

WATER BAR 12 SITE-SPECIFIC ANALYSIS

I. Drainage Area
As shown, the drainage area to Water Bar 12 is 2.04 acres. This is greater than the 1.5 acre-maximum in the MVP 17.3 Water Bar End Treatment Detail and, therefore, requires a site-specific analysis to determine the water bar end treatment length.

II. Runoff Coefficient
The flowpath for Water Bar 12 begins as sheet flow in a HSG A wooded area with slopes greater than 6%. Therefore, the runoff coefficient used in the sheet flow time of concentration calculation will be 0.08.

The flowpath exiting the Water Bar 12 end treatment will be along HSG B meadow with slopes greater than 6%. Therefore, the runoff coefficient used in the end treatment calculation will be 0.19.

TABLE 4 - 5b
Rational Equation Coefficients for SCS Hydrologic Soil Groups (A, B, C, D)
Rural Land Uses

Land Use	Treatment / Practice	Hydrologic Condition	HYDROLOGIC SOIL GROUP/SLOPE											
			A			B			C			D		
			0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Pasture or Range		Good	0.07	0.09	0.10	0.18	0.20	0.22	0.27	0.29	0.31	0.32	0.34	0.35
	Contoured	Good	0.03	0.04	0.06	0.11	0.12	0.14	0.24	0.26	0.28	0.31	0.33	0.34
Meadow			0.06	0.08	0.10	0.10	0.14	0.19	0.12	0.17	0.22	0.15	0.20	0.25
Wooded		Good	0.05	0.07	0.08	0.08	0.11	0.15	0.10	0.13	0.17	0.12	0.15	0.21

Source: Maryland State Highway Administration

III. Time of Concentration
As shown, the time of concentration for Water Bar 12 is 41 minutes.

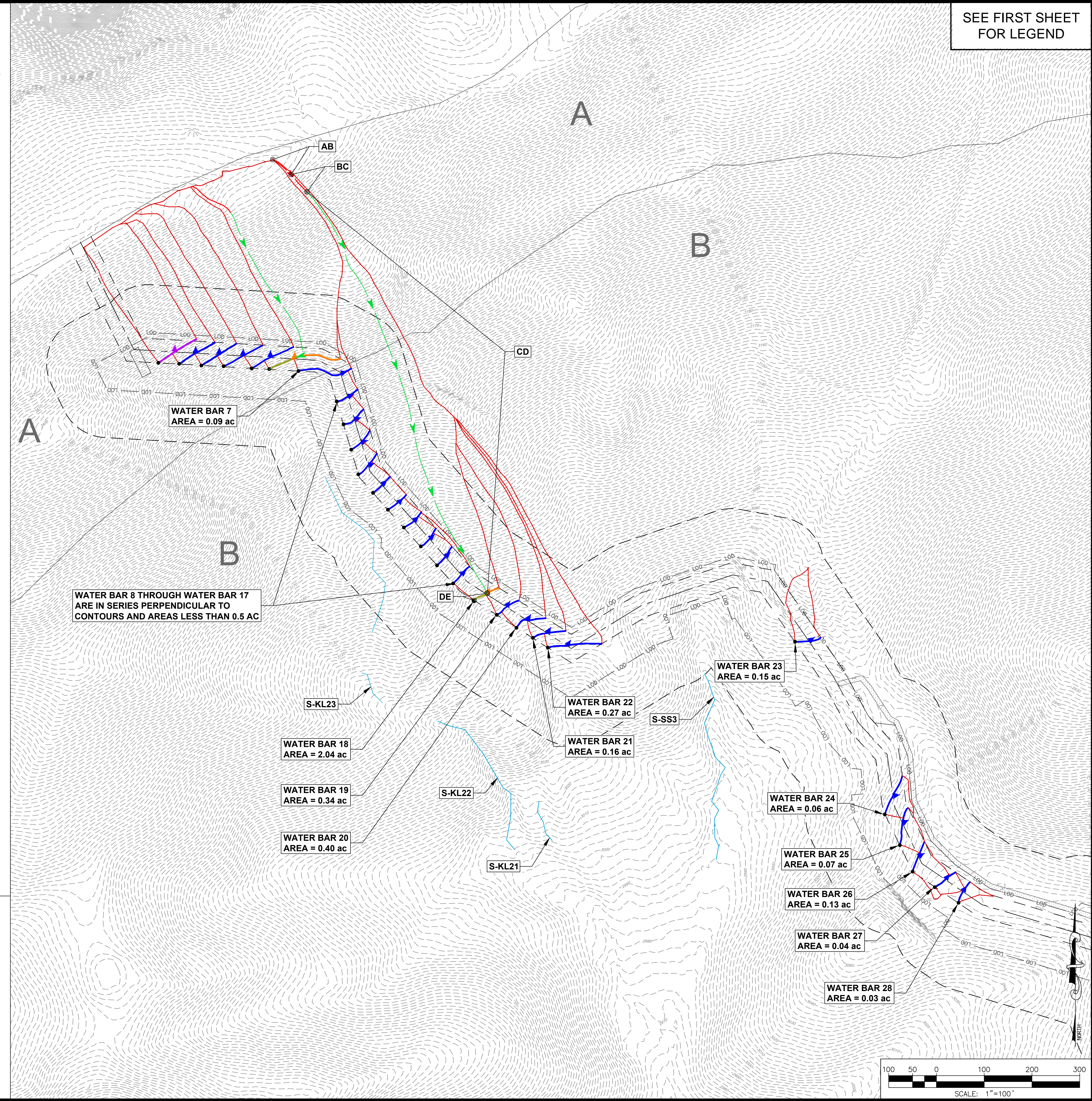
TIME OF CONCENTRATION: WATER BAR 12

ID	Description	C	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)
AB	Sheet flow 1	0.08	50.0	0.14	$T_c = 0.225L^{0.42} S^{-0.19} C^{-1.0}$			0.352
BC	Sheet flow 2	0.08	50.0	0.36				0.294
Shallow Concentrated Flow								
CD	Downslope		930.6	0.345			9.47	0.027
DE	Water bar		31.9	0.02			2.28	0.004
Channel Flow								
								$T_c = L / (3600V)$
Total Tc =								0.678
Total Tc (min) =								41

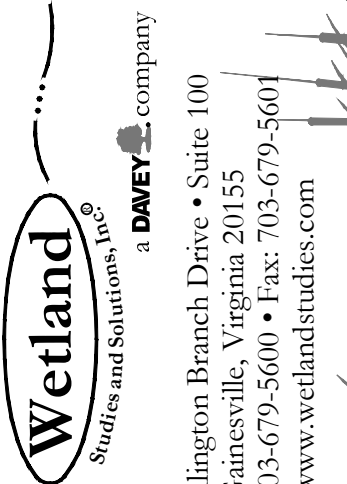
IV. Summary
As shown, the water bar end treatment calculator indicates a 10.4-foot long end treatment will ensure sheet flow conditions leaving Water Bar 12. For ease of construction, the maximum allowable water bar end treatment length of 20 feet will be used for Water Bar 12.

End Treatment Length Calculator

Enter Site Specific Data	T _c = 41	time of concentration to water bar, min
	A = 2.04	water bar drainage area, ac
	S = 0.33	weir discharge overland slope, ft/ft
Computed	i = 3.2	computed from IDF, in/hr
Enter Flow Parameters	C = 0.17	assumes A/B soils, >6% slope, meadow (conservative)
	C _w = 3.33	weir coefficient (spillway)
	n = 0.24	sheetflow, dense grasses
	H = 0.1	sheetflow depth over weir, ft
Computed Weir Length ----->		10.4 ft
Velocity Check ----->		0.77 fps



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Post-Construction Water Bar Drainage Area Map

Giles County, Virginia

Stormwater Management Plan

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No.	Date	Description	App. By	Rev. By

REVISIONS

Horizontal Datum: NAD 83
Vertical Datum: NAVD 88
Boundary and Topo Source: Holland Engineering, Inc.

Design	Draft	Approved
MAM	MAM	FRG

Sheet #
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Computer File Name:
L:\33000\2200\22018\18-001\AD004\ENR\Drainage Area WSB Drainage Areas.dwg

DATE: January 22, 2018 SCALE: As Noted

WATER BAR 45 SITE-SPECIFIC ANALYSIS

I. Drainage Area
As shown, the drainage area to Water Bar 45 is 1.57 acres. This is greater than the 1.5 acre-maximum in the MVP 17.3 Water Bar End Treatment Detail and, therefore, requires a site-specific analysis to determine the water bar end treatment length.

II. Runoff Coefficient
The flowpath for Water Bar 45 begins as sheet flow in a HSG B wooded area with slopes between 2% and 6%. Therefore, the runoff coefficient used in the sheet flow time of concentration calculation will be 0.11.

The flowpath exiting the Water Bar 45 end treatment will be along HSG B meadow with slopes greater than 6%. Therefore, the runoff coefficient used in the end treatment calculation will be 0.19.

TABLE 4 - 5b
Rational Equation Coefficients for SCS Hydrologic Soil Groups (A, B, C, D) Rural Land Uses

Land Use	Treatment / Practice	Hydrologic Condition	HYDROLOGIC SOIL GROUP/SLOPE											
			A			B			C			D		
			0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Pasture or Range		Good	0.07	0.09	0.10	0.18	0.20	0.22	0.27	0.29	0.31	0.32	0.34	0.35
	Contoured	Good	0.03	0.04	0.06	0.11	0.12	0.14	0.24	0.26	0.28	0.31	0.33	0.34
Meadow			0.06	0.08	0.10	0.10	0.14	0.19	0.12	0.17	0.22	0.15	0.20	0.25
Wooded		Good	0.05	0.07	0.08	0.08	0.11	0.15	0.10	0.13	0.17	0.12	0.15	0.21

Source: Maryland State Highway Administration

III. Time of Concentration
As shown, the time of concentration for Water Bar 45 is 27 minutes.

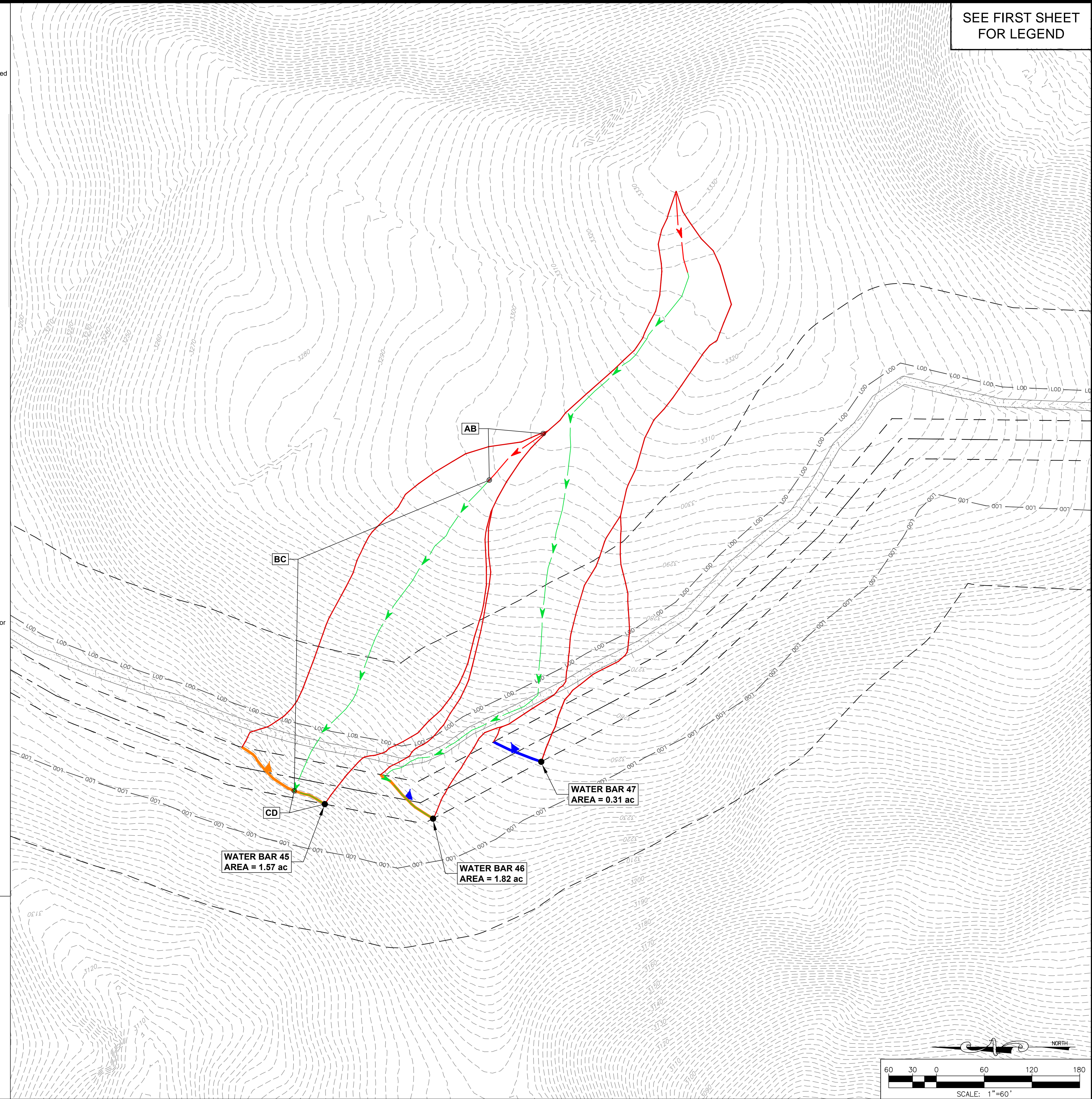
TIME OF CONCENTRATION: WATER BAR 45

ID	Type of Flow	C	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)
AB	Sheet flow	0.11	100.0	0.04			$T_c = 0.225L^{0.42} S^{-0.19} C^{-1.0}$	0.435
Shallow Concentrated Flow								Fig. 3-1, TR-55 $T_c=L/(3600V)$
BC	Downslope		466.5	0.22			7.62	0.017
CD	Water bar		42.1	0.02			2.28	0.005
Channel Flow								$T_c=L/(3600V)$
Total $T_c =$								0.457
Total T_c (min) =								27

IV. Summary
As shown, the water bar end treatment calculator indicates a 9.6-foot long end treatment will ensure sheet flow conditions leaving Water Bar 45. For ease of construction, the maximum allowable water bar end treatment length of 20 feet will be used for Water Bar 45.

End Treatment Length Calculator

Enter Site Specific Data	$T_c =$ 27	time of concentration to water bar, min
	$A =$ 1.57	water bar drainage area, ac
	$S =$ 0.42	weir discharge overland slope, ft/ft
Computed	$i =$ 3.4	computed from IDF, in/hr
Enter Flow Parameters	$C =$ 0.19	assumes B soils, >6% slope, meadow (conservative)
	$C_w =$ 3.33	weir coefficient (spillway)
	$n =$ 0.24	sheetflow, dense grasses
	$H =$ 0.1	sheetflow depth over weir, ft
Computed Weir Length ----->	9.6 ft	
Velocity Check ----->	0.87 fps	



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Post-Construction Water Bar Drainage Area Map
Giles County, Virginia
Stormwater Management Plan
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No.	Date	Description	App. By	Rev. By

DATE: January 22, 2018
SCALE: As Noted

Horizontal Datum: NAD 83
Vertical Datum: NAVD 88
Boundary and Topo Source: Holland Engineering, Inc.

Design	Draft	Approved
MAM	MAM	FRG

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Computer File Name: L:\3000\2018\20180101\01\ADDDA\ENR\Drainage Area\WSB Drainage Area.dwg

Water Bar 46 SITE-SPECIFIC ANALYSIS

I. Drainage Area
As shown, the drainage area to Water Bar 46 is 1.82 acres. This is greater than the 1.5 acre-maximum in the MVP 17.3 Water Bar End Treatment Detail and, therefore, requires a site-specific analysis to determine the water bar end treatment length. This plan assumes the existing Mystery Ridge Road drainage ditch will empty into Water Bar 46. Field conditions may warrant re-sizing the water bar end treatment length.

II. Runoff Coefficient
The flowpath for Water Bar 46 begins as sheet flow in a HSG B wooded area with slopes greater than 6%. Therefore, the runoff coefficient used in the sheet flow time of concentration calculation will be 0.15.

The flowpath exiting the Water Bar 46 end treatment will be along HSG B meadow with slopes greater than 6%. Therefore, the runoff coefficient used in the end treatment calculation will be 0.19.

TABLE 4 - 5b
Rational Equation Coefficients for SCS Hydrologic Soil Groups (A, B, C, D)
Rural Land Uses

Land Use	Treatment Practice	Hydrologic Condition	STORM FREQUENCIES OF LESS THAN 25 YEARS											
			HYDROLOGIC SOIL GROUP/SLOPE											
			A			B			C			D		
			0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Pasture or Range	Good	Good	0.07	0.09	0.10	0.18	0.20	0.22	0.27	0.29	0.31	0.32	0.34	0.35
			0.03	0.04	0.06	0.11	0.12	0.14	0.24	0.26	0.28	0.31	0.33	0.34
Meadow	Contoured	Good	0.06	0.08	0.10	0.10	0.14	0.19	0.12	0.17	0.22	0.15	0.20	0.25
Wooded	Good	Good	0.05	0.07	0.08	0.08	0.11	0.15	0.10	0.13	0.17	0.12	0.15	0.21

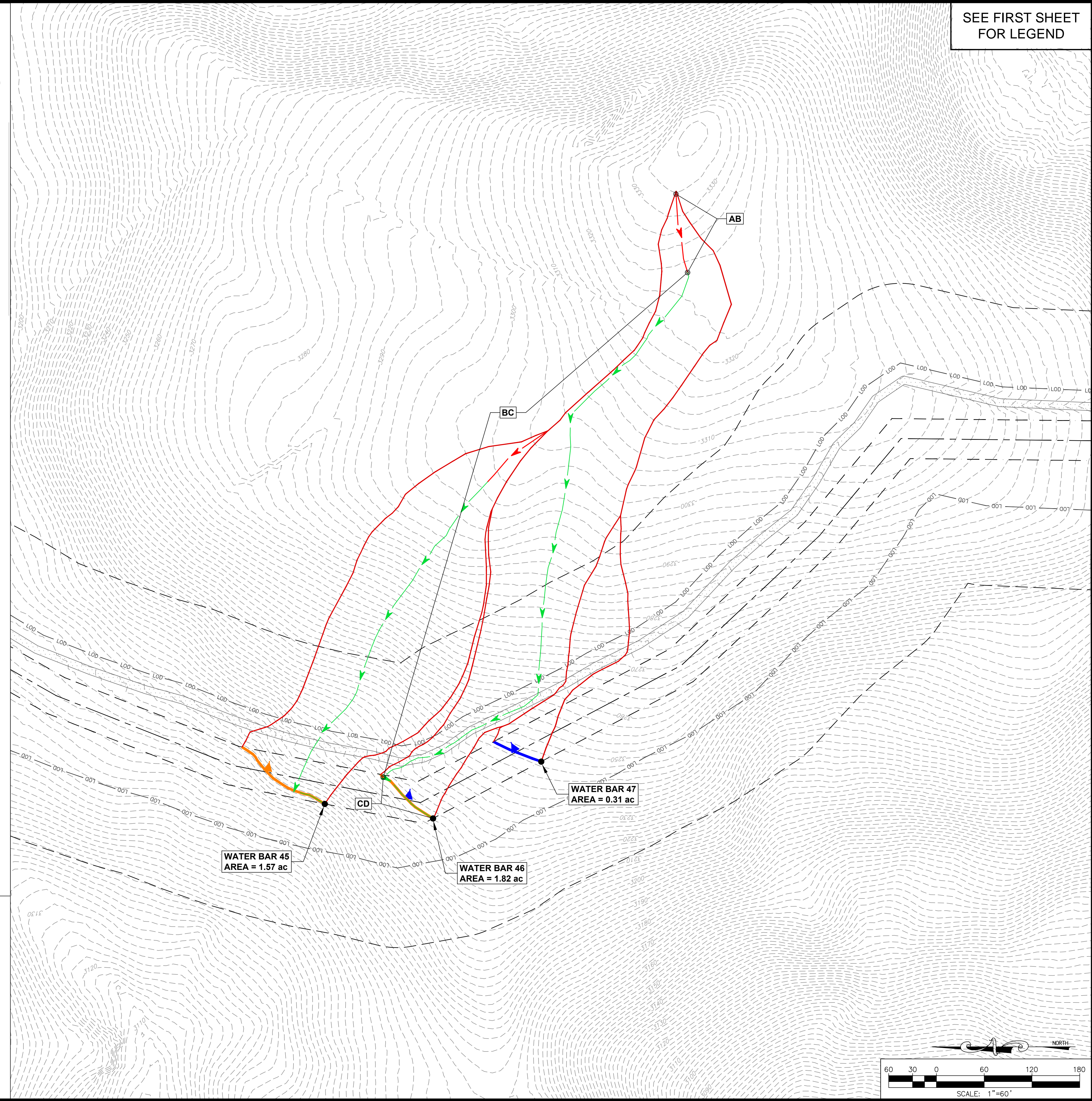
Source: Maryland State Highway Administration

III. Time of Concentration
As shown, the time of concentration for Water Bar 46 is 20 minutes.

ID	Description	C	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)
AB	Sheet flow	0.15	100.0	0.09		$T_c = 0.225L^{0.42} C^{-0.19} S^{-1.0}$		0.275
Shallow Concentrated Flow								
BC	Downslope		816.4	0.12			Fig. 3.1, TR-55 $T_c = L / (3600V)$	5.62
CD	Water bar		82.0	0.02				2.28
Channel Flow								
							$T_c = L / (3600V)$	
Total Tc =								0.325
Total Tc (min) =								20

IV. Summary
As shown, the water bar end treatment calculator indicates a 12.9-foot long end treatment will ensure sheet flow conditions leaving Water Bar 46. For ease of construction, the maximum allowable water bar end treatment length of 20 feet will be used for Water Bar 46.

Enter Site Specific Data	$T_c = 20$ time of concentration to water bar, min
	$A = 1.82$ water bar drainage area, ac
	$S = 0.22$ weir discharge overland slope, ft/ft
Computed	$i = 4.0$ computed from IDF, in/hr
Enter Flow Parameters	$C = 0.19$ assumes B soils, >6% slope, meadow (conservative)
	$C_w = 3.33$ weir coefficient (spillway)
	$n = 0.24$ sheetflow, dense grasses
	$H = 0.1$ sheetflow depth over weir, ft
Computed Weir Length ----->	12.9 ft
Velocity Check ----->	0.63 fps



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MAM	MAM	FRG

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Computer File Name:
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