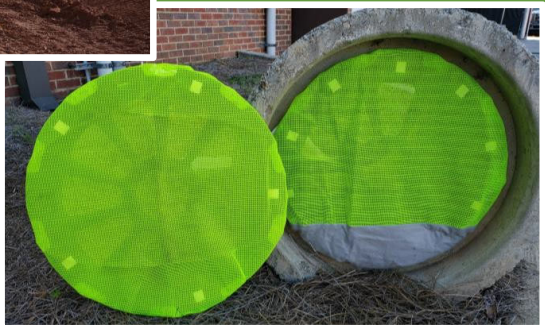
Performance-Based Sediment Control Products



Overview/Introduction

- Keith Potter, General Manager, Silt Saver Inc.
- Are we asking the right questions?
  - Design review checklists
  - Rules of Thumb
- What happens upstream, matters downstream?
  - Stop the insanity
- Feedback Loops
- IECA Silt Fence Design Guide & Design Tool
  - Determine runoff volume, peak flow, & storage volume
  - Options to increase volume & manage peak flow
- Be the Change You Want to See!

GSWCC Checklist

- Plans must be developed by Level II Certified Design Professional
- LOD limited to 50 acres without special authorization from GA EPD
- Must list total and disturbed acres for the construction phase submitted
- Identify receiving waters and sensitive areas adjacent to project

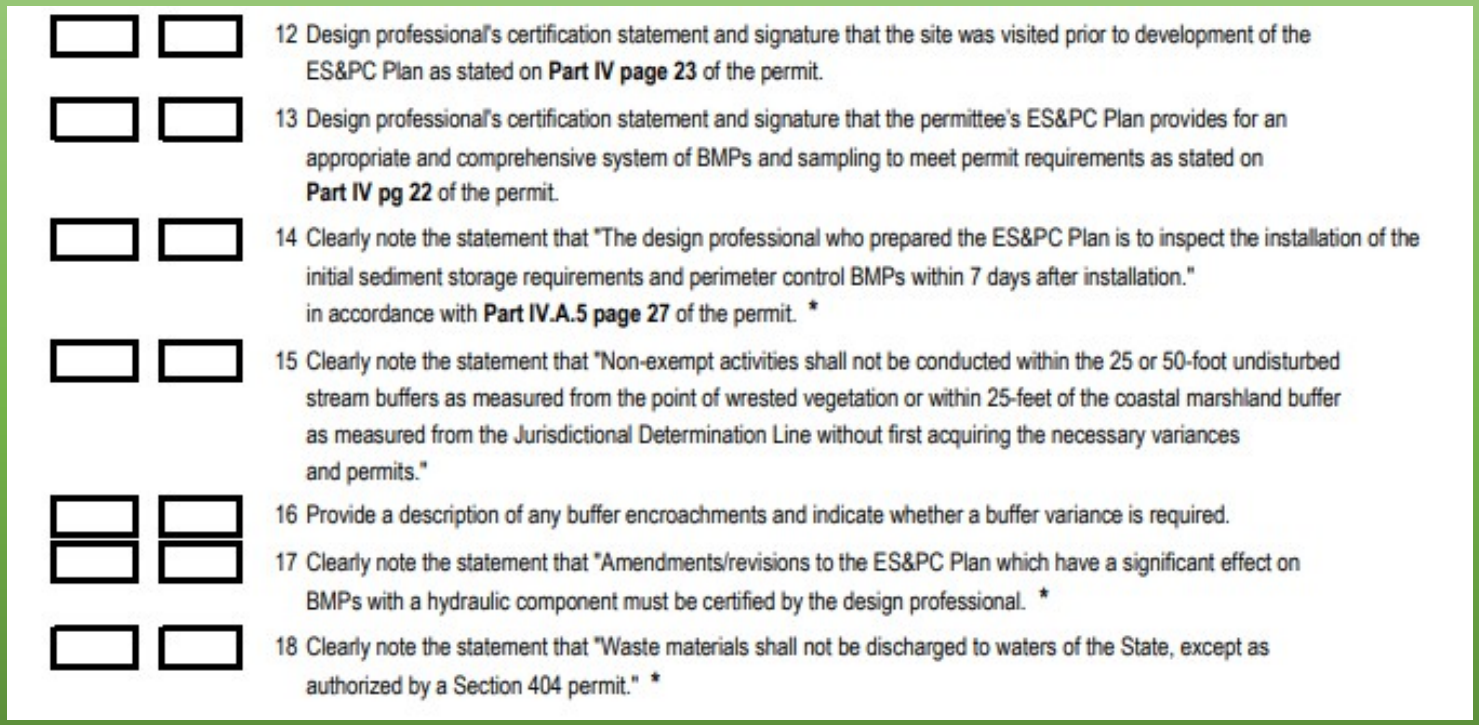
EROSION, SEDIMENTATION & POLLUTION CONTROL PLAN CHECKLIST
COMMON DEVELOPMENT CONSTRUCTION PROJECTS (Primary and Tertiary Permittees)
SWCD:_____

Project Name:_____ **Address:**_____
City/County:_____ **Date on Plans:**_____
Name & email of person filling out checklist:_____

Plan Page #	Included Y/N	TO BE SHOWN ON ES&PC PLAN
☐	☐	1 The applicable Erosion, Sedimentation and Pollution Control Plan Checklist established by the Commission as of January 1 of the year in which the land-disturbing activity was permitted. (The completed Checklist must be submitted with the ES&PC Plan or the Plan will not be reviewed)
☐	☐	2 Level II certification number issued by the Commission, signature and seal of the certified design professional. (Signature, seal and level II number must be on each sheet pertaining to ES&PC Plan or the Plan will not be reviewed)
☐	☐	3 Limit of disturbance shall be no greater than 50 acres at any one time without prior written authorization from the GAEPD District Office. If GAEPD approves the request to disturb 50 acres or more at any one time, the Plan must include at least 4 of the BMPs listed in Appendix 1 of this checklist and the GAEPD approval letter. * (A copy of the written approval by GAEPD must be attached to the Plan for the Plan to be reviewed.)
☐	☐	4 The name and phone number of the 24-hour contact responsible for erosion, sedimentation and pollution controls.
☐	☐	5 Provide the name, address, email address, and phone number of the primary permittee or tertiary permittee.
☐	☐	6 Note total and disturbed acreages of the project or phase under construction.
☐	☐	7 Provide the GPS location of the construction exit for the site. Give the Latitude and Longitude in decimal degrees.
☐	☐	8 Initial date of the Plan and the dates of any revisions made to the Plan including the entity who requested the revisions.
☐	☐	9 Descriptions of the nature of construction activity and existing site conditions.
☐	☐	10 Provide vicinity map showing site's relation to surrounding areas. Include designation of specific phase, if necessary.
☐	☐	11 Identify the project receiving waters and describe all sensitive adjacent areas including streams, lakes,

GSWCC Checklist

- Design Professional (DP) must certify site visit conducted prior to plan development
- DP must certify a comprehensive system of BMPs and sampling to meet permit requirements included
- DP must certify inspection of initial sediment storage requirements and perimeter control BMPs within 7 days of installation
- DP must note that revisions effecting hydraulic components must be certified by DP



12 Design professional's certification statement and signature that the site was visited prior to development of the ES&PC Plan as stated on **Part IV page 23** of the permit.

13 Design professional's certification statement and signature that the permittee's ES&PC Plan provides for an appropriate and comprehensive system of BMPs and sampling to meet permit requirements as stated on **Part IV pg 22** of the permit.

14 Clearly note the statement that "The design professional who prepared the ES&PC Plan is to inspect the installation of the initial sediment storage requirements and perimeter control BMPs within 7 days after installation." in accordance with **Part IV.A.5 page 27** of the permit. *

15 Clearly note the statement that "Non-exempt activities shall not be conducted within the 25 or 50-foot undisturbed stream buffers as measured from the point of wrested vegetation or within 25-feet of the coastal marshland buffer as measured from the Jurisdictional Determination Line without first acquiring the necessary variances and permits."

16 Provide a description of any buffer encroachments and indicate whether a buffer variance is required.

17 Clearly note the statement that "Amendments/revisions to the ES&PC Plan which have a significant effect on BMPs with a hydraulic component must be certified by the design professional. *

18 Clearly note the statement that "Waste materials shall not be discharged to waters of the State, except as authorized by a Section 404 permit." *

GSWCC Checklist

- Statement that E&SC control measures must be installed prior to LDA
- Statement that EC measures be maintained at all times. If implementation of plan is not effective, additional E&SC shall be implemented
- Statement that disturbed areas left open > 14 days must be stabilized
- Special requirements for working within 1 linear mile of Impaired Stream Segment

☐ ☐ 19 Clearly note statement that "The escape of sediment from the site shall be prevented by the installation of erosion and sediment control measures and practices prior to land disturbing activities."

☐ ☐ 20 Clearly note statement that "Erosion control measures will be maintained at all times. If full implementation of the approved Plan does not provide for effective erosion control, additional erosion and sediment control measures shall be implemented to control or treat the sediment source."

☐ ☐ 21 Clearly note the statement "Any disturbed area left exposed for a period greater than 14 days shall be stabilized with mulch or temporary seeding."

☐ ☐ 22 Indication that the applicable portion of the primary permittees ES&PC Plan is to be provided to each secondary permittee prior to the secondary conducting any construction activity and that each secondary shall sign the Plan or portion of the Plan applicable to their site. List the names and addresses of all secondary permittees. *

☐ ☐ 23 Any construction activity which discharges storm water into an Impaired Stream Segment, or within 1 linear mile upstream of and within the same watershed as any portion of a Biota Impaired Stream Segment, must comply with Part III. C. of the permit. Include the completed Appendix 1 listing all the BMPs that will be used for those areas of the site which discharge to the Impaired Stream Segment. *

☐ ☐ 24 If a TMDL Implementation Plan for sediment has been finalized for the Impaired Stream Segment (identified in Item 23 above) at least six months prior to submittal of NOI, the ES&PC Plan must address any site-specific conditions or requirements included in the TMDL Implementation Plan. *

☐ ☐ 25 BMPs for concrete washdown of tools, concrete mixer chutes, hoppers and the rear of the vehicles. Washout of the drum at the construction site is prohibited.

☐ ☐ 26 Provide BMPs for the remediation of all petroleum spills and leaks.

☐ ☐ 27 Description of practices to provide cover for building materials and building products on site. *

☐ ☐ 28 Description of the measures that will be installed during the construction process to control pollutants in storm water that will occur after construction operations have been completed.

☐ ☐ 29 Description of the practices that will be used to reduce the pollutants in storm water discharges.

GSWCC Checklist

- Description and timeline for sequence of major construction activities
- #37 requires description of sediment storage and perimeter BMPs by phase

☐	☐	30 Description and chart or timeline of the intended sequence of major activities which disturb soils for the major portions of the site (i.e., initial perimeter and sediment storage BMPs, clearing and grubbing activities, excavation activities, utility activities, temporary and final stabilization). *
☐	☐	31 Provide complete requirements of Inspections and record keeping by the primary permittee or tertiary permittee.
☐	☐	32 Provide complete requirements of Sampling Frequency and Reporting of sampling results. *
☐	☐	33 Provide complete details for Retention of Records as per Part IV.F. of the permit.
☐	☐	34 Description of analytical methods to be used to collect and analyze the samples from each location. *
☐	☐	35 Appendix B rationale for NTU values at all outfall sampling points where applicable. *
☐	☐	36 Delineate all sampling locations if applicable, perennial and intermittent streams and other water bodies into which storm water is discharged. *
☐	☐	37 A description of appropriate controls and measures that will be implemented at the construction site including: (1) initial sediment storage requirements and perimeter control BMPs, (2) intermediate grading and drainage BMPs, and (3) final BMPs. For construction sites where there will be no mass grading and the initial perimeter control BMPs, intermediate grading and drainage BMPs, and final BMPs are the same, the Plan may combine all of the BMPs into a single phase.
☐	☐	38 Plan addresses BMPs for all phases of common development including individual building lots and out-parcels, etc. regardless of who owns or operates the individual sites. Include a typical and any situational lots applicable.

GSWCC Checklist

- Requirement for existing and proposed contour lines
- Allowance for use of alternative BMPs as certified by DP
- Delineation of required buffer as well as wetlands and state waters within 200’
- Hydrology study, drainage areas, and estimated runoff coefficient or peak discharge for pre- and post-construction conditions
- Soils and LODs by phase

39 Graphic scale and North arrow.

40 Existing and proposed contour lines with contour lines drawn at an interval in accordance with the following:

Map Scale	Ground Slope	Contour Intervals, ft.
1 inch = 100ft or larger scale	Flat 0 - 2%	0.5 or 1
	Rolling 2 - 8%	1 or 2
	Steep 8% +	2,5 or 10

41 Use of alternative BMPs whose performance has been documented to be equivalent to or superior to conventional BMPs as certified by a Design Professional (unless disapproved by GAEPD or the Georgia Soil and Water Conservation Commission). Please refer to the Alternative BMP Guidance Document found at www.gaswcc.georgia.gov.

42 Use of alternative BMP for application to the Equivalent BMP List. Please refer to Appendix A-2 of the Manual for Erosion & Sediment Control in Georgia 2016 Edition.

43 Delineation of the applicable 25-foot or 50-foot undisturbed buffers adjacent to State waters and any additional buffers required by the Local Issuing Authority. Clearly note and delineate all areas of impact.

44 Delineation of on-site wetlands and all State waters located on and within 200 feet of the project site.

45 Delineation and acreage of contributing drainage basins on the project site.

46 Provide hydrology study and maps of drainage basins for both the pre- and post-developed conditions. *

47 An estimate of the runoff coefficient or peak discharge flow of the site prior to and after construction activities are completed. *

48 Storm-drain pipe and weir velocities with appropriate outlet protection to accommodate discharges without erosion. Identify/Delineate all storm water discharge points.

49 Soil series for the project site and their delineation.

50 The limits of disturbance for each phase of construction.

GSWCC Checklist

- Requirement to provide justification to use equivalent controls if basins are not achievable
- Requirement to use outlet structures that discharge from the surface of impoundments
- Location of BMPs utilizing uniform coding symbols
- Vegetative plan for temporary and permanent seeding

☐ ☐ 51 Provide a minimum of 67 cubic yards of sediment storage per acre drained using a temporary sediment basin, retrofitted detention pond, and/or excavated inlet sediment traps for each common drainage location. Sediment storage volume must be in place prior to and during all land disturbance activities until final stabilization of the site has been achieved. A written justification explaining the decision to use equivalent controls when a sediment basin is not attainable must be included in the Plan for each common drainage location in which a sediment basin is not provided. A written justification as to why 67 cubic yards of storage is not attainable must also be given. Worksheets from the Manual must be included for structural BMPs and all calculations used by the design professional to obtain the required sediment storage when using equivalent controls. When discharging from sediment basins and impoundments, permittees are required to utilize outlet structures that withdraw water from the surface, unless infeasible. If outlet structures that withdraw water from the surface are not feasible, a written justification explaining this decision must be included in the Plan.

☐ ☐ 52 Location of Best Management Practices that are consistent with, and no less stringent than, the Manual for Erosion and Sediment Control in Georgia. Use uniform coding symbols from the Manual, Chapter 6, with legend.

☐ ☐ 53 Provide detailed drawings for all structural practices. Specifications must, at a minimum, meet the guidelines set forth in the Manual for Erosion and Sediment Control in Georgia.

☐ ☐ 54 Provide vegetative plan, noting all temporary and permanent vegetative practices. Include species, planting dates and seeding, fertilizer, lime and mulching rates. Vegetative plan shall be site specific for appropriate time of year that seeding will take place and for the appropriate geographic region of Georgia.

* This requirement of the Common Development permit is not applicable to Tertiary Permittees with a Plan(s) for a typical individual lot(s), if the total land disturbance within the construction site is less than five (5) acres and the total land disturbance within each individual lot is less than one (1) acre. If applicable, the * checklist item would be N/A.

Effective January 1, 2023

What about “Rules of Thumb”?

- Slope Steepness vs Slope Length
- Maintain flow velocity at silt fence to <1.0 FPS
- Limit drainage area to 0.25 acres per 100 LF silt fence

Slope Steepness	Max Slope Length
<2%	100 ft
2-5%	75 ft
5-10%	50 ft
10-20%	25 ft
>20%	15 ft

Based on Richardson and Middlebrooks, “A Simplified Design Method for Silt Fence,” 1991

What about "The Rest of the Story"?

- Assumes design life of silt fence < 6 months
- "…limited to applications where the erosion occurs in the form of sheet erosion and where there is **no concentration of water flowing to the barrier**."
- "The silt fence system must be designed to provide a containment volume greater than the anticipated volume of runoff water. If this cannot be accomplished, then the silt fences must **incorporate non-erosional outlets** to allow controlled over topping of the fence."

Based on Richardson and Middlebrooks, "A Simplified Design Method for Silt Fence," 1991

What happens upstream, matters downstream

What happens upstream, matters downstream

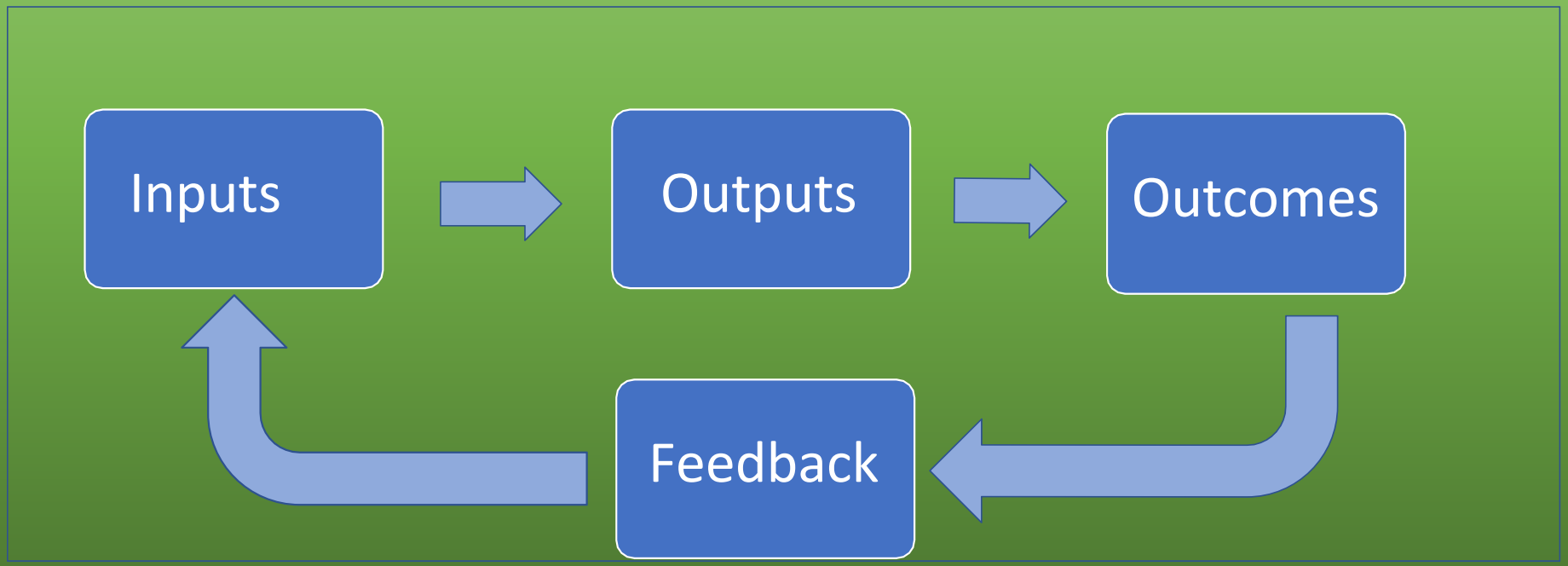
What happens upstream, matters downstream

What happens upstream, matters downstream

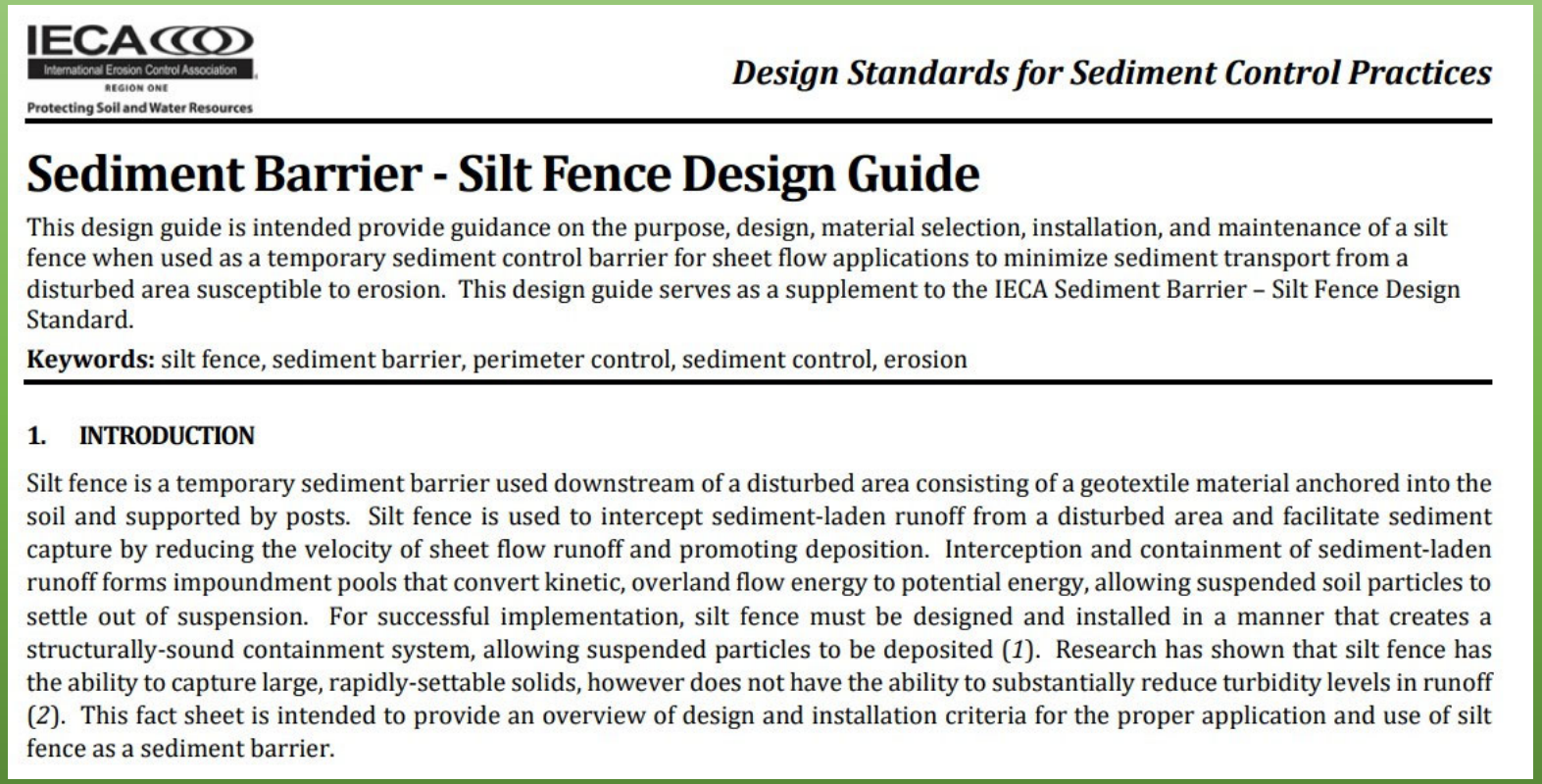
What happens upstream, matters downstream

The definition of insanity is doing the same thing **over and over and expecting different results**. -Albert Einstein.

How do we stop the insanity?



IECA Sediment Barrier – Silt Fence Design Guide



IECA International Erosion Control Association REGION ONE
Protecting Soil and Water Resources

Design Standards for Sediment Control Practices

Sediment Barrier - Silt Fence Design Guide

This design guide is intended provide guidance on the purpose, design, material selection, installation, and maintenance of a silt fence when used as a temporary sediment control barrier for sheet flow applications to minimize sediment transport from a disturbed area susceptible to erosion. This design guide serves as a supplement to the IECA Sediment Barrier – Silt Fence Design Standard.

Keywords: silt fence, sediment barrier, perimeter control, sediment control, erosion

1. INTRODUCTION

Silt fence is a temporary sediment barrier used downstream of a disturbed area consisting of a geotextile material anchored into the soil and supported by posts. Silt fence is used to intercept sediment-laden runoff from a disturbed area and facilitate sediment capture by reducing the velocity of sheet flow runoff and promoting deposition. Interception and containment of sediment-laden runoff forms impoundment pools that convert kinetic, overland flow energy to potential energy, allowing suspended soil particles to settle out of suspension. For successful implementation, silt fence must be designed and installed in a manner that creates a structurally-sound containment system, allowing suspended particles to be deposited (*1*). Research has shown that silt fence has the ability to capture large, rapidly-settable solids, however does not have the ability to substantially reduce turbidity levels in runoff (*2*). This fact sheet is intended to provide an overview of design and installation criteria for the proper application and use of silt fence as a sediment barrier.

https://ieca-standards.knowledgeowl.com/help

IECA Sediment Barrier – Silt Fence Design Guide

Sediment Barrier - Silt Fence

Last Modified on 10/28/2022 3:04 pm EDT

IECA Design Standard: Sediment Barrier - Silt Fence

This IECA Design Standard is intended to guide designers on the purpose, design, material selection, installation, and maintenance of a silt fence when used as a temporary sediment control barrier for sheet flow applications to minimize sediment transport from a disturbed area susceptible to erosion.

Silt Fence Design Standard.pdf

Silt Fence Design Guide.pdf

Silt Fence Literature Review.pdf

Design Tool: http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

Developed by the IECA Standards and Practices Committee.

https://ieca-standards.knowledgeowl.com/help

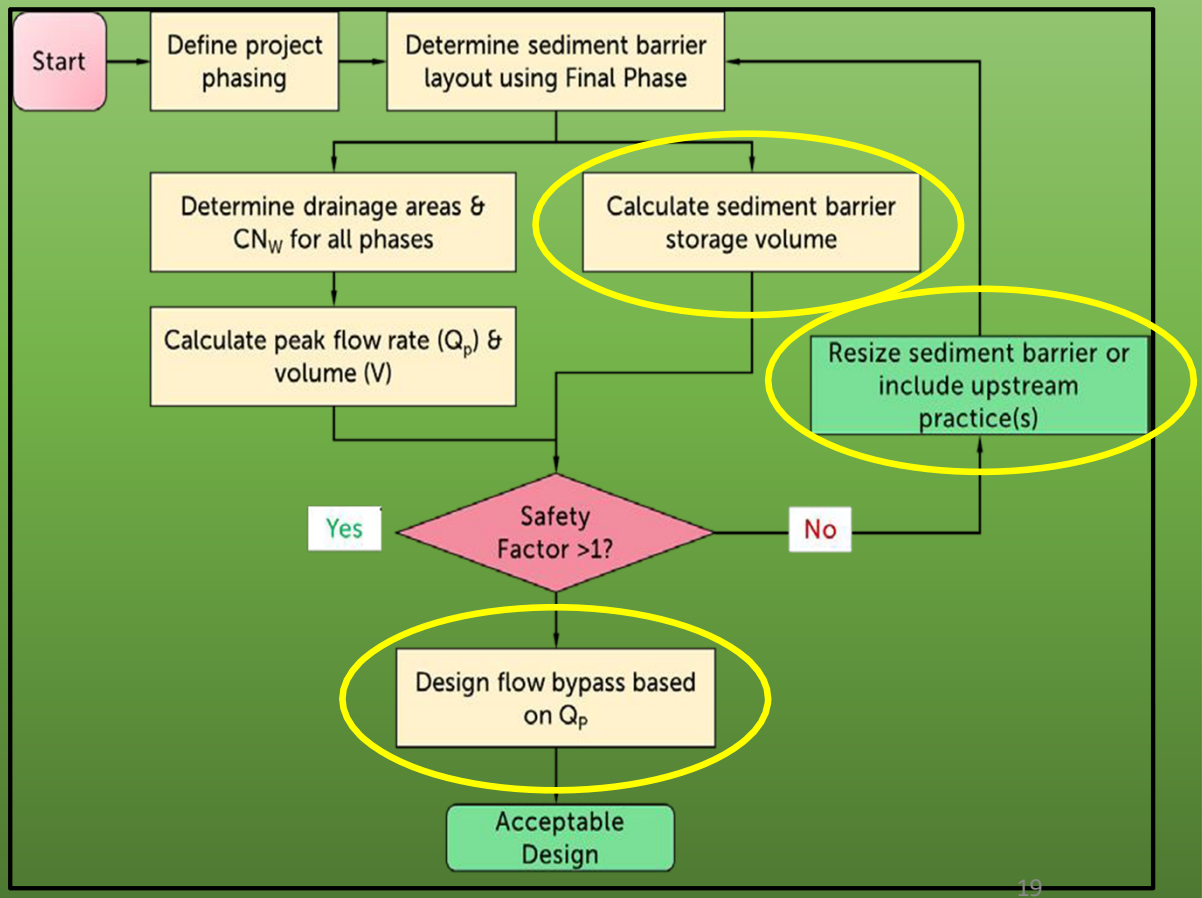
Related Articles

Silt Fence Webinar

IECA Sediment Barrier – Silt Fence Design Guide

- Recommends silt fence segments be designed to retain volume of 2-year, 24-hour storm without overtopping at a **maximum impoundment depth of 2 ft.**

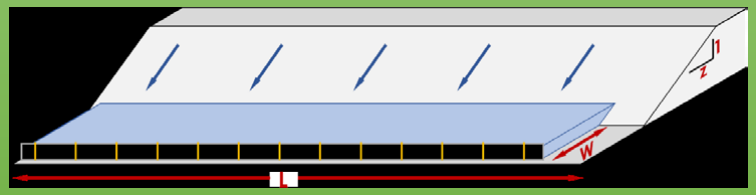
https://ieca-standards.knowledgeowl.com/help



IECA Sediment Barrier – Silt Fence Design Guide

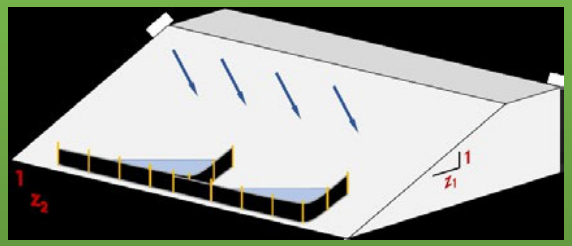
- Provides guidance on installing upstream practices to increase storage volume upstream of perimeter segments
  - Linear installation

    $V = hL(W + z/2)$



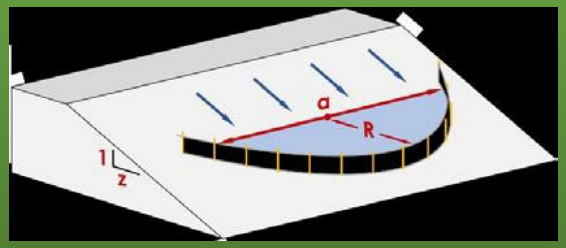
  - "J" hooks

    $V = h^3 z_1 z_2 / 2$



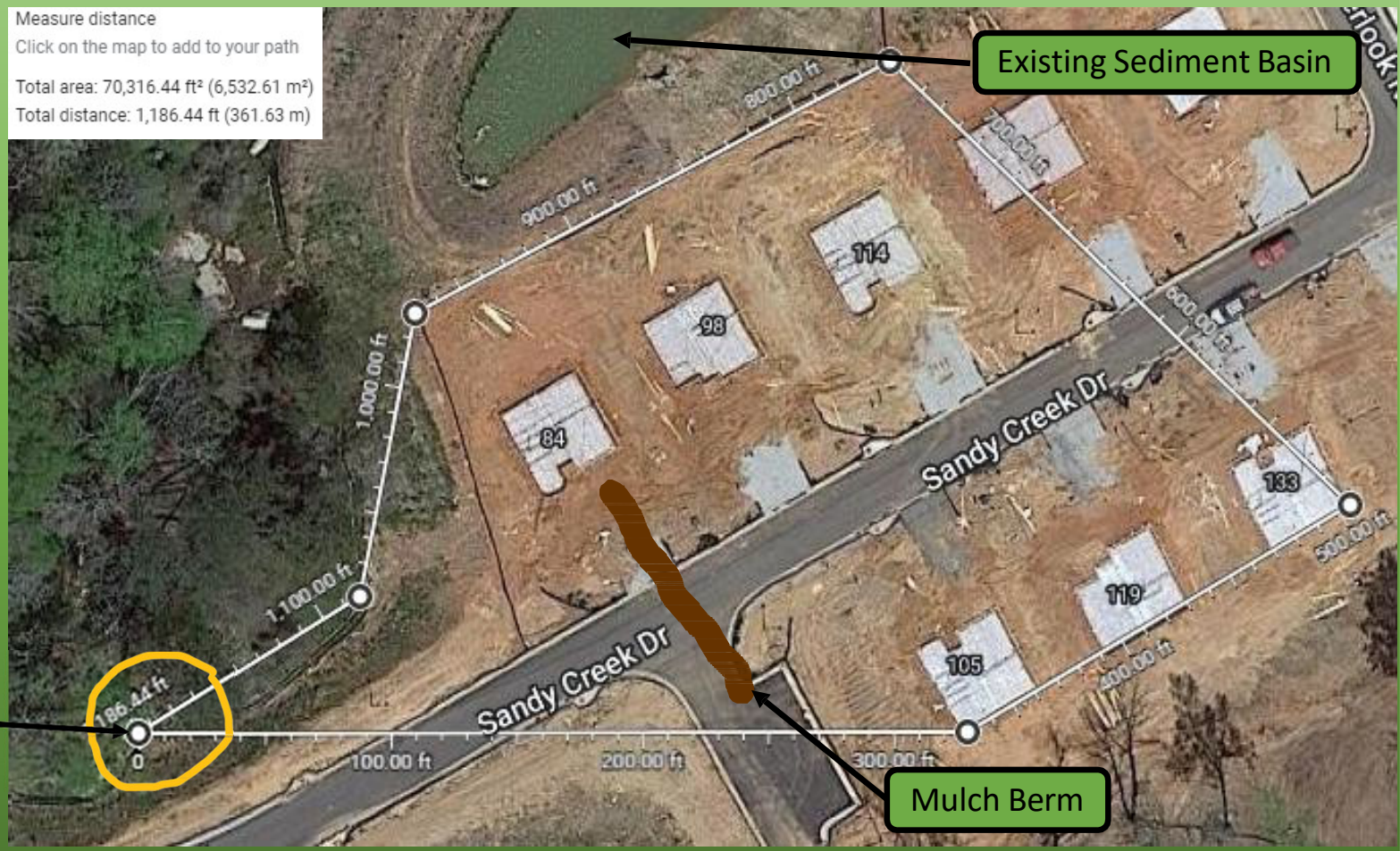
  - "C" configurations

    $V = ahR/3$



https://ieca-standards.knowledgeowl.com/help

What happens upstream, matters downstream



What happens upstream, matters downstream

Drainage area 1.61 acres sloping toward the right in this photo
Slope was nominal 6.5 percent

What happens upstream, matters downstream

What happens upstream, matters downstream

What happens upstream, matters downstream

What happens upstream, matters downstream

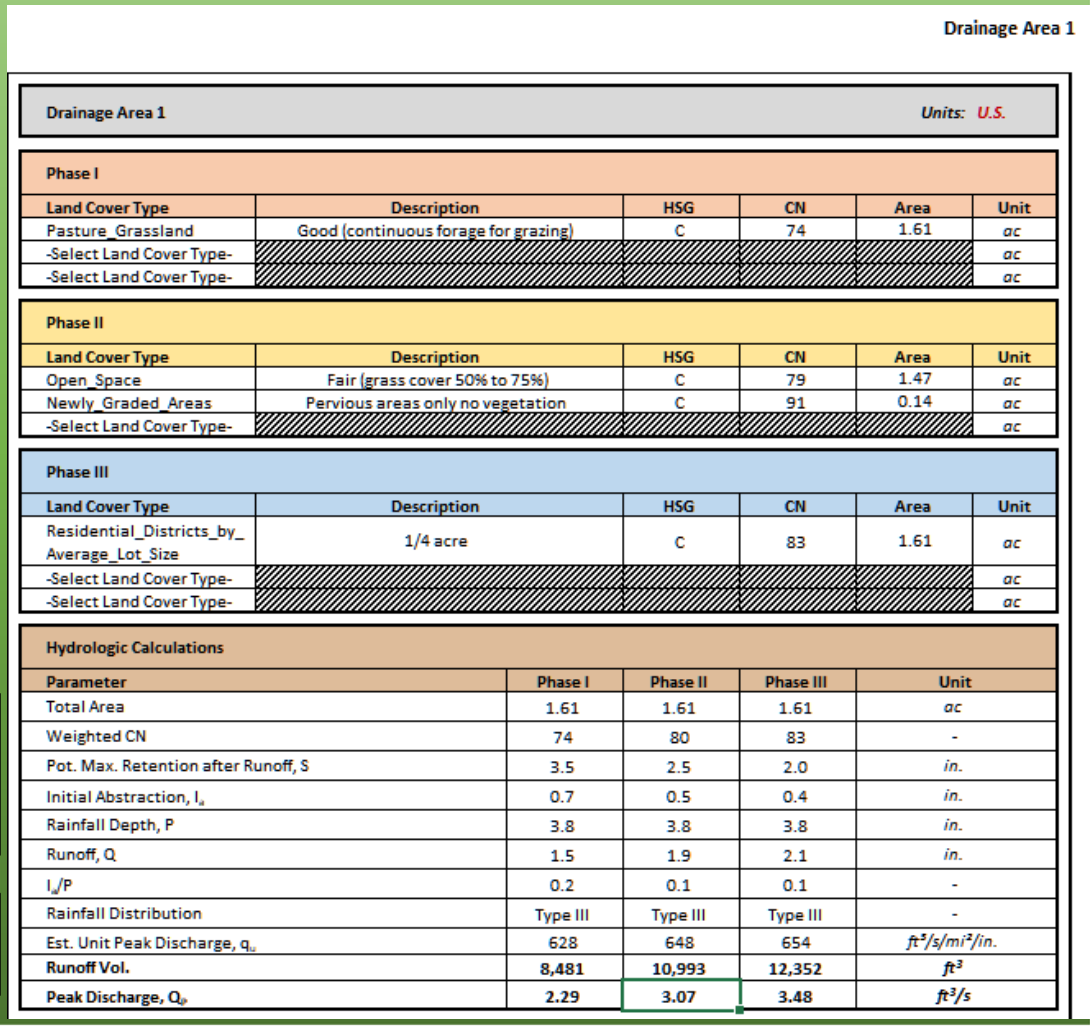
What happens upstream, matters downstream

IECA Sediment Barrier – Silt Fence Design Tool

- Based on NRCS method
- Tabs for each drainage area
- Analyzes each phase of construction
- Calculates runoff volume and peak discharge for each phase

Webinar: Dr. Perez & Dr. Whitman
https://ieca-standards.knowledgeowl.com/help/ieca-design-standards-sediment-barrier-silt-fence

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html



Drainage Area 1

Drainage Area 1 — Units: U.S.

Phase I

Land Cover Type	Description	HSG	CN	Area	Unit
Pasture_Grassland	Good (continuous forage for grazing)	C	74	1.61	ac
-Select Land Cover Type-					ac
-Select Land Cover Type-					ac

Phase II

Land Cover Type	Description	HSG	CN	Area	Unit
Open_Space	Fair (grass cover 50% to 75%)	C	79	1.47	ac
Newly_Graded_Areas	Pervious areas only no vegetation	C	91	0.14	ac
-Select Land Cover Type-					ac

Phase III

Land Cover Type	Description	HSG	CN	Area	Unit
Residential_Districts_by_Average_Lot_Size	1/4 acre	C	83	1.61	ac
-Select Land Cover Type-					ac
-Select Land Cover Type-					ac

Hydrologic Calculations

Parameter	Phase I	Phase II	Phase III	Unit
Total Area	1.61	1.61	1.61	ac
Weighted CN	74	80	83	-
Pot. Max. Retention after Runoff, S	3.5	2.5	2.0	in.
Initial Abstraction, I_a	0.7	0.5	0.4	in.
Rainfall Depth, P	3.8	3.8	3.8	in.
Runoff, Q	1.5	1.9	2.1	in.
I_a/P	0.2	0.1	0.1	-
Rainfall Distribution	Type III	Type III	Type III	-
Est. Unit Peak Discharge, q_u	628	648	654	$ft^3/s/mi^2/in.$
Runoff Vol.	**8,481**	**10,993**	**12,352**	ft^3
Peak Discharge, Q_p	**2.29**	**3.07**	**3.48**	ft^3/s

IECA Sediment Barrier – Silt Fence Design Tool

- Input sediment barrier configuration for each drainage area SF Summary Tab – Pg 1
- DA 1 impoundment depth 2', length approximately 25' & 2 rows
- Calculated storage volume = 870 CF

Design Summary Sheet - Pg. 1 — *Units: U.S.*

Project Information		Rainfall Parameters	
Project:	GA Residential	SCS Distribution Type:	Type II
State:	GA	Design Storm Event:	2-yr, 24-hr
County:	Walton	Rainfall Depth :	3.80 in.
Designer:	Potter		

Design Parameters — NOAA ATLAS 14

Area ID	Installation Configuration	h	W	L	a	z_1	z_2	R	Storage Vol.
		ft	ft	ft	ft	ft/ft	ft/ft	ft	ft^3
1	Linear	2.00	1	50		15.4			870
2	Linear	2.00	1	50		15.4			870
3	C Shape	2.00			70			31	1,447
4	J Hook	2.00				10.0	15.4		616
5	J Hook	2.00				10.0	15.4		616
6	J Hook	2.00				4.0	15.4		246
7	J Hook	2.00				4.0	15.4		246

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- Summary Tab – Pg 2 summarizes runoff volume and peak discharge by phase
- Used Phase II data
  - Volume = 10,993 CF
  - Peak Discharge = 4.66 CFS

Phasing Schedule

Phase	Description	Start	End	Days	Maint. Cycles
I	Predeveloped (existing) contours, cleared and grubbed.	1/1/21	3/1/21	59	1.2
II	Final contours/ building pads, no parking lots, no vegetation	3/1/21	5/1/21	61	1.0
III	Final grading, permament features installed, no vegetation.	5/1/21	12/31/21	244	1.4

Hydrologic Analysis Summary

Area ID	Phase I					Phase II					Phase III				
	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles
	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#
1	1.61	8,481	3.55	527	1.2	1.61	10,993	4.66	416	1.0	1.61	12,352	5.3	595	1.4
2	0.37	1,949	0.82	121	0.3	0.37	2,383	1.01	96	0.2	0.37	2,625	1.1	137	0.3
3	0.19	975	0.41	61	0.1	0.19	1,210	0.51	48	0.1	0.19	1,348	0.6	70	0.1
4	0.06	316	0.13	0.00	0.0	0.06	393	0.17	0.00	0.00	0.06	426	0.18	0.00	0.00
5	0.06	316	0.13	0.00	0.0	0.06	393	0.17	0.00	0.00	0.06	426	0.18	0.00	0.00
6	0.03	158	0.07	0.00	0.0	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00
7	0.03	158	0.07	0.00	0.00	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- Summary Tab – Pg 3 analyzes runoff volume vs storage volume
- Provides sizing for dewatering weir based on peak discharge
- Iterative tool – resize drainage areas and add storage volume

Design Summary Sheet - Pg. 3

Dewatering and Weir Notes:
Include dewatering oriface board in all silt fence segments, placing at the lowest elevation. Protect downstream with geotextile apron or aggregate to reduce scouring from splash erosion. When weir is included in dewatering board, additional scour protection measures should be taken downstream. If design flow rate exceeds weir flow rate capacity (as denoted by red flag), consider smaller contributing area or additional upstream erosion and sediment control practices. Depicted weir geometry is worst case for the entire worksheet. Designer may consider multiple weir sizes in project design.

Weir Design

Area ID	Safety Factor			Design Criteria	Dimension			Q_P	Q_W
	I	II	III		height	width	Θ		
					in.	in.	deg.	ft³/s	ft³/s
1	0.1	0.1	0.1	Fail	6.0	12.0	90	5.29	0.44
2	0.4	0.4	0.3	Fail	6.0	12.0	90	1.12	0.44
3	1.5	1.2	1.1	Pass	6.0	12.0	90	0.57	0.44
4	1.9	1.6	1.4	Pass	6.0	6.0	53	0.18	0.22
5	1.9	1.6	1.4	Pass	6.0	6.0	53	0.18	0.22
6	1.6	1.3	1.2	Pass	6.0	6.0	53	0.09	0.22
7	1.6	1.3	1.2	Pass	6.0		0	0.09	0.00

Selected Weir Geometry

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

Simulated Changes to Drainage Area

- Extend mulch berm to divert runoff to basin

IECA Sediment Barrier – Silt Fence Design Tool

- DA 1 reduced from 1.61 acres to 0.37 acres
- Open space = 0.3 acres
- Graded area = 0.07 acres

Drainage Area 2 — *Units: U.S.*

Phase I

Land Cover Type	Description	HSG	CN	Area	Unit
Pasture_Grassland	Good (continuous forage for grazing)	C	74	0.37	ac
-Select Land Cover Type-					ac
-Select Land Cover Type-					ac

Phase II

Land Cover Type	Description	HSG	CN	Area	Unit
Open_Space	Fair (grass cover 50% to 75%)	C	79	0.30	ac
Newly_Graded_Areas	Pervious areas only no vegetation	A	77	0.07	ac
-Select Land Cover Type-					ac

Phase III

Land Cover Type	Description	HSG	CN	Area	Unit
Residential_Districts_by_Average_Lot_Size	1/3 acre	C	81	0.37	ac
-Select Land Cover Type-					
-Select Land Cover Type-					ac

Hydrologic Calculations

Parameter	Phase I	Phase II	Phase III	Unit
Total Area	0.37	0.37	0.37	ac
Weighted CN	74	79	81	-
Pot. Max. Retention after Runoff, S	3.5	2.7	2.3	in.
Initial Abstraction, I_a	0.7	0.5	0.5	in.
Rainfall Depth, P	3.8	3.8	3.8	in.
Runoff, Q	1.5	1.8	2.0	in.
I_a/P	0.2	0.1	0.1	-
Rainfall Distribution	Type III	Type III	Type III	-
Est. Unit Peak Discharge, q_u	628	644	651	$ft^3/s/mi^2/in.$
Runoff Vol.	**1,949**	**2,383**	**2,625**	ft^3
Peak Discharge, Q_p	**0.53**	**0.66**	**0.74**	ft^3/s

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- DA 2 impoundment depth 2’, length approximately 25’ & 2 rows
- Calculated storage volume = 870 CF
- No change from initial configuration

Project Information		Rainfall Parameters	
Project:	GA Residential	SCS Distribution Type:	Type II
State:	GA	Design Storm Event:	2-yr, 24-hr
County:	Walton	Rainfall Depth :	3.80 in.
Designer:	Potter		

Design Parameters — NOAA ATLAS 14

Area ID	Installation Configuration	h	W	L	a	z_1	z_2	R	Storage Vol.
		ft	ft	ft	ft	ft/ft	ft/ft	ft	ft³
1	Linear	2.00	1	50		15.4			870
2	Linear	2.00	1	50		15.4			870
3	C Shape	2.00			70			31	1,447
4	J Hook	2.00				10.0	15.4		616
5	J Hook	2.00				10.0	15.4		616
6	J Hook	2.00				4.0	15.4		246
7	J Hook	2.00				4.0	15.4		246

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- Phase II data
  - Volume = 2,383 vs 10,993 CF
  - Peak Discharge = 1.01 vs 4.66 CFS

Phasing Schedule

Phase	Description	Start	End	Days	Maint. Cycles
I	Predeveloped (existing) contours, cleared and grubbed.	1/1/21	3/1/21	59	1.2
II	Final contours/ building pads, no parking lots, no vegetation	3/1/21	5/1/21	61	1.0
III	Final grading, permament features installed, no vegetation.	5/1/21	12/31/21	244	1.4

Hydrologic Analysis Summary

Area ID	Phase I					Phase II					Phase III				
	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles
	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#
1	1.61	8,481	3.55	527	1.2	1.61	10,993	4.66	416	1.0	1.61	12,352	5.3	595	1.4
2	0.37	1,949	0.82	121	0.3	0.37	2,383	1.01	96	0.2	0.37	2,625	1.1	137	0.3
3	0.19	975	0.41	61	0.1	0.19	1,210	0.51	48	0.1	0.19	1,348	0.6	70	0.1
4	0.06	316	0.13	0.00	0.0	0.06	393	0.17	0.00	0.00	0.06	426	0.18	0.00	0.00
5	0.06	316	0.13	0.00	0.0	0.06	393	0.17	0.00	0.00	0.06	426	0.18	0.00	0.00
6	0.03	158	0.07	0.00	0.0	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00
7	0.03	158	0.07	0.00	0.00	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00

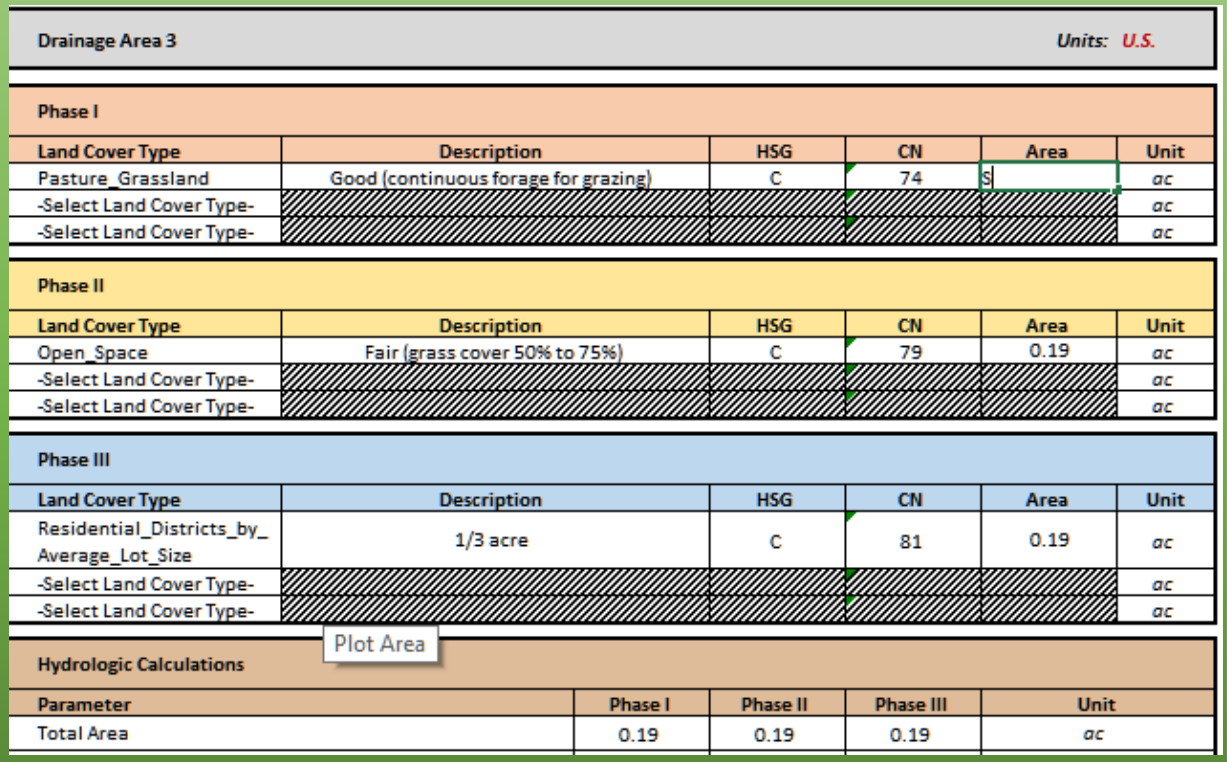
Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

Simulated Changes to Drainage Area

- Add sediment storage to existing silt fence
- Divide DA 2 into 5 drainage areas

IECA Sediment Barrier – Silt Fence Design Tool

- DA 2 broken into DA 3-7
- DA3 = 0.19 acres
- DA4 & DA5 = 0.06 acres
- DA6 & DA7 = 0.03 acres



Drainage Area 3 — *Units: U.S.*

Phase I

Land Cover Type	Description	HSG	CN	Area	Unit
Pasture_Grassland	Good (continuous forage for grazing)	C	74	S	ac
-Select Land Cover Type-					ac
-Select Land Cover Type-					ac

Phase II

Land Cover Type	Description	HSG	CN	Area	Unit
Open_Space	Fair (grass cover 50% to 75%)	C	79	0.19	ac
-Select Land Cover Type-					ac
-Select Land Cover Type-					ac

Phase III

Land Cover Type	Description	HSG	CN	Area	Unit
Residential_Districts_by_Average_Lot_Size	1/3 acre	C	81	0.19	ac
-Select Land Cover Type-					ac
-Select Land Cover Type-					ac

Plot Area

Hydrologic Calculations

Parameter	Phase I	Phase II	Phase III	Unit
Total Area	0.19	0.19	0.19	ac

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- DA3 – C-shape slope breaker
- Calculated storage volume = 1447 CF

Design Summary Sheet - Pg. 1 — *Units: U.S.*

Project Information		Rainfall Parameters	
Project:	GA Residential	SCS Distribution Type:	Type II
State:	GA	Design Storm Event:	2-yr, 24-hr
County:	Walton	Rainfall Depth :	3.80 in.
Designer:	Potter		

Design Parameters — NOAA ATLAS 14

Area ID	Installation Configuration	h	W	L	a	z_1	z_2	R	Storage Vol.
		ft	ft	ft	ft	ft/ft	ft/ft	ft	ft^3
1	Linear	2.00	1	50		15.4			870
2	Linear	2.00	1	50		15.4			870
3	C Shape	2.00			70			31	1,447
4	J Hook	2.00				10.0	15.4		616
5	J Hook	2.00				10.0	15.4		616
6	J Hook	2.00				4.0	15.4		246
7	J Hook	2.00				4.0	15.4		246

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

Phase II data

- Volumes = 1,210 vs 2,383 CF
- Peak Discharge = 0.55 vs 1.01 CFS

Phasing Schedule

Phase	Description	Start	End	Days	Maint. Cycles
I	Predeveloped (existing) contours, cleared and grubbed.	1/1/21	3/1/21	59	1.2
II	Final contours/ building pads, no parking lots, no vegetation	3/1/21	5/1/21	61	1.0
III	Final grading, permament features installed, no vegetation.	5/1/21	12/31/21	244	1.4

Hydrologic Analysis Summary

Area ID	Phase I					Phase II					Phase III				
	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles
	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#
1	1.61	8,481	3.55	527	1.2	1.61	10,993	4.66	416	1.0	1.61	12,352	5.3	595	1.4
2	0.37	1,949	0.82	121	0.3	0.37	2,383	1.01	96	0.2	0.37	2,625	1.1	137	0.3
3	0.19	1,001	0.42	62	0.1	0.19	1,210	0.51	48	0.1	0.19	1,348	0.6	70	0.1
4	0.06	316	0.13	0.00	0.0	0.06	393	0.17	0.00	0.00	0.06	426	0.18	0.00	0.00
5	0.06	316	0.13	0.00	0.0	0.06	393	0.17	0.00	0.00	0.06	426	0.18	0.00	0.00
6	0.03	158	0.07	0.00	0.0	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00
7	0.03	Plot Area	.07	0.00	0.00	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

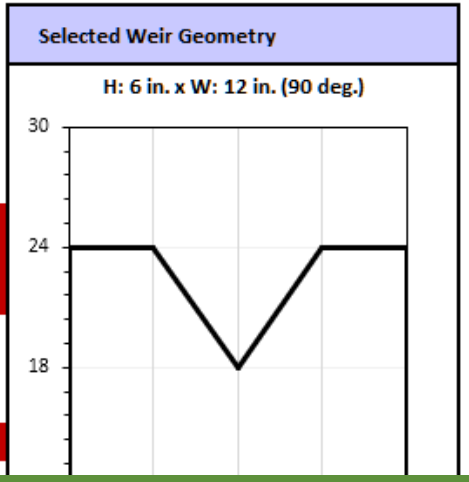
- Design Criteria status shows Pass
- Runoff volume 1,210 vs storage volume 1,447

Dewatering and Weir Notes:
Include dewatering oriface board in all silt fence segments, placing at the lowest elevation. Protect downstream with geotextile apron or aggregate to reduce scouring from splash erosion. When weir is included in dewatering board, additional scour protection measures should be taken downstream. If design flow rate exceeds weir flow rate capacity (as denoted by red flag), consider smaller contributing area or additional upstream erosion and sediment control practices. Depicted weir geometry is worst case for the entire worksheet. Designer may consider multiple weir sizes in project design.

Weir Design

Area ID	Safety Factor			Design Criteria	Dimension			Q_P	Q_W
	I	II	III		height	width	θ		
					in.	in.	deg.	ft³/s	ft³/s
1	0.1	0.1	0.1	Fail	6.0	12.0	90	5.29	0.44
2	0.4	0.4	0.3	Fail	6.0	12.0	90	1.12	0.44
3	1.4	1.2	1.1	Pass	6.0	12.0	90	0.57	0.44
4	1.9	1.6	1.4	Pass	6.0	6.0	53	0.18	0.22
5	1.9	1.6	1.4	Pass	6.0	6.0	53	0.18	0.22
6	1.6	1.3	1.2	Pass	6.0	6.0	53	0.09	0.22
7	1.6	1.3	1.2	Pass	6.0		0	0.09	0.00

Selected Weir Geometry



Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- DA4 to DA7 – J-hooks
- Better utilize existing fence segments
- Calculated storage volumes = 1724 CF

Project Information		Rainfall Parameters	
Project:	GA Residential	SCS Distribution Type:	Type II
State:	GA	Design Storm Event:	2-yr, 24-hr
County:	Walton	Rainfall Depth :	3.80 in.
Designer:	Potter		

Design Parameters — NOAA ATLAS 14

Area ID	Installation Configuration	h	W	L	a	z_1	z_2	R	Storage Vol.
		ft	ft	ft	ft	ft/ft	ft/ft	ft	ft^3
1	Linear	2.00	1	50		15.4			870
2	Linear	2.00	1	50		15.4			870
3	C Shape	2.00			70			31	1,447
4	J Hook	2.00				10.0	15.4		616
5	J Hook	2.00				10.0	15.4		616
6	J Hook	2.00				4.0	15.4		246
7	J Hook	2.00				4.0	15.4		246

Plot Area

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

Phase II data

- Combined Volume = 1,178 CF
- Peak Discharge = 0.17 & 0.08 CFS

Phasing Schedule

Phase	Description	Start	End	Days	Maint. Cycles
I	Predeveloped (existing) contours, cleared and grubbed.	1/1/21	3/1/21	59	1.2
II	Final contours/ building pads, no parking lots, no vegetation	3/1/21	5/1/21	61	1.0
III	Final grading, permament features installed, no vegetation.	5/1/21	12/31/21	244	1.4

Hydrologic Analysis Summary

Area ID	Phase I					Phase II					Phase III				
	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles	Area	Vol.	Q_p	Soil Loss	Maint. Cycles
	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#	ac	ft^3	ft^3/s	ft^3	#
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7	0.03	158	0.07	0.00	0.00	0.03	196	0.08	0.00	0.00	0.03	213	0.09	0.00	0.00

Design Tool:
http://www.eng.auburn.edu/research/centers/auesctf/tools/siltspread.html

IECA Sediment Barrier – Silt Fence Design Tool

- Design Criteria status shows Pass
- Combined runoff volume 1,178 vs storage volume 1,724 CF

Dewatering and Weir Notes:
Include dewatering oriface board in all silt fence segments, placing at the lowest elevation. Protect downstream with geotextile apron or aggregate to reduce scouring from splash erosion. When weir is included in dewatering board, additional scour protection measures should be taken downstream. If design flow rate exceeds weir flow rate capacity (as denoted by red flag), consider smaller contributing area or additional upstream erosion and sediment control practices. Depicted weir geometry is worst case for the entire worksheet. Designer may consider multiple weir sizes in project design.

Weir Design

Area ID	Safety Factor			Design Criteria	Dimension			Q_P	Q_W
	I	II	III		height	width	Θ		
					in.	in.	deg.	ft³/s	ft³/s
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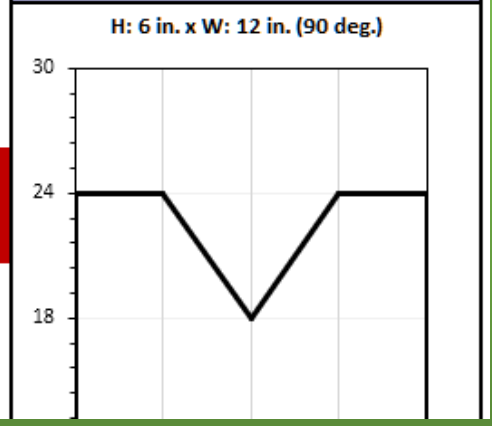
2	0.4	0.4	0.3	Fail	6.0	12.0	90	1.12	0.44
3	1.4	1.2	1.1	Pass	6.0	12.0	90	0.57	0.44
4	1.9	1.6	1.4	Pass	6.0	6.0	53	0.18	0.22
5	1.9	1.6	1.4	Pass	6.0	6.0	53	0.18	0.22
6	1.6	1.3	1.2	Pass	6.0	6.0	53	0.09	0.22
7	1.6	1.3	1.2	Pass	6.0	6.0	53	0.09	0.22

Selected Weir Geometry



Design Tool:
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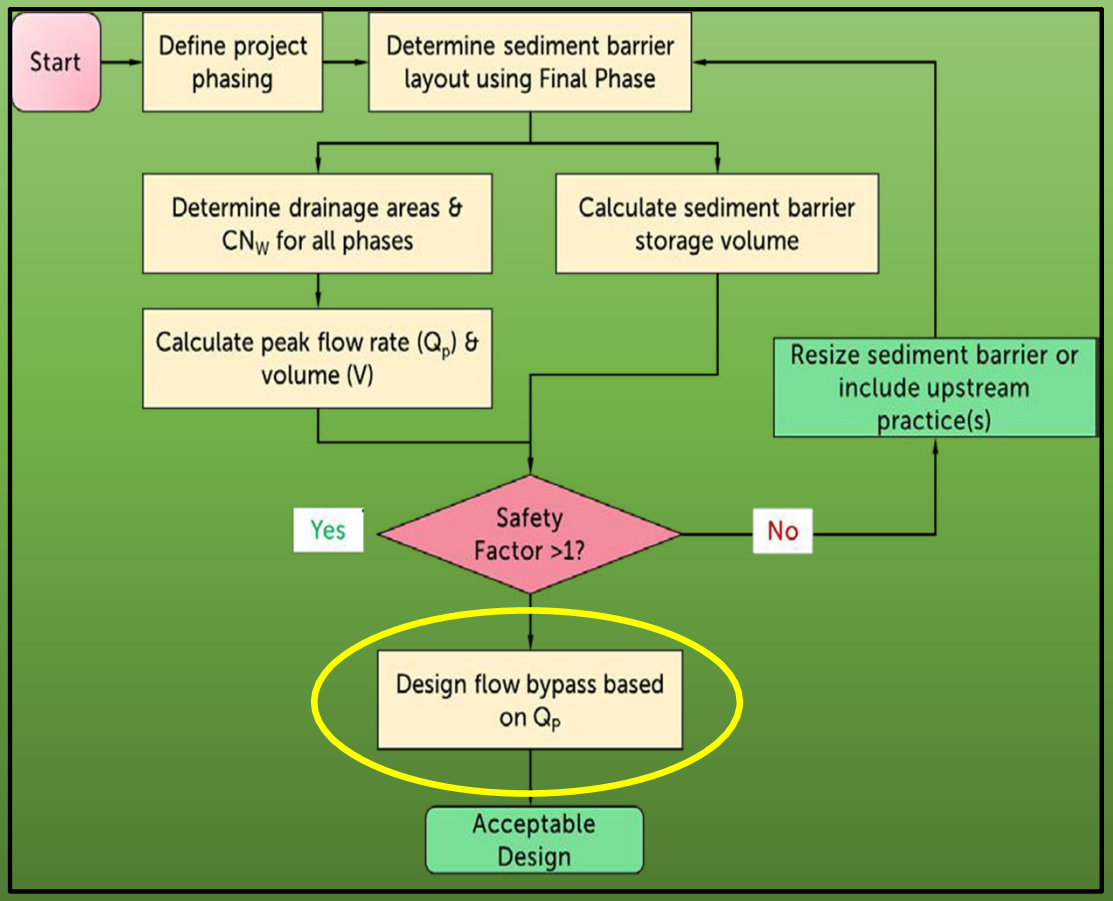


Step 2 - Dewatering

- Minimize overtopping or periods of excessive ponding
- Allow for runoff that exceeds design storm
- Designed to convey peak flow rate for design storm
- Dewater within 4 to 12 hours

https://ieca-standards.knowledgeowl.com/help

IECA Sediment Barrier – Silt Fence Design Guide

MANUAL FOR
EROSION AND SEDIMENT CONTROL
IN GEORGIA

2016 Edition

GSWCC

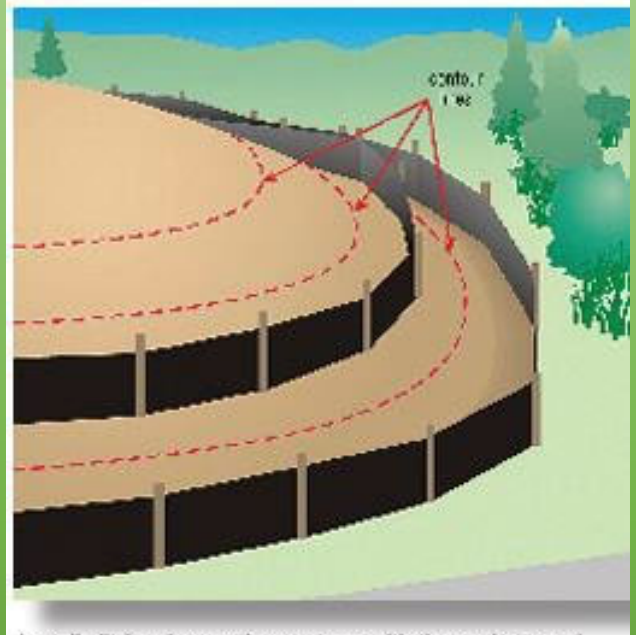
Sediment Barrier Sd1

DEFINITION

Sediment Barriers are temporary structures made up of a porous material typically supported by steel or wood posts. Types of sediment barriers may include silt fence, brush piles, mulch berms, compost filter socks or other filtering material.

PURPOSE

To minimize and prevent sediment carried by sheet flow from leaving the site and entering natural drainage ways or storm drainage systems by slowing storm water runoff and causing the deposition and/or filtration of sediment at the structure. The barriers retain the soil on the disturbed land until the activities disturbing the land are completed and vegetation is established.



Install silt fencing on the contour, with the ends turned uphill to trap muddy runoff and prevent bypasses. Remove silt fences when grass is established.

Installation

Sediment barriers should be installed along the contour.

Temporary sediment barriers shall be installed according to the following specifications as shown on the plans or as directed by the design professional.

IECA Sediment Barrier – Silt Fence Design Guide

IECA Sediment Barrier – Silt Fence Design Guide

Dewatering board & V-notch weir

Considerations

- Located at lowest elevation to be effective
- Sized to handle peak runoff
- Install a device for each significant impoundment area
- Requires a “splash pad” to prevent scour outside perimeter barrier

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IECA Sediment Barrier – Silt Fence Design Guide

Silt Fence Break (Outlet)

Considerations

- Located at lowest elevation to be effective
- Requires frequent maintenance
- Becomes less efficient as sediment deposits in stone
- Install a device for each significant impoundment area

IECA Sediment Barrier – Silt Fence Design Guide

Two-Stage Silt Fence (Internally Reinforced)

Considerations

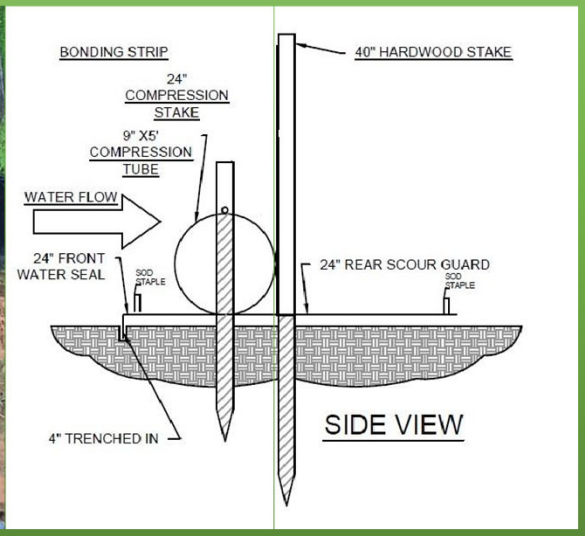
- Releases runoff at elevation changes around perimeter – not concentrated at one point
- Becomes more efficient as sediment deposits
- Disperses runoff laterally preventing overtopping
- Prevents scour outside perimeter barrier
- Dewaters runoff at surface like a skimmer & prevents undermining

IECA Sediment Barrier – Silt Fence Design Guide

Two-Stage Silt Fence Outlet

Considerations

- Reduces potential for blinding
- Becomes more efficient as sediment deposits
- Disperses runoff laterally preventing overtopping
- Prevents scour outside perimeter barrier
- Dewaters runoff at surface like a skimmer & prevents undermining
- Capable of handling runoff in channels



IECA Sediment Barrier – Silt Fence Design Guide

Real World Silt Fence Outlets

What happens upstream, matters downstream

What happens upstream, matters downstream

What happens upstream, matters downstream

Everyone Thinks of Changing the World, But No One Thinks of Changing Himself – Leo Tolstoy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