

ALL COSTS GIVEN ARE COMPLETE IN PLACE				
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
CLEARING & GRUBBING	LS		\$	\$
EXCAVATION	CY			
EMBANKMENT	CY			
FENCING	LF			
STRUCTURES				
ACCESS ROAD				
AS-BUILTS				
SUB-TOTAL				\$
10% CONTINGENCY				\$
TOTAL PROJECT COST				\$

**SPECIFIC APPLICATION**

This method of inlet protection is applicable where heavy concentrated flows are not but when ponding around the structure might cause excessive inconvenience 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**

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 GAGE LINE 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 MUST 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.

1. SITE PREPARATION SHALL BE IN ACCORDANCE WITH THE COUNTY OF ROCKAWE DESIGN AND CONSTRUCTION STANDARDS FOR DETENTION PONDS LATEST EDITION.
2. SLOPES STEEPER THAN 3 TO 1 (HORIZONTAL TO VERTICAL) SHALL BE BENCH 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 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 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  $\pm 4\%$  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 ROCKAWE 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 REMOVED 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 SEED.
10. THE MINIMUM SLOPE OF THE BASIN "FLOOR" SHALL BE ONE (1) PERCENT GRADE.

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

NO.	TITLE	KEY	SYMBOL	NO.	TITLE	KEY	SYMBOL
3.01	SAFETY FENCE	(SAF)		3.20	ROCK CHECK DAMS	(CD)	
3.02	TEMPORARY GRAVEL CONSTRUCTION ENTRANCE	(CE)		3.21	LEVEL SPREADER	(LS)	
3.03	CONSTRUCTION ROAD STABILIZATION	(CRS)		3.22	VEGETATIVE STREAMBANK STABILIZATION	(VSS)	
3.04	STRAW BALE BARRIER	(STB)		3.23	STRUCTURAL STREAMBANK STABILIZATION	(SSS)	
3.05	SILT FENCE	(SF)		3.24	TEMPORARY VEHICULAR STREAM CROSSING	(VSC)	
3.06	BRUSH BARRIER	(BB)		3.25	UTILITY STREAM CROSSING	(USC)	
3.07	STORM DRAIN INLET PROTECTION	(IP)		3.26	DEWATERING STRUCTURE	(DS)	
3.08	CULVERT INLET PROTECTION	(CIP)		3.27	TURBIDITY CURTAIN	(TC)	
3.09	TEMPORARY DIVERSION DIKE	(DD)		3.28	SUBSURFACE DRAIN	(SD)	
3.10	TEMPORARY FILL DIVERSION	(FD)		3.29	SURFACE ROUGHENING	(SR)	
3.11	TEMPORARY RIGHT-OF-WAY DIVERSION	(RWD)		3.30	TOPSOILING	(TO)	
3.12	DIVERSION	(DV)		3.31	TEMPORARY SEEDING	(TS)	
3.13	TEMPORARY SEDIMENT TRAP	(ST)		3.32	PERMANENT SEEDING	(PS)	
3.14	TEMPORARY SEDIMENT BASIN	(SB)		3.33	SODDING	(SO)	
3.15	TEMPORARY SLOPE DRAIN	(TSD)		3.34	BERMUDA GRASS AND ZOYSIAURASS ESTABLISHMENT	(ZG)	
3.16	PAVED FLUME	(PF)		3.35	MULCHING	(MU)	
3.17	STORMWATER CONVEYANCE CHANNEL	(SCC)		3.36	SOIL STABILIZATION BLANKETS AND MATTING	(SE, ZB)	
3.18	OUTLET PROTECTION	(OP)		3.37	TREES, SHRUBS, VINES AND GROUND COVERS	(VEG)	
3.19	RIPRAP	(RR)		3.38	TREE PRESERVATION AND PROTECTION	(TP)	
				3.39	DUST CONTROL	(DC)	

Diagram illustrating the VDOT #1 coarse aggregate filter cloth (optional) configuration. The diagram shows a cross-section of the filter cloth (optional) and the aggregate layer, with a 2:1 slope indicated. The filter cloth is labeled "FILTER CLOTH (OPTIONAL)" and the aggregate is labeled "VDOT #1 COARSE AGGREGATE". The flow direction is indicated by an arrow labeled "FLOW". The downstream view shows a circular pattern of aggregate with a 1/8 inch scale bar.

The diagram consists of two parts. The top part is a plan view labeled "(DOWNSTREAM VIEW)" showing a water cloth with a hexagonal pattern. A line labeled "WATER CLOTH (OPTIONAL)" points to the pattern. A dimension line indicates a width of "6'". The bottom part is a cross-section showing a water cloth with a hexagonal pattern on a slope. The slope is labeled "2:1". The water cloth is labeled "VDOT #1" and "COARSE AGGREGATE". An arrow labeled "FLOW" points to the left.

The diagram illustrates a cross-section of a gravel filter system. On the left, a pile of gravel is shown with a small structure (possibly a culvert or pipe) passing through it. An arrow labeled "RUNOFF WATER" points from the left towards the gravel filter. The gravel filter is a layer of gravel that traps sediment. Below the gravel filter is a "SEDIMENT" layer, which is a layer of soil or silt that has been trapped. Below the sediment layer is a "CONCRETE GUTTER". To the right of the gravel filter is a "CURB INLET". The gravel filter is supported by a "WIRE MESH" structure. The "CURB INLET" is a concrete structure that allows water to flow into the gutter. The "GRVEL FILTER" is a layer of gravel that traps sediment. The "SEDIMENT" is a layer of soil or silt that has been trapped. The "CONCRETE GUTTER" is a concrete structure that collects runoff water. The "CURB INLET" is a concrete structure that allows water to flow into the gutter. The "WIRE MESH" is a structure that supports the gravel filter. The diagram also shows dimensions: "12\" and "12\".

**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.

(P) GRAVEL CURB INLET SEDIMENT FILTER

SEDIMENT-LADEN RUNOFF

AS REQUIRED

DEPTH BELOW TOP OF INLET: MIN. 1'-MAX. 2'

MAX. SLOPE 2:1

WEEP HOLES FOR DEWATERING

LARGER PARTICLES WILL SETTLE

STORM WATER WITH LARGER PARTICLES REMOVED

DRAIN INLET

FLOW

FLOW

FLOW

IP EXCAVATED DROP INLET SEDIMENT TRAP

A cross-sectional diagram of a road embankment. The top layer is labeled "COMPACTED SOIL" and is shown with a wavy, hatched pattern. Below this is a layer with a brick-like hatched pattern. A horizontal line with arrows at both ends is labeled "FLOW". A vertical dimension line on the left indicates a height of "18\" MIN.". A horizontal dimension line at the bottom indicates a width of "4.5' MIN.". The embankment is shown with a slight slope on the right side.

FD  
TEMPORARY FILL DIVERSION

RWD  
TEMPORARY RIGHT-OF-WAY DIVERSION

DV  
DIVERSION

A cross-sectional diagram of a trench. A vertical post is on the right. A filter fabric is shown extending from the trench wall and being tamped into the trench. Labels include 'Filter Fabric', 'Extend Fabric and Tamp into Trench', 'Post', and a vertical dimension of '4.0' on the right. The bottom is labeled 'CROSS SECTION'.

• 10' IF WIRE USED.  
• 6' IF WIRE NOT USED.

**(SF) CONSTRUCTION OF A SILT FENCE**

The diagrams illustrate two scenarios for pipe outlet design:

- Left Diagram (No Defined Channel):** Shows a plan view of a pipe outlet with diameter  $\phi d_o$  and a section A-A. The section view shows a pipe with diameter  $d$  and a slope length  $L_a$ . Below the diagrams is the text: "Pipe Outlet To Flat Area With No Defined Channel".
- Right Diagram (Well-Defined Channel):** Shows a plan view of a pipe outlet with diameter  $\phi d_o$  and a section A-A. The section view shows a pipe with diameter  $d$  and a slope length  $L_a$ . Below the diagrams is the text: "Pipe Outlet To Flat Area With Well-Defined Channel".

At the bottom left, there is a logo consisting of the letters "OP" inside a circle, followed by the text "OUTLET PROTECTION".

NOTES

1. Apron lining may be rip-rap, grouted rip-rap, or concrete.
2.  $L_a$  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".

\* SEE PLATE 3.13-1

Diagram illustrating the cross-section of a diversion dike structure. The structure consists of several layers: CLASS 1 RIP-RAP, COARSE AGGREGATE, and FILTER CLOTH. The length of the dike is determined by the formula:  $\text{Length(ft)} = 6 \times \text{Drainage Area (ac.)}$ . A dimension of 1.0' is indicated for the top layer. The structure is shown adjacent to an EXCAVATED AREA.

(ST) SEDIMENT TRAP

## NOTES

[illegible]

ALL COSTS GIVEN ARE COMPLETE IN PLACE			(NEW ITEMS ONLY)	
DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
CONSTRUCTION ENTRANCE	EA	2	\$ 1,200.00	\$ 2,400.00
SILT FENCE	LF	2100	3.00	6,300.00
CONSTRUCTION ROAD STABILIZATION	LF	800	4.00	3,200.00
DIVERSION DIKE	LF	1300	4.00	5,200.00
INLET PROTECTION	EA	7	150.00	10,500.00
OUTLET PROTECTION	EA	1	200.00	200.00
TOPSOIL STOCKPIILING	AC	6.7	500.00	3,350.00
PERMANENT SEEDING	AC	6.7	1,000.00	6,700.00
TEMPORARY SEEDING	AC	6.7	500.00	3,350.00
MULCHING	AC	6.7	250.00	1,675.00
S.C.C.	LF	230	4.00	920.00
BLANKET MATTING	SY	1,150	1.50	1,725.00
SUB-TOTAL				\$ 45,520.00
10% CONTINGENCY				\$ 4,552.00
EST. TOTAL COST			\$ 50,072.00	

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 SHOWN 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.

<u>TYPE A</u>	<u>TYPE B (SLOPES 3:1 OR STEEPER)</u>
<p>15 OCTOBER TO 1 FEBRUARY  K-31 FESCUE • 5 LB / 1000 SF  BORKZY WINTER RYE • 1/2 LB / 1000 SF</p> <p>1 FEBRUARY TO 1 JUNE  K-31 FESCUE • 5 LB / 1000 SF  ANNUAL RYE • 1/2 LB / 1000 SF</p> <p>1 JUNE TO 1 SEPTEMBER  K-31 FESCUE • 5 LB / 1000 SF  GERMAN MILLET • 1/2 LB / 1000 SF</p> <p>1 SEPTEMBER TO 15 OCTOBER  K-31 FESCUE • 5 LB / 1000 SF  ANNUAL RYE • 1/2 LB / 1000 SF</p>	<p>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</p> <p>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</p>
<p>LIME: 140 LB / 1000 SF PULVERIZED AGRICULTURAL LIMESTONE</p> <p>FERTILIZER: 5-20-10 • 25 LB / 1000 SF  38-0-0 • 7 LB / 1000 SF</p> <p>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.</p> <p>SOIL CONDITIONING: INCORPORATION OF LIME AND FERTILIZER, SELECTION OF CERTIFIED SEED, MULCHING, MAINTENANCE OF NEW SEEDINGS, 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.</p> <p>SEED APPLICATION: APPLY SEED UNIFORMLY WITH A CYCLONE SEEDER, DRILL, CULTIPACK SEEDER, OR HYDROSEDER ON A FIRM, FRIABLE, SEEDBED. MAXIMUM SEEDING DEPTH SHALL BE 1/4 INCH.</p>	
<p>TOTAL DISTURBED AREA = 67 AC. = 292,000 SQ. FT.</p>	

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

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

SHEET  
9 OF 11