EROSION PREVENTION AND SEDIMENT CONTROL PLANS

TECHNICAL GUIDANCE HANDBOOK

City of Portland
Bureau of Environmental Services

Unified Sewerage Agency
of Washington County

Revised

February 1994

170022

TABLE OF CONTENTS

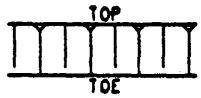
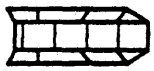
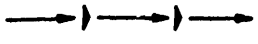
LIST OF TABLES

LIST OF DETAIL DRAWINGS

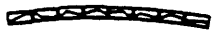
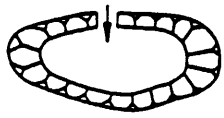
170022

UNIFORM EROSION CONTROL SYMBOLS

UNIFORM CODING SYSTEM FOR EROSION AND SEDIMENTATION CONTROL BMPs AND THEIR APPLICABILITY TO CONTROL VARIOUS PROBLEM AREAS.

BMPs	Code	Symbols
I. TOPO SYMBOLS		
PONDS		
CREEK/STREAM		
ORIGINAL GROUND LINE (CROSS SECTION)		
SLOPE		
II. COVER PRACTICES		
TEMPORARY SEEDING	TS	
MULCHING & MATTING	MU	
CLEAR PLASTIC COVERING	CPC	
BUFFER ZONES	BZ	
PERMANENT SEEDING & PLANTING	PS	
III. EROSION CONTROL		
TIRE WASH	TW	
STABILIZED CONSTRUCTION ENTRANCE	CE	
DUST CONTROL	DC	
PIPE SLOPE DRAINS	PSD	
GRADIENT TERRACES	GT	
INTERCEPTOR DIKE & SWALE	IDS	
CHECK DAMS	CD	

UNIFORM EROSION CONTROL SYMBOLS

BMPs	Code	Symbols
III. EROSION CONTROL (CONT.)		
OUTLET PROTECTION	OP	
RIPRAP	RR	
VEGETATIVE STREAMBANK STABILIZATION	VSS	
BIOENGINEERING METHODS OF STREAMBANK STABILIZATION	BSS	
STRUCTURAL STREAMBANK PROTECTION	SSS	
IV. SEDIMENT DETENTION		
FILTER FENCE	FF	
STRAW BALE BARRIER (BIOFILTER)	STB	
BIO-FILTER BAGS	BFB	
GRAVEL FILTER BERM	GFB	
SEDIMENT TRAP (OR SUMP)	ST	
SEDIMENT POND OR BASIN	SB	

EROSION PREVENTION AND SEDIMENT CONTROL PLANS TECHNICAL GUIDANCE HANDBOOK

PHILOSOPHY STATEMENT: This handbook contains erosion prevention techniques and sediment control measures. In order to meet the high water quality requirements of the Tualatin River Basin, the use of erosion prevention techniques shall be emphasized, rather than sediment control measures. This shall be especially important on larger construction sites immediately before and during the rainy portion of the year. Erosion prevention techniques are designed to protect soil particles from the force of rain and wind so that they will not erode. These techniques include such things as ground cover and matting. Sediment control measures are designed to capture soil particles after they have been dislodged and attempt to retain the soil particles on-site. These measures include such things as silt fences and settling basins. Both erosion prevention techniques and sediment control measures have appropriate uses, however, numerous case studies have shown that sediment control measures are less effective in preventing soil movement than erosion prevention techniques.

1.0 INTRODUCTION

Each year tons of sediment are washed and blown from construction sites into local streams, rivers and lakes. It is a major source of pollution to these water bodies. Eroded materials also clog streets, storm drains, culverts and stream channels and cause private property damage. The degradation of wildlife habitat and water quality and the burden placed on taxpayers for cleanup could be largely avoided through implementation of adequate erosion control practices.

This handbook introduces plan submittal requirements and recommended measures for construction site erosion control. All construction activities, public and private, which involve disturbance of the land surface are covered by the requirements in this handbook. The handbook was developed to address state-mandated erosion control requirements for the Tualatin River Basin, and it is applicable to the west Portland metropolitan area and other areas with

similar soils conditions. Details of geographical areas in which the information in this handbook is enforced, plus permit application, reviews and enforcement information are available from the applicable local jurisdiction.

Erosion control measures are required for construction areas where the ground surface will be disturbed with clearing, grading, fills, excavations and other construction activities.

An important concept to keep in mind when developing construction and erosion control plans is: *construction practices which minimize the amount of disturbed land area and avoid or minimize work on steep slopes are encouraged.* Such practices can provide the following positive results:

A. Less chance of soil washing off the site and clogging streets, drainage systems, and neighbor's yards.

B. The number and size of erosion control measures required will be minimized.

C. The costs of maintaining erosion control facilities are minimized.

D. As much top soil as possible is retained on the site, making revegetation and landscaping easier to establish.

2.0 EROSION CONTROL PLAN SUBMITTAL REQUIREMENTS

Planning considerations and submittal requirements for erosion control plans for various types of construction projects are presented below. Full details of construction project erosion control requirements, submittal requirements, and review/enforcement procedures are available from the applicable local jurisdiction.

Approval of a construction erosion control plan by the jurisdiction does not relieve the applicant's responsibility to ensure that erosion control measures are constructed and maintained to contain sediment on the construction site.

2.1 Considerations in Planning for Erosion Control

Following are recommended steps and check lists to use in the development and implementation of an acceptable erosion control plan. This information will provide the necessary tools to gain jurisdictional approval of construction activities for all types of construction sites and developments.

STEP 1: Identify Site Characteristics:

EXISTING:

- topography/contours
- existing drainage patterns and existing drainage systems on and immediately up and downstream of site
- site soils, as necessary
- wetlands and sensitive areas, creeks, and other identified areas of concern

FUTURE:

- future site contours
- future site drainage system type and location
- future impervious areas

STEP 2: Lay Out Preconstruction Plan and Proposed Base Measures:

- determine construction timing and sequence
- establish primary site access point(s) for construction traffic
- lay out limits of clearing and construction activities
- establish base protection measures including sediment barriers at toe of disturbed area and stabilized construction entrances
- establish maintenance procedures for erosion control measures

STEP 3: Measures During Construction:

- continue establishment of site interior base measures as site clearing and other site disturbances occur, including stockpile protection and sediment filters along slope contours
- determine if construction may occur during wet season (November 1 through April 30)
- establish and schedule wet weather measures including cover measures over exposed soils
- establish maintenance procedures for erosion control measures

STEP 4: Post Construction Measures

- establish stabilized cover or other measures before removing base erosion control measures and as by approved by permitting agency

2.2 Permit Application Requirements: Single Family Homes and Duplexes on Existing Lots of Record

Single family home and duplex construction on existing lots of record and construction of additions to existing single family homes and duplexes which will cause ground surface disturbance in excess of 500 square feet of area have the following requirements for construction period erosion control.

Erosion control methods are as designated in Table 3-1 in Chapter 3.

Submit with application for permit the following information:

A. completed Erosion Control Information form from Appendix B (or other form as supplied by the local jurisdiction),

B. construction schedule information, as required, including:

1. construction start and completion dates,
2. dates when erosion control measures will be in place,
3. timing of site clearing and grading, fills placement, excavations,

4. projected date of removal of erosion control measures (after landscaping is established or after establishment of a healthy grass stand or other vegetation).

The following may also be required by the permitting jurisdiction:

A. a site plan showing locations of the various required erosion control measures; or

B. a typed sheet stating locations of the various required erosion control measures (can be submitted as part of the construction schedule, above).

2.3 Other Private Developments Construction

Construction on private property, other than those sites covered in Section 2.2 above, which will cause ground surface disturbance have the following requirements for erosion control.

Recommended erosion control measures are as designated in Tables 3-2 and 3-3 in Chapter 3.

Submit with construction plans for subdivision approval, grading, building, or erosion control permit the following information:

A. completed Erosion Control Information form from Appendix B (or other form as supplied by the local jurisdiction),
B. construction schedule with the following information:

1. construction start and completion dates,
2. dates when erosion control measures will be in place,
3. timing of site clearing and grading, fills placement, excavations,
4. projected date of removal of erosion control measures (after landscaping is established or after establishment of a healthy grass stand or other vegetation).

Submit also with construction plans an erosion control site plan drawing showing:

A. locations, types and applicable dimensions of erosion control measures,

B. applicable details of erosion control measures showing full dimensions and construction information,

C. existing and proposed ground contours,

D. locations and sizes of existing and proposed drainage pipes and channels (labeled as such and with arrows indicating flow direction),

E. site entrances/exits,

F. applicable standard erosion control notes from Appendix D, with additions or changes as required,

G. other notes including references to timing of placement and removal of erosion control measures, and erosion measure specifications such that types and quantities of materials necessary for the installation of the erosion control measures are fully detailed.

If the site erosion control plan includes sediment traps or ponds, the applicant shall also submit calculations used for determining trap or pond sizing.

Because of particular site conditions or preferences, the applicant may desire in certain cases to use different erosion control measures than are recommended in Tables 3-2 or 3-3. In such cases, the applicant must submit calculations or other supporting information used to determine the sizing and layout of the submitted erosion control plan.

Design criteria and use of the Soil Conservation Service Universal Soil Loss Equation for the purpose of sizing sediment traps or ponds, and proposed new erosion control measures are described in Appendix C.

2.4 Private Construction in Public Rights-of-Way

Private construction in public rights-of-way has the same erosion control plan submittal requirements as noted in Section 2.3 above.

An exception is construction of private utilities and similar localized construction or maintenance activities. Such construction must meet noted erosion control measures in Table 3-3 for utilities construction and stock piles as applicable. For such construction, the applicant need only submit the Erosion Control Information form in Appendix B as required, unless different erosion measures than indicated in Table 3-3 are desired, in which case an erosion control site plan drawing must be submitted as shown in Section 2.3 above.

2.5 Public Works Construction

Public Works construction projects have the same erosion control plan design requirements as note above for private construction in public rights-of-way. Erosion control plan submittal/review requirements are in accordance with the appropriate jurisdiction's existing public works design review process.

3.0 RECOMMENDED EROSION CONTROL MEASURES

3.1 Introduction and General Plan Requirements

Recommended construction period erosion control measures are detailed in this chapter. The methods and measures outlined in this handbook are recommended for use in the development of appropriate erosion control plan permit submittals as outlined in Chapter 2.

Erosion control measures are required during all construction and site disturbance activity and until permanent site ground covers are in place. As further detailed in Sections 3.2 and 3.3, certain base erosion control measures are required for construction sites at all times of the year. Also, additional cover or filtration measures are required during the wet weather

season (November 1 through April 30). **All seed applications shall be completed prior to September 1.**

Erosion control measures utilized for any construction site must be designed to achieve a disturbed area erosion loss of no more than 1 ton per acre per year, based on the Soil Conservation Service (SCS) Universal Soil Loss Equation. The erosion control measures outlined in the matrices in Section 3.2 are designed to achieve the 1 ton per acre per year goal, based on a typical soil type for the urban Tualatin River basin area. If, based on particular site conditions, different types or combinations of erosion control measures are desired for a construction site, the SCS Universal Soil Loss Equation or other approved supporting methodology/information must be used to design the erosion control system, and the design calculations must be submitted to the appropriate jurisdiction's permit review section with the proposed erosion control plan. A brief summary of the use of the Universal Soil Loss Equation is presented in Appendix C.

The designer should keep in mind when laying out an erosion control plan that the purpose of the plan is to minimize erosion and sedimentation from disturbed ground surfaces. Minimizing the area of clearing and grading, phasing of construction, and use of other methods to reduce the amount of land area disturbed will provide the greatest erosion control benefits.

The site owner/developer is responsible for seeing that erosion control measures are installed, maintained and working as designed. An approved erosion control plan does not waive the owner/developer's responsibility for ensuring that erosion control is achieved. If an installed erosion control system does not adequately contain sediment on site, then the erosion measures must be field adjusted as necessary by the applicant, and as approved by the permitting jurisdiction.

3.2 Erosion Control Matrices

Tables 3-1 through 3-3 are matrices presenting recommended erosion control measures for various site and construction types.

Table 3-1 is a matrix summarizing recommended erosion controls for single family residential and duplex construction activities on single lots of record. Table 3-2 summarizes recommended erosion control measures for larger construction sites including commercial, industrial and subdivision development and construction. Table 3-3 is a matrix presenting recommended erosion controls for small, linear utilities construction and ditches/swales.

Erosion control measures are divided into two categories:

Base measures which are required for construction sites at all times while there is disturbed, unstabilized ground surface on the site, and

Supplementary wet weather measures which are required between November 1 and April 30 in addition to the base measures.

Base measures are indicated on Tables 3-1 through 3-3 with and "X" or an "A," "X" indicating primary recommended base measures and "A" indicating alternate measures. Wet weather measures are indicated on Tables 3-1 through 3-3 with an "*" for primary recommended measures and with an "O" for alternate measures.

Each erosion control measure presented in the matrices is presented in further detail with design, construction and maintenance criteria in Section 3.3. Applicable subsections of Section 3.3 are referenced in parenthesis after each erosion control measure presented in the matrices.

TABLE 3-1
EROSION CONTROL MATRIX
SINGLE FAMILY/DUPLEX RESIDENTIAL

BASE MEASURES	SINGLE FAMILY/DUPLEX RES. slope <2%	SINGLE FAMILY/DUPLEX RES. slope >2%	STOCK PILES
1. Gravel Construction Entrance (Sec. 3.3.1)	X	X	
2. Sediment Fence/Barrier at toe of disturbed area or stockpile (Sec. 3.3.2 & 3.3.3)		X	X
3. Sidewalk Subgrade Gravel Barrier A(2.) (site slopes to stret at <5% grade) (alternate to #2.) (Sec. 3.3.4)			
4. Undisturbed Buffer at toe of disturbed areas (alternate to #2.) (site slopes < 10%) (Sec. 3.3.5)		A(2.)	
WET WEATHER MEASURES			
5. 6-mil plastic sheet cover (Sec. 3.3.9)			*
6. 2"-min. straw mulch cover			O
POST CONSTRUCTION			
7. Reestablish ground cover or landscape prior to removing erosion measures (Sec. 3.3.6)	X	X	

Key: X = Base Measure
A = Alternate to Base Measure Indicated in Parenthesis
* = Supplemental Wet Weather Measure (November 1 - April 30)
O = Alternate Wet Weather Measure to *

170022

TABLE 3-2
EROSION CONTROL MATRIX
COMMERCIAL, SUBDIVISION AND LARGE SITE CONSTRUCTION

	SITE SLOPE						STOCK PILES
	<2%	<10%	<15%	<20%	<30%	<50%	>50%
BASE MEASURES							
1. Gravel Construction Entrance (Sec. 3.3.1)	X	X	X	X	X	X	
2. Sediment fence or barrier at toe of disturbed area (Sec. 3.3.2 and 3.3.3)		X	X	X	X	X	X
3. Undisturbed buffer at to of disturbed area (Sec 3.3.5)		A(2.)					
4. Sediment fence installed on contours (spacing) (Sec. 3.3.2)		X (300')	X (150')	X (100')	X (50')	X (25')	X (25')
5. Temp. interceptor dikes/swales around active work areas (Sec.3.3.11)	#	#	#	#	#	#	#
WET WEATHER MEASURES							
6. Established grass (Sec. 3.3.6)		*	*	*	*	*	
7. 2"-min. straw mulch cover (Sec. 3.3.7)		O	O	O	O	O	O
8. Erosion Blankets with anchors (Sec. 3.3.8)		O	O	O	O	O	O
9. 6-mil plastic sheet cover (Sec. 3.3.9)		O	O	O	O	O	*
10. Sediment trap or pond (Sec. 3.3.10)		O	O	O	O	O	
POST CONSTRUCTION							
11. Reestablish ground cover or landscape prior to removing erosion measures (Sec. 3.3.6)	X	X	X	X	X	X	X

Key: X = Base Measure
A = Alternate to Base Measure Indicated in Parenthesis
# = Optional Base Measure, Can use as Applicable
* = Supplemental Wet Weather Measure (November 1 - April 30) (Seeding prior to September 1)
O = Alternate Wet Weather Measure to *

NOTE: If different areas of the site have considerably different slopes, the site may be divided up and erosion measures selected for each area from the appropriate column in the matrix.

TABLE 3-3
EROSION CONTROL MATRIX
UTILITIES CONSTRUCTION AND
STOCK PILES / DITCHES / SWALES PROTECTION

	UTILITIES CONSTRUCTION		STOCK PILES	DITCHES/SWALES
	Catch Basin Drainage	Ditch Drainage		(Construction / protection)
BASE MEASURES				
1. Sediment Fence or Barrier at toe (Sec. 3.3.2 and 3.3.3)				X
2. Check Dams (Sec. 3.3.13 and 3.3.3)		X		X
3. Storm drain inlet protection barrier	X			
WET WEATHER MEASURES				
4. Established grass (Sec. 3.3.6)				*
5. 6-mill plastic sheet cover (Sec. 3.3.9)			*	
6. 2"-min. straw mulch cover (Sec. 3.3.7)			O	O
7. Erosion blanket with anchors (Sec. 3.3.8)				O
POST CONSTRUCTION				
8. Reestablish ground cover or landscape prior to removing erosion measures (Sec. 3.3.6)	X	X		X

KEY: x = Base Measure
* = Supplemental Wet Weather Measure (November 1 - April 30) (Seeding prior to Sept. 1)
O = Alternate Wet Weather Measure to *

3.3 Recommended Design Criteria

The following sections provide design, construction and maintenance criteria and recommendations for the erosion control measures listed in the matrices in Section 3.2.

3.3.1 Gravel Construction Entrances

Purpose

To reduce the amount of mud, dirt, rocks, etc, transported onto roads by motor vehicles or storm water runoff by constructing a stabilized pad of gravel at entrances/exits to construction sites.

Conditions Where Practice Applies

At any construction site where traffic will be leaving the site and moving directly onto public roads, other paved areas, or other approved access points.

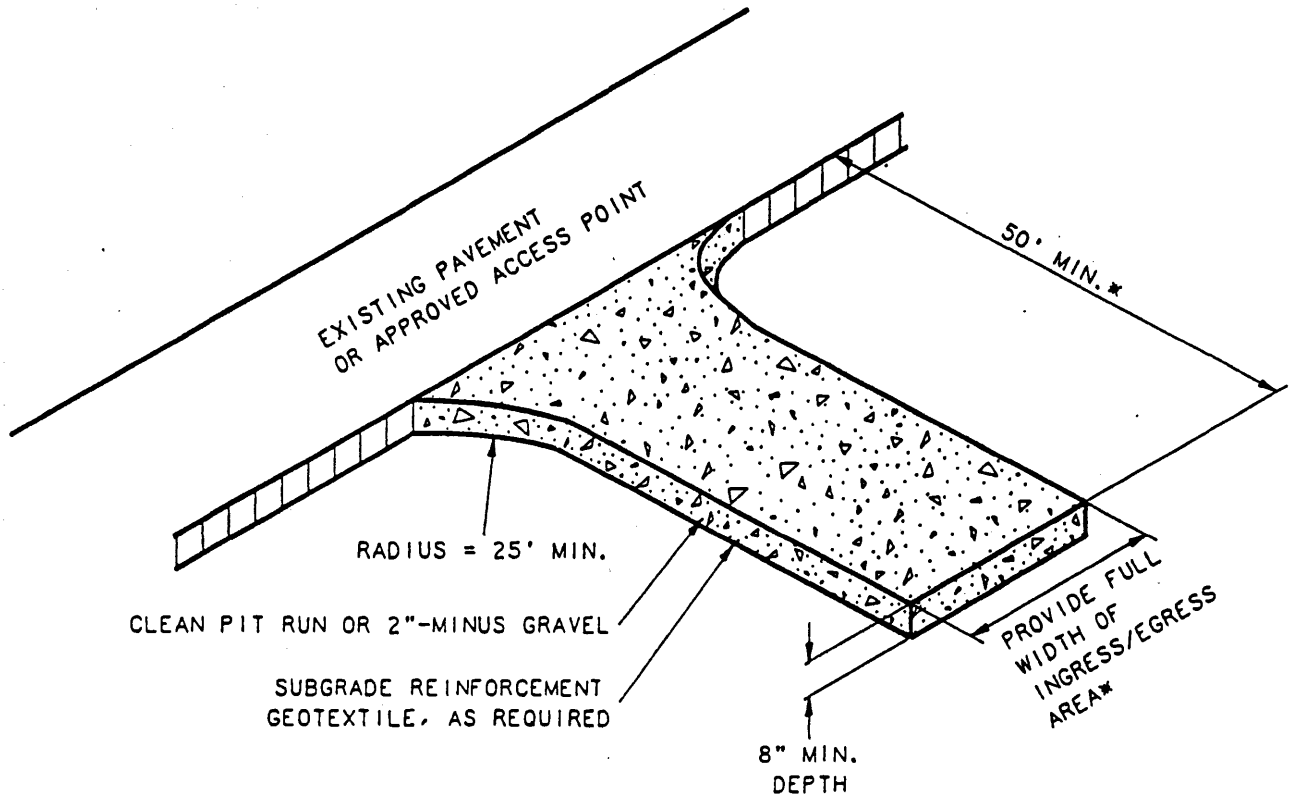
Design Criteria/Specifications

A. See Figure 3-1A for details.

B. Material should be clean pit run or 3/4"-minus gravel (or larger, as needed).

C. The gravel pad shall be at least 8 inches thick and 50 feet in length. Width shall be the full width of the vehicle ingress and egress area. (A 20-foot minimum pad length may be acceptable as approved for single family and duplex residential construction sites.)

D. Use subgrade reinforcement geotextile under gravel pads for all but construction of a single family/duplex residence on existing lots of record.



*20' MIN. FOR SINGLE FAMILY AND DUPLEX RESIDENTIAL

TECHNICAL GUIDANCE HANDBOOK	Gravel Construction Entrance Detail Drawing 3-1A

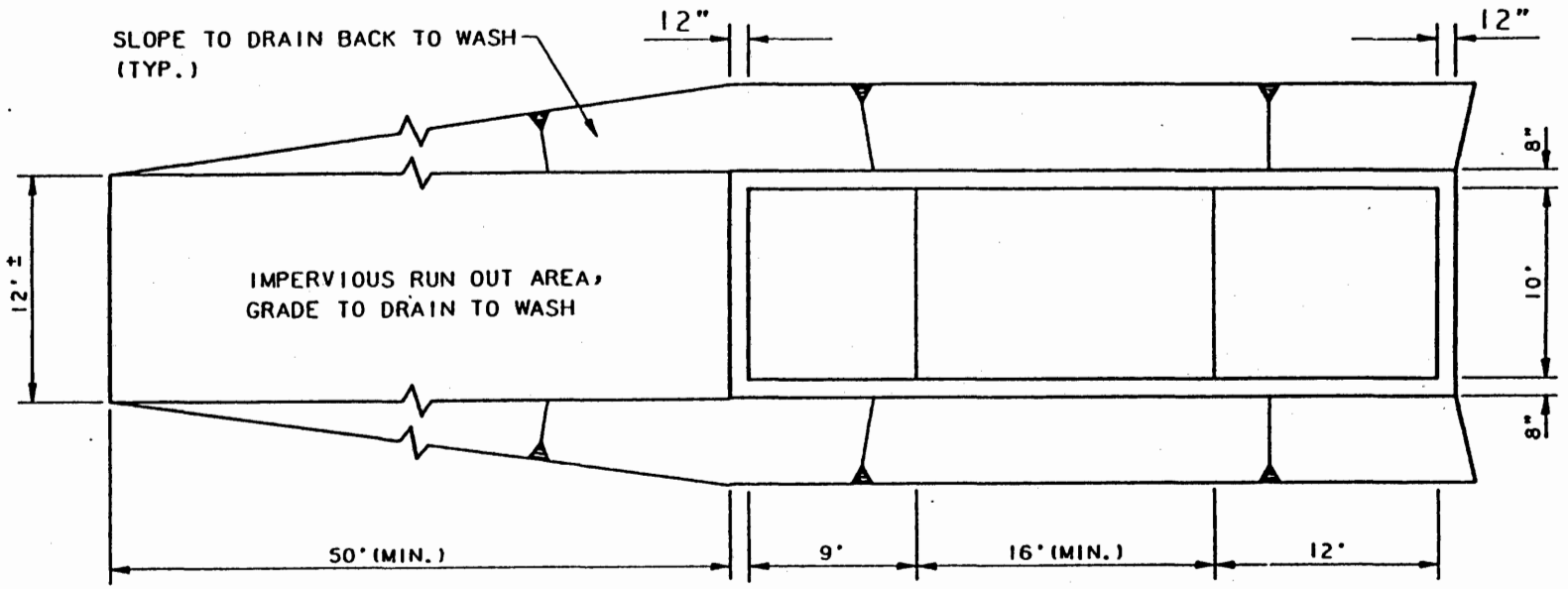
FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-1A PLOT 1:1

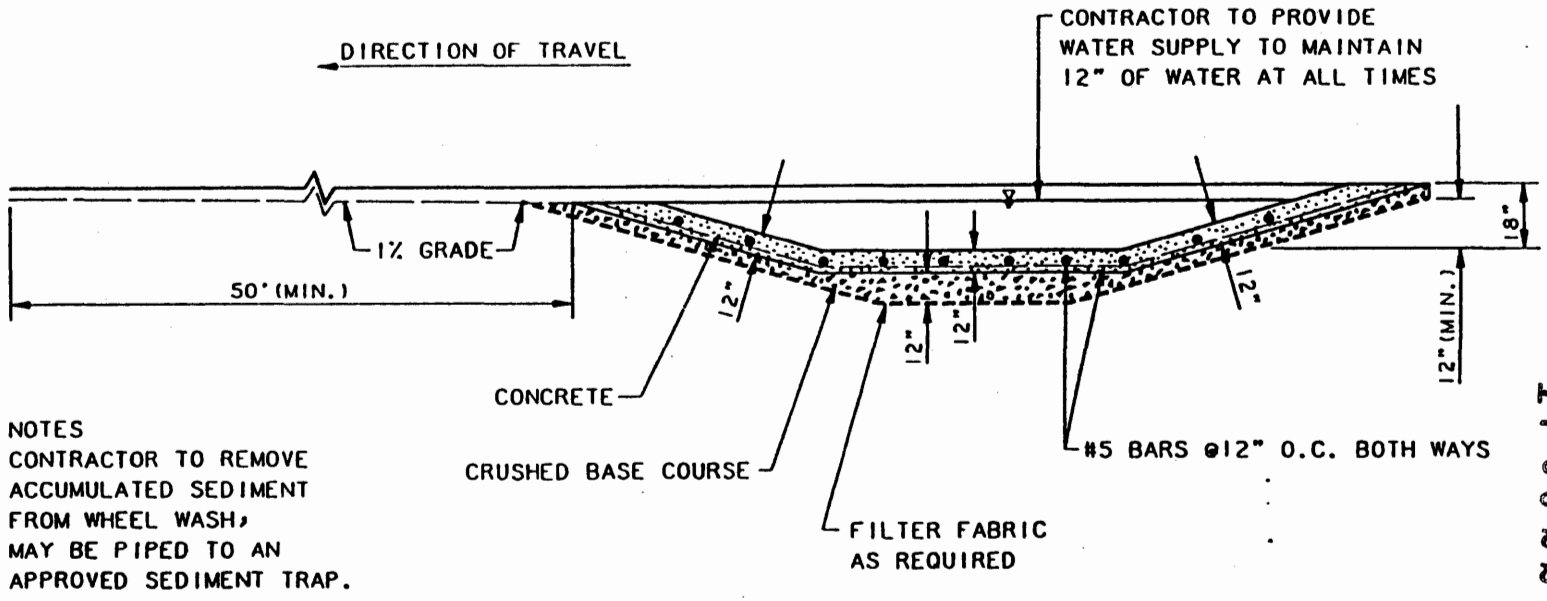
FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-1B PLOT 1:1

TECHNICAL GUIDANCE HANDBOOK

Wheel Wash

Detail Drawing 3-1B





NOTES
CONTRACTOR TO REMOVE ACCUMULATED SEDIMENT FROM WHEEL WASH, MAY BE PIPED TO AN APPROVED SEDIMENT TRAP.

17 00 22

E. Additional gravel may have to be added periodically to maintain proper function of the pad.

F. Additional Measures. If the gravel pad does not adequately remove dirt and mud from vehicle wheels such that mud and dirt tracking is evident off site, additional measures must be taken. Such measures may include washing off wheels before vehicles leave the site or other construction techniques/work operations modifications.

Wheel washing should be done on the gravel pad or in an approved wheel wash structure located onsite, adjacent to and on the site interior side of the gravel pad. Wash water shall be drained through a silt-trapping structure prior to leaving the construction site. See Detail Drawing 3-1B for details of a typical wheel wash structure.

Another additional measure is to construct gravel filter berms across on-site traffic wheel paths to capture and retain sediment. Berms shall be 1 foot high with 3:1 side slopes, constructed of 3/4 to 3-inch well-graded or crushed rock with less than 5 percent fines. Berms must be inspected regularly and accumulated sediment removed and rock added or replaced as needed. Berms should be spaced as follows:

- every 300 feet on slopes less than 5 percent,
- every 200 feet on slopes between 5 and 10 percent,
- every 100 feet on slopes greater than 10 percent.

3.3.2 Temporary Sediment Fences

Purpose

To reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing runoff velocities.

Conditions Where Practice Applies

A. Down slope of disturbed areas where runoff occurs as sheet runoff.

B. At the toe of soil stock piles.

C. At intervals as indicated on Table 3-2 along the contours of large disturbed areas.

D. At grade breaks exceeding 20 percent.

E. Following discharge from a sediment trap or pond

F. Sediment fences shall not be installed across streams.

Design Criteria/Specifications

A. See Detail Drawing 3-2 for details.

B. Maximum sheet or overland flow path length to sediment fence as shown in Table 3-2.

C. Selection of filter fabric tensile and bursting strength depends on the slope characteristics. The use of standard or heavy duty filter fabric shall meet design standards. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 degrees to 120 degrees. Selection shall be based on standard engineering principles for design.

D. Standard or heavy duty filter fabric fence shall have manufactured stitched loops for 2"x 2" post installation. Stitched loops shall be installed on the up-hill side of the sloped area, with posts spaced a maximum of 6 feet apart.

E. Filter fabric fence shall have a minimum vertical burial of 6 inches. All excavated material from filter fabric fence installation shall be firmly redeposited along the entire trenched area on the uphill side of the fence.

F. The physical integrity of all materials shall be sufficient to meet the requirements of their intended use and withstand normal wear and tear.

G. Where practical the filter fabric shall be purchased in a continuous roll to the length of the barrier to avoid use of joints. When joints are necessary, 2"x 2" posts shall be interlocked with each other and be attached securely.

H. Sediment fences shall be inspected by applicant/contractor immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs, relocations or additions shall be made immediately.

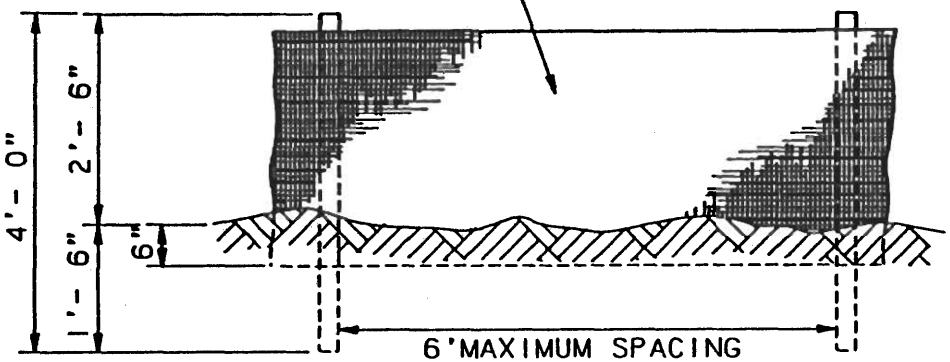
I. At no time shall more than one foot depth of sediment be allowed to accumulate behind a sediment fence. Sediment should be removed or regraded into slopes, and the sediment fences repaired and reestablished as needed.

FILE DRAFT:INSPECTORS GRAPHICS DRAWING SEDFENCE PLOT 1:1

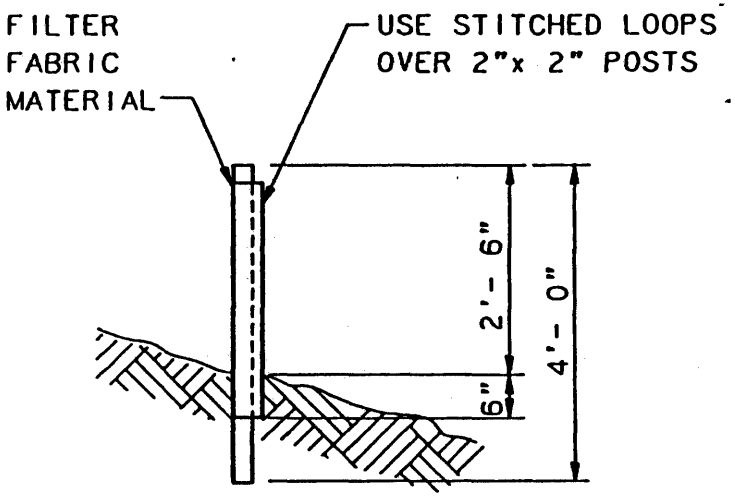
TECHNICAL GUIDANCE HANDBOOK

Sediment Fence

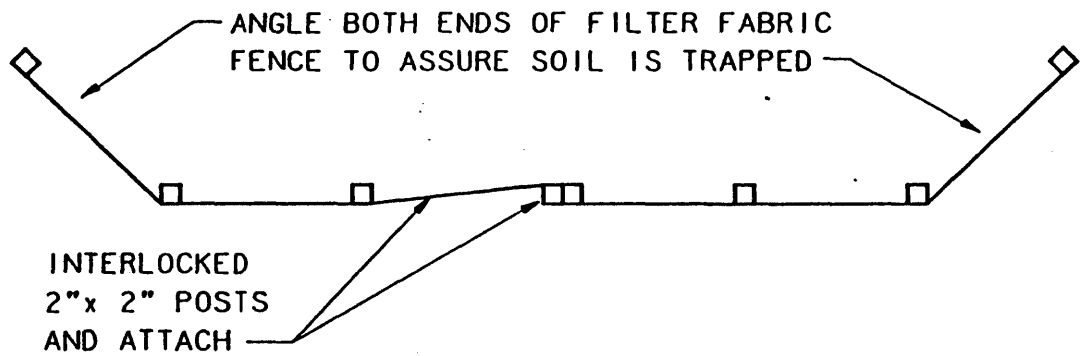
Detail Drawing 3-2



FRONT VIEW
NTS



SIDE VIEW
NTS



TOP VIEW
NTS

NOTES:

1. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
2. 2"x 2" FIR, PINE OR STEEL FENCE POSTS.
3. STITCHED LOOPS TO BE INSTALLED UPHILL SIDE OF SLOPE.
4. COMPACT ALL AREAS OF FILTER FABRIC TRENCH.

17 00 22

3.3.3 Straw Bale Sediment Barrier/Bio-Filter Bags

Purpose

To reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing runoff velocities. Also may be used to divert runoff around active work areas or into sediment filtration/sedimentation areas. **Straw bales shall not be considered a means of filtering sediment.**

Conditions Where Practice Applies

A. May be used for slope protection on single family or site development activities on existing lots of record, as approved, or as prescribed in the Erosion Control Matrix.

B. At toe of soils stock piles.

C. Bio-Filter bags can be used in all newly constructed or existing drainage ditches and/or swales.

D. Note: see Section 3.3.11 "Temporary Interceptor Dikes and Swales" for use of straw bales as flow interceptor dikes.

E. Note: see Section 3.3.13 "Check Dams" for use of straw bales.

F. See Detail Drawing 3-7D for Bio-Filter Bag catch basin protection.

Conditions Where Practice Does Not Apply

A. Straw bales shall not be used in newly constructed, or existing ditches, swales, streams, creeks nor for catch basin protection.

Design Criteria/Specifications

A. See Detail Drawing 3-3A through 3-3D for details of straw bale sediment barriers and Bio-Filter Bags.

B. Straw bales shall be standard 40 to 60 pound rectangular bales of cereal grain or seed straw.

C. Bio-filter bags shall be clean 100 percent recycled wood product waste. Size of bag shall be 18x8x30 inches and weigh approximately 45 pounds, and made of 1/2 inch plastic mesh.

D. Stakes shall be wood of size as shown on Detail Drawing 3-3A and driven through bales and into ground to a minimum depth of 12 inches.

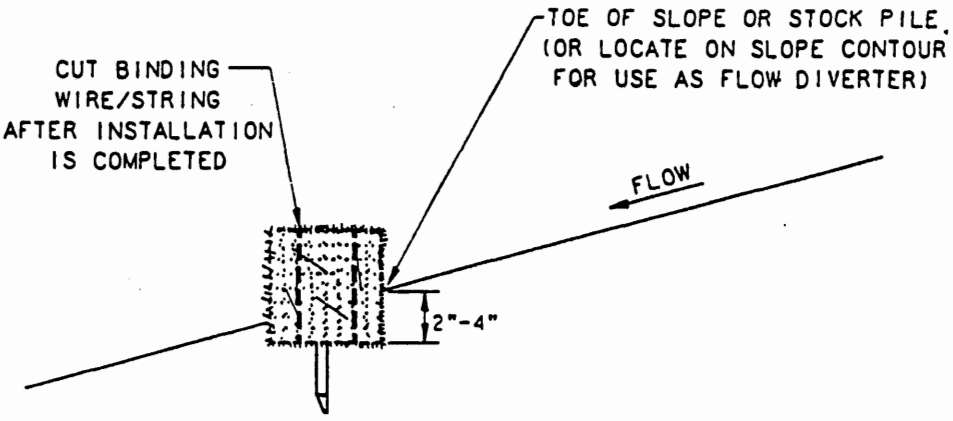
E. Stakes for Bio-Filter bags shall be installed as shown in the Notes on Detail Drawings 3-3B through 3-3D.

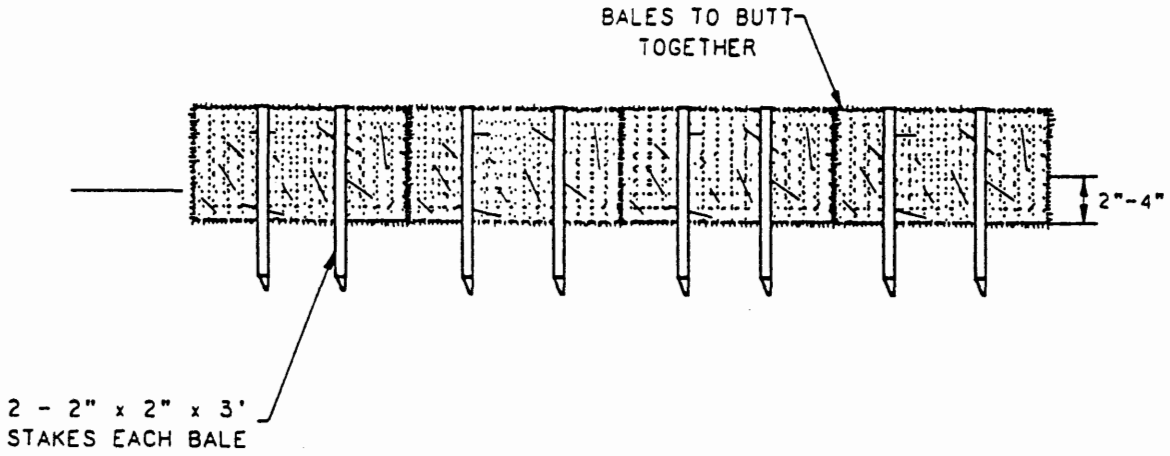
F. Straw bales shall be keyed into existing ground 2 to 4 inches.

G. Straw bale sediment barriers and Bio-Filter bags may be left in place or used as mulch after completion of site work if approved by the jurisdiction.

H. At no time shall more than a one foot depth of sediment be allowed to accumulate behind straw bale sediment barriers **and/or Bio-Filter bags**. Sediment should be removed or regraded into the slope, or new lines of barriers installed uphill of sediment-laden barriers.

170022

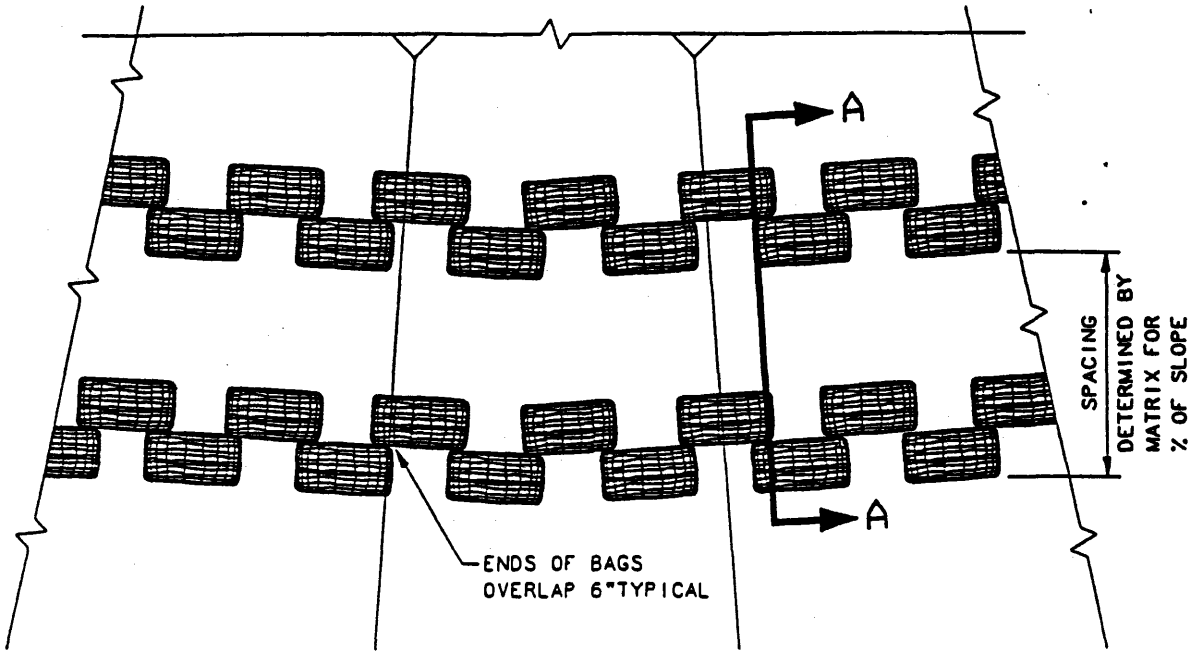




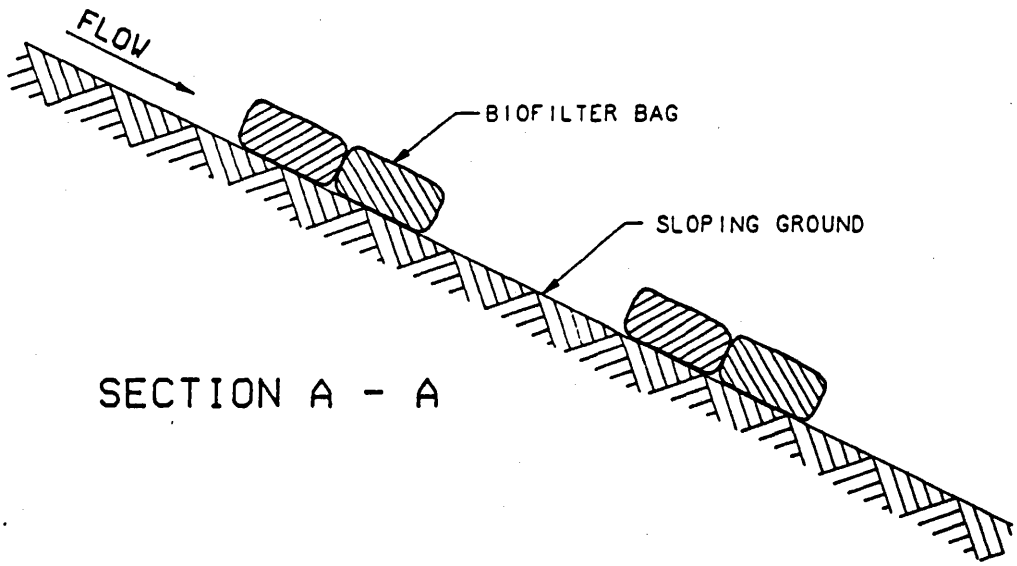
NOTES:
* EMBED BALES 2 TO 4 INCHES
* DRIVE STAKES MINIMUM 12" INTO GROUND SURFACE
* DRIVE STAKES FLUSH TO TOP OF BALES

TECHNICAL GUIDANCE HANDBOOK	Straw Bale Overland Flow DETAIL DRAWING 3-3A

FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-3A PLOT 1:1



PLAN VIEW



SECTION A - A

ALTERNATE #1

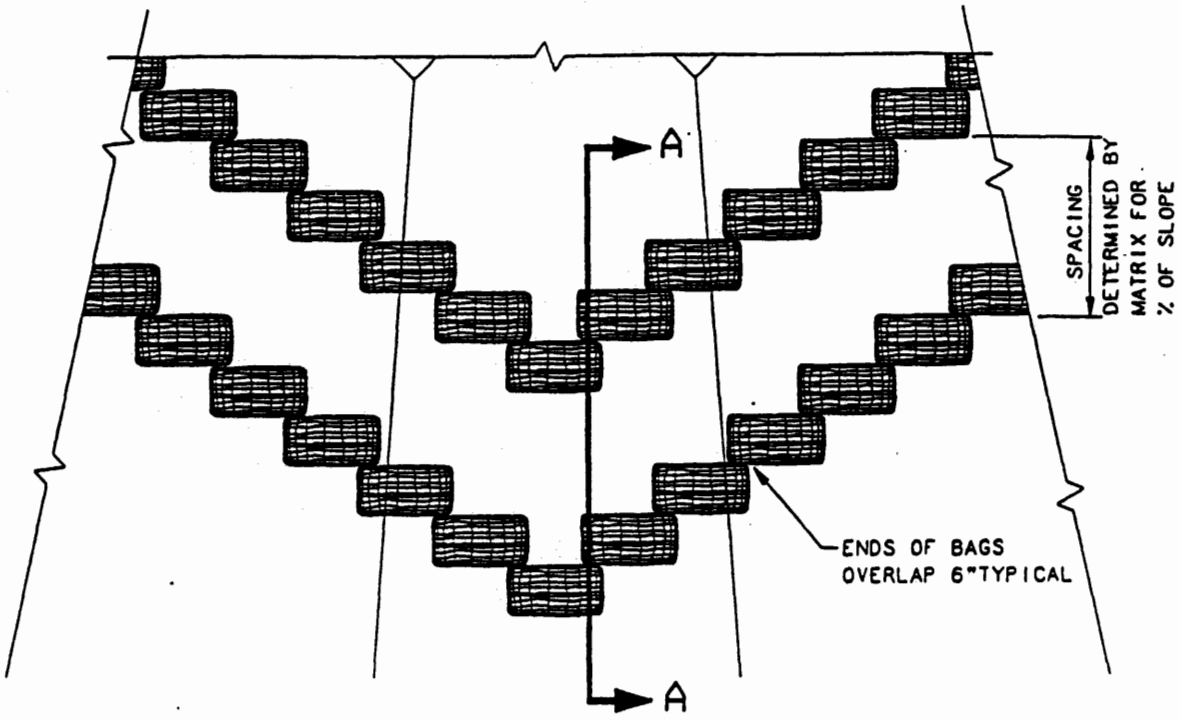
NTS

NOTE:
STAKING OF BAGS MAY BE REQUIRED WITH EITHER METHOD. USING (2) 1"x 2" WOOD STAKES OR APPROVED EQUAL PER BAG.

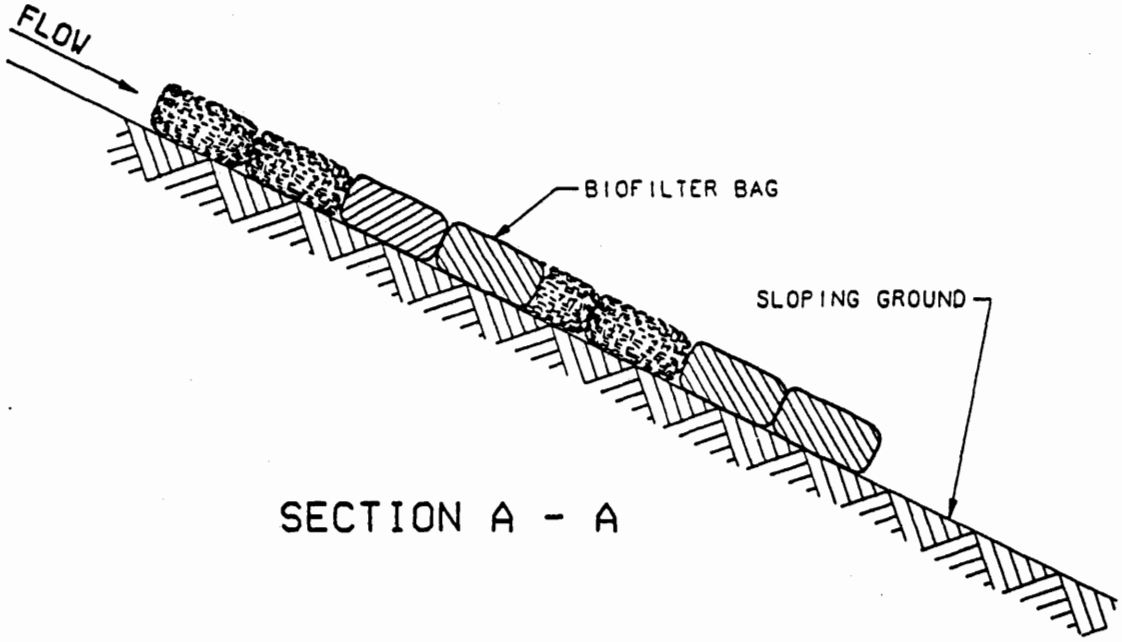
TECHNICAL GUIDANCE HANDBOOK	Biofilter Bag Overland Flow Detail Drawing 3-3B

FILE DRAFT: INSPECTORS GRAPHICS DRAWING ALT1 PLOT 1:1

170022



PLAN VIEW



SECTION A - A

ALTERNATE #2

NTS

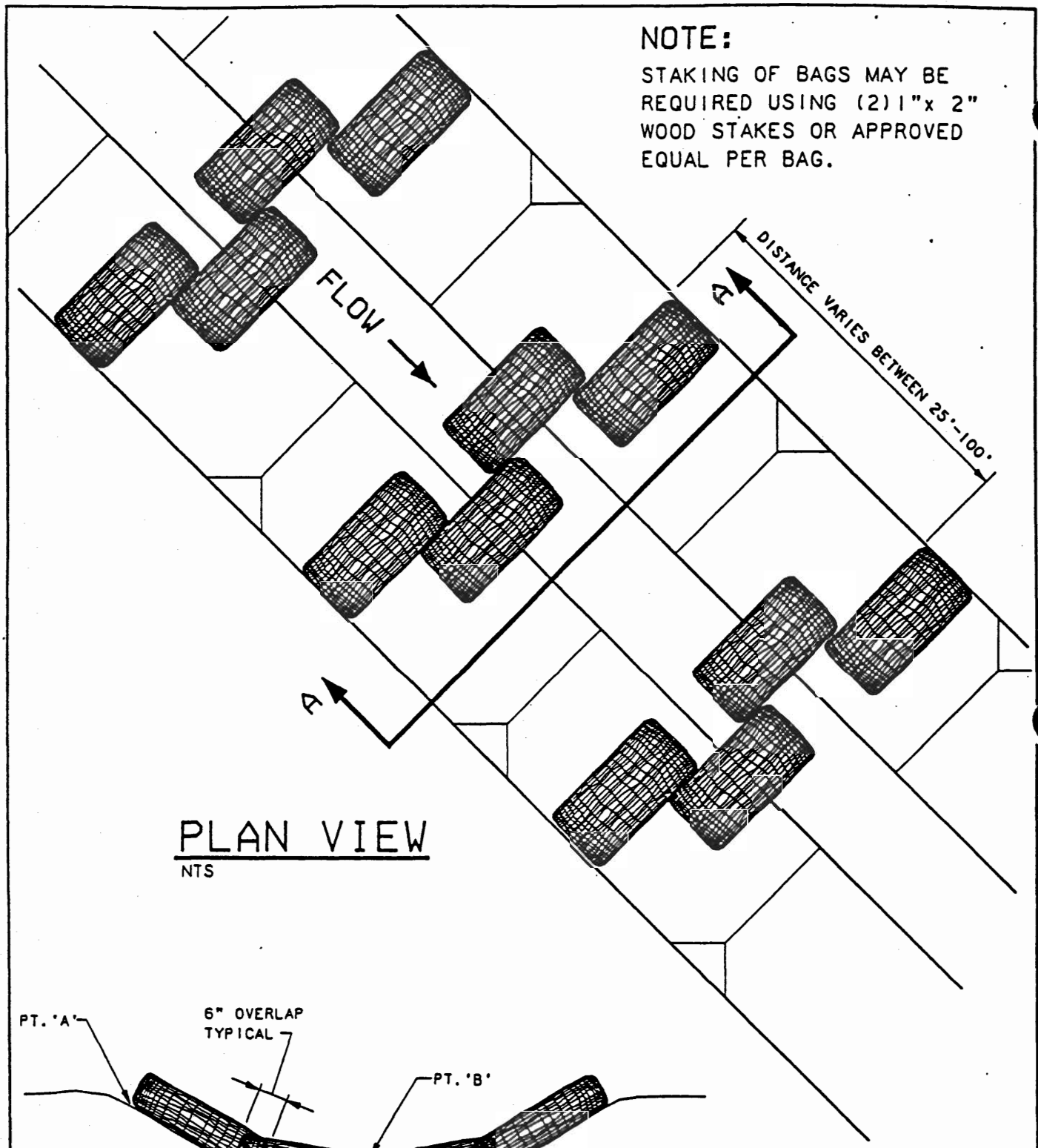
NOTE:
STAKING OF BAGS MAY BE REQUIRED WITH EITHER METHOD. USING (2) 1"x 2" WOOD STAKES OR APPROVED EQUAL PER BAG.

TECHNICAL GUIDANCE HANDBOOK	Biofilter Bag Overland Flow Detail Drawing 3-3C

FILE DRAFT: INSPECTORS GRAPHICS DRAWING ALT2 PLOT 1:1

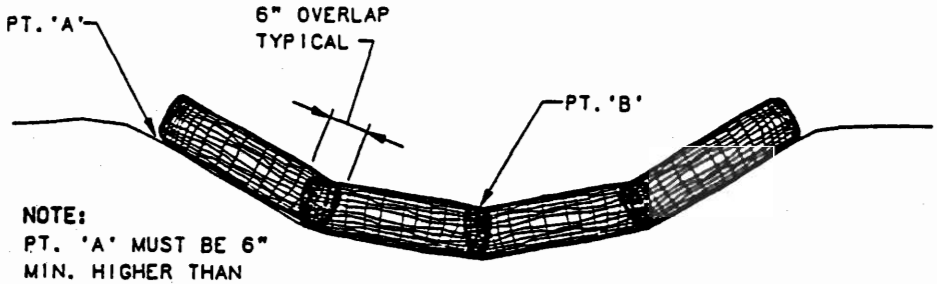
NOTE:

STAKING OF BAGS MAY BE REQUIRED USING (2) 1"x 2" WOOD STAKES OR APPROVED EQUAL PER BAG.



PLAN VIEW

NTS



NOTE:
PT. 'A' MUST BE 6" MIN. HIGHER THAN PT. 'B'

SECTION A-A

NTS

TECHNICAL GUIDANCE HANDBOOK	Biofilter Bag Ditches and Swales Detail Drawing 3-3D

FILE DRAFT: INSPECTORS GRAPHICS DRAWING BAG DITCH PLOT 1:1

3.3.4 Sidewalk Subgrade Gravel Barrier

Purpose

To reduce the transport of sediment from a construction site by using the sidewalk subgrade gravel as a temporary filter for sediment-laden runoff.

Conditions Where Practice Applies

Single family/duplex residential construction sites, where the site slopes to a street with planned but unconstructed sidewalks, and site slopes are less than 5 percent.

Design Criteria/Specifications

A. Sidewalk subgrade gravel must be in place during the entire construction period, from the time of initial site clearing/grading through establishment of permanent site cover. If the sidewalk concrete is to be poured prior to establishment of permanent siste cover, approved sediment barriers must be instlaled prior to pouring concrete.

B. Sidewalk subgrade gravel must have a minimum 4-inch depth and a 4-foot width.

C. If the sidewalk subgrade gravel does not provide an effective filter such that sediment is leaving the construction site, additional measures must be applied. These may include replacement of gravel or installation of sediment barriers.

D. Subgrade gravel may not meet the local jurisdiction's specifications for sidewalk concrete placement if too much sediment has infiltrated the rock. The permittee must therefore weigh the benefits of eliminating sediment barriers versus the possibility that the subgrade gravel may be rejected by the local jurisdiction.

3.3.5 Undisturbed Buffers

Purpose

To provide a natural vegetated buffer area for filtering erosion from construction areas, as an alternate in certain cases or supplemental measure to sediment barriers.

Conditions Where Practice Applies

An undisturbed buffer may be used as approved as an alternate to a sediment barrier at the toe of the site slopes if the buffer meets the following criteria:

A. the buffer is an undisturbed grassy area or covered with other approved dense vegetation,

B. the buffer is downhill and in the drainage path of the construction/disturbed area,

C. there are no concentrated flows from the disturbed site entering the buffer,

D. the buffer area is owned by the applicant or approved for such use in writing by the owner,

E. slopes in the buffer and its drainage area are less than 10 percent,

F. the grassed buffer area impacted by the potential disturbed area runoff is at least equal in area to the uphill construction/disturbed area draining to it.

3.3.6 Temporary Grasses and Permanent Vegetative Cover

Purpose

To reduce erosion and sedimentation by stabilizing exposed soils with vegetation and mulching.

Conditions Where Practice Applies

A. Ground surfaces exposed during the wet season (November 1 through April 30).

B. Areas which will not be subjected to heavy wear by on-going construction traffic.

C. Exposed ground surfaces at end of construction period (permanent cover must be established prior to removal of any erosion control measures).

D. Temporary or permanent stabilization of new or disturbed ditches or swales.

Design Criteria/Specifications: Temporary Erosion Control Grasses

A. Temporary grass cover measures must be fully established by November 1 or other cover measures will have to implemented until adequate grass coverage is achieved. To establish an adequate grass stand for controlling erosion by November 1, it is recommended that seeding and mulching occur by **September 1**.

B. Hydromulch shall be applied with grass seed at a rate of 2000 lb./acre. On slopes steeper than 10 percent, hydroseed and mulch shall be applied with a bonding agent (tackifier). Application rate and methodology to be in accordance with seed supplier recommendations.

C. Dry, loose, weed-free straw used as mulch shall be applied at double the hydromulch application requirement (4000 lb./acre). Anchor straw by working in by hand or with equipment (rollers, cleat tracks, etc.).

D. Mulch shall be spread uniformly immediately following seeding.

E. Soil Preparation - Top soil should be prepared according to landscape plans, if available, or recommendations of grass seed supplier. It is recommended that slopes be roughened before seeding by "track-walking," (driving a crawling tractor up and down slopes to leave a pattern of cleat imprints parallel to slope contours) or other method to provide more stable sites for seeds to rest.

F. Seeding - Recommended erosion control grass seed mixes are as follows. Similar mixes designed to achieve erosion control may be substituted if approved by jurisdiction.

1. Dwarf Grass Mix (low height, low maintenance):
   Dwarf Perennial Ryegrass, 80% by weight
   Creeping Red Fescue, 20% by weight
   application rate: 100 pounds minimum per acre

2. Standard Height Grass Mix
   Annual Ryegrass, 40% by weight
   Turf-type Fescue, 60% by weight
   Application rate: 100 pounds minimum per acre

G. Fertilization for grass seed - In accordance with supplier's recommendations. Development areas within 50 feet of water bodies and wetlands must use a non-phosphorus fertilizer.

H. Netting and Anchors, as needed - For disturbed areas on slopes and in ditches/swales, biodegradable netting or jute is desirable and may be used instead of bonding agents to provide a stable area for seeding. Netting should be anchored in accordance with manufacturer's recommendations.

I. Watering - Seeding shall be supplied with adequate moisture to establish grass. Supply water as needed, especially in abnormally hot or dry weather or on adverse sites. Water application rates should be controlled to provide adequate moisture without causing runoff.

J. Re-seeding - Areas which fail to establish grass cover adequate to prevent erosion shall be re-seeded as soon as such areas are identified, and all appropriate measures taken to establish adequate cover.

Design Criteria/Specifications: Permanent Vegetative Groundcover

A. At the end of site construction, paving, approved permanent site landscaping or establishment of a healthy stand of grass (or alternative vegetation as approved) must occur prior to removal of site erosion control measures.

3.3.7 Straw Mulch

Purpose

To reduce erosion by providing a protective cover over disturbed bare or reseeded soils. Also can be used to enhance success of seeding/revegetation.

Conditions Where Practice Applies

A. As a cover on ground surfaces and stockpiles exposed during the wet season (November 1 through April 30).

B. As a mulch to enhance vegetation establishment in areas that have been seeded.

Design Criteria/Specifications

A. Loose, weed-free straw mulch shall be applied at a rate of no less than 4000 pounds (2 tons) per acre, and shall have a minimum depth in-place of 2 inches. It shall be spread uniformly throughout the entire area and integrated into the top layer of soil.

B. Mulch must be stabilized in place by hand or machine punching the straw into the soil, spraying it with a tacking agent, or covering it with an erosion blanket. See Section 3.3.8 "Erosion Blankets" for appropriate design criteria for such coverings.

3.3.8 Erosion Blankets

Purpose

To provide immediate protection and physical stabilization of disturbed soils. Typically used when vegetative cover cannot be achieved due to soils, slopes or time of year. Can be used to enhance success of seeding, planting and/or sodding.

Conditions Where Practice Applies

A. On areas of steep slopes (greater than 50 percent) and areas of moderate slopes that are prone to erosion.

B. As a cover on ground surfaces exposed during the wet season (November 1 through April 30).

C. As supplemental aid to seed and/or mulch treatment on slopes or in ditches or swales.

Design Criteria/Specifications

A. Erosion blankets may be used on level areas and on slopes up to 1:1. Where soil is highly erodible, netting shall only be used in conjunction with an organic mulch such as straw or wood fiber. The blanket must be applied so that it is in complete contact with the soil; if it is not, erosion will occur beneath it. Erosion blankets shall be securely anchored to the slope in accordance with manufacturer's recommendations.

B. Deformed plastic filament matting such as Enkamat (and other erosion control blankets as approved) may be used for stream velocity protection and other special applications when approved by the jurisdiction.

3.3.9 Plastic Sheet Covering

Purpose

To provide immediate erosion protection to slopes and disturbed areas when vegetative cover cannot be achieved due to soils, slopes or time of year. To provide erosion protection on soils, spoils, and other erodible stockpiles.

Conditions Where Practice Applies

A. Disturbed areas which require immediate erosion protection.

B. On areas of steep slopes (greater than 50 percent) and areas of moderate slopes that are prone to erosion.

C. On ground surfaces and stockpiles exposed during wet weather season (November 1 through April 30).

D. As a temporary measure to provide erosion protection and assist in germination on areas seeded between November 1 and March 31.

Design Criteria/Specifications

A. Plastic sheeting shall be polyethylene and have a minimum thickness of 6 mil.

B. Covering shall be installed and maintained tightly in place by using sandbags or tires on ropes with a maximum 10 foot grid spacing in all directions. All seams shall be taped or weighted down full length and there shall be at least a 12-inch overlap of all seams. For seams parallel to the slope contour, the uphill sheet shall overlap the downhill sheet. No runoff shall be allowed to run under the plastic covering.

C. Drainage from areas covered by plastic sheeting shall be controlled such that no discharge occurs directly onto uncontrolled, disturbed areas of the construction site.

D. Clear plastic sheeting may be installed on areas seeded between November 1 to March 31 to provide a greenhouse-type environment, and remain until vegetation is firmly established.

3.3.10 Sediment Traps and Ponds

Purpose

To collect and store sediment eroded from exposed ground surfaces, disturbed during the construction period, prior to establishment of permanent vegetation and drainage facilities.

Conditions Where Practice Applies

A. Downhill of areas with exposed soils during the wet season (November 1 through April 30).

B. Sediment Traps: where the tributary drainage area is 3 acres or less (but not including single family and duplex residences constructed singly, on existing lots of record), and slopes are less than 50 percent.

C. Sediment Ponds: where the tributary drainage area is 10 acres or less and slopes are less than 50 percent.

Design Criteria/Specifications

Temporary interceptor dikes or swales may be constructed to divert runoff to sediment traps or ponds.

Sediment Traps

The sediment trap may be formed completely by excavation or by construction of a compacted embankment. It shall have a sediment storage depth not to exceed 1.5 feet, topped by a 2 foot deep settlement zone. Sediment trap side slopes shall be 3:1 or flatter. The outlet of the trap should be a weir/spillway, providing a minimum 1 foot overflow depth between the spillway and embankment.

A filter fabric fence or similar filter must be constructed to filter runoff from the trap prior to discharge from the construction site.

A. See Detail Drawing 3-4 for details.

B. Calculate the required sediment storage volume using the SCS Universal Soil Loss Equation as described in Appendix C and assuming a minimum one year sediment accumulation period for design purposes. To convert tons of sediment as calculated to cubic feet, multiply by 0.05 tons per cubic foot.

C. Determine the bottom surface area of the sediment trap using the calculated sediment volume and the maximum 1.5 foot depth and 3:1 side slope requirements.

D. Determine the total trap dimensions by adding an additional 2 feet of depth for settling volume (before overtopping of spillway) above the sediment storage volume, while not exceeding 3:1 side slopes.

E. A 3:1 ratio of trap length to width is desirable. Length is defined as the average distance from the inlet to the outlet of the trap.

Sediment Ponds

A sediment pond may be formed by partial excavation and/or by construction of a compacted embankment. It may have one or more

inflow points carrying polluted runoff. Baffles to spread the flow throughout the pond should be included. A securely anchored riser pipe is the recommended principal discharge mechanism, with an emergency overflow spillway. The riser pipe should be perforated and covered with filter fabric and gravel "cone" for filtration; or solid with a 1" diameter dewatering hole and perforated drain pipe. Outlet protection shall be provided to reduce erosion at the pipe outlet. A filter fabric fence or similar filter must be constructed to filter runoff from the pond prior to discharge from the construction site.

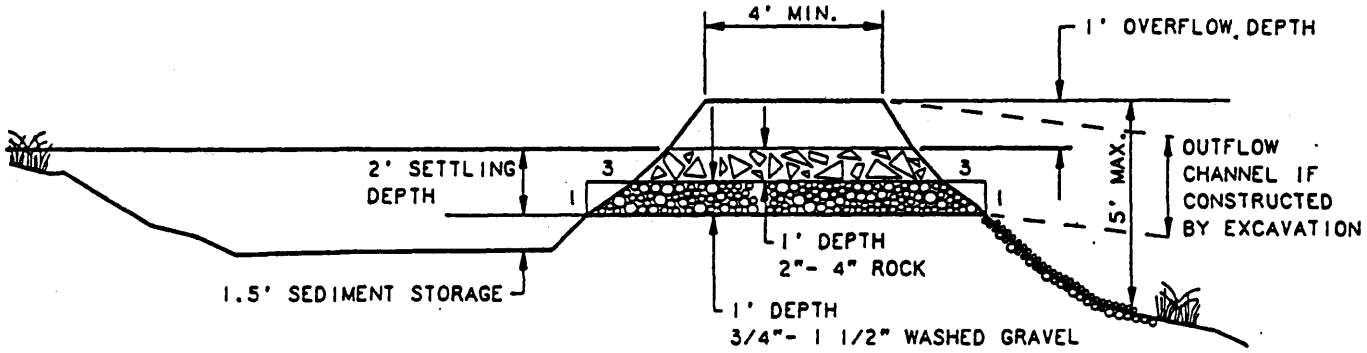
A. The sediment pond shall have a sediment storage depth no greater than 3 feet, topped by a 2-foot (minimum) to 4-foot (maximum) deep settlement zone and an additional 1 foot minimum of freeboard. The pond side slopes shall be 3:1 or flatter.

B. See Detail Drawing 3-5 for details.

C. The sediment storage volume is determined in the same manner as mentioned above for sediment traps.

D. The pond riser pipe and outlet pipe shall be sized to carry the 10-year design storm (or as otherwise required by the jurisdiction).

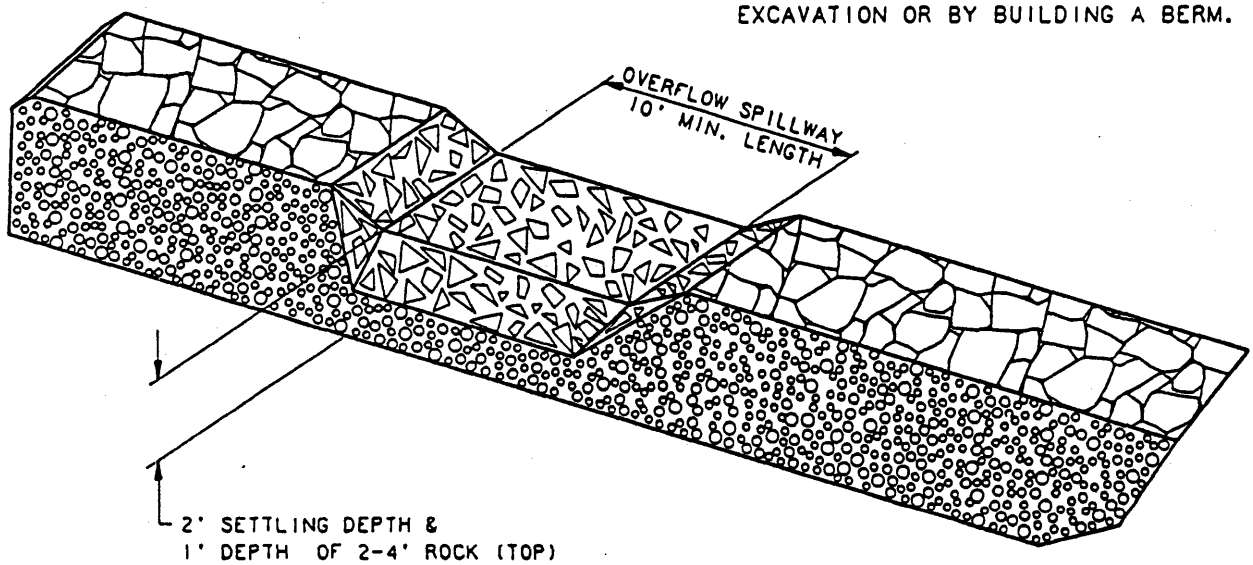
E. A 3:1 ratio between the pond length and width is desirable. Length is defined as the average distance from the inlet to the outlet of the trap. Use baffles in the pond to help prevent short-circuiting and to increase the effective pond length where site conditions prohibit constructing a pond with a direct 3:1 length to width ratio.



CROSS SECTION

NTS

NOTE: MAY BE CONSTRUCTED BY EXCAVATION OR BY BUILDING A BERM.



SEDIMENT TRAP OUTLET

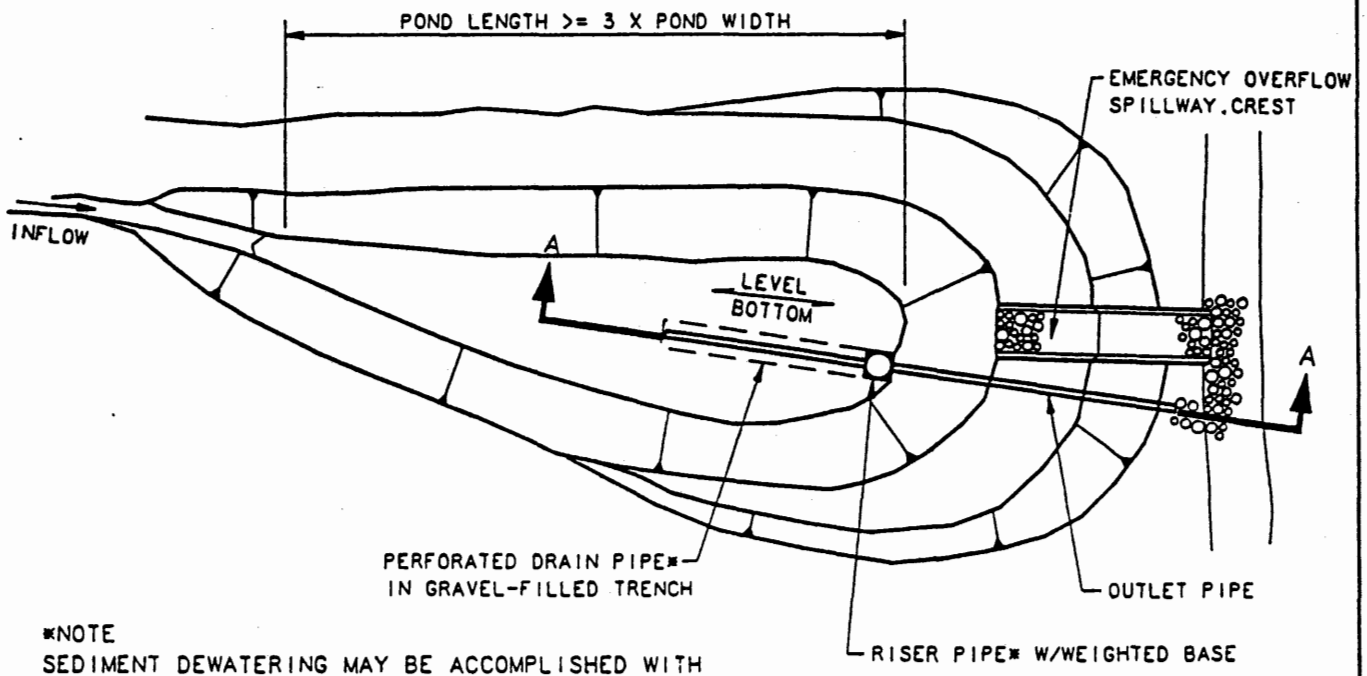
NTS

NOTE:
A FILTER FABRIC FENCE OR SIMILIAR FILTER MUST BE CONSTRUCTED TO FILTER RUNOFF FROM THE SEDIMENT TRAP PRIOR TO DISCHARGE FROM THE CONSTRUCTION SITE.

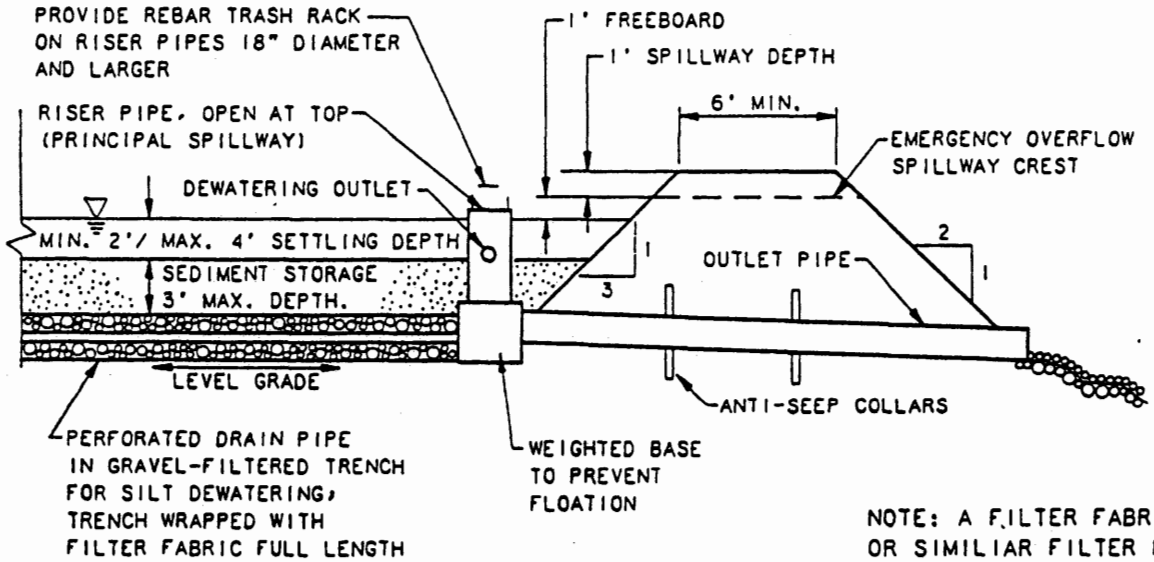
TECHNICAL GUIDANCE HANDBOOK	Sediment Trap Detail Drawing 3-4

FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-4 PLOT 1:1

170022



*NOTE
SEDIMENT DEWATERING MAY BE ACCOMPLISHED WITH PERFORATED DRAIN PIPE IN TRENCH AS SHOWN OR WITH A PERFORATED RISER COVERED WITH FILTER FABRIC AND GRAVEL "CONE".



SECTION A-A

NOTE: A FILTER FABRIC FENCE OR SIMILIAR FILTER MUST BE CONSTRUCTED TO FILTER RUNOFF FROM THE POND PRIOR TO DISCHARGE FROM THE CONSTRUCTION SITE.

TECHNICAL GUIDANCE HANDBOOK	Sediment Pond Detail Drawing 3-5

FILE DRAFT:INSPECTORS GRAPHICS DRAWING DR3-5 PLOT 1:1

3.3.11 Temporary Interceptor Dikes and Swales

Purpose

To intercept storm runoff from drainage areas above unprotected slopes and direct to a stabilized outlet. To intercept storm runoff from a disturbed site and direct it to a sediment trap or pond.

Conditions Where Practice Applies

A. Where the volume and velocity of runoff from disturbed slopes must be reduced. When an interceptor dike or swale is placed above a disturbed slope, it reduces the volume of water reaching the disturbed area by intercepting runoff from above.

B. Where sediment traps or ponds are to be used. Interceptor dikes and swales can be used to direct site runoff to a sediment trap or pond.

Design Criteria/Specifications

A. Intercepted runoff must be directed to a stabilized area such that no erosion occurs due to the additional water and velocity, or to a sediment pond or trap.

B. See Detail Drawing 3-6 for details. Straw Bales may also be used to intercept runoff. See Section 3.3.3 "Straw Bale Sediment Barrier" for installation criteria and specifications.

C. Interceptor dikes and swales shall be stabilized with approved cover before put into use. Such cover may include grass, rock or erosion blankets.

D. Spacing between interceptor dikes and swales along slope contours is as follows:

Slope	Spacing
< 5%	300 feet
5-10%	200 feet
10-40%	100 feet

E. Minimize construction traffic over dikes and swales.

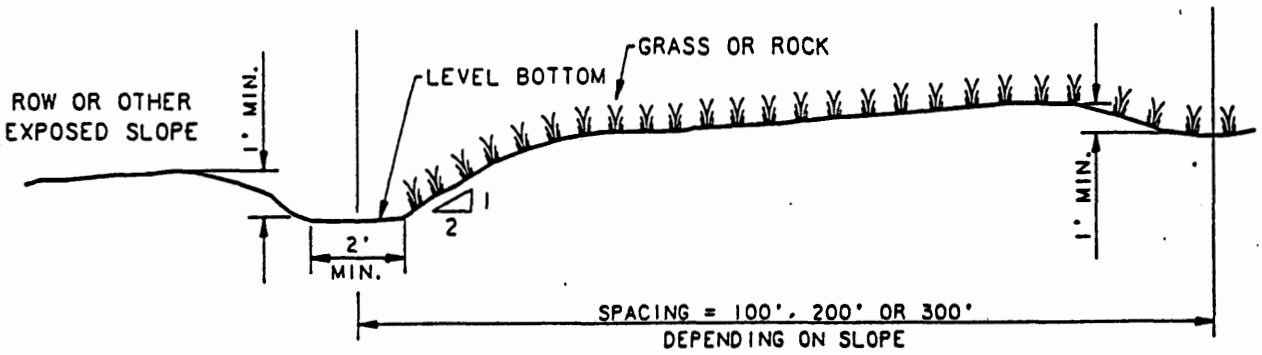
F. The upslope side of interceptor dikes shall provide positive drainage to the dike outlet. Provide energy dissipation measures as necessary to minimize erosion at dike outlet.

G. Grades for drainage parallel to interceptor dikes shall be between 0.5 and 1.0 percent.

H. Maximum grade of interceptor swales shall be 5 percent, and provide positive drainage to outlet.

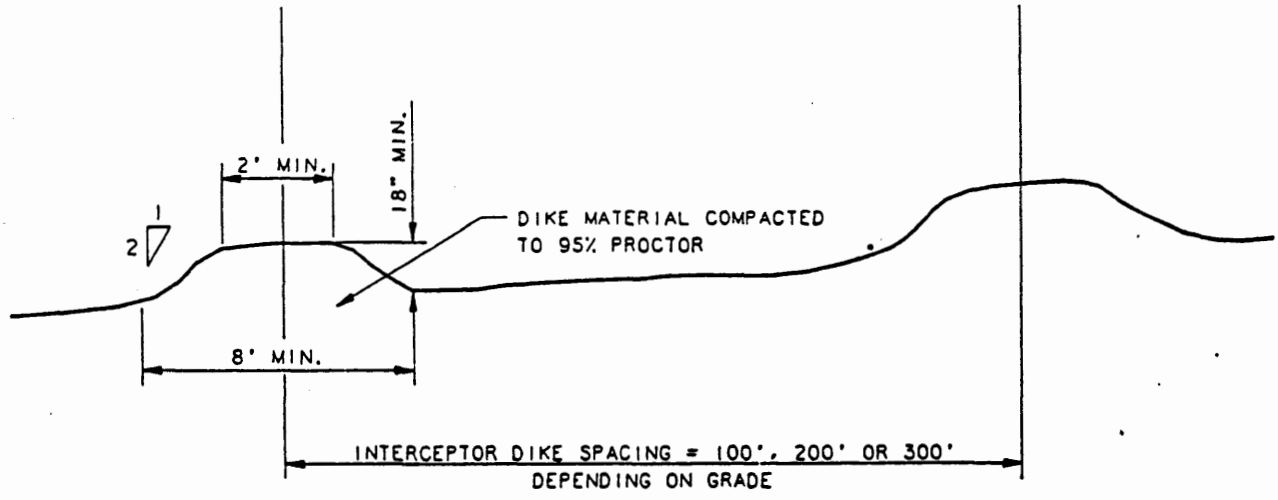
I. Outlets shall lead to sediment trap/pond when runoff from disturbed areas is intercepted by dikes/swales. Outlets shall be stabilized to prevent erosion.

J. Temporary dikes and swales shall be graded out at the completion of construction, when permanent vegetation has been established.



BOTTOM WIDTH	2 FEET MINIMUM, THE BOTTOM WIDTH SHALL BE LEVEL
DEPTH	1 FOOT MINIMUM
SIDE SLOPE	2H:1V OR FLATTER
GRADE	MAXIMUM 5 PERCENT, WITH POSITIVE DRAINAGE TO A SUITABLE OUTLET (SUCH AS SEDIMENTATION POND)

INTERCEPTOR SWALE



TEMPORARY INTERCEPTOR DIKES

TECHNICAL GUIDANCE HANDBOOK	Interceptor Swales & Dikes Detail Drawing 3-6

FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-6 PLOT 1:1

3.3.12 Storm Drain Inlet Protection

Purpose

To prevent sediment from entering storm drain systems prior to permanent stabilization of disturbed areas.

Conditions Where Practice Applies

A. Where interior site storm drain inlets are operational before permanent stabilization of the disturbed drainage area, as approved by jurisdiction.

B. Adjacent to and immediately downhill of utility type construction in existing paved areas with catch basin drainage.

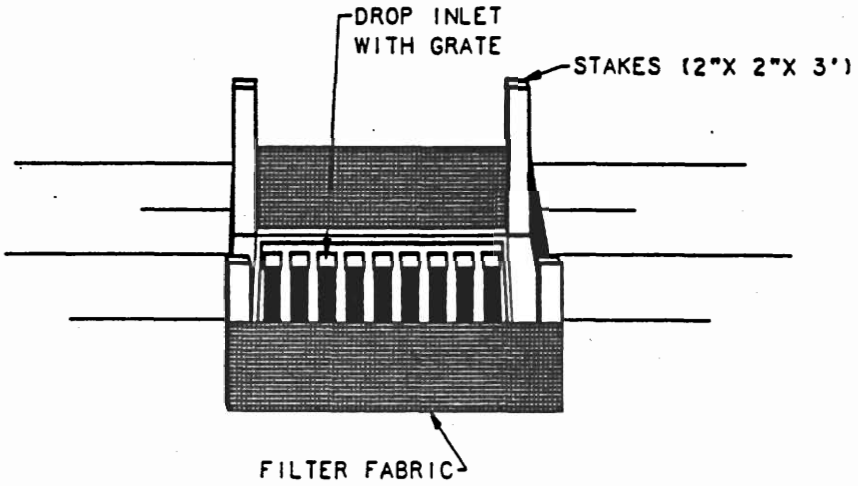
C. In public right-of-way areas for use during approved flushing operations.

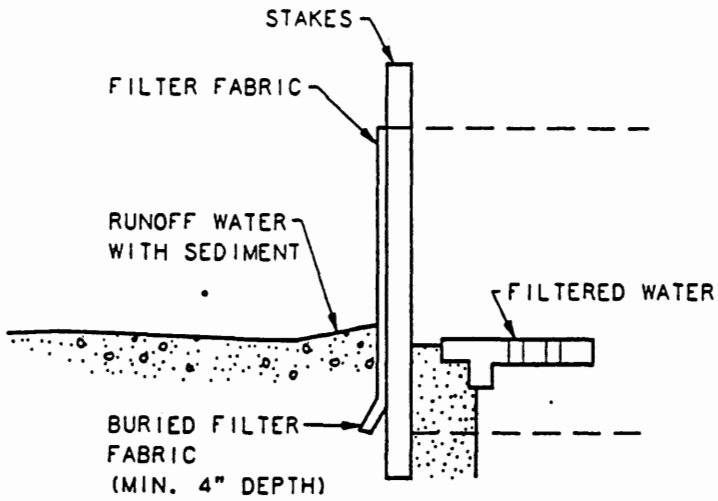
Design Criteria/Specifications

A. Design criteria and specifications for three recommended alternative methods of storm drain inlet protection are presented on Detail Drawings 3-7 A, B, C and D.

B. Berms may be required to direct drainage to flow through the filters and prevent bypassing of the inlets.

C. At no time shall more than a one foot depth of sediment be allowed to accumulate against storm drain inlet protection measures. Sediment must be removed and inlet protection measures restored as needed to maintain their sediment trapping and filtering capability.

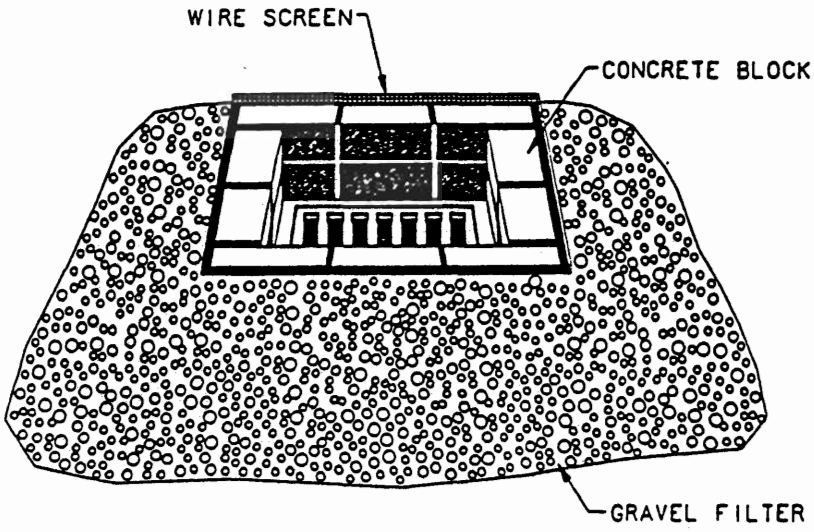


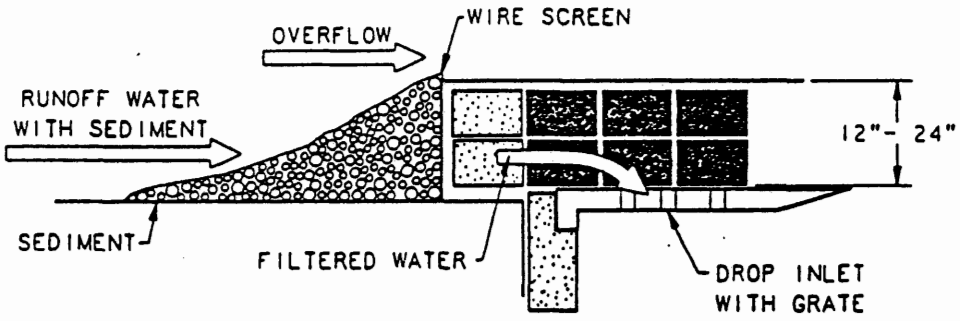


TECHNICAL GUIDANCE HANDBOOK	Filter Fabric Inlet Barrier Detail Drawing 3-7A

FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-7A PLOT 1:1

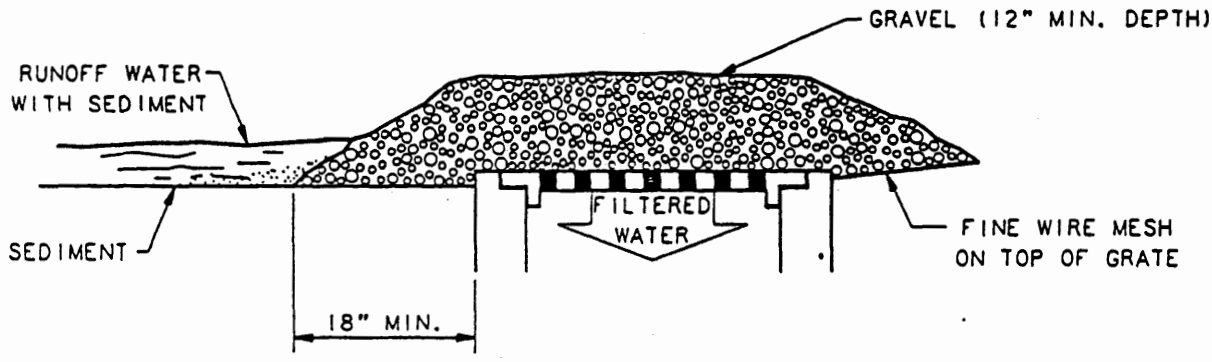
170022





TECHNICAL GUIDANCE HANDBOOK	Block & Gravel Inlet Barrier Detail Drawing 3-7B

FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-7B PLOT 1:1



TECHNICAL GUIDANCE HANDBOOK	Gravel & Wire Mesh Inlet Barrier Detail Drawing 3-7C

FILE DRAFT: INSPECTORS GRAPHICS DRAWING DR3-7C PLOT 1:1