STORMWATER MANAGEMENT COST ESTIMATE

ALL COSTS GIVEN ARE COMPLETE IN PLACE

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
STRUCTURES - MH	EA.	1	1,500	1,500
AS-BUILTS	EA.	1	1,500	1,500
72" CMP PIPE	LF	150	80.00	12,000
SUB-TOTAL				$ 15,000
10% CONTINGENCY	PROVIDED IN OVERALL BONDING TABLE			
TOTAL PROJECT COST				$ 15,000

(MU) MULCHING

1992 3.35

TABLE 3.35-A

ORGANIC MULCH MATERIALS AND APPLICATION RATES

MULCHES:	RATES: Per Acre	RATES: Per 1000 sq. ft.	NOTES:
Straw or Hay	1½ - 2 tons (Minimum 2 tons for winter cover)	70 - 90 lbs.	Free from weeds and coarse matter. Must be anchored. Spread with mulch blower or by hand.
Fiber Mulch	Minimum 1500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods.* Apply as slurry.
Corn Stalks	4 - 6 tons	185 - 275 lbs.	Cut or shredded in 4-6" lengths. Air-dried. Do not use in fine turf areas. Apply with mulch blower or by hand.
Wood Chips	4 - 6 tons	185 - 275 lbs.	Free of coarse matter. Air-dried. Treat with 12 lbs nitrogen per ton. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.
Bark Chips or Shredded Bark	50 - 70 cu. yds.	1-2 cu. yds.	Free of coarse matter. Air-dried. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.

* When fiber mulch is the only available mulch during periods when straw should be used, apply at a minimum rate of 2000 lbs./ac. or 45 lbs./1000 sq. ft.

Source: Va. DSWC

III - 353

(TS) TEMPORARY SEEDING MIXTURE

TABLE 3.31 -B

"QUICK REFERENCE FOR ALL REGIONS"

PLANTING DATES:	SPECIES:	RATE (LBS./ACRE)
SEPT. 1- FEB. 15	50/50 MIX OF ANNUAL RYEGRASS (LOLIUM MULIFLORUM) & CEREAL (WINTER) RYE (SECALE CEREALE)	50-100
FEB. 16- APR. 30	ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM)	60-100
MAY 1- AUG 31	GERMAN MILLET (SETARIA ITALICA)	50

Source: Va. DSWC

GENERAL NOTES

1. DESIGN OF DETENTION BASINS SHALL CONFORM TO THE REQUIREMENTS OF THE COUNTY OF ROANOKE DRAINAGE STANDARDS (REF. SECTIONS 503.02, 503.03, AND 505.02). THE DESIGN OF THE FACILITY AND PREPARATION OF AS-BUILT PLANS SHALL BE BY A CERTIFIED PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE COMMONWEALTH OF VIRGINIA.

2. ACCESS TO THE FACILITY MUST BE PROVIDED IN ACCORDANCE WITH THE COUNTY OF ROANOKE DESIGN AND CONSTRUCTION STANDARDS FOR DETENTION PONDS, LATEST EDITION.

3. IF THE FACILITY IS OVER FOUR (4) FEET DEEP, TAKES OVER TWO (2) HOURS TO DRAIN, OR THE INTERIOR SLOPE EXCEEDS 3 (H): 1 (V), PERMANENT FENCING MAY BE REQUIRED, ADDITIONALLY, IF THE FACILITY IS IN A CONGESTED AREA OR WILL IN ANY WAY POSE A HAZARD TO THE GENERAL PUBLIC, FENCING MAY BE REQUIRED. FENCING SHALL BE A MINIMUM OF SIX (6) FEET HIGH, A MINIMUM OF STANDARD NINE GAUGE LINK FENCE, AND MUST HAVE ONE OR MORE LOCKING DOUBLE GATES (MINIMUM TEN FEET WIDE) FOR ACCESS.

4. DETENTION PONDS SHALL BE BONDED IN ACCORDANCE WITH THE ROANOKE COUNTY BONDING POLICY FOR SUBDIVISION AND SITE DEVELOPMENT. A SEPARATE BOND FOR THE DETENTION FACILITY WILL BE REQUIRED AND ADMINISTERED APART FROM THE SUBDIVISION DEVELOPMENT BOND. REFERENCE ESTIMATE - THIS SHEET.

5. REFERENCE THE COUNTY OF ROANOKE DESIGN AND CONSTRUCTION STANDARDS FOR DETENTION PONDS, LATEST EDITION, FOR ACCEPTANCE AND MAINTENANCE OF THE FACILITY. CERTIFIED AS-BUILTS ARE REQUIRED AND MUST INCLUDE:

   A. DIMENSIONS OF THE FACILITY

   B. VOLUME @ MAXIMUM DEPTH

   C. ELEVATIONS OF STRUCTURES, SPILLWAYS, AND TOP

   D. MATERIALS VERIFICATION INCLUDING RESULTS OF DENSITY TESTS CONDUCTED BY AN INDEPENDENT SOIL TESTING LABORATORY

   E. LOCATION AND ELEVATION OF BENCHMARK.

6. ONE FOOT MINIMUM FREEBOARD REQUIRED FOR THE 100 YR WATER SURFACE ELEVATION.

CONSTRUCTION NOTES

1. SITE PREPARATION SHALL BE IN ACCORDANCE WITH THE COUNTY OF ROANOKE DESIGN AND CONSTRUCTION STANDARDS FOR DETENTION PONDS, LATEST EDITION.

2. SLOPES STEEPER THAN 3 TO 1 (HORIZONTAL TO VERTICAL) SHALL BE BENCHED OR STEPPED PRIOR TO PLACING FILL ON THEM.

3. ON-SITE FILL MATERIAL OR BORROW FILL MATERIAL MAY BE UTILIZED. FILL MATERIAL SOILS, IN GENERAL:

   A. SHALL BE COMPACTABLE
   B. SHALL BE WITHIN AN ACCEPTABLE RANGE OF MOISTURE CONTENT WHICH IS READILY CONTROLLED
   C. SHALL NOT BE HIGHLY SUSCEPTIBLE TO VOLUME CHANGE (SHRINKAGE OR SWELL) OR SETTLEMENT

4. FILL MATERIALS CONTAINING ROCKS LARGER THAN SIX (6) INCHES (15.2 CM) SHALL NOT BE USED. THE UPPERMOST TWO (2) FEET (61 CM) SHALL NOT HAVE ANY ROCK LARGER THAN TWO (2) INCHES (5.1 CM) IN DIAMETER.

5. THE APPROVED FILL SHALL BE PLACED IN EIGHT (8) INCH (20 CM) LOOSE LIFTS. EACH LIFT SHALL BE SPREAD IN UNIFORM LAYERS. FILL SOIL SHALL BE UTILIZED ONLY WITHIN A MOISTURE RANGE OF +/- 2% OF THE OPTIMUM MOISTURE CONTENT. COMPACTION OF THE FILL SHALL BE PERFORMED WITH APPROVED EQUIPMENT. COMPACTION OF THE LAYERS SHALL BE CONTINUOUS AND UNIFORM.

6. EMBANKMENT MATERIAL IN FILL AREAS SHALL BE PLACED IN LIFTS NOT EXCEEDING EIGHT (8) INCHES AND SHALL BE COMPACTED TO A MINIMUM 95% DENSITY IN ACCORDANCE WITH SECTION 303 OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS.

7. FIELD DENSITY TESTS ARE TO BE CONDUCTED BY AN INDEPENDENT SOILS TESTING LABORATORY UNDER THE DIRECTION OF A QUALIFIED GEOTECHNICAL ENGINEER. THE RESULTS OF THESE TESTS SHALL BE SUBMITTED TO THE COUNTY OF ROANOKE WITH AS-BUILT PLANS AS A CONDITION OF ACCEPTANCE OF THE FACILITY BY THE COUNTY. FIELD DENSITY TESTS, AS DIRECTED BY THE ENGINEER SHALL BE PERFORMED PERIODICALLY TO DETERMINE THE DEGREE OF COMPACTION. ANY AREAS FAILING TO MEET THE ABOVE REQUIREMENTS SHALL BE REWORKED AND/OR RECOMPACTED UNTIL THE REQUIRED DEGREE OF COMPACTION IS ACHIEVED.

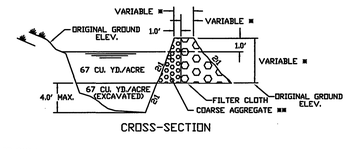
8. ANTI-SEEP COLLARS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.

9. ALL DISTURBED AREAS SHALL BE COVERED WITH FOUR (4) INCHES OF TOPSOIL AND SEEDED.

10. THE MINIMUM SLOPE OF THE BASIN FLOOR SHALL BE ONE (1) PERCENT GRADED TO DRAIN TO THE PRINCIPAL SPILLWAY.

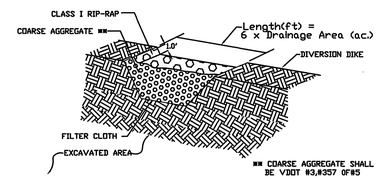
NO.	TITLE	KEY	SYMBOL
3.01	SAFETY FENCE	SAF	
3.02	TEMPORARY GRAVEL CONSTRUCTION ENTRANCE	CE	
3.03	CONSTRUCTION ROAD STABILIZATION	CRS	
3.04	STRAW BALE BARRIER	STB	
3.05	SILT FENCE	SF	
3.06	BRUSH BARRIER	BB	
3.07	STORM DRAIN INLET PROTECTION	IP	
3.08	CULVERT INLET PROTECTION	CIP	
3.09	TEMPORARY DIVERSION DIKE	DD	
3.10	TEMPORARY FILL DIVERSION	FD	
3.11	TEMPORARY RIGHT-OF-WAY DIVERSION	RWD	
3.12	DIVERSION	DV	
3.13	TEMPORARY SEDIMENT TRAP	ST	
3.14	TEMPORARY SEDIMENT BASIN	SB	
3.15	TEMPORARY SLOPE DRAIN	TSD	
3.16	PAVED FLUME	PF	
3.17	STORMWATER CONVEYANCE CHANNEL	SCC	
3.18	OUTLET PROTECTION	OP	
3.19	RIPRAP	RR	

NO.	TITLE	KEY	SYMBOL
3.20	ROCK CHECK DAMS	CD	
3.21	LEVEL SPREADER	LS	
3.22	VEGETATIVE STREAMBANK STABILIZATION	VSS	
3.23	STRUCTURAL STREAMBANK STABILIZATION	SSS	
3.24	TEMPORARY VEHICULAR STREAM CROSSING	VSC	
3.25	UTILITY STREAM CROSSING	USC	
3.26	DEWATERING STRUCTURE	DS	
3.27	TURBIDITY CURTAIN	TC	
3.28	SUBSURFACE DRAIN	SD	
3.29	SURFACE ROUGHENING	SR	
3.30	TOPSOILING	TO	
3.31	TEMPORARY SEEDING	TS	
3.32	PERMANENT SEEDING	PS	
3.33	SODDING	SO	
3.34	BERMUDA GRASS AND ZOYSIAURASS ESTABLISHMENT	BE / ZO	B OR Z
3.35	MULCHING	MU	
3.36	SOIL STABILIZATION BLANKETS AND MATTING	B / M	TREAT. I / TREAT. II
3.37	TREES, SHRUBS, VINES AND GROUND COVERS	VEG	
3.38	TREE PRESERVATION AND PROTECTION	TP	
3.39	DUST CONTROL	DC	



CROSS-SECTION

* SEE PLATE 3.13-1



** COARSE AGGREGATE SHALL BE VDOT #3,#357 OF#5

(ST) SEDIMENT TRAP

NOTES

For areas less than 3.0 acres. For areas larger than 3.0 acres, A SEDIMENT TRAP, is required Please see Va' ESC manual for design.

EROSION-SILTATION CONTROL COST ESTIMATE

ALL COSTS GIVEN ARE COMPLETE IN PLACE

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
CONSTRUCTION ENTRANCE	EA	1	$ 1,200	$ 2,400
SILT FENCE	LF	1420	4.00	5,680
INLET PROTECTION	EA	10	150	1500
DIVERSION	LF	370	3.00	.1110
SEDIMENT TRAP	EA	1	500	500
RIP RAP	C.Y.	70	25	1,750
PERMANENT SEEDING	1000 SF	30	35	1,050
CONSTRUCTION ROAD STABILIZATION	LF	50	4.00	200
SAFETY FENCE	LF	340	5.00	1,700
R.O.W. DIVERSION	EA	1	200	200
SUB-TOTAL				$ 16,090
25% CONTINGENCY				$ 4,023
TOTAL PROJECT COST				$ 20,113

TEMPORARY SEDIMENT TRAP DATA

STRUCTURE	DRAINAGE AREA (ACRES)	STORAGE (C.Y.) REQ'D	STORAGE (C.Y.) DESIGN	WEIR LENGTH (FT.)	WEIR HEIGHT (FT.)	BERM HEIGHT (FT.)
ST #1	1.35	181	185	8.5'	1'	3'

GENERAL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION & SEDIMENT CONTROL MEASURES SHALL BE ACCOMPLISHED IN STRICT ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS CONTAINED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
2. THE APPROVING AUTHORITY MAY ADD TO, DELETE, RELOCATE, CHANGE, OR OTHERWISE MODIFY CERTAIN EROSION AND SEDIMENT CONTROL MEASURES WHERE FIELD CONDITIONS ARE ENCOUNTERED THAT WARRANT SUCH MODIFICATIONS.
3. ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN ON THE PLAN SHALL BE PLACED IN ADVANCE OF THE WORK BEING PERFORMED, AS FAR AS PRACTICAL.
4. IN NO CASE DURING CONSTRUCTION SHALL WATER RUNOFF BE DIVERTED OR ALLOWED TO FLOW TO LOCATIONS WHERE ADEQUATE PROTECTION HAS NOT BEEN PROVIDED.
5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LEAVE THE SITE ADEQUATELY PROTECTED AGAINST EROSION, SEDIMENTATION, OR ANY DAMAGE TO ANY ADJACENT PROPERTY AT THE END OF EACH DAY'S WORK.
6. FOR THE EROSION CONTROL KEY SYMBOLS SHOWN ON THE PLANS, REFER TO THE VIRGINIA UNIFORM CODING SYSTEM FOR EROSION AND SEDIMENT CONTROL PRACTICES CONTAINED IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION. THESE SYMBOLS AND KEYS ARE TO BE UTILIZED ON ALL EROSION CONTROL PLANS SUBMITTED TO ROANOKE COUNTY.

APPROVED

(PS) PERMANENT SEEDING MIXTURE

TYPE A

15 OCTOBER TO 1 FEBRUARY
K-31 FESCUE @ 5 LB / 1000 SF
BORZY WINTER RYE @ 1/2 LB / 1000 SF

1 FEBRUARY TO 1 JUNE
K-31 FESCUE @ 5 LB / 1000 SF
ANNUAL RYE @ 1/2 LB / 1000 SF

1 JUNE TO 1 SEPTEMBER
K-31 FESCUE @ 5 LB / 1000 SF
GERMAN MILLET @ 1/2 LB / 1000 SF

1 SEPTEMBER TO 15 OCTOBER
K-31 FESCUE @ 5 LB / 1000 SF
ANNUAL RYE @ 1/2 LB / 1000 SF

TYPE B (SLOPES 3:1 OR STEEPER)

15 MARCH TO 1 MAY
CROWN VETCH @ 1/2 LB / 1000 SF
PERENNIAL RYEGRASS @ 1/2 LB / 1000 SF
RED TOP @ 1/8 LB / 1000 SF

15 AUGUST TO 1 OCTOBER
CROWN VETCH @ 1/2 LB / 1000 SF
PERENNIAL RYEGRASS @ 1/2 LB / 1000 SF
RED TOP @ 1/8 LB / 1000 SF

LIME: 140 LB / 1000 SF PULVERIZED AGRICULTURAL LIMESTONE

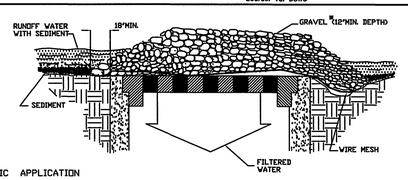
FERTILIZER: 5-20-10 @ 25 LB / 1000 SF
38-0-0 @ 7 LB / 1000 SF

MULCH: IF REQUIRED, SHALL BE USED OVER ALL SEEDED AREAS AND SHALL BE APPLIED IN ACCORDANCE WITH SECTION 1.75 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.

SOIL CONDITIONING: INCORPORATION OF LIME AND FERTILIZER, SELECTION OF CERTIFIED SEED, MULCHING, MAINTENANCE OF NEW SEEDLINGS, AND RESEEDING SHALL BE IN ACCORDANCE WITH SPECIFICATIONS CONTAINED WITHIN THE VIRGINIA SOIL EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION. ADDITIONAL SEEDING TO BE PERFORMED AS REQUIRED BY THE INSPECTOR.

SEED APPLICATION: APPLY SEED UNIFORMLY WITH A CYCLONE SEEDER, DRILL, CULTIPACKER SEEDER, OR HYDROSEEDER ON A FIRM, FRIABLE, SEEDBED. MAXIMUM SEEDING DEPTH SHALL BE 1/4 INCH.

TOTAL DISTURBED AREA = 2.45 AC. = 106,722 SQ. FT.



SPECIFIC APPLICATION

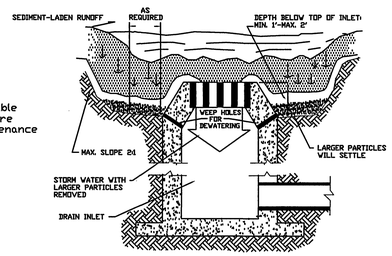
This method of inlet protection is applicable where heavy concentrated flows are expected, but not where ponding around the structure might cause excessive inconvenience or damage to adjacent structures and unprotected areas.

* Gravel shall be VDOT #3, #357 or #5 coarse aggregate.

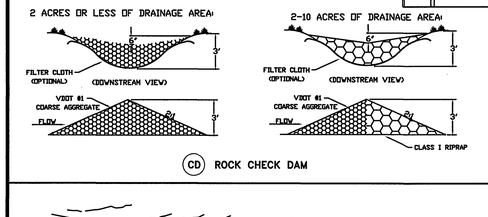
(IP) GRAVEL AND WIRE MESH DROP INLET SEDIMENT FILTER

SPECIFIC APPLICATION

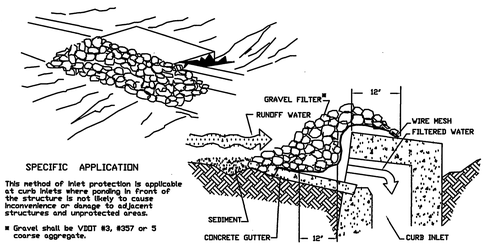
This method of inlet protection is applicable where heavy flows are expected and where an overflow capability and ease of maintenance are desirable.



(IP) EXCAVATED DROP INLET SEDIMENT TRAP



(CD) ROCK CHECK DAM

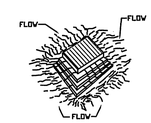


SPECIFIC APPLICATION

This method of inlet protection is applicable at curb inlets where ponding in front of the structure is not likely to cause inconvenience or damage to adjacent structures and unprotected areas.

* Gravel shall be VDOT #3, #357 or 5 coarse aggregate.

(IP) GRAVEL CURB INLET SEDIMENT FILTER

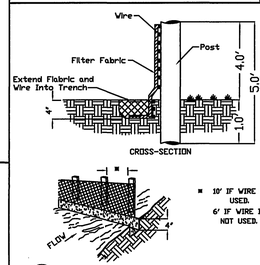


(DD) TEMPORARY DIVERSION DIKE

(FD) TEMPORARY FILL DIVERSION

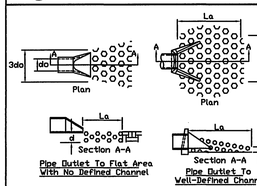
(RWD) TEMPORARY RIGHT-OF-WAY DIVERSION

(DV) DIVERSION



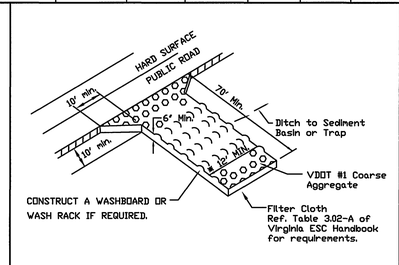
* 10' IF WIRE IS USED. 6' IF WIRE IS NOT USED.

(SF) CONSTRUCTION OF A SILT FENCE

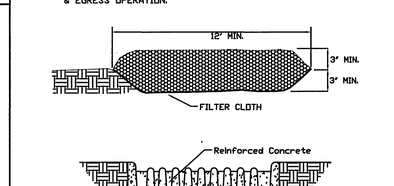


(OP) OUTLET PROTECTION

NOTES
1. Apron lining may be rip-rap, grouted rip-rap, or concrete.
2. La is the length of the rip-rap apron as calculated using plates 1.36d and 1.36e.
3. d = 1.5 times the maximum stone diameter, but not less than 6".



* MUST EXTEND FULL WIDTH OF INGRESS & EGRESS OPERATION.



(CE) TEMPORARY GRAVEL CONSTRUCTION ENTRANCE

DEPARTMENT OF ENGINEERING AND INSPECTIONS

NO.	REVISIONS	DATE
1	ENGR. & INSPEC.	04-10-93
2	ENGR. & INSPEC.	08-05-93
3	ENGR. & INSPEC.	10-27-93
4		
5		
6		

COUNTY OF ROANOKE

DATE: 11/02/93
SCALE: NO SCALE
DRAWING BY: CLN,AF (G:\CAD\DETAILS\EROS)
DESIGNED BY:
APPROVED BY: GWS,III

BOJANGLES RESTAURANT
EROSION & SEDIMENT CONTROL
STORMWATER MANAGEMENT DETAILS

SHEET 8 OF17