WATER BAR 6 SITE-SPECIFIC ANALYSIS

I. Drainage Area

As shown, the drainage area to Water Bar 6 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 6 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 6 end treatment will be along HSG A meadow with slopes greater than 6%. Therefore, the runoff coefficient used in the end treatment calculation will be 0.10.

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

STORM FREQUENCIES OF LESS THAN 25 YEARS													
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 6 is 28 minutes.

TIME OF CONCENTRATION: WATER BAR 6

ID	Description	C	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)
AB	Sheet flow	0.08	100.0	0.1852	T_{ch} 0.225L$^{0.42}$S$^{-0.19}$C$^{-1.0}$			0.447
Shallow Concentrated Flow							Fig. 3.1, TR-55	T_t=L/(3600V)
BC	Downslope		339.1	0.42			10.41	0.009
CD	Water bar		78.3	0.02			2.28	0.010
Channel Flow								T_t=L/(3600V)
							Total T_c (hr) =	0.465
							Total T_c (min) =	28

IV. Summary

As shown, the water bar end treatment calculator indicates a 5-foot long end treatment will ensure sheet flow conditions leaving Water Bar 6. For ease of construction, the maximum allowable water bar end treatment length of 20 feet will be used for Water Bar 6.

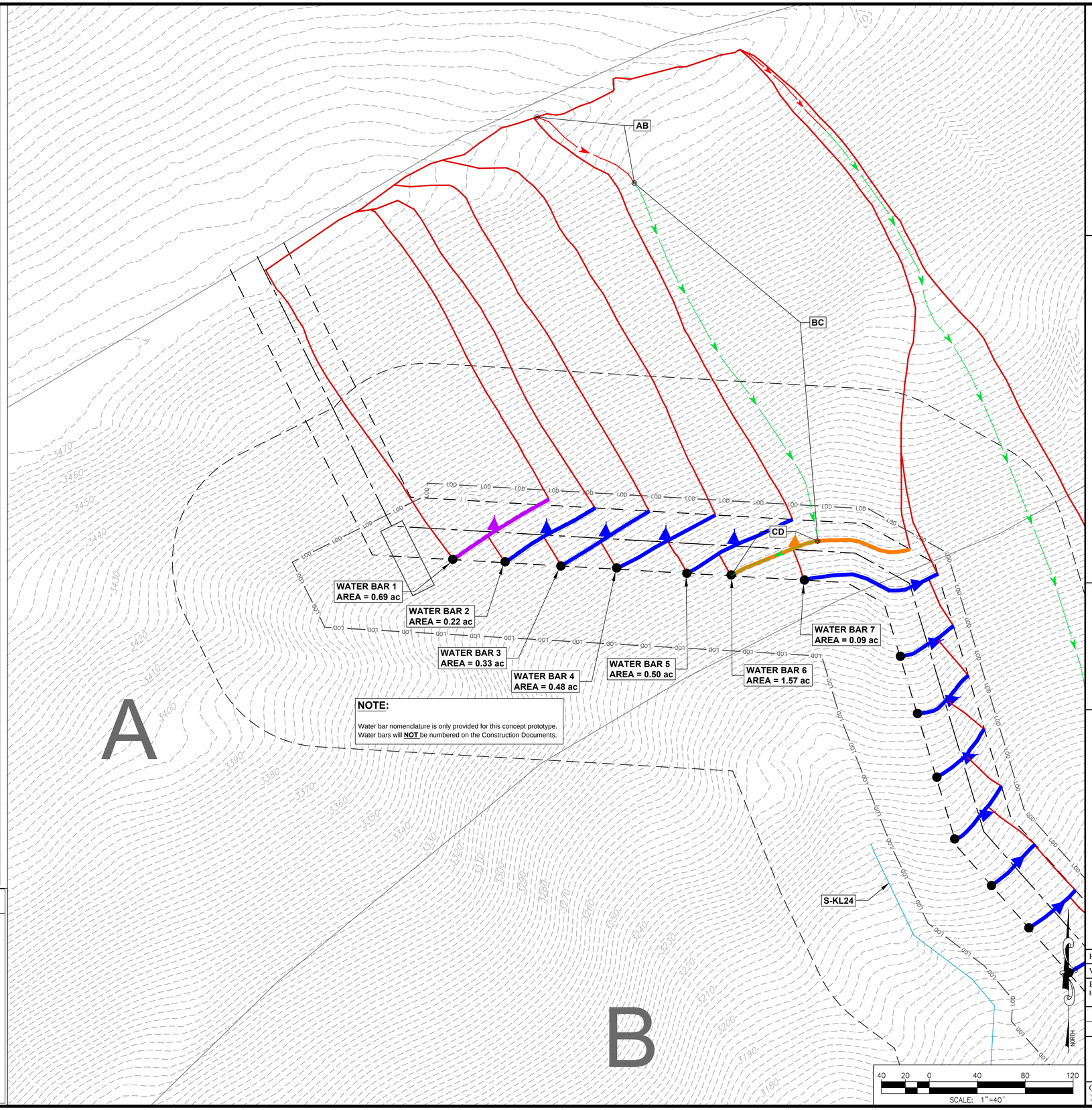
End Treatment Length Calculator

Enter Site Specific Data	T_c =	28	time of concentration to water bar, min
	A =	1.57	water bar drainge area, ac
	S =	0.44	weir discharge overland slope, ft/ft
Computed	i =	3.3	computed from IDF, in/hr
Enter Flow Parameters	C =	0.1	assumes A 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 ------> **5.0 ft**
Velocity Check ------> **0.89 fps**

DRAINAGE AREA PLAN LEGEND

- EXISTING CONTOURS - 2' C.I.
- MYSTERY RIDGE ROAD -EXISTING DIRT ROAD-
- FIELD-DELINEATED STREAMS
- HYDROLOGIC SOIL BOUNDARIES
- PROPOSED PIPELINE CENTERLINE
- PERMANENT RIGHT-OF-WAY -MEADOW LAND USE-
- LIMITS OF DISTURBANCE (LOD) / TEMPORARY RIGHT-OF-WAY -BRUSH LAND USE-
- 100' BUFFER FROM LOD
- WATER BAR DRAINAGE AREA (EXCLUDING THOSE IN SERIES)
- TIME OF CONCENTRATION SHEET FLOW
- TIME OF CONCENTRATION SHALLOW CONCENTRATED FLOW
- PERMANENT WATER BAR 10' END TREATMENT
- PERMANENT WATER BAR 15' END TREATMENT
- PERMANENT WATER BAR 20' END TREATMENT
- APPROXIMATE LOCATION OF WATER BAR END TREATMENTS (PENDING FIELD CONDITIONS)



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Post-Construction Water Bar Drainage Area Map

Giles County, Virginia

Stormwater Management Plan

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COMMONWEALTH OF VIRGINIA
MICHAEL S. ROLLAND
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1/22/18
PROFESSIONAL ENGINEER

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1 of 5

Computer File Name:
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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

STORM FREQUENCIES OF LESS THAN 25 YEARS													
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_{ci} $0.225L^{0.42}S^{-0.19}C^{-1.0}$			0.352
BC	Sheet flow 2	0.08	50.0	0.36				0.294
Shallow Concentrated Flow							Fig. 3.1, TR-55	T_t=L/(3600V)
CD	Downslope		930.6	0.345			9.47	0.027
DE	Water bar		31.9	0.02			2.28	0.004
Channel Flow								T_t=L/(3600V)
							Total T_c =	0.678
							Total $T_{c\ (min)}$ =	41

IV. Summary

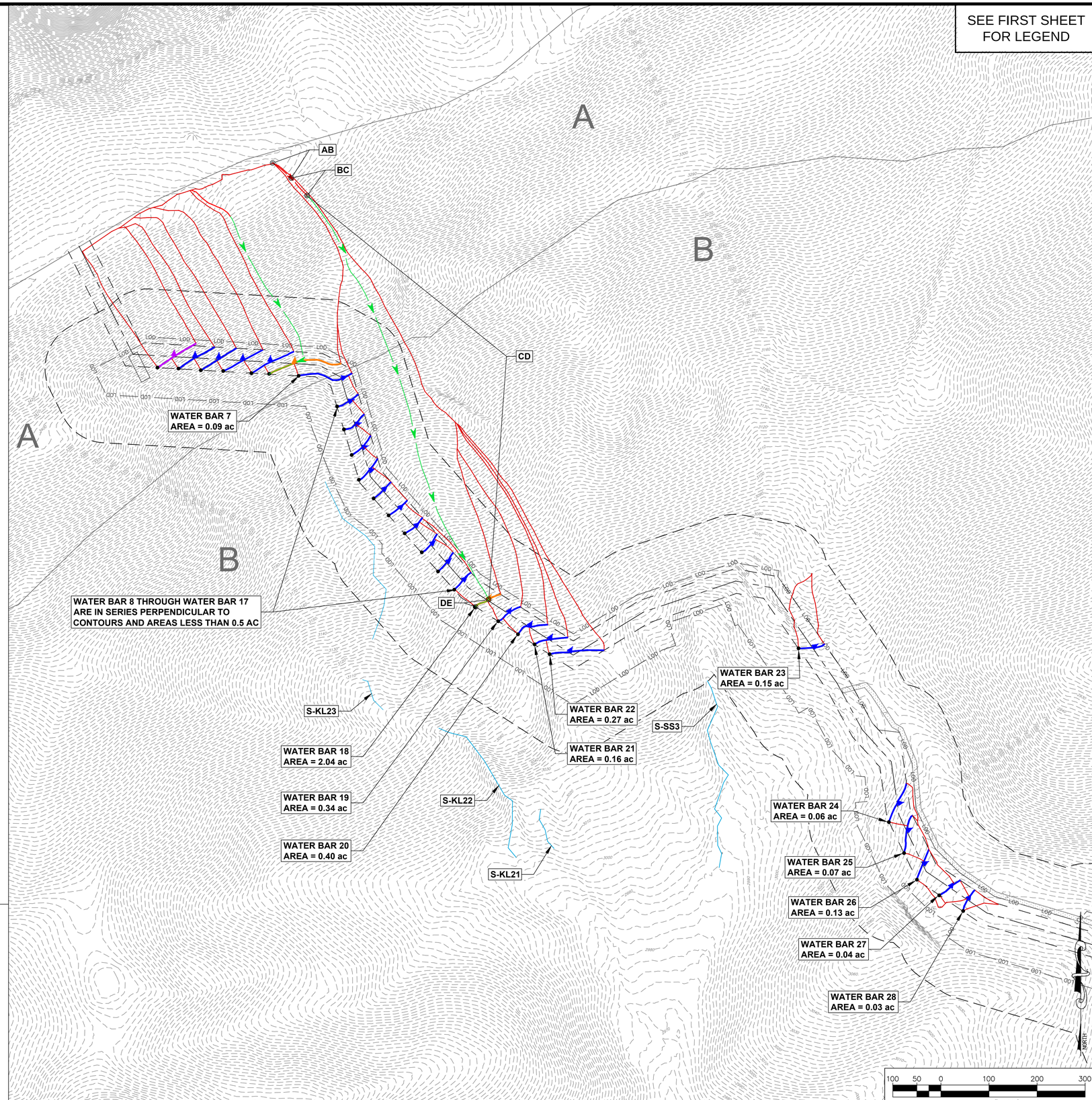
As shown, the water bar end treatment calculator indicates a 10.4-foot long end treatment will ensure sheet flow conditions leaving Water Bar 12. For ease of construction, the maximum allowable water bar end treatment length of 20 feet will be used for Water Bar 12.

End Treatment Length Calculator

Enter Site Specific Data	T_c =	41	time of concentration to water bar, min
	A =	2.04	water bar drainge 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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REVISIONS

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MAM	MAM	FRG

Sheet #

2 of 5

Computer File Name:
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WSSI Drainage Areas.dwg

SEE FIRST SHEET FOR LEGEND

WATER BAR 28
AREA = 0.03 ac

WATER BAR 29
AREA = 0.07 ac

WATER BAR 30
AREA = 0.05 ac

WATER BAR 31
AREA = 0.08 ac

WATER BAR 32
AREA = 0.08 ac

WATER BAR 33
AREA = 0.34 ac

WATER BAR 34
AREA = 0.26 ac

WATER BAR 35
AREA = 0.19 ac

WATER BAR 36
AREA = 0.08 ac

WATER BAR 37
AREA = 0.08 ac

WATER BAR 38
AREA = 0.04 ac

WATER BAR 39
AREA = 0.04 ac

WATER BAR 40
AREA = 0.03 ac

WATER BAR 41
AREA = 0.06 ac

WATER BAR 42
AREA = 0.11 ac

WATER BAR 43
AREA = 0.21 ac

WATER BAR 44
AREA = 0.10 ac

NORTH

40 20 0 40 80 120
SCALE: 1"=40'

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Post-Construction Water Bar Drainage Area Map

Giles County, Virginia

Stormwater Management Plan

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Design	Draft	Approved
MAM	MAM	FRG

Sheet #

3 of 5

Computer File Name:
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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

STORM FREQUENCIES OF LESS THAN 25 YEARS													
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_t=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_t=L/(3600V)
							Total T_c =	0.457
							Total T_c (min) =	27

IV. Summary

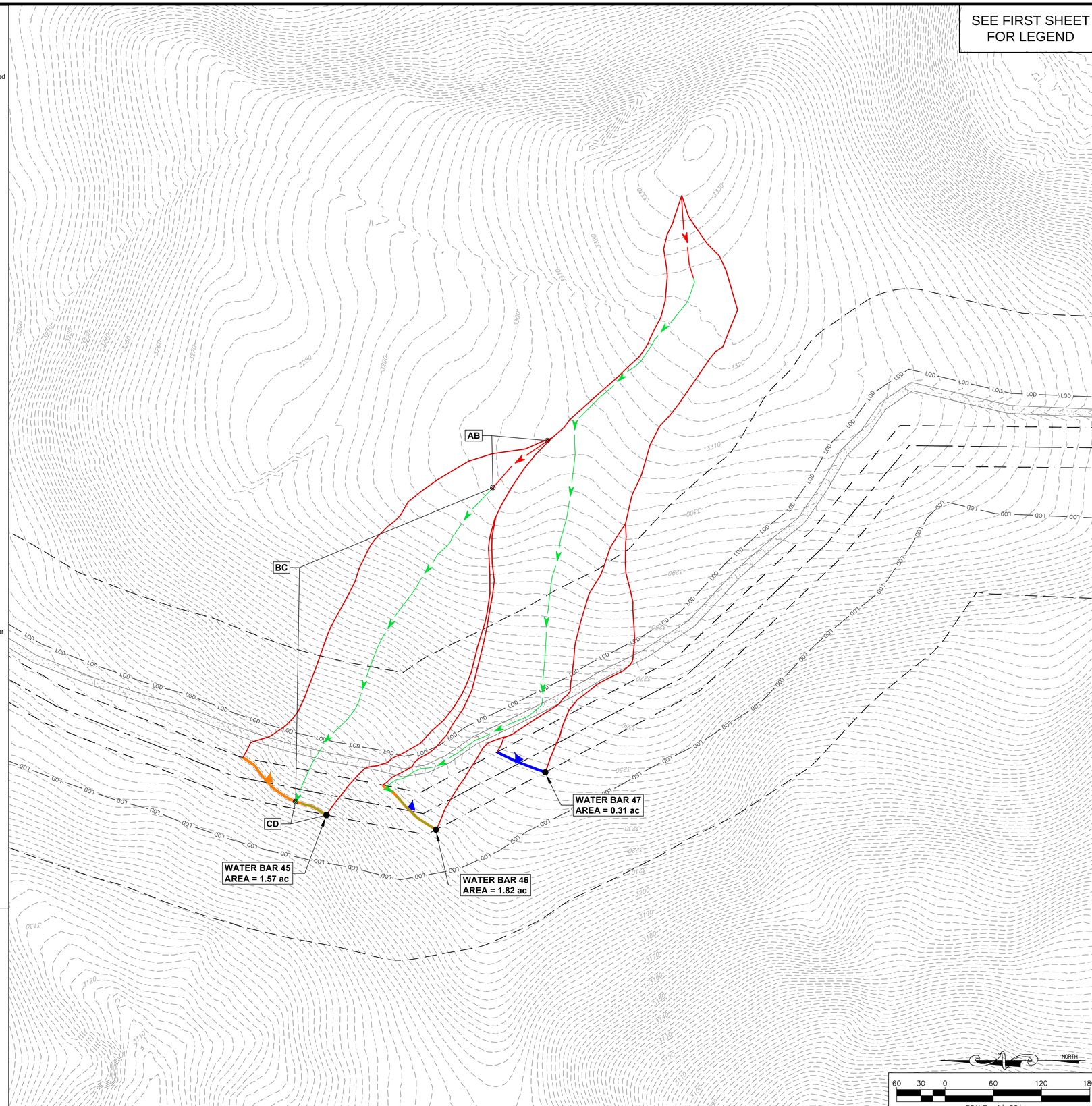
As shown, the water bar end treatment calculator indicates a 9.6-foot long end treatment will ensure sheet flow conditions leaving Water Bar 45. For ease of construction, the maximum allowable water bar end treatment length of 20 feet will be used for Water Bar 45.

End Treatment Length Calculator

Enter Site Specific Data	T_c =	27	time of concentration to water bar, min
	A =	1.57	water bar drainge 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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Sheet #

4 of 5

Computer File Name:
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WSSI Drainage Areas.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

STORM FREQUENCIES OF LESS THAN 25 YEARS														
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 46 is 20 minutes.

TIME OF CONCENTRATION: WATER BAR 46

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_{ci} 0.225L$^{0.42}$S$^{-0.19}$C$^{-1.0}$			0.275
Shallow Concentrated Flow							**Fig. 3.1, TR-55**	T_T=L/(3600V)
BC	Downslope		816.4	0.12			5.62	0.040
CD	Water bar		82.0	0.02			2.28	0.010
Channel Flow								T_T=L/(3600V)
							Total T_c =	0.325
							Total T_c (min) =	20

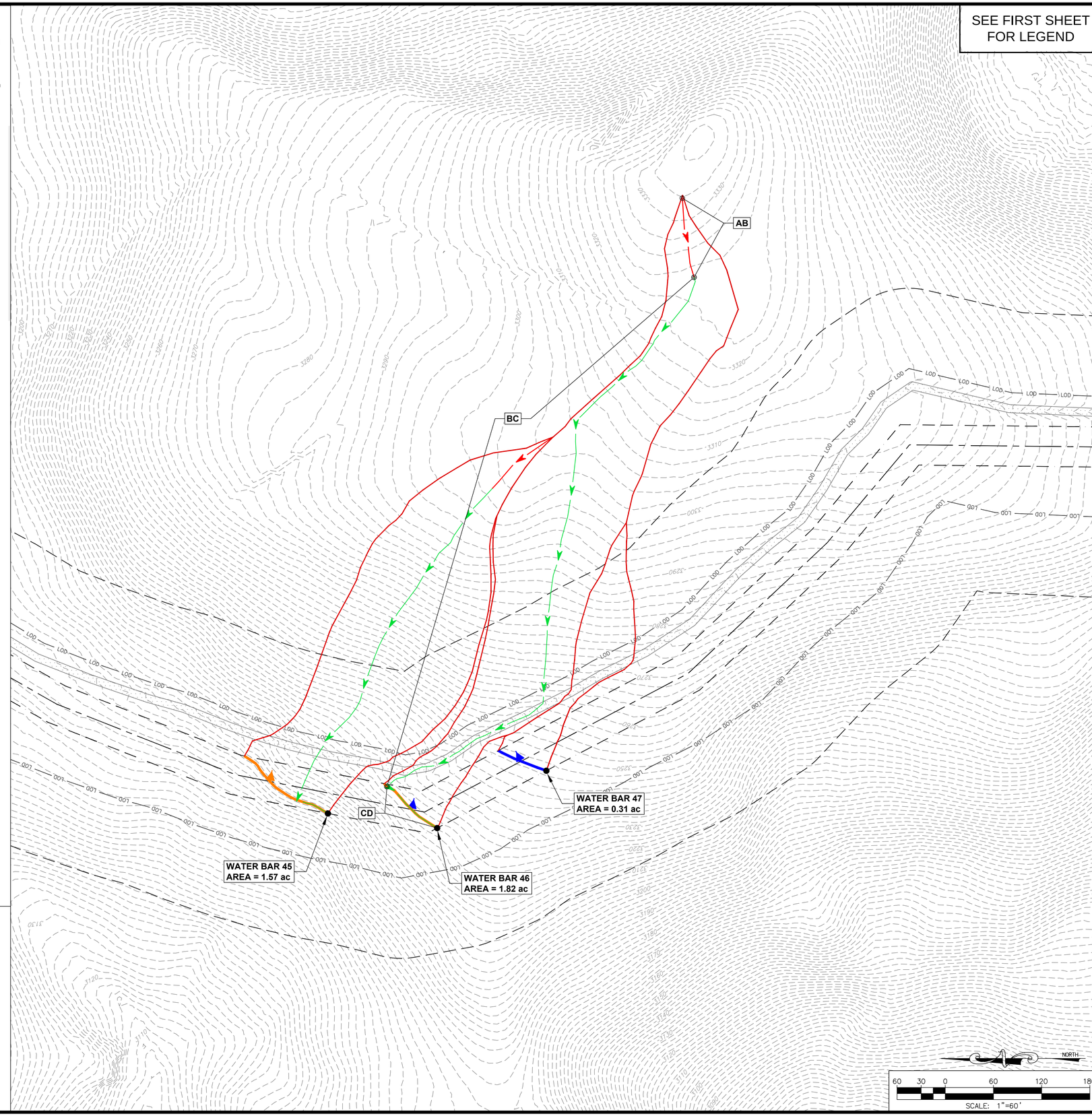
IV. Summary

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.

End Treatment Length Calculator

Enter Site Specific Data	T_c =	20	time of concentration to water bar, min
	A =	1.82	water bar drainge 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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