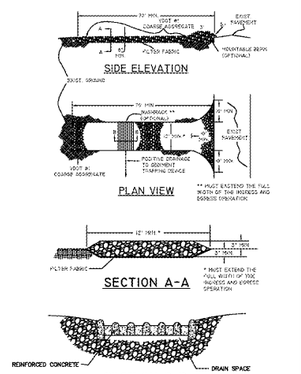
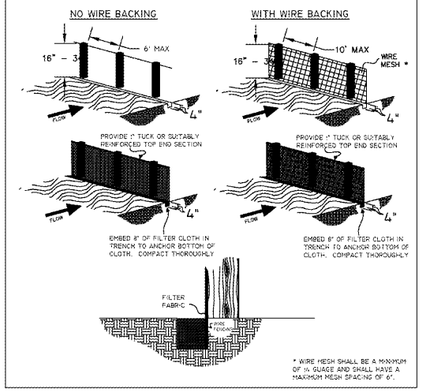
STONE CONSTRUCTION ENTRANCE

STD. & SPEC. 3.02 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)



SILT FENCE

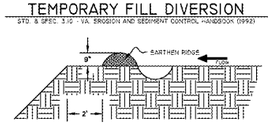
STD. & SPEC. 3.05 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)



* WIRE MESH SHALL BE A MINIMUM OF 14 GUAGE AND SHALL HAVE A MAXIMUM MESH SPACING OF 6".

TEMPORARY FILL DIVERSION

STD. & SPEC. 3.10 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)

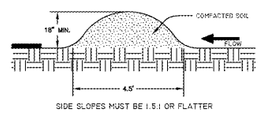


THE DIVERSION SHALL BE AT LEAST 2' INSIDE OF THE TOP EDGE OF FILL.

THE SUPPORTING RIDGE SHALL BE CONSTRUCTED WITH A UNIFORM HEIGHT ALONG ITS ENTIRE LENGTH TO PREVENT BREACHING.

TEMPORARY DIVERSION DIKE

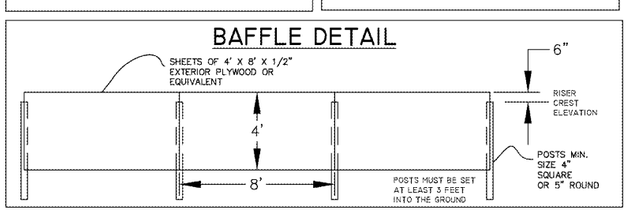
STD. & SPEC. 3.09 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)



SIDE SLOPES MUST BE 1.5:1 OR FLATTER

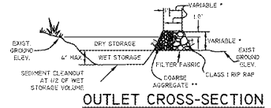
TEMPORARY OR PERMANENT SEEDING AND MULCH MUST BE APPLIED IMMEDIATELY UPON CONSTRUCTION

BAFFLE DETAIL

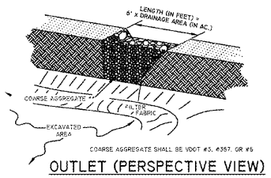


TEMPORARY SEDIMENT TRAP

STD. & SPEC. 3.13 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)



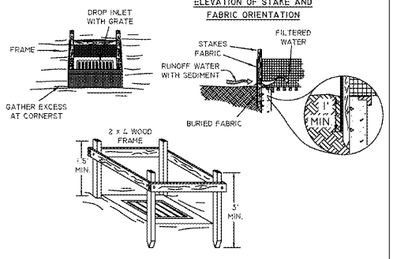
OUTLET CROSS-SECTION



OUTLET (PERSPECTIVE VIEW)

SILT FENCE DROP INLET PROTECTION

STD. & SPEC. 3.07 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)

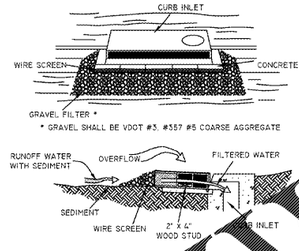


SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPES NO GREATER THAN 5%) WHERE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 cfs ARE TYPICAL. THIS METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

BLOCK AND GRAVEL CURB INLET SEDIMENT FILTER

STD. & SPEC. 3.07 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)

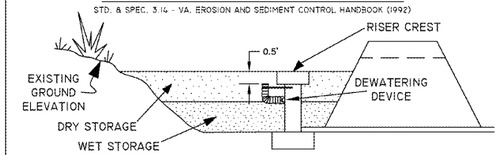


SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING IN FRONT OF THE STRUCTURE.

TEMPORARY SEDIMENT BASIN

STD. & SPEC. 3.14 - VA. EROSION AND SEDIMENT CONTROL HANDBOOK (1992)



SEDIMENT TRAP STAGE STORAGE TABLE

Stage (ft)	Area (sq ft)	Storage (cu ft)
256.00	854	0
257.00	1,699	1,277
258.00	2,474	3,363
259.00	3,293	6,247
260.00	4,169	9,978
260.10	4,259	10,399

SEDIMENT TRAPS

Trap #	Drainage Area (acres)	Wet Storage: Volume Required (Cu. Yd.)	Wet Storage: Volume Provided (Cu. Yd.)	Wet Storage: Elevation	Dry Storage: Volume Required (Cu. Yd.)	Dry Storage: Volume Provided (Cu. Yd.)	Dry Storage: Elevation	Outlet Length (Feet)	Bottom Elevation	Top of Berm Elevation	Top Width	Dimensions (L x W)
1	1.50	120.6	124.0	258.00	120.6	121.0	259	11	256.00	260.10	4	30 X 120
2	1.00	67.0	76.0	257.00	67.0	69.0	258.50	6	254.00	260.50	4	40 X 60

50/10 DETENTION SUMMARY

	Q (CFS)	AREA (ACRES)	C	:	C ADJ FACTOR
Q_{10} PRE-DEVELOPMENT (A)	12.47	3.08	CN: 83.0	P_{10}: 5.08" P_{50}: 7.28"	N/A
Q_{50} POST-DEVELOPMENT (ON-SITE BYPASS) (B)	--	--	--	--	--
Q_{50} POST-DEVELOPMENT (OFF-SITE THROUGH PROJECT) (C)	--	--	--	--	--
Q_{50} ALLOWABLE (A - B + C)	12.47 CFS				
Q_{50} FROM BASIN/PIPE (ROUTED)*	12.37 CFS				

*Q50 INCLUDES OUTFLOW FROM DETENTION COMBINED WITH THE BYPASS FLOW

NOTE: SCS RUNOFF METHOD WAS USED TO MODEL THE PROPOSED DETENTION SYSTEM; SEE SHEET CG-201 FOR THE STORMWATER NARRATIVE AND SHEET CG-504 FOR ROUTING INFORMATION.

SEDIMENT BASINS

Basin #	Drainage Area (acres)	Wet Storage: Volume Required (Cu. Yd.)	Wet Storage: Volume Provided (Cu. Yd.)	Dry Storage: Volume Required (Cu. Yd.)	Dry Storage: Volume Provided (Cu. Yd.)	Bottom Elevation	Riser Crest Elevation	Riser Diameter	Dewatering Device Elevation	Dewatering Device Diameter	25- Yr. Storm Elevation	Emergency Spillway Elevation	Anti-Vortex Device Diameter	Top of Dam Elevation	Top of Dam Width	BAFFLE: Flowlength to Width Ratio	BAFFLE: Baffle Length	BAFFLE: Top of Baffle	BARREL: Pipe Length	BARREL: Pipe Diameter	BARREL: Invert In	BARREL: Invert Out

CHANNEL PROTECTION COMPLIANCE SUMMARY TABLE

Discharge Point	Conditions within Limits of Analysis	Applicable Channel Protection Criteria: Criteria A Q_2	Criteria A Q_{cap}	Criteria A V_2	Criteria A $V_{allowable}$	Criteria B: Project consistent with design of restored system	Criteria C $Q_{developed}$	Criteria C $RV_{developed}$	Criteria C IF	Criteria C $Q_{pre-developed}$	Criteria C $RV_{pre-developed}$	Criteria C $Q_{developed} \times RV_{developed}$ ≤	Criteria C $Q_{pre-developed} \times RV_{pre-developed}$
OUTFALL 1	[X] Manmade [ ] Restored [ ] Natural					[ ] YES	2.81	17,968	0.80	4.82	13,605	50,491	≤ 60,460
OUTFALL 2	[X] Manmade [ ] Restored [ ] Natural	47.71	210.14	8.66	15.00	[ ] YES							
	[ ] Manmade [ ] Restored [ ] Natural					[ ] YES							
	[ ] Manmade [ ] Restored [ ] Natural					[ ] YES							
	[ ] Manmade [ ] Restored [ ] Natural					[ ] YES							
	[ ] Manmade [ ] Restored [ ] Natural					[ ] YES							
	[ ] Manmade [ ] Restored [ ] Natural					[ ] YES							

Channel Protection Criteria

A. The stormwater conveyance system receiving the post-development flow rate from the two-year 24-hour storm event without causing erosion of the system (V_2 must be shown to be non-erosive)

B. The development project, in combination with other stormwater runoff, is consistent with the design parameters of the restored stormwater conveyance and the restored stormwater conveyance system is functioning as designed

C. The discharge from the development satisfies the Energy Balance requirement
($Q_{developed} \times RV_{developed}$ ≤ IF × ($Q_{pre-developed} \times RV_{pre-developed}$)
where:
$Q_{developed}$ = the peak flow rate of runoff from the developed site
$RV_{developed}$ = the volume of runoff from the site based on developed conditions
IF = the improvement factor (0.8 for sites > 1 acre, 0.9 for sites ≤ 1 acre)
$Q_{pre-developed}$ = the peak flow rate of runoff from the pre-developed site
$RV_{pre-developed}$ = the volume of runoff from the site based on pre-developed conditions

FLOOD PROTECTION COMPLIANCE SUMMARY TABLE

Discharge Point	Conditions within Limits of Analysis	APPLICABLE FLOOD PROTECTION CRITERIA: Criteria A $Q_{10\text{-post}}$	Criteria A $Q_{capacity}$	Criteria B $Q_{10\text{-post}}$ (Required for Criteria B.1 and B.2)	Criteria B $Q_{capacity}$ (Required for Criteria B.1)	Criteria B Q_{10} pre-developed (Required for Criteria B.2)
OUTFALL 1	[X] No Localized Flooding [ ] Existing Localized Flooding			8.53 CFS	46.22 CFS	12.47 CFS
OUTFALL 2	[X] No Localized Flooding [ ] Existing Localized Flooding	63.55 CFS	210.14 CFS			
	[ ] No Localized Flooding [ ] Existing Localized Flooding					
	[ ] No Localized Flooding [ ] Existing Localized Flooding					
	[ ] No Localized Flooding [ ] Existing Localized Flooding					
	[ ] No Localized Flooding [ ] Existing Localized Flooding					

Flood Protection Criteria

A. Where localized flooding does not currently exist, the 10-year 24-hour storm event must be confined to the most restrictive stormwater conveyance system within the limits of analysis.

B. Where localized flooding exists within the limits of analysis, the 10-year 24-hour storm event must:
   1. be confined within the most restrictive stormwater conveyance system within the limits of analysis (detention or downstream improvements may be provided to meet this criterion), or
   2. be released at a rate that is less than the pre-development peak flow rate from the 10-year 24-storm event.

OUTFALL ADEQUACY FOR SEDIMENT BASINS/TRAPS

In accordance with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations, all sediment basins and traps must discharge directly into an adequate outfall. Adequacy of off-site receiving channels or pipes must be verified by addressing one of the following Adequacy Situations:

A. The drainage area from the project at the discharge point is less than or equal to one percent of the total drainage area at the discharge point and the 10-year storm is contained within the channel banks (Project Drainage Area and Total Drainage area are required),
OR

B. Natural channels must be analyzed to demonstrate that (1) the 10-year storm will not overtop the channel banks and (2) the 2-year storm will not cause erosion of the channel bed and banks ($Q_{Capacity}$, Q_{10}, $V_{Allowable}$, and V_2 are required), except $Q_{Capacity}$ and Q_{10} are not applicable if the channel is in the 100-year floodplain, RPA,SPA.
OR

C. Man-made channels must be analyzed to demonstrate that (1) the 10-year storm will not overtop the channel banks and (2) the 2-year storm will not cause erosion of the channel bed or banks ($Q_{Capacity}$, Q_{10}, $V_{Allowable}$, and V_2 are required),
OR

D. Pipes and storm sewer systems must be analyzed to demonstrate that the 10-year storm will be contained within the system ($Q_{Capacity}$, Q_{10}, and Hydraulic Grade Line calculations are required).
OR

E. Runoff is discharged through an energy dissipator at the limits of the 100-year floodplain, RPA buffer, or SPA buffer.

Discharge Point	Adequacy Situation	Project Drainage Area	Total Drainage Area	$Q_{Capacity}$	Q_{15}	$V_{Allowable}$	V_2	Cross-section, Profile, and Calculations Shown on Sheet (s)
OUTFALL 1	D	4.38 ACRES	4.38 ACRES	46.22 CFS	8.53 CFS	--	--	CG-201, CG-301, CG-302
OUTFALL 2	A	0.10 ACRES	18.19 ACRES	210.14 CFS	63.55 CFS	--	--	CR-106

Discharge Point = Unique identifier for the discharge point
Project Drainage Area = the drainage area of the project that drains to the discharge point in acres
$Q_{Capacity}$ = the carrying capacity of the channel or pipe in CFS
$V_{Allowable}$ = the maximum velocity (in FPS) that the channel lining can withstand without eroding
Adequacy Situation - either A, B, C, D, or E as described above
Total Drainage Area - the total drainage area to the discharge point in acres
Q_{15} = the peak discharge at the discharge point for the 10-year storms in CFS
V_2 = the velocity at the discharge point for the 2-year storm in FPS

Generally, scaled channel cross-sections must be provided every fifty (50) feet and at the most constricted locations of all outfall channels for a **minimum** of 150 feet of profile.

No.	REVISIONS	DATE	BY
1	OIL WATER SEPARATOR REVISIONS	11/07/18	RRP
2	OIL WATER SEPARATOR REVISIONS	01/02/19	RRP
3	UNDERGROUND PIPE CONNECTION REVISIONS	01/03/19	RRP
4	PHASE II E&S REVISIONS	01/14/19	RRP
5	BID SET REVISIONS	01/17/19	RRP

POD# 2018-00101 & 00196

Kimley»Horn
© 2018 KIMLEY-HORN AND ASSOCIATES, INC.
1700 WILLOW LAWN DR., SUITE 270, RICHMOND, VA 23230
PHONE: 804-673-3820
WWW.KIMLEY-HORN.COM

COMMONWEALTH OF VIRGINIA
RYAN R. PERKINS
Lic. No. 046585
PROFESSIONAL ENGINEER
11/09/2018

KHA PROJECT 113160005
DATE 11/09/2018
SCALE AS SHOWN
DESIGNED BY KRW
DRAWN BY KRW
CHECKED BY RRP

WAWA AT PARHAM AND THREE CHOPT

PREPARED FOR
REBKEE CO.

HENRICO COUNTY VIRGINIA

E&SC DETAILS

SHEET NUMBER
CE-502