total CA 0.28

Ditch Slope	
High Pt.	Low Pt.

Sheet	Shallow	Ditch
-------	---------	-------

L (Length of flow, ft.)	34	269
S [Slope (%)]	1.6	0.38
k (Intercept coeff.)		0.619
Velocity (fps)		1.25
Time of Conc. (min)	1.8	3.6
Total time (min)		5.4

Use Tc: 10.0 \*10 min. CB in ditch



# STORM SEWER SYSTEM

**PID :** 116137      **Date :** 10/13/2022      **Project :** ROS-23-6.87

**Location :** Intx. US 23 and Trego Creek Road, Ross County Ohio

**Description :** Storm Design: Sta. 368+50

**Designer :**

**Rainfall Area:** C

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 606.50

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	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(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'
DA8	OUT	368+50	0.82	0.68	15.00	4.47	5.08	3.0	3.5	15	80.0	0.0866	613.34	10.24	17.72	0.0038	613.73	615.94	2.21	1.35	CB 8
	begin	368+50	0.82	0.68									606.41				607.41	607.66			0.015

### TIME OF CONCENTRATION

**PROJECT:** ROS-23-6.87  
**AREA:** DA-8  
**STATION:** 368+50  
 Ex. CB-8

Total Area		acres
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		C value	Area (ac.)		CA
		0.3			
		0.35			
		0.4			
		0.45			
		0.5	0.14		0.07
		0.55			
		0.6			
		0.65			
		0.7			
		0.9	0.63		0.56
C avg. (Runoff coeff.)	<b>0.83</b>	Total Area	<b>0.77</b>	Total CA	<b>0.63</b>

	Sheet	Shallow	Ditch
L (Length of flow, ft.)	34		553
S [Slope (%)]	1.6		0.32
k (Intercept coeff.)			0.457
Velocity (fps)			0.85
<b>Time of Conc. (min)</b>	<b>2.5</b>		<b>10.9</b>
<b>Total time (min)</b>			<b>13.3</b>

Ditch Slope	
High Pt.	Low Pt.

Use Tc: 13.3 \*15 min. CB in ditch

# Appendix 3

## (Post Construction BMPs)



### Post Construction - Project Summary

**Project Data**

		Units
Project EDA	1.32	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	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)	1.32	acres
Ain (New Impervious Area in New Permanent R/W)	0	acres
<b>T% (Treatment Percent)</b>	<b>20.00</b>	<b>%</b>
<b>Treatment Requirement</b>	<b>0.26</b>	<b>acres</b>

**BMPs Provided**

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
VFS1	Vegetated Filter Strip	1.32	1.32

**Treatment Provided**

<b>Total Area with ODOT R/W Treated (acres)</b>	<b>1.32</b>
<b>Treatment Requirements (acres)</b>	<b>0.26</b>
Treatment Check	<b>Good</b>

**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)
Filter Strip #1	US 23	351+30	353+60	LT	9	49.9	4	230	0.26	9,432	116.4	1,048.0
Filter Strip #2								0			0.0	0.0
Filter Strip #3								0			0.0	0.0
Filter Strip #4								0			0.0	0.0
Filter Strip #5								0			0.0	0.0
Filter Strip #6								0			0.0	0.0
Filter Strip #7								0			0.0	0.0
Filter Strip #8								0			0.0	0.0
Filter Strip #9								0			0.0	0.0
Filter Strip #10								0			0.0	0.0

**Total Treatment Credit Earned from Vegetated Filter Strips** 0.26 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	NA	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?	No	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