



North Carolina Department of Transportation

Highway Stormwater Program  
STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS



(Version 2.08; Released April 2018)

WBS Element: 37673.3.GV3      TIP No.: R-2721 A      County(ies): Wake      Page 1 of 10

General Project Information

WBS Element:	37673.3.GV3	TIP Number:	R-2721 A	Project Type:	New Location	Date:	12/4/2019
NCDOT Contact:	Deanna Riffey		Contractor / Designer:	Jeffrey L. Reck, PE			
Address:	NCDOT Hydraulics Unit 1590 Mail Service Center Raleigh, NC 27699-1590		Address:	Moffatt & Nichol 4700 Falls of Neuse Rd., Suite 300 Raleigh, NC 27609			
	Phone: (919)707-6151			Phone: (919) 781-4626			
	Email: <a href="mailto:driffey@ncdot.gov">driffey@ncdot.gov</a>			Email: <a href="mailto:jreck@moffattnichol.com">jreck@moffattnichol.com</a>			
City/Town:	Holly Springs		County(ies):	Wake			
River Basin(s):	Neuse		CAMA County?	No			
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	4.60	Surrounding Land Use:	Residential
Project Built-Up Area (ac.)		Proposed Project	Existing Site
		231.7 ac.	43.7 ac.
Typical Cross Section Description:	<p>-L- (I-540) will have grassed median ditch with 8:1 sides slopes, 3 paved lanes with 12' paved shoulders (total width of pavement is 124 feet), outside grass roadway ditches with 6:1 sides, and cut and fill slopes have a maximum 2:1 slope. -Y1- (NC 55 Bypass) will have and additional 18' lane and 12' paved shoulder added to the northbound side. Along -Y2- East Williams St. a 10' paved shoulder will be added on the southbound side. Along -Y3- and -Y4- (Sunset Lake Rd) there will be two lanes (11' and 14') in each direction with a center turn lane (16') with 2'-6" curb and gutter. -Y5- (Holly Springs Rd) will have three travel lanes (12', 12', and 11') in each direction with a bike lane (5') and 2'-6" curb and gutter. -Y6- (Pierce Olive Rd) will have a 12' lane in each direction with 4' paved shoulders. -Y1- (NC 55 Bypass) will have and additional 18' lane and 12' paved shoulder added to the northbound side. At the intersection of Holly Springs Rd and I-540 there will be a diverging diamond interchange.</p> <p>Along the existing -Y1- (NC 55 Bypass) there are two lanes with an 11' and a 12' lane in each direction and paved shoulders. Along the existing -Y2- (E Williams St.) there is a lane in each direction each being 11.5' lanes and paved shoulders. -Y3- and -Y4- have a lane in each direction that are 11' with paved shoulders at some locations and curb and gutter at other locations. -Y5- (Holly Springs Rd.) has a 10.5' lane in each direction along with a paved median that varies in width. The proposed I-540 is new location.</p>		

Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 66,400	Year: 2040	Existing: 20,200	Year: 2018
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**General Project Narrative:**  
**(Description of Minimization of Water Quality Impacts)**

The North Carolina Department of Transportation (NCDOT) has proposed to construct an extension of I-540 from NC 55 (Holly Springs) to US 401 (Fuquay-Varina). Below are a list of minimization efforts associated with water quality impacts. The interchange at NC 55 Bypass and I-540 will feature two additional ramps and relocate an exit loop. There will be a new diverging diamond interchange located at Holly Springs Rd and the new I-540 roadway. At East Williams St. the proposed I-540 will cross above grade. Sunset Lake Road, Holly Springs Rd, and Pierce-Olive road will cross the proposed I-540 above grade. Steps were taken to reduce wetland and stream impacts where possible. Within wetland areas 2:1 slopes are proposed where practical. For any fill slopes located in wetlands toe protection is being installed. Rip rap pads are being used near wetland and jurisdictional areas to minimize the potential for erosion. During the construction process, there will be no staging of construction equipment or storage of construction supplies in jurisdictional wetlands or streams. In addition, any borrow or waste sites will be located outside of jurisdictional areas. Any sediment and erosion control devices will follow the NCDOT procedure for Environmentally Sensitive Areas where required and will be installed as needed throughout the site to promote stability and minimize sedimentation. Grass swales and rip rap dissipate treatments have been designed and utilized where practical to minimize the impacts to jurisdictional and wetland areas. NCDOT is proposing to bridge the stream at Middle Creek along the proposed I-540 to avoid and minimize impacts to jurisdictional features in the area.

Waterbody Information

Surface Water Body (1):	Middle Creek	NCDWR Stream Index No.:	27-43-15-(1)
NCDWR Surface Water Classification for Water Body	Primary Classification:	Class C	
	Supplemental Classification:	Nutrient Sensitive Waters (NSW)	
Other Stream Classification:			
Impairments:			
Aquatic T&E Species?	Comments:		
NRTR Stream ID:	SPX	Buffer Rules in Effect:	Neuse
Project Includes Bridge Spanning Water Body?	Yes	Deck Drains Discharge Over Buffer?	No
Deck Drains Discharge Over Water Body?	No	Dissipator Pads Provided in Buffer? No	
(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	



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**Additional Waterbody Information**

<b>Surface Water Body (2):</b>	Rocky Branch		<b>NCDWR Stream Index No.:</b>	27-43-15-4.5	
<b>NCDWR Surface Water Classification for Water Body</b>	<b>Primary Classification:</b>	Class C			
	<b>Supplemental Classification:</b>	Nutrient Sensitive Waters (NSW)			
<b>Other Stream Classification:</b>					
<b>Impairments:</b>					
<b>Aquatic T&amp;E Species?</b>	No	<b>Comments:</b>			
<b>NRTR Stream ID:</b>	SAD		<b>Buffer Rules in Effect:</b>	Neuse	
<b>Project Includes Bridge Spanning Water Body?</b>	No	<b>Deck Drains Discharge Over Buffer?</b>	N/A	<b>Dissipator Pads Provided in Buffer?</b>	Yes
<b>Deck Drains Discharge Over Water Body?</b>	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					



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**Swailes**

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
5	-LREV- 18+50 MED	(1)Middle Creek	0.0	6.0	6.0	0.4	35	150	0.73%	1.2	1.2	1.5	1.3	No	Yes
	-LREV- 20+00 MED														
5	-LREV- 12+00 - LT	(1)Middle Creek	0.0	4.0	6.0	0.2	16	150	3.59%	0.2	1.5	0.3	1.6	No	Yes
	-LREV- 13+50 - LT														
6	-LREV- 33+50 MED	(1)Middle Creek	0.0	6.9	4.0	0.4	35	150	1.47%	1.2	1.6	1.5	1.7	No	Yes
	-LREV- 35+00 MED														
6	-LREV- 38+00 MED	(1)Middle Creek	0.0	8.0	6.8	1.1	106	450	1.32%	3.5	1.9	4.5	2.1	No	Yes
	-LREV- 42+50 MED														
6	-LREV- 42+50 MED	(1)Middle Creek	0.0	8.0	7.5	1.7	167	650	1.06%	5.6	2.0	7.1	2.1	No	Yes
	-LREV- 49+00 MED														
6	-LREV- 38+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.3	26	100	1.31%	0.7	1.4	0.9	1.5	No	Yes
	-LREV- 39+50 RT														
6	-Y1- 39+00 MED	(1)Middle Creek	0.0	5.0	3.5	0.1	14	50	0.33%	0.5	0.8	0.6	0.8	No	Yes
	-Y1- 39+50 MED														
6	-Y1- 39+50 MED	(1)Middle Creek	0.0	5.0	3.6	0.2	17	100	0.33%	0.6	0.8	0.7	0.9	No	Yes
	-Y1- 40+50 MED														
6	-Y1- 40+50 MED	(1)Middle Creek	0.0	5.0	4.5	0.2	23	132	0.33%	0.8	0.9	1.0	0.9	No	Yes
	-Y1- 41+82 MED														
6	-Y1- 41+82 MED	(1)Middle Creek	0.0	5.0	3.0	0.0	3	18	0.33%	0.1	0.6	0.2	0.6	No	Yes
	-Y1- 42+00 MED														
6	-Y1- 42+00 M	(1)Middle Creek	0.0	5.0	5.0	0.5	53	150	0.47%	1.9	1.2	2.4	1.3	No	Yes
	-Y1- 43+50 M														
6	-Y1- 43+88 MED	(1)Middle Creek	0.0	5.0	17.3	0.2	15	32	0.50%	0.5	0.7	0.6	0.8	No	Yes
	-Y1- 44+20 MED														
6	-Y1- 42+50 RT	(1)Middle Creek	0.0	6.0	3.0	0.8	77	138	1.12%	1.8	1.7	2.4	1.8	No	Yes
	-Y1- 43+88 RT														
6	-Y1RPBREV- 18+50 LT	(1)Middle Creek	0.0	6.0	4.0	0.2	21	150	2.79%	0.3	1.5	0.4	1.6	No	Yes
	-Y1RPBREV- 20+00 LT														
6	-Y1RPCREV- 17+00 LT	(1)Middle Creek	0.0	6.0	4.0	0.4	37	350	3.35%	0.5	1.8	0.7	2.0	No	Yes
	-Y1RPCREV- 20+50 LT														
7	-LREV- 50+50 MED	(1)Middle Creek	0.0	7.3	8.0	0.5	52	200	0.45%	1.8	1.1	2.3	1.1	No	Yes
	-LREV- 52+50 MED														
7	-LREV- 52+50 MED	(1)Middle Creek	0.0	7.3	8.0	0.6	63	270	1.17%	2.1	1.6	2.7	1.7	No	Yes
	-LREV- 55+20 MED														
7	-LREV- 55+20 MED	(1)Middle Creek	0.0	8.0	8.0	0.7	74	330	1.92%	2.5	2.0	3.2	2.1	No	Yes
	-LREV- 58+50 MED														
7	-LREV- 48+12 LT	(1)Middle Creek	0.0	3.0	3.0	0.9	92	103	0.50%	1.6	1.3	2.0	1.4	No	Yes
	-LREV- 49+15 LT														

**Additional Comments**

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**Swailes**

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
8	-LREV- 66+50 MED	(1)Middle Creek	0.0	8.0	4.0	0.6	63	240	1.26%	2.2	1.8	2.9	1.9	No	Yes
	-LREV- 68+90 MED														
8	-LREV- 68+90 MED	(1)Middle Creek	0.0	8.0	4.0	0.4	42	160	0.52%	1.5	1.1	1.9	1.2	No	Yes
	-LREV- 70+50 MED														
9	-LREV- 70+50 MED	(1)Middle Creek	0.0	8.0	4.0	0.8	79	200	0.49%	2.8	1.3	3.6	1.4	No	Yes
	-LREV- 73+50 MED														
9	-LREV- 73+50 MED	(1)Middle Creek	0.0	8.0	4.0	0.8	79	300	0.48%	2.8	1.3	3.6	1.4	No	Yes
	-LREV- 76+50 MED														
9	-LREV- 76+50 MED	(1)Middle Creek	0.0	8.0	4.0	0.8	79	300	0.42%	2.8	1.2	3.6	1.3	No	Yes
	-LREV- 79+50 MED														
9	-LREV- 79+50 MED	(1)Middle Creek	0.0	8.0	4.0	0.7	71	280	0.74%	2.6	1.5	3.3	1.6	No	Yes
	-LREV- 82+30 MED														
10	-LREV- 82+30 MED	(1)Middle Creek	0.0	8.0	4.9	0.8	76	470	1.10%	2.9	1.8	3.7	1.9	No	Yes
	-LREV- 87+00 MED														
10	-LREV- 87+00 MED	(1)Middle Creek	0.0	8.0	5.8	0.5	50	230	1.15%	1.8	1.6	2.3	1.7	No	Yes
	-L- 89+30 MED														
10	-L- 89+30 MED	(1)Middle Creek	0.0	8.0	6.9	0.6	60	270	0.97%	2.3	1.5	2.9	1.6	No	Yes
	-L- 92+00 MED														
10	-L- 92+00 MED	(1)Middle Creek	0.0	8.0	7.0	0.6	63	150	0.30%	2.2	1.0	2.9	1.0	No	Yes
	-L- 93+50 MED														
10	-L- 93+50 MED	(1)Middle Creek	0.0	8.0	7.2	0.4	37	170	0.30%	1.3	0.9	1.7	0.9	No	Yes
	-L- 95+20 MED														
10	-L- 89+50 LT	(1)Middle Creek	0.0	4.0	6.0	0.6	62	250	1.24%	1.3	1.6	1.7	1.7	No	Yes
	-L- 92+00 LT														
10	-L- 92+00 LT	(1)Middle Creek	0.0	4.0	6.0	0.6	60	150	0.98%	1.3	1.5	1.6	1.6	No	Yes
	-L- 93+50 LT														
10	-L- 93+50 LT	(1)Middle Creek	0.0	4.0	6.0	0.9	92	170	1.12%	2.0	1.7	2.5	1.8	No	Yes
	-L- 95+20 LT														
10	-L- 90+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.9	91	220	0.50%	2.2	1.3	2.8	1.4	No	Yes
	-L- 92+70 RT														
10	-L- 92+70 RT	(1)Middle Creek	0.0	6.0	4.0	1.5	145	480	0.50%	3.3	1.4	4.2	1.5	No	Yes
	-L- 97+50 RT														
11	-L- 98+20 MED	(1)Middle Creek	0.0	7.0	8.0	0.6	55	230	0.33%	2.0	1.0	2.5	1.0	No	Yes
	-L- 100+50 MED														
11	-L- 100+50 MED	(1)Middle Creek	0.0	6.0	8.0	0.4	43	175	0.30%	1.5	0.9	2.0	1.0	No	Yes
	-L- 102+25 MED														
11	-L- 102+25 MED	(1)Middle Creek	0.0	6.7	8.0	0.5	47	325	0.67%	1.7	1.2	2.1	1.3	No	Yes
	-L- 105+50 MED														

**Additional Comments**

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Swales															
Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
11	-L- 105+50 MED	(1)Middle Creek	0.0	6.7	8.0	0.4	43	200	1.82%	1.5	1.8	1.9	1.9	No	Yes
	-L- 107+50 MED														
11	-L- 96+50 LT	(1)Middle Creek	0.0	4.0	6.0	1.3	134	170	0.75%	2.4	1.5	3.1	1.6	No	Yes
	-L- 98+20 LT														
11	-L- 100+50 LT	(1)Middle Creek	0.0	4.0	6.0	0.8	78	175	0.79%	1.6	1.4	2.1	1.5	No	Yes
	-L- 102+25 LT														
11	-L- 105+50 LT	(1)Middle Creek	0.0	4.0	6.0	0.9	90	200	1.07%	2.0	1.7	2.6	1.8	No	Yes
	-L- 107+50 LT														
11	-L- 97+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.2	20	68	0.85%	0.4	1.0	0.5	1.1	No	Yes
	-L- 98+18 RT														
11	-L- 98+18 RT	(1)Middle Creek	0.0	6.0	4.0	0.5	46	182	1.88%	0.9	1.7	1.1	1.8	No	Yes
	-L- 100+00 RT														
11	-L- 102+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.1	12	100	0.36%	0.2	0.6	0.2	0.6	No	Yes
	-L- 103+50 RT														
11	-L- 103+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.5	49	200	0.50%	0.9	1.0	1.1	1.1	No	Yes
	-L- 105+50 RT														
11	-L- 105+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.1	12	50	2.60%	0.2	1.3	0.3	1.4	No	Yes
	-L- 106+00 RT														
11	-L- 106+00 RT	(1)Middle Creek	0.0	6.0	4.0	0.3	33	50	2.60%	0.5	1.7	0.6	1.8	No	Yes
	-L- 106+50 RT														
11	-L- 106+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.6	55	316	2.66%	1.0	2.0	1.3	2.1	No	Yes
	-L- 109+66.06 RT														
12	-L- 120+00 LT	(1) Middle Creek	0.0	4.0	6.0	1.3	125	300	0.97%	3.6	1.9	4.5	2.0	No	Yes
	-L- 123+00 LT														
12	-L- 117+30 RT	(1)Middle Creek	0.0	6.0	4.0	1.0	97	570	1.36%	2.0	1.8	2.6	2.0	No	Yes
	-L- 123+00 RT														
13	-L- 120+00 MED	(1)Middle Creek	0.0	7.0	8.0	1.0	102	469	0.71%	3.6	1.5	4.5	1.6	No	Yes
	-L- 124+68.69 MED														
13	-L- 124+68.69 MED	(1)Middle Creek	0.0	7.0	8.0	0.6	57	264	0.40%	2.0	1.1	2.6	1.1	No	Yes
	-L- 127+33 MED														
13	-L- 127+33 MED	(1)Middle Creek	0.0	6.7	8.0	0.3	33	154	0.86%	1.2	1.2	1.5	1.3	No	Yes
	-L- 128+87 MED														
13	-L- 128+87 MED	(1)Middle Creek	0.0	6.7	8.0	0.6	57	263	0.86%	2.0	1.4	2.5	1.5	No	Yes
	-L- 131+50 MED														
13	-L- 128+00 LT	(1)Middle Creek	0.0	4.0	6.0	1.4	135	350	0.79%	3.5	1.7	4.5	1.8	No	Yes
	-L- 131+50 LT														
13	-L- 129+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.3	34	200	0.81%	0.7	1.2	0.9	1.3	No	Yes
	-L- 131+50 RT														

**Additional Comments**



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14	-L- 131+50 MED -L- 135+25 MED	(1)Middle Creek	0.0	6.0	8.0	0.8	81	375	0.85%	2.9	1.6	3.6	1.7	No	Yes
14	-L- 135+25 MED -L- 138+00 MED	(1)Middle Creek	0.0	6.0	8.0	0.6	61	275	0.86%	2.1	1.5	2.7	1.5	No	Yes
14	-L- 138+00 MED -L- 139+00 MED	(1)Middle Creek	0.0	6.0	8.0	0.2	22	100	0.87%	0.8	1.1	1.0	1.2	No	Yes
14	-L- 139+00 MED -L- 142+50 MED	(1)Middle Creek	0.0	6.0	8.0	0.8	75	350	0.85%	2.6	1.5	3.4	1.6	No	Yes
14	-L- 142+50 MED -L- 144+95 MED	(1)Middle Creek	0.0	6.7	8.0	0.5	53	245	0.85%	1.9	1.4	2.4	1.5	No	Yes
14	-L- 144+95 MED -L- 146+00 MED	(1)Middle Creek	0.0	6.7	8.0	0.2	23	105	0.86%	0.8	1.1	1.0	1.2	No	Yes
14	-L- 146+00 MED -L- 147+92.65 MED	(1)Middle Creek	0.0	6.7	8.0	0.4	42	193	0.61%	1.5	1.2	1.9	1.3	No	Yes
14	-L- 148+33 MED -L- 150+00 MED	(1)Middle Creek	0.0	6.0	8.0	0.4	36	167	0.39%	1.3	1.0	1.6	1.0	No	Yes
14	-L- 131+50 LT -L- 135+25 LT	(1)Middle Creek	0.0	4.0	6.0	1.5	150	375	0.85%	3.5	1.8	4.4	1.9	No	Yes
14	-L- 135+00 LT -L- 139+00 LT	(1)Middle Creek	0.0	4.0	6.0	1.2	117	400	0.86%	3.1	1.7	3.9	1.8	No	Yes
14	-L- 143+50 LT -L- 145+00 LT	(1)Middle Creek	0.0	4.0	6.0	0.8	82	150	0.86%	1.1	1.3	1.5	1.4	No	Yes
14	-L- 131+50 RT -L- 135+25 RT	(1)Middle Creek	0.0	6.0	4.0	0.9	85	375	0.86%	1.5	1.4	1.9	1.5	No	Yes
14	-L- 135+25 RT -L- 138+00 RT	(1)Middle Creek	0.0	6.0	4.0	0.5	52	275	0.89%	1.0	1.3	1.2	1.4	No	Yes
15	-L- 150+00 MED -L- 152+20 MED	(1)Middle Creek	0.0	6.7	8.0	0.5	48	220	1.30%	1.7	1.6	2.1	1.7	No	Yes
15	-L- 152+20 MED -L- 154+00 MED	(1)Middle Creek	0.0	6.7	8.0	0.4	38	180	1.77%	1.3	1.7	1.7	1.8	No	Yes
15	-L- 154+00 MED -L- 156+00 MED	(1)Middle Creek	0.0	6.7	8.0	0.4	44	200	1.25%	1.5	1.5	2.0	1.7	No	Yes
15	-L- 156+00 MED -L- 159+43.47 MED	(1)Middle Creek	0.0	6.2	8.0	0.6	63	343	1.36%	2.1	1.7	2.7	1.8	No	Yes
15	-L- 169+21 MED -L- 169+66 MED	(2)Rocky Branch	0.0	9.0	6.0	0.4	40	45	0.31%	1.4	0.9	1.8	0.9	No	Yes
15	-L- 169+66 MED -L- 170+54 MED	(2)Rocky Branch	0.0	8.0	6.0	0.2	21	88	0.91%	0.8	1.2	1.0	1.2	No	Yes

**Additional Comments**

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**Swailes**

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
15	-L- 156+00 LT	(1)Middle Creek	0.0	4.0	6.0	0.8	82	210	1.50%	1.9	1.9	2.5	2.0	No	Yes
	-L- 158+10 LT														
15	-L- 154+00 RT	(1)Middle Creek	0.0	6.0	4.0	0.2	15	100	1.60%	0.3	1.2	0.4	1.3	No	Yes
	-L- 155+00 RT														
15	-L- 155+00 RT	(1)Middle Creek	0.0	6.0	4.0	1.0	104	400	0.62%	1.8	1.3	2.3	1.4	No	Yes
	-L- 159+00 RT														
16	-L- 159+43.47 MED	(2)Rocky Branch	0.0	5.5	8.0	0.5	49	257	1.42%	1.7	1.7	2.2	1.8	No	Yes
	-L- 162+00 MED														
16	-L- 162+00 MED	(2)Rocky Branch	0.0	7.1	8.0	0.6	55	250	0.30%	1.9	0.9	2.5	1.0	No	Yes
	-L- 164+50 MED														
16	-L- 164+50 MED	(2)Rocky Branch	0.0	8.0	7.7	0.3	32	150	0.31%	1.1	0.8	1.4	0.9	No	Yes
	-L- 166+00 MED														
16	-L- 173+00 MED	(2)Rocky Branch	0.0	8.0	6.0	0.4	40	200	0.57%	1.5	1.1	2.0	1.2	No	Yes
	-L- 175+00 MED														
16	-L- 160+50 LT	(2)Rocky Branch	0.0	4.0	6.0	0.6	60	150	0.76%	1.5	1.4	2.0	1.5	No	Yes
	-L- 162+00 LT														
16	-L- 162+00 LT	(2)Rocky Branch	0.0	4.0	6.0	0.7	69	250	0.85%	1.6	1.5	2.0	1.6	No	Yes
	-L- 164+50 LT														
16	-L- 160+50 RT	(1)Middle Creek	0.0	6.0	4.0	0.3	27	150	1.16%	0.5	1.2	0.7	1.3	No	Yes
	-L- 162+00 RT														
16	-L- 162+00 RT	(2)Rocky Branch	0.0	6.0	4.0	0.4	41	250	1.72%	1.0	1.7	1.2	1.8	No	Yes
	-L- 164+50 RT														
17	-L- 175+00 MED	(2)Rocky Branch	0.0	8.0	6.0	0.5	48	150	0.57%	1.7	1.2	2.1	1.2	No	Yes
	-L- 176+50 MED														
17	-L- 176+50 MED	(2)Rocky Branch	0.0	8.0	6.7	0.7	73	270	0.49%	2.6	1.2	3.4	1.3	No	Yes
	-L- 179+20 MED														
17	-L- 181+20 MED	(2)Rocky Branch	0.0	8.0	6.7	0.8	82	380	1.06%	2.9	1.7	3.7	1.8	No	Yes
	-L- 185+00 MED														
17	-L- 188+00 MED	(2)Rocky Branch	0.0	8.1	6.5	0.4	44	190	1.98%	1.6	1.8	2.0	1.9	No	Yes
	-L- 189+90 MED														
17	-L- 194+10 MED	(2)Rocky Branch	0.0	8.0	8.0	0.5	54	240	1.90%	1.9	1.9	2.4	2.0	No	Yes
	-L- 196+50 MED														
17	-L- 196+50 MED	(2)Rocky Branch	0.0	8.0	8.0	0.5	54	250	1.07%	1.9	1.5	2.4	1.6	No	Yes
	-L- 199+00 MED														
17	-L- 175+00 LT	(2)Rocky Branch	0.0	4.0	6.0	0.2	18	150	0.67%	0.3	0.9	0.4	1.0	No	Yes
	-L- 176+50 LT														
17	-L- 176+50 LT	(2)Rocky Branch	0.0	4.0	6.0	0.4	42	270	0.57%	0.8	1.1	1.0	1.1	No	Yes
	-L- 179+20 LT														

**Additional Comments**

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Swales															
Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
17	-L- 180+00 LT	(2)Rocky Branch	0.0	4.0	6.0	0.9	87	500	1.24%	1.9	1.8	2.5	1.9	No	Yes
	-L- 185+00 LT														
17	-L- 188+00 LT	(2)Rocky Branch	0.0	4.0	6.0	0.6	60	190	0.65%	1.2	1.2	1.6	1.3	No	Yes
	-L- 189+90 LT														
17	-L- 196+00 LT	(2)Rocky Branch	0.0	6.0	6.0	0.3	34	50	1.68%	0.7	1.5	0.9	1.6	No	Yes
	-L- 196+50 LT														
17	-L- 181+21 RT	(2)Rocky Branch	0.0	6.0	4.0	1.5	146	379	1.06%	3.4	1.9	4.4	2.0	No	Yes
	-L- 185+00 RT														
17	-L- 185+00 RT	(2)Rocky Branch	0.0	6.0	4.0	1.4	135	300	0.95%	3.1	1.8	3.9	1.9	No	Yes
	-L- 188+00 RT														
17	-L- 188+00 RT	(2)Rocky Branch	0.0	6.0	4.0	0.9	94	190	1.07%	2.2	1.7	2.8	1.8	No	Yes
	-L- 189+90 RT														
17	-L- 194+00 RT	(2)Rocky Branch	0.0	6.0	4.0	0.7	71	250	1.90%	1.6	2.0	2.1	2.1	No	Yes
	-L- 196+50 RT														
17	-L- 196+50 RT	(2)Rocky Branch	0.0	6.0	4.0	0.6	63	250	1.07%	1.5	1.6	1.9	1.7	No	Yes
	-L- 199+00 RT														
17	-Y5- 24+70 RT	(2)Rocky Branch	0.0	3.0	3.0	0.7	70	95	0.95%	1.5	1.7	2.0	1.8	No	Yes
	-Y5- 25+65 RT														
17	-Y5- 26+90 RT	(2)Rocky Branch	0.0	3.0	3.0	0.5	48	60	1.60%	1.0	1.8	1.2	1.9	No	Yes
	-Y5- 27+50 RT														
17	-Y5RPB- 10+24 LT	(2)Rocky Branch	0.0	6.0	4.0	0.7	69	484	0.68%	1.4	1.3	1.7	1.4	No	Yes
	-Y5RPB- 15+08 LT														
17	-Y5RPB- 15+08 LT	(2)Rocky Branch	0.0	6.0	4.0	0.1	9	64	0.33%	0.2	0.6	0.2	0.6	No	Yes
	-Y5RPB- 15+72 LT														
17	-Y5RPB- 15+72 LT	(2)Rocky Branch	0.0	6.0	4.0	0.7	66	333	1.25%	1.3	1.6	1.6	1.7	No	Yes
	-Y5RPB- 19+05 LT														
17	-Y5RPB- 19+05 LT	(2)Rocky Branch	0.0	6.0	4.0	0.7	71	75	0.43%	1.4	1.1	1.8	1.2	No	Yes
	-Y5RPB- 19+80 LT														
17	-Y5RPB- 19+80 LT	(2)Rocky Branch	0.0	6.0	4.0	0.4	40	138	0.61%	0.8	1.1	1.0	1.2	No	Yes
	-Y5RPB- 21+18 LT														
17	-Y5RPC- 27+50 RT	(2)Rocky Branch	0.0	6.0	4.0	0.7	67	250	0.77%	1.7	1.4	2.2	1.5	No	Yes
	-Y5RPC- 30+00 RT														
17	-Y5RPC- 24+50 LT	(2)Rocky Branch	0.0	6.0	4.0	0.5	49	300	1.75%	0.8	1.6	1.0	1.7	No	Yes
	-Y5RPC- 27+50 LT														
17	-Y5RPCNB- 10+00 LT	(2)Rocky Branch	0.0	6.0	4.0	0.3	28	81	0.65%	0.7	1.1	0.9	1.1	No	Yes
	-Y5RPCNB- 10+81 LT														
17	-Y5RPCNB- 10+81 LT	(2)Rocky Branch	0.0	6.0	4.0	0.3	30	160	0.63%	0.7	1.1	0.9	1.1	No	Yes
	-Y5RPCNB- 12+41 LT														
<b>Additional Comments</b>															





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**Swales**

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17	-Y5RPD- 15+66 LT	(2)Rocky Branch	0.0	6.0	4.0	0.2	16	290	2.32%	0.5	1.6	0.6	1.7	No	Yes
	-Y5RPD- 18+56 LT	(2)Rocky Branch	0.0	6.0	4.0	0.3	32	294	4.08%	0.5	2.0	0.7	2.1	No	Yes
17	-Y5RPD- 21+50 RT	(2)Rocky Branch	0.0	6.0	4.0	0.1	11	150	5.00%	0.2	1.7	0.2	1.8	No	Yes
	-Y5RPD- 23+00 RT	(2)Rocky Branch	0.0	8.0	8.0	0.3	30	139	0.30%	1.1	0.8	1.3	0.8	No	Yes
18	-L- 199+00 MED	(2)Rocky Branch	0.0	8.0	8.0	0.3	29	136	0.30%	1.0	0.8	1.3	0.8	No	Yes
	-L- 200+39.35 MED	(2)Rocky Branch	0.0	8.0	8.0	0.5	49	225	0.45%	1.7	1.0	2.2	1.1	No	Yes
18	-L- 201+75 MED	(2)Rocky Branch	0.0	8.0	8.0	1.1	108	500	0.45%	3.8	1.3	4.8	1.4	No	Yes
	-L- 204+00 MED	(2)Rocky Branch	0.0	8.0	8.0	0.7	65	300	0.45%	2.3	1.1	2.9	1.2	No	Yes
18	-L- 204+00 MED	(2)Rocky Branch	0.0	8.0	8.0	0.9	94	435	0.40%	3.3	1.2	4.2	1.3	No	Yes
	-L- 209+00 MED	(2)Rocky Branch	0.0	6.7	8.0	0.4	43	200	0.40%	1.5	1.0	1.9	1.1	No	Yes
18	-L- 209+00 MED	(2)Rocky Branch	0.0	4.0	6.0	1.3	132	435	0.40%	3.5	1.3	4.4	1.4	No	Yes
	-L- 212+00 MED	(2)Rocky Branch	0.0	6.0	4.0	0.3	29	215	0.83%	0.6	1.1	0.8	1.2	No	Yes
19	-L- 215+65 RT	(2)Rocky Branch	0.0	6.0	4.0	0.6	55	400	0.40%	1.1	1.0	1.4	1.1	No	Yes
	-L- 219+65 RT	(2)Rocky Branch	0.0	6.0	8.0	0.4	44	200	0.40%	1.5	1.0	2.0	1.1	No	Yes
20	-L- 226+00 MED	(2)Rocky Branch	0.0	6.6	8.0	0.4	43	200	0.38%	1.5	1.0	1.9	1.0	No	Yes
	-L- 228+00 MED	(2)Rocky Branch	0.0	6.0	8.0	0.3	33	200	0.37%	1.2	0.9	1.5	1.0	No	Yes
20	-L- 230+00 MED	(2)Rocky Branch	0.0	6.0	8.0	0.7	65	143	0.53%	2.3	1.2	2.9	1.3	No	Yes
	-L- 232+00 MED	(2)Rocky Branch	0.0	6.0	8.0	0.3	34	157	0.61%	1.2	1.1	1.5	1.2	No	Yes
20	-L- 232+00 MED	(2)Rocky Branch	0.0	6.8	8.0	0.7	71	325	0.73%	2.5	1.4	3.2	1.5	No	Yes
	-L- 233+43 MED	(2)Rocky Branch	0.0	6.0	8.0	0.3	34	157	0.61%	1.2	1.1	1.5	1.2	No	Yes
20	-L- 233+43 MED	(2)Rocky Branch	0.0	6.0	8.0	0.3	34	157	0.61%	1.2	1.1	1.5	1.2	No	Yes
	-L- 235+00 MED	(2)Rocky Branch	0.0	6.8	8.0	0.7	71	325	0.73%	2.5	1.4	3.2	1.5	No	Yes
20	-L- 235+00 MED	(2)Rocky Branch	0.0	6.8	8.0	0.7	71	325	0.73%	2.5	1.4	3.2	1.5	No	Yes
	-L- 238+25 MED	(2)Rocky Branch	0.0	6.8	8.0	0.7	71	325	0.73%	2.5	1.4	3.2	1.5	No	Yes

**Additional Comments**

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Swales															
Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
20	-L- 224+00 LT -L- 226+38 LT	(2)Rocky Branch	0.0	4.0	6.0	1.5	153	238	0.59%	3.0	1.5	3.9	1.6	No	Yes
20	-L- 227+92 LT -L- 230+50 LT	(2)Rocky Branch	0.0	4.0	4.0	1.3	125	258	0.31%	3.3	1.3	4.3	1.4	No	Yes
20	-L- 231+23 LT -L- 233+43 LT	(2)Rocky Branch	0.0	4.0	6.0	0.8	84	220	1.42%	2.1	1.9	2.6	2.0	No	Yes
20	-L- 233+43 LT -L- 235+00 LT	(2)Rocky Branch	0.0	4.0	6.0	0.6	57	157	1.90%	1.4	1.9	1.8	2.0	No	Yes
20	-L- 235+00 LT -L- 238+50 LT	(2)Rocky Branch	0.0	4.0	6.0	1.3	125	350	0.56%	2.6	1.4	3.3	1.5	No	Yes
20	-L- 228+00 RT -L- 229+00 RT	(2)Rocky Branch	0.0	6.0	4.0	0.5	50	100	0.48%	1.0	1.1	1.3	1.1	No	Yes
20	-L- 229+00 RT -L- 230+00 RT	(2)Rocky Branch	0.0	4.0	4.0	0.5	50	100	0.85%	1.0	1.4	1.2	1.4	No	Yes
20	-L- 230+00 RT -L- 230+95 RT	(2)Rocky Branch	0.0	4.0	4.0	0.2	19	95	3.16%	0.4	1.7	0.5	1.8	No	Yes
20	-L- 232+00 RT -L- 235+00 RT	(2)Rocky Branch	0.0	6.0	4.0	0.7	71	300	1.71%	1.2	1.8	1.5	1.9	No	Yes
20	-L- 235+00 RT -L- 238+25 RT	(2)Rocky Branch	0.0	6.0	4.0	0.7	74	325	1.13%	1.6	1.6	2.0	1.7	No	Yes
20	-Y6- 12+00 RT -Y6- 14+00 RT	(2)Rocky Branch	0.0	6.0	6.0	0.3	32	200	0.69%	0.7	1.1	0.9	1.1	No	Yes
20	-Y6- 12+00 LT -Y6- 13+75 LT	(2)Rocky Branch	0.0	6.0	6.0	0.4	35	175	0.61%	0.8	1.0	1.0	1.1	No	Yes
27	-Y4- 34+26 LT -Y4- 37+04 LT	(1)Middle Creek	0.0	5.0	6.0	1.3	126	278	0.73%	3.0	1.6	3.7	1.7	No	Yes
29	-Y5C- 11+00 RT -Y5C- 11+50 RT	(2)Rocky Branch	0.0	4.0	3.0	0.1	10	50	5.98%	0.2	2.0	0.3	2.2	No	Yes
29	-Y5C- 11+50 RT -Y5C- 11+87 RT	(2)Rocky Branch	0.0	4.0	3.0	0.2	18	37	1.19%	0.3	1.2	0.4	1.2	No	Yes
30	-Y5- 57+50 LT -Y5- 58+75 LT	(2)Rocky Branch	0.0	6.0	4.0	0.2	21	125	0.71%	0.3	0.9	0.4	0.9	No	Yes
30	-Y5- 57+38 RT -Y5- 60+00 RT	(2)Rocky Branch	0.0	6.0	4.0	0.4	42	262	1.24%	1.3	1.6	1.6	1.7	No	Yes
31	-Y5- 60+00 RT -Y5- 61+00 RT	(2)Rocky Branch	2.0	6.0	4.0	0.2	15	100	3.15%	0.4	1.5	0.5	1.6	No	Yes
34	-Y5A- 28+00 RT -Y5A- 31+00 RT	(2)Rocky Branch	0.0	6.0	6.0	1.2	123	300	1.17%	3.2	1.9	4.1	2.0	No	Yes

**Additional Comments**

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