DESISIGN MANUAL FOR STORMWATER MANAGEMENT

THE CITY OF FAIRMONT, WEST VIRGINIA

JULY 2006

PREPARED BY: SANITARY SEWER BOARD, ENGINEERING DEPARTMENT,
AND THE STORMWATER DEPARTMENT
THE CITY OF FAIRMONT
PO BOX 1428
FAIRMONT, WEST VIRGINIA 26554
(304) 366-0540

REVISED 2015

Sanitary Sewer Board
City of Fairmont
PO Box 1428 Fairmont, WV 26555-1428
Phone: (304) 366-0540
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ONLINE APPLICATION

City of Fairmont Stormwater Permit Application

Permit #_____

Date:_____ Permit Fee _____

Applicant: _____

Applicant's
Adddress_____

Applicant's Phone Number_____ Fax Number _____

Project
Address_____

Tax Map Number _____ Parcel Number _____

Contact Person _____

Phone Number _____ Fax Number _____

Total Area of Project_____ Square Feet Acres _____

Description of
Project_____
_____
_____

For Office Use Only

Native Soils: Yes No

Department
Requirements:_____
_____
_____

Approved _____ Date _____ Approved By_____

Field
Notes:_____
_____
_____

CITY OF FAIRMONT STORMWATER DEPARTMENT

INSPECTION AND MAINTENANCE AGREEMENT
FOR PRIVATE STORMWATER MANAGEMENT FACILITIES

This agreement, made this _____ day of _____ 20_____
by and between _____
hereinafter referred to as the "OWNER(S)" of the following property:_____
_____,
and the City of Fairmont Stormwater Department, hereinafter referred to as the Stormwater Department.

WITNESSETH:

We, the OWNER(S) with full authority to execute deeds, mortgages, other covenants, all rights, titles and interest in the property described above, do hereby covenant with the Stormwater Department and agree as follows:

1. The OWNERS(S) of said property shall provide for the maintenance of the stormwater management facility to ensure that the facility is and remains in good working condition in accordance with approved design standards, rules, regulations and applicable laws.

2. The OWNER(S) of said property shall promptly repair and restore all grade surfaces, walls, drains, structures, vegetation, erosion, and sediment control measures and other protective devices. Such repairs or restorations shall be in accordance with approved plans, rules and regulations and applicable laws.

3. The OWNER(S) of said property shall perform necessary landscaping (grass cutting, etc.) and trash removal as part of regular maintenance.

4. The OWNER(S) shall grant the Stormwater Department or its agent the right of entry at reasonable times and in a reasonable manner for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the facility.

5. If necessary, the OWNER(S), shall levy regular or special assessments against all present or subsequent owners of property served by the facility to ensure that the facility is properly maintained.

6. Should the OWNER(S) fail to maintain the facility or correct any defects within a reasonable period of time (30 days maximum) after proper written notice by the Stormwater Department, the City of Fairmont or its agent and/or contractor is authorized to perform the necessary maintenance or repairs and may assess the OWNER(S) served by the facility for the cost of the work, any applicable

penalties, legal fees and court cost. Any said assessment shall be a lien against all properties served by the facility including owner's property upon recordation of said lien on the land records of Marion County for said assessment may be placed on the property stormwater bill of said property and collected as ordinary fees by the Stormwater Department. The OWNER(S) shall maintain perpetual access from public rights-of-way to the facility for Stormwater Department or its agent and/or contractor.

7. The OWNER(S) shall indemnify and save the Stormwater Department harmless from any and all claims for damages to persons or property arising from the construction, maintenance and use of the facility.

8. This AGREEMENT and the Covenants contained herein shall apply to and bind the OWNER(S) heirs, executors, successors and assigns and shall bind all present and subsequent owners of the property served by this facility.

9. The OWNER(S) shall record this AGREEMENT, prior to final plat and/or final site plan approval in the land records of Marion County, West Virginia, and the OWNER(S) shall provide proof of such resolution to the Stormwater Department.

10. It is further understood and agreed between the parties hereto that the duties and responsibilities of the OWNER(S) as set forth herein with respect to real estate constitute an affirmative burden on the real estate having the force and effect of a covenant running with the land.

IN WITNESS WHEREOF, the OWNER(S) and the STORMWATER DEPT executed this AGREEMENT as of this _____ day of _____ 20 _____.

ATTEST: FOR THE OWNER(S)

_____ _____

_____ _____

ATTEST: FOR THE STORMWATER DEPT.

_____ _____

_____ _____

STATE OF WEST VIRGINIA
COUNTY OF MARION

I hereby certify that _____ whose name is signed to the writing above and hereto annexed, bearing date the _____ day of _____, 20 has this day acknowledged the same before me in my said County.

Given under my hand this _____ day of _____ 20 .

My Commission expires: _____

_____
NOTARY PUBLIC

STATE OF WEST VIRGINIA
COUNTY OF MARION

I hereby certify that _____ whose name is signed to the writing above and hereto annexed, bearing date the _____ day of _____, 20 has this day acknowledged the same before me in my said County.

Given under my hand this _____ day of _____ 20 .

My Commission expires: _____

_____
NOTARY PUBLIC

TABLE OF CONTENTS

I. GENERAL INFORMATION

APPROVAL PROCESS

1. STORMWATER PERMIT APPLICATION CAN BE OBTAIN IN DESIGN MANUAL,ON LINE OR AT THE CITY OF FAIRMONT PLANNING DEPARTMENT (see attached application, and City of Fairmont Ordinance 1355 Article 941.03 i)
2. STORMWATER PERMIT APPLICATION IS FORWARDED TO STORMWATER DEPARTMENT FOR REVIEW AND PROCESSING.
3. APPLICANTIS NOTIFIED BY STORMWATER DEPARTMENT IF A STORMWATER MANAGEMENT PLAN MUST BE SUBMITTED.
4. STORMWATER PERMIT WILL BE APPROVED AS SUBMITTED OR WITH THE STORMWATER DEPARTMENT REQUIREMENTS THENRETURNED TO THE PLANNING DEPARTMENT.
5. APPLICANT WILL BE NOTIFIED BY THE PLANNING DEPARTMENT THAT THE PERMIT APPLICATION IS READY FOR THEM TO COME IN TO PAY FOR AND PICK UP STORMWATER PERMIT.

II. PERMIT FEES (See attached City of Fairmont Ordinance 1355 Article 941.13)

III. WAIVERS FOR PROVING STORMWATER MANAGEMENT PLAN (see attached City of Fairmont Ordinance 1355 Article 941.15)

IV. FEE IN LIEU OF STORMWATER MANAGEMENT PRACTICES (see City of Fairmont Ordinance 1355 Article 941.15 k)

V. STORMWATER MANAGEMENT PLAN/SUBMITTAL CONTENTS/REQUIRMENTS

1) PLAN/PROFILE SHEETS 24"x36"
   a) ORIGINAL CONDITIONS
      i) CONTOURS
      ii) PROPERTY LINES
      iii) BUILDINGS, ROADS, ETC.

   b) PROPOSED

2) PLANS/CALCULATIONS STAMPED BY PE

3) CALCULATION SHEETS FOR ONE INCH CAPTURE

   a) PRE CONSTRUCTION

   b) POST CONSTRUCTION

4) O&M (see attached agreement)

VI. CONSTRUCTION MATERAILS/METHODS

1) PIPE SHALL BE AS FOLLOWS UNLESS OTHERWISE APPROVED BY THE DIRECTOR
   a) HDPE PIPE MEETING ASTM D3350 OR LATEST REVISIOIN
   b) REINFORCED CONCRETE PIPE MEETING ASTM C76 CLASS II OR THE LATEST REVISION

2) PIPE SIZE

   a) 12 INCHES IS MINIMUM

   b) SIZE WILL BE APPROVED BY THE DIRECTOR

3) STRUCTURES/LOCATIONS

a) STRUCTURES WILL BE PRECASTED OR POURED IN PLACE CONCRETE
b) A FORGED FRAME AND GRATE WILL BE PLACED ON TOP STRUCTURES

c) A MANHOLE OR INLET SHALL BE CONSTRUCTED AT EVERY CHANGE IN DIRECTION, PIPE SIZE OR CHANGE IN SLOPE

d) THE MAXIMUM DISTANCE UNINTERUPTED BY APPURTENANCES SHALL BE 300 FEET FOR PIPE 42 INCHES OR LESS AND 500 FEET FOR PIPE MORE THAN 42 INCHES

4) REDUCTION IN PIPE SIZE

a) THERE MAY NOT BE A REDUCTION IN PIPE SIZE ALONG THE DIRECTION OF FLOW EXCEPT FOR STORMWATER MANAGEMENT PURPOSES

5) MININMUM COVER REQUIREMENTS

a) THE MINIMUM COVER FOR ALL PIPES WITHIN THE STREET RIGHT OF WAY SHALL BE 2 FEET

b) OUTSIDE THE RIGHT OF WAY SHALL BE 1 FOOT EXCEPT TO LOADING CONDITIONS WHERE 2 FOOT COVER SHALL BE REQUIRED

c) MININMUM COVER MAY BE WAIVED BY THE DIRECTOR

6) ENDWALLS AND ENDWALLS SECTION

a) THE ENDS, ENTRY, OR EXIT OF ANY STORM SEWER OR CULVERT SHALL BE PROVIDED WITH A STANDARD ENDWALL, HEADWALL, CURB INLET, YARD INLET, FLARED END SECTION OR OTHER APPROVED APPRUTENACE SUITABLE FOR THE USE OF THE STORM SEWER WITH THE FOLLOWING EXCEPTION:

i) 12 INCH PIPE UNDER DRIVEWAYS FROM STREETS USING OPEN DRAINAGE DITCHES IN LIEU OF AN UNDERGROUND SYSTEM WITH CURB AND GUTTER ARE NOT REQUIRED TO HAVE ENDWALLS. ALL SUCH STRUCTURES SHALL BE SHOWN ON THE PLANS AND PROFILE DRAWINGS. THE FOLLOWING GUIDELINES WILL BE USED TO DETERMINE WEATHER AND END SECTION OR ENDWALL WILL BE USED.

b) ON CULVERTS OR STORM SEWER INLETS AND OUTLETS FRO 12" IN DIAMETER FLARED END SECTIONS WILL BE USED UNLESS THE

HEIGHTS OF FILL AND SIDE SLOPES EXCEEDEXEEDS 20 FEET OR 2:1 RESPECTIVE IN WHICH CASE A STANARD HEADWALL SHOULD BE USED. IF THE HEADWALL EXCEEDS HW/D RATIO GREATER THAN 1.5, THEN A HEADWALL OR APPROVED END TREATMENT WILL GENERALLY BE REQUIRED PROVIDED IT CAN BE INSTALLED SAFELY AND WON'T CREATE A POTNTIAL TRAFFIC HAZARD IN THE OPINION OF THE CITY ENGINEER.

c) ON CULVERTS OR STORM SEWER INLETS AND OUTLETS BETWEEN 24" AND 36" INCH DIAMETER EITHER STANDARD FLARE END-SECTIONS OR HEADWALLS WILL BE REQUIRED DEPENDING UPON THE HEIGHT OF THE FILL, THE QUANITTY OF WATER, AND ITS VELOCITY FOR THE DESIGNED YEAR STORM. GENERALLY SPEAKING, A FLARED END-SECTION CAN BE USED IF THE FILLS ARE 20' OR LESS, HW/D IS LESS THAN 1.5, THERE IS LESS THAN 50 CFS INFLOW, OF IF THE INSTALLATION OF A HEADWALL WOULD CONSTITUTE A SAFTY HAZARD IN THE OPION OF THE CITY ENGINEER.

d) IF THE CULVERT OR STROM SEWER INLET AND OUTLET EXCEEDS 36" IN DIAMETER A STANDARD HEADWALL WILL BE PROVIDED UNLESS THIS HEADWALL WOULD CONSTITUTE A SAFTY HAZARD TO THE TRAVELING PUBLIC IN THE OPION OF THE CITY ENGINEER, IN WHICH CASE A FLARED END-SECTION SHOULD BE CONSIDERED. IT SHOULD ALSO BE NOTED THAT FOR OVAL OR ELLIPTICAL SHAPE PIPES THE COMARATIVE SIZE FOR ROUND PIPES WILL BE USED IN DETERMINING WHAT TYPE OF END TREATMENT WILL BE PROVIDED.

e) ALL HEADWALLS WILL BE CONCRETE OR PREFABRICATED CONCRETE.

f) EROSION CONTROL AT OUTLETS: PROVIDE EROSION PROTETION AT THE OUTLETS OF STORM SEWER LINES AND CULVERTS BASED ON OUTLET VELOCITY IN ACCORDANCE WITH THE FOLLOWING: (FPS: Feet per Second)

i) 2 FPS TO 5 FPS VELOSITY: SOD PROTECTION ATH THE OUTLET OR EQUALLY EROSION RESISTANT MATERAL.

ii) 5 FPS TO 8 FPS VELOSCITY: DRY RIP-RAP

iii) 8 FPS TO 11 FPS VELOCITY: CLASS 11, DRY RIP-RAP OR CURRENT EQUIVALENT.

iv) 11 FPS TO 18 FPS VELOCITIES: GROUTED RIP-RAP OR CURRENT EQUIVALENT.

v) VELOCITIES IN EXCESS OF 18 FPS SHALL REQUIRE SPECIAL DESIGN ENERGY DISSIPATERS OR IMPACT BASINS. THESE STUCTURES MAY BE DEIGNED IN ACCORDANCE WITH THE FOLLOWING PUBLICATIONS: HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATERS, ENGINEERING NOMOGRAPH #25, U.S. DEPATMENT OF THE INTERIOR, BUREAU OF RECLAMATION; DESIGN OF SMALL DAMS, U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION. APPROPIATE RIP-RAP PROTECTION SHOULD BE PROVIDED IN CONJUNCTION AND SCOUR BELOW THE STRUCTURE.

g) PLACEMENT OF EROSION CONTROL MEASURES: PLACEMENT OF THE ABOVE EROSION CONTROL MEASURES SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING EXCEPTIONS:

(i) THE LENGTH OF THE APRON OF EROSION CONTROL SHAALL BE CALCULATED BY THE FOLLOWING FORMULA: La=0.37VoD

WHERE La = APRON LENGTH REQUIRED, IN FEET Vo = OUTLET VELOCITY, FEET PER SECOND

D = DIAMETER OF PIPE, FEET

(ii) THE MINIMUM DEPTH OF CLASS II RIP-RAP SHALL BE 24" (2 FEET). IF NECESSARY, APPROPRIATE NOTES AND/OR DETAILS FOR CONSTRUCTION OF THESE EROSION CONTROL MEASURES SHALL BE INCLUDED ON THE PLANS.

h) EROSION CONTROL GUIDELINES: IN AN EFFORT TO ELIMINATE THE NUMEROUS EROSION PROBLEMS AND SUBSEQUENT CONSTRUCTION FAILURES WHICH HAVE OCCURRED AT THE OUTLETS OF STORM SEWER SYSTEMS, THE FOLLOWING CRITERIA FOR LAYING OUT AND DESIGNING STORM SEWER SYSTEMS ARE REQUIRED:

i) THE OUTLET END OF THE STORM SEWER SYSTEM SHOULD, WITHOUT EXCEPTION; DISCHARGE DIRECTLY INTO A STABILIZES EXISTING DRAINAGEWAY.

ii) THE OUTLET END OF THE STORM SEWER SYSTEM SHOULD BE AS COMPATIBLE AS POSSIBLE WITH THE GRADE, HORIZONTAL AND

VERTICAL ALIGNMENT AND LOCATION OF THE EXISTING DRAINAGEWAY INTO WHICH IT WILL DISCHARGE.

iii) PLACING OUTLET STRUCTURES OR STORM SEWER SYSTEMS ON FILL MATERIAL SHOULD BE AVOIODED. IF THE OUTLET IS ON FILL EXTRA EROSION PROTECTION IS REQUIRED.

iv) PLACING EROSION PROTECTION AT OUTLETS ON FILL MATERIAL SHOULD BE AVOIDED; PREFERRED ALTERNATIVE IS A STABILIZED DITCH OF ADEQUATE CAPACITY TO CONVEY THE DESIGN STORM FLOW FROM THE OUTLET STRUCTURE TO THE EXISTING DRAINAGEWAY. HOWEVER, ANY SUCH DEVIATION FROM THE ABOVE APPROVAL OF THE CITY ENGINEER.

i) SPREAD ON STREETS: STORM SEWER SYSTEMS MUST BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE WV DOH DRAINAGE MANUAL.

i) DRAINAGE ACROSS INTERSECTIONS OF STREETS WITH CURB AND GUTTER: WHENEVER CURB AND GUTTER CONSTRUCTION IS PROPOSED, STORMWATER SHALL NOT BE ALLOWED TO CROSS THE SURFACE OF STREET INTERSECTIONS EXCEPT IN UNUSUAL CIRCUMSTANCES. WHERE SUBSURFACE CONVEYANCE OF STORM WATER IS DEEMED IMPRACTICAL (Due to the distance to the nearest structure) BY THE CITY ENGINEER AND PROVIDED THAT THE SURFACE STORM WATER FLOW DOES NOT EXCEED 2 CUBIC FEET PER SECOND, THE MEANS OF SURFACE CONVEYANCE SHALL BE APPROVED BY THE CITY ENGINEER.

j) DRAINAGE ACROSS INTERSECTIONS OF STREETS WITHOUT CURB AND GUTTER: WHENEVER STREETS WITHOUT CURB AND GUTTER ARE PROPOSED, NO WATER SHALL BE ALLOWED TO CROSS AT STREET INTERSECTIONS. THE WATER MUST BE HANDLED BY A STORM SEWER PIPE OR SYSTEM.

k) EASEMENT WIDTHS FOR STORM SEWER SYSTEMS: THE WIDTHS OF DRAINAGE EASEMENTS SHALL NOT BE LESS THAN AS PRESCRIBED IN THE FOLLOWING AND SHALL BE SHOWN ON PLAN AND PROFILE SHEETS AND RECORD PLATS:

15" TO 18" PIPE	15' EASEMENT
21" TO 33" PIPE	20' EASEMENT

36" TO 48" PIPE	25' EASEMENT
54" TO 72" PIPE	30' EASEMENT

FOR TRENCH DEPTHS GREATER THAN SIX (6) FEET FIVE FEET OF ADDITIONAL EASEMENT WIDTH SHALL BE REQUIRED FOR EACH FIVE FEET INCREMENT OF ADDITIONAL DEPTH.

ALL STORM SEWERS SHALL BE PLACED WITHIN THE MIDDLE THIRD OF THE EASEMENT.

l) EASEMENT WIDTHS FOR OPEN DRAINAGEWAYS: ALL OPEN DRAINAGEWAYS (AREA OF CONCENTRATED FLOW) WILL BE IN A MINIMUM DRAINAGE EASEMENT OF FIFTEEN (15) FEET. FOR OPEN DRAINAGEWAYS (Areas of concentrated flow) AN EASEMENT IS REQUIRED OF SUFFFICENT WIDTH FOR PROPER CONSTRUCTION AND MAINTENANCE BASED ON THE DRAINAGEWAYS SLOPE AND TYPICAL CROSS-SECTION. DRAINAGE DITCHES SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CURRENT WV DOH SPECIFICATIONS. THE COMPUTATIONS SHALL BE SUBMITTED TO THE CITY ENGINEER AND THE DITCH SHALL BE SHOWN ON THE PLAN AND PROFILE WITH A TYPICAL CROSS SECTION. STABILIZATION WILL BE REQUIRED BASED ON VELOCITY; EASEMENTS SHALL BE SHOWN ON A RECORDED PLAT.

m) FLOOD PLAIN STUDIES: FLOOD PLAIN STUDIES, WHEN REQUESTED BY THE CITY ENGINEER SHALL BE BASED UPON THE 100 YEAR FREQUENCY RAINFALL CURVE. TWO COPIES OF THE STUDY SHALL BE SUBMITTED WHICH SHALL INCLUDE PLAN AND PROFILE, TOPOGRAPHY CONTOUR INTERVALS, FLOOD LEVEL LINE, FREEBOARD LINE AND ALL LOTS ADJACENT TO FLOOD PLAIN LIMITS. FLOOD PLAIN STUDIES WILL BE REQUIRED WHENEVER THE DRAINAGE AREA IS GREATER THAN 100 ACRES.

FLOOD PLAIN STUDIES MAY BE REQUIRED WITH THE DRAINAGE AREA GREATER THAN 40 ACRES IF THERE ARE LOTS PROPOSED ADJACENT TO THE STREAM, IT IS A HIGH DENSITY AREA AND THE UPSTREAM DEVELOPMENT (ACTUAL OR PROPOSED) IS NOT CONTROLLED, OR PLANNED TO BE CONTROLLED, BY STORMWATER MANAGEMENT DEVICES. IN ADDITION TO DETERMINING THE 100 YEAR FLOOD PLAIN, THE CITY ENGINEER MAY REQUIRE CALCULATION OF A FLOODWAY.

FLOOD PLAIN STUDIES MAY BE REQUIRED FOR DRAINAGE AREAS LESS THAN 40 ACRES. IF THERE ARE LOTSPROPOSED ADJACENT TO THE STREAM ON WHICH THE PROPOSED BUILDING SITE IS LESS THAN 10 FEET ABOVE THE FLOW LINE OF THE STREAM. IN SUCH CASES WHERE THE FLOOD PLAIN STUDY IS NOT REQUIRED, A BUILDING RESTRICTION LINE SHALL BE SHOWN ON THE PLAT WHICH CONFORMS, AS A MININMUM, TO THE CONTOUR WHICH IS 10 FEET ABOVE THE FLOW LINE OF THE STREAM. AN EASEMENT SHALL BE REQUIRED FOR THE FLOOD AREA AS ESTABLISHED ABOVE.

n) OVERLAND RELIEF: ALL STORM DRAINAGE SYSTEM MUST BE DESIGNED AS A MINIMUM, TO PROVIDE OVERLAND RELIEF FOR THE 100-YEAR STORM WITHOUT DAMAGE OR ENDANGERING NEARBY BUILDINGS.

o) DRAINAGE/ FLOW ARROWS: DRAINAGE ARROWS ARE TO BE SHOWN ON CURB AND GUTTER, STORM SEWERS, DITCHES, ON-SITE PAVEMENT AND DRAINAGE AREAS.

p) MINIMUM ALLOWABLE CLEARANCES: MINIMUM ALLOWABLE CLEARANCE BETWEEN STORM SEWER AND ANY OTHER UNDERGROUND PIPING SHALL BE 3FEET.

q) EROSION PROTECTION AT THE END OF CURB AND GUTTER: EROSION PROTECTION SHALL BE PLACED WHERE CURB AND GUTTER ENDS ON FILL SECTIONS OR ANY SOIL WHICH HAS ERODING CHARACTERISTICS AS DETERMINED BYTHE CITY ENGINEER.

r) PAVED DITCHES: IN ADDITION TO OTHER SITUATIONS THAT REQUIRE PAVED DITCHES, PAVED DITCHES SHALL BE REQUIRED IN ACCORDANCE WITH WV DOH SPECIFICATIONS. ALL PAVED DITCHES SHALL BE SHOWN IN PLAN AND PROFILE BY STATIONING AND GRADE. A TYPICAL SECTION OF PROPOSED DITCH SHALL BE SHOWN ON PLAINS. TRANSITIONING OF PAVED DITCHES TO OTHER APPURTENANCES SHALL BE SHOWN.

s) CONSTRUCTION TO PROPERTY LINE: ALL STORM SEWER PIPES OR SYSTEMS INCLUDING ENERGY DISSIPATING DEVICES SHALL BE CONSTRUCTED TO THE PROPERTY LINE TO PROTECT ADJACENT PROPERTIES. WHERE A STORM SEWER SYSTEM TERMMINATES AT A REAR PROPERTY LINE ABOVE THE TOE OF A FILL SLOPE, THE STORM SEWER SHALL BE CONTINUED TO THE TOE OF THE SLOPE EITHER BY MEANS OF ADDITIONAL PIPE OR PAVED DITCH.

t) CURB INLETS IN SAG POINTS: FOR CURB INLETS OCCURRING IN SAG POINTS OF THE ROADWAY, A MINIUM LENGTH OF THROAT OF SIX (6) FEET SHALL BE REQUIRED AND SHALL BE CALCULATED BASED ON A 0.1% GRADE.

u) MAJOR CULVERT DESIGN: ALL MAJOR CULVERT DESIGNS WILL BE IN ACCORDANCE WITH THE WV DOH STANDARDS.

v) DITCH LININGS: IN STORM DRAINAGE SYSTEMS, PERMANENT DITCH LINERS OF PART-CIRCLE SECTIONS OF BITUMINOUS OR ASBESTOS FIBER PIPE, OR PLASTIC OR SIMILAR MATERIALS OF LIGHT WEIGHT WITH NON-RIDED PROPERTIES, ARE NOT ACCEPTABLE. DITCH LINERS OF PART-CIRCLE SECTIONS OF HEAVY WEIGHT, RIGID PIPE, SUCH AS CEMENT CONCRETE MAY OR MAY NOT BE ACCEPTABLE DEPENDING ON CONDITIONS, MEANS OF JOINTING AND ANCHORING PROVIDED, BEDDING INICATED,ETC. DITCH LININGS OF POURED CONCRETE ARE GENERALLY ACCEPTABLE FOR MOST SITUATIONS.

w) STORM SEWER CONSTRUCTION ON STEEP GRADES: THE NEED FOR ANCHORS MUST BE INVESTIGATED WHEN STORM SEWERS ARE LAID EFFECTUAL ANCHORS TO PREVENT SLIDING WHEN THE SLOPE EXCEEDS 16% GENERALLY, SLOPES OVER 20% ARE NOT ACCEPTABLE UNLESS SPECTICALLY APPROVED BY THE CITY ENGINEER.

x) STANARDS DETAILS-DRAINAGE STRUCTURES: STRUCTURES AND APPURTENANCES FOR INLETS, CURB AND GUTTER, ENDWALLS, JUNCTION, ETC.SHALL CONFORM TO THE WV DOH UNLESS APPROVED OTHERWISE IN WRITING AND ON THE PLANS BY THE CITY ENGINEER. THE USE OF PRECAST WILL BE ALLOWED ATHE THE DISCRETION OF THE CITY ENGINEER. (See attached detail)

7) DETENTION STRUCTURES/INFILTRATION STRUCTURES: REQUIRMENT THAT KEEP AND MANAGE ONSITE THE FIRST (1) INCH OF RAINFALL FROM AN AVERAGE 24-HOUR STORM PROCEEDED BY 48 HOURS OF NO MEASURABLE PRECIPITATION OR THAT EQUAL BENEFITS FOR QUALITY WATER.

a) STORMWATER IS TREATED BEFORE RELEASE TO SURFACE WATERS VIA EXTENDED OR ENGINEERED INFILTRATION. EXTENDED FILTRATION PRACTICES THAT ARE DESIGNED TO CAPTURE AND MANAGE UP TO ONE (1) INCH OF RAINFALL MAY DISCHARGE THROUGH AN UNDERDRAIN SYSTEM.

b) RUN-OFF VOLUME REDUCTION CAN BE ACHIEVED BY:

i) CANOPY INTERCEPTION

ii) SOIL AMENDMENTS

iii) EVAPORATION

iv) EVAPOTRANSPIRATION

v) RAINFALL HARVESTING SUCH AS RAIN TANKS AND CISTERNS

vi) GRASS CHANNELS AND SWALES

vii) REFORESTATION

viii) GREEN ROOFS

ix) ROOFTOP DISCONNECTIONS, SUCH AS GUTTER DRAINS

x) PERMEABLE PAVERS/PAVEMENT

xi) POROUS CONCRETE

xii) ENGINEERED INFILTRATION INCLUDING EXTENDED INFILTRATION VIA BIORETENTION CELLS WITH EVENTUAL RELEASE

xiii) RELEASE TO GROUNDWATER MAY REQUIRE AN UNDERGROUND INJECTION CONTROL PERMIT AND PERMITTEES ARE REQUIRED TO LIST PROJECTS USING THIS PRACTICE IN THE ANNUAL REPORT

xiv) ANY COMBINATION OF THESE METHODS.

c) A REDUCTION OF 0.2 INCHES FROM THE ONE INCH RUNOFF REDUCTION STANDARD MAY BE APPLIED TO ANY OF THE FOLLOWING TYPES OF DEVELOPMENT:

i) REDEVELOPMENT

ii) BROWNFIELD REDEVELOPMENT

iii) HIGH DENSITY (>7 UNITS PER ACRE)

iv) VERTICAL DENSITY, (FLOOR TO AREA RATIO (FAR) OF 2 OR > 18 UNITS PER ACRE)

v) MIXED USE AND TRANSIT ORIENTED DEVELOPMENT (Within ½ mile of transit)

STORMWATER DESIGN MANUAL
GRAVITY FLOW

Manning Equation

$$V = (1.49/n) * R^{0.67} * S^{0.50}$$ where;

V = Velocity in FPS.

n = Pipe roughness coefficient.

S = Slope in feet per foot.

R = Hydraulic radius. where;

$$R = \frac{\text{cross sectional area of flow}}{\text{wetted perimeter}}$$

$Q = V * A$ where;

Q = Flow in CFS.

V = Velocity in FPS.

A = Cross sectional area of flow in SQ. FT.

Roughness Coefficients, n

High Density Polyethylene Pipe Smooth Wall (HDPE)	0.012
Reinforced Concrete Pipe (RCP)	0.013

STORMWATER DESIGN MANUAL
RUNOFF CALCULATION

Rational Method

$Q = C * I * A$ where;

Q = Runoff flow rate in CFS.

C = Runoff coefficient.

I = Rainfall intensity in IN/HR.

A = Area in ACRES.

Using STEEL formula to calculate I.

For a 10 year event;

$$I = 170/(23 + Tc)$$ where;

Tc = Time of concentration in MINUTES.

Using KIRPICH formula to calculate Tc.

$$Tc = 0.00013 * (L)^{0.77} / (S)^{0.385}$$ where;

L = the runoff travel length in feet from the most remote point in the watershed.

S = the average slope estimated as;

$$S = \frac{Er - Ed}{L}$$ where;

Er = the elevation at the most remote point in the watershed.

Ed = the elevation at the discharge point of the watershed.

C. Runoff Coefficients

Roofs	0.80 – 0.95
Drives and walks	0.75 – 0.90
Pavement, concrete, asphalt, etc.	0.75 – 0.95
Compacted gravel	0.60 – 0.80
Loose gravel	0.25 – 0.40
Pervious soil, light growth	0.20 – 0.40
Pervious soil, heavy growth	0.15 – 0.35
Impervious soil, light growth	0.25 – 0.50
Impervious soil, heavy growth	0.35 – 0.60
Central business districts	0.65 – 0.85
Dense residential	0.50 – 0.70
Suburban residential	0.35 – 0.60
Rural areas, parks, etc.	0.15 – 0.30
Light industrial	0.50 – 0.80
Heavy industrial	0.60 – 0.90

VII GENERAL REQUIREMENTS FOR INSTALLATION OF DRAINAGE APPURTENANCES

1) CONSTRUCTION STAKEOUT: PRIOR TO THE CONSTRUCTION OF ANY STORM DRAINAGE SYSTEM, THE OWNERS OF DEVELOPERS ENGINEER OR SURVEYOR SHALL PLACE ADEQUATE LINE AND GRADE STAKES AND SHALL ALSO SET TO FINISH GRADE, ALL IN ACCORDANCE WITH APPROVED PLANS.

2) BEDDING: THE PROVISIONS OF THE CURRENT SECTIONS OF THE WV DOH SPECIFICATIONS SHALL APPLY FOR THE BEDDING REQUIREMENTS OF STORM DRAINAGE SYSTEM

3) BACKFILLING: ALL STORM DRAINAGE PIPE CULVERTS SHALL BE BACK-FILLED TO A MINIUM DEPTH OF COVER TWO (2) FEET ABOVE THE TOP OF THE PIPE. (See 5 under construction methods and material)

WHEN THE STORM DRAIN IS UNER THE CURB AND GUTTER, A MINIUM OF NINE (9) INCHES CLEARANCE FROM THE BOTTOM OF THE GUTTER MAY BE PERMITTED BY THE CITY ENGINEER.

4) PIPE MATERIALS: UNLESS OTHERWISE APPROVED IN WRITING BY THE CITY ENGINEER, OR UNLESS SPECIFICALLY INDICATED ON PLANS HAVING HIS APPROVAL, ALL PIPE USED FOR CONSTRUCTION OF STORM DRAINAGE SYSTEMS SHALL BE CONCRETE CULVERT PIPE OR HDPE PIPE MEETING THE CURRENT AND APPROPRIATE SPECIFICATIONS OF THE AMERICAN SOCIETY FOR TESTING MATERIALS. THE LAYING LENGTH SHALL NOT BE LESS THAN THREE (3) FEET FOR CONCRETE PIPE.

5) JOINTING-RUBBER GASKET: THE USE OF RUBBER GASKETS WHEN JOINTING CONCRETE PIPES WILL BE PERMITTED PROVIDED THAT INSTALLATION IS IN STRICT ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS AND THE RECOMMENDED LUBRICANTS IS USED. THE TYPE OF RUBBER GASKET, LUBRICANT, AND PIPE THEREFOR WILL BE SUBJECT TO APPROVAL BY THE CITY ENGINEER OR DESIGNATED AGENT.

6) JOINTING SPECIFICATIONS: ALL JOINTING OF CONCRETE OR HDPE PIPE MUST COMPLY WITH THE CURRENT CRITERIA, STANDARDS, AND SPECIFICATIONS OF THE PIPE MANUFACTURER.

7) DITCH CONSTRUCTION: DITCHES SHALL BE CONSTRUCTION TRUE TO THE APPROVED CROSS-SECTION AND SHALL BE CONSTUCTED ON A

UNIFORM GRADE AND STRAIGHT LINE WITH THE LONGITUDINAL AXIS OF THE DRAIN PIPE.

8) CURB AND GUTTER CONSRUCTION: CURB AND GUTTER CONSTRUCTION SHALL BE IN SECTIONS OF UNIFORM LENGTH, APPOXIMATELY TEN (10) FEET AND NO SECTION SHALL BE LESS THAN SIX (6) FEET IN LENGTH.

9) EXPANSION JOINTS: EXPANSION JOINTS SHALL BE PLACED IN HEADER CURB, COMBINATION CURB AND GUTTER, AND SIDEWALK EVERY FORTY (40) FEET. WHERE STATIONARY STRUCTURES SUCH AS DROP INLETS, AND SIDEWALKS, AN EXPANSION JOINT SHALL BE PLACED BETWEEN THE STRUCTURE AND THE CURB AND GUTTER AND SIDEWALK.

10) DROP INLETS: ALL DROP INLETS AND INSTALLATION SHALL COMPLY WITH WV DOH ROAD AND BRIDGE STANDARD DETAIL SPECIFICATIONS OR SPECIFICATIONS APPROVED BY THE CITY ENGINEER OR DESIGNATED AGENT.

11) HEADWALLS: ALL HEADWALLS SHALL BE CONCRETE AND INSTALLED IN ACCORDANCE WITH CURRENT WV DOH ROAD AND BRIDGE STANDARD DETAIL SPECIFICATIONS.

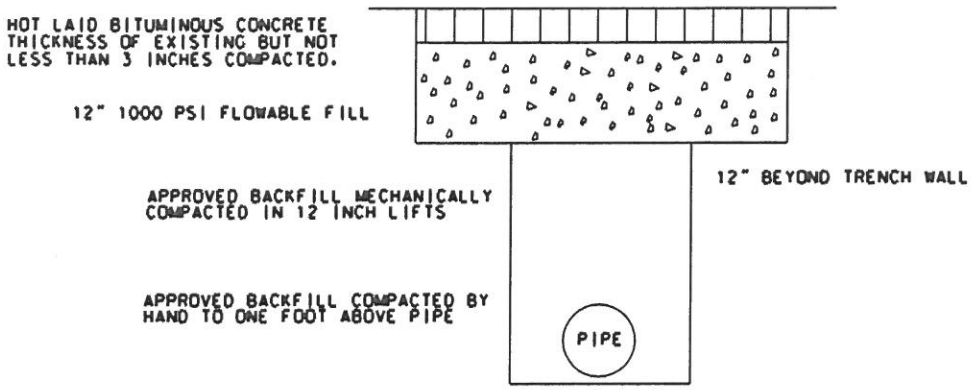
12) DETENTION STRUCTURES: ALL DETENTION STRUCTURES SHALL BE INSTALLED PER THE WEST VIRGINIA ERSION AND SEDIMENT CONTROL HANDBOOK FOR DEVELOPING AREAS 1993 EDITION.

13) SILT FENCE: ALL SILT FENCE SHALL BE INSTALLED PER THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK FOR DEVELOPING AREAS 1993 EDITION (See attached detail)

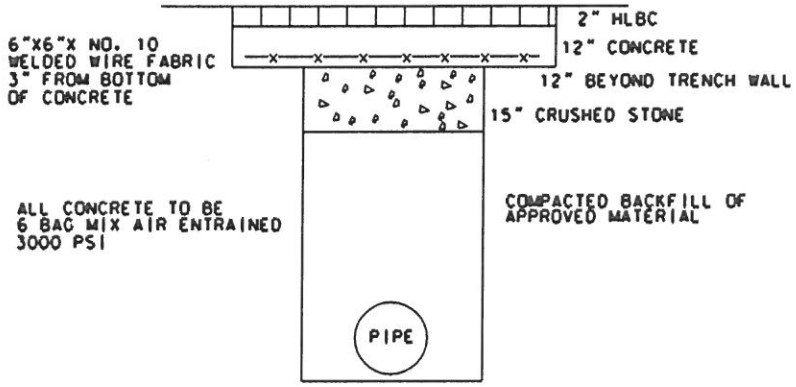
14) TRENCH REPAIR: ALL TRENCH REPAIR SHALL BE COMPLETED PER ATTACHED DRAWING FOR THE CITY OF FAIRMONT TRENCH REPAIR IN STREET RIGHT OF WAY AND REPAIR OUT OF THE STREET RIGHT OF WAY (SEE ATTACHED DETAIL)

VIII DESIGN STANDARDS: DESIGN STORM FOR FLOOD PLAINS USE 100 YEAR STORM, FOR NON-FLOODPLAIN USE 10 YEAR STORM, FOR DETENTION STRUCTURES USE 10 YEAR STORM. (See attached detail sheets for formulas, calculations and coefficients).

IX CONSTRUCTION SITE OPERATIONS TO CONTROL WASTE: CONSTRUCTION SITE OPERATORS NEED TO CONTROL THE FOLLOWING WASTE ITEMS.

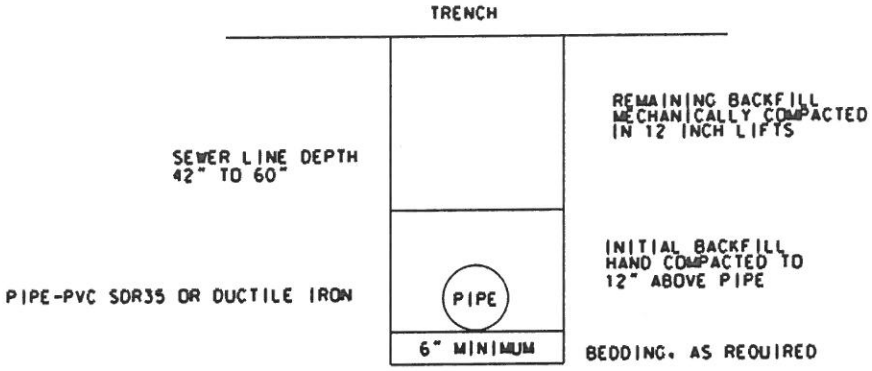


DETAIL G-1A
TRENCH REPAIR CITY STREET

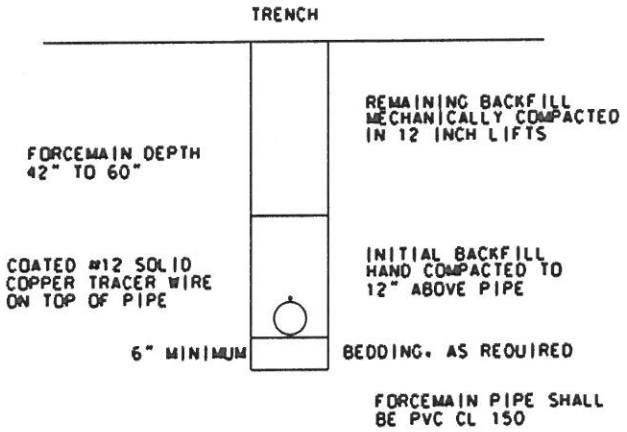


DETAIL G-1B
TRENCH REPAIR STATE HIGHWAY TYPE "B"

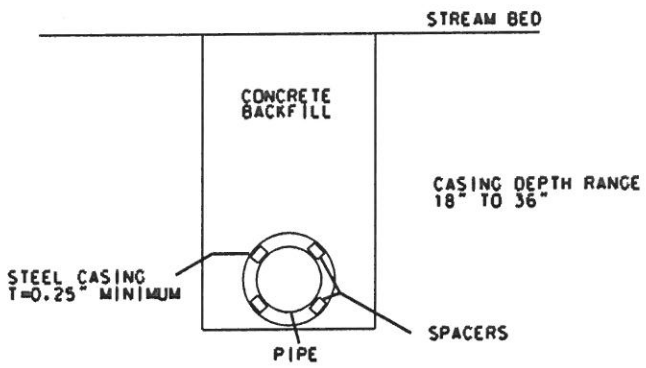
REVISIONS	GENERAL STANDARD STREET DETAIL	CITY OF FAIRMONT FAIRMONT, WEST VIRGINIA OFFICE OF THE ENGINEER	JUL 2006 DR. BY: JWF DR. NO: G-1



DETAIL S-2A
TYPICAL TRENCH DETAIL-GRAVITY SEWER

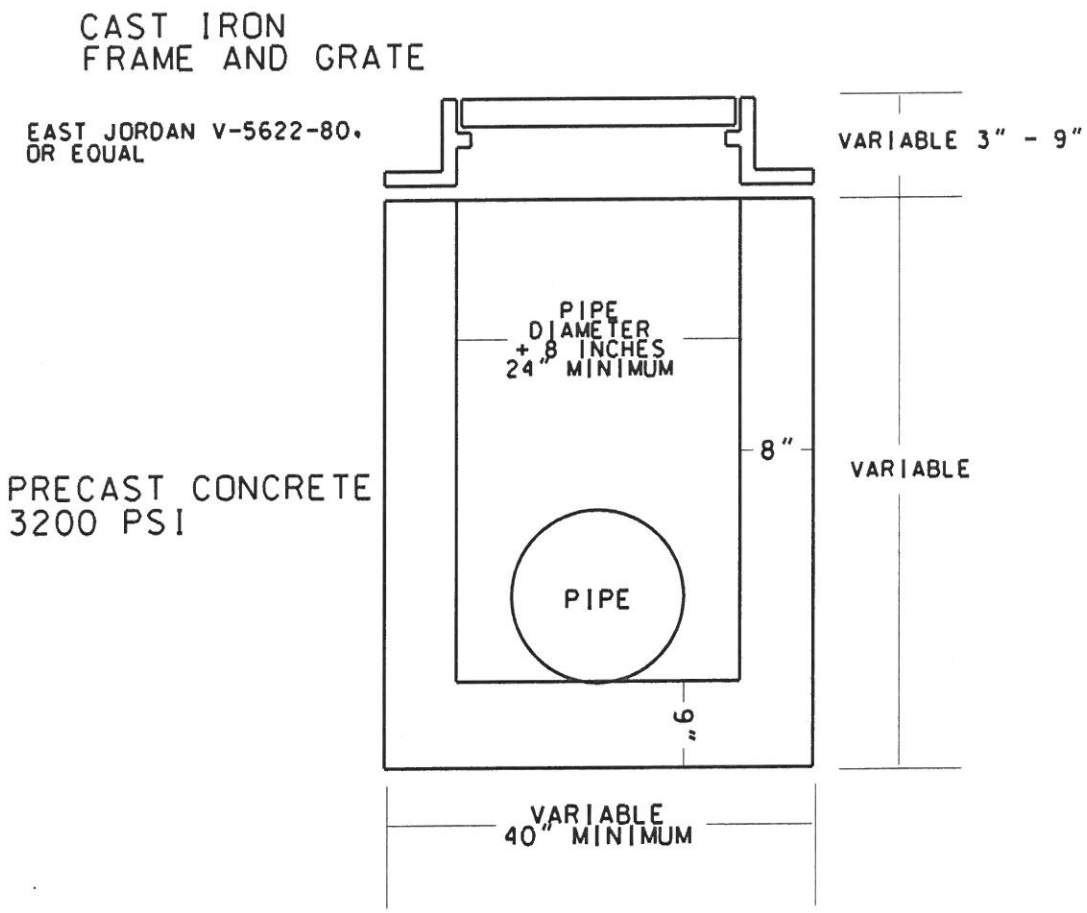


DETAIL S-2B
TYPICAL TRENCH DETAIL-FORCEMAIN



DETAIL S-2C
STREAM CROSSING TRENCH DETAIL

REVISIONS	SANITARY SEWER BOARD TYPICAL TRENCH DETAIL	CITY OF FAIRMONT FAIRMONT, WEST VIRGINIA OFFICE OF THE ENGINEER	JAN 2005
			DR. BY: JWF
			DR. NO: S-2



DETAIL ST-1
DROP INLET DETAIL

REVISIONS	SANITARY SEWER BOARD STANDARD DROP INLET DETAIL	CITY OF FAIRMONT FAIRMONT, WEST VIRGINIA OFFICE OF THE ENGINEER	JUL 2006 DR. BY: JWF DR. NO: ST-1

1) DISCARDED BUILDING MATERAIL NEEDS TO BE PUT IN A DUMPSTER, TRAILOR OR DUMP TRUCK AND PROPERLY DISPOSED OF.

2) A SUMP PIT NEEDS TO BE DUG FOR A CONCRETE TRUCK WASHOUT LOCATION OR THE TRUCK NEEDS TO GO BACK TO THEIR PLANT AND WASH OUT.

3) CHEMICALS ARE TO BE DISPOSED OF IN MANNER IN ACCORDANCE WITH THE MSD SHEETS FOR THAT CHEMICAL.

4) A PORTABLE TOILET OR A TEMORARY OR PERMANT CONECTION TO MAIN SANITARY SEWER MAY BE USED FOR SANITARY WASTE

X STORMWATER SETTLEMENT CONTOL DEVICES:

1) SILT FENCES

a) DEFINITION: A TEMPORARY BARRIER WITH A LIFE EXPECTANCY OF SIX (6) MONTHS OR LESS, INSTALLED BELOW SMALL SISTURED AREAS OR AT THE TOE OF A SLOPE.

b) PURPOSE: THE PURPOSE OF A SILT FENCE IS TO INTERCEPT AND DETAIN SEDIMENT FROM SMALL UNPROTECTED AREAS.

c) CONDITIONS WHERE PRACTICE APPLIES: A SILT FENCE MAY BE USED WHERE.

i) THERE IS NO CONCENTRATION OF WATER IN A CHANNEL OT OTHER DRAINAGE WAY ABOVE THE BARRIER.

ii) EROSION WILL OCCURIN THE FORM OF SHEET OR RILL EROSION.

iii) PROTECTION OF A PROPERTY LINE OR LIMITS OF GRADING IS REQUIRED.

iv) THE LENGTH OF SLOPE OF THE CONTRIBUTING DRAINAGE AREA ABOVE THE FENCE IS LESS THAN 200 FEET. THE SLOPE SHOULD BE 25 PERCENT OR LESS. IF SLOPE IS GREATER THAN 25 PERCENT, FENCES SHOULD BE LOCATED ON 100 FEET SPACING.

2) DESIGN CRITERIA

a) ALL SILT FENCES SHALL BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE

b) A DETAIL OF THE SILT FENCE SHALL BE SHOWN ON THE PLAN, AND CONTAIN THE FOLLOWING MINIMUM REQUIREMENTS:

i) THE TYPE, SIZE, AND SPACING OF FENCE POST.

ii) THE SIZE OF WOVEN WIRE SUPPORT FENCE.

iii) THE TYPE OF FILTER CLOTH USED.

iv) THE METHOD OF ANCHORING THE FILTER CLOTH.

3) MATERIALS

a) SILT FENCE CLOTH: FILTER FABRIC SHALL BE A PERVIOUS SHEET OF WOVEN GEOTEXTILE FABRIC CONSISTIONG OF LONG CHAIN POLYMERIC FILAMENTS OR YARN SUCH AS POLYPROPYLENE, POLYETHYLIDENE-CHLORIDE. THE FABRIC SHALL BE FIXED SO THAT THE FILAMENTS OR YARNS RETAIN THEIR RELATIVE POSITIONS TO EACH OTHER. THE FABRIC SHALL BE RESISTANT TO COMMONLY ENCOUNTERED CHEMICALS, MILDEW, ROT, INSECTS, AND RODENTS.

b) FENCE POSTS: THE LENGTH SHALL BE MINIMUM OF 48 INCHES LONG. WOODPOSTS WILL BE OF SOUND QUALITY HARDWOOD WITH A MINIMUM DIAMETER OF TWO (2) INCHES, OR AS APPROVED. STEEL POSTS WILL BE STANDARD T OR U SECTION WEIGHING NOT LESS THAN 1.33 POUNDS PER LINEAR FOOT.

c) WIRE FENCE: WHERE REQUIRED WOVEN WIRE FENCING SHALL BE A MINIUM SIX (6) INCH MESH OPENINGS, OR AS APPROVED.

4) PREFABRICATED SILT FENCE: PREFABRICATED SILT FENCE WITH POSTS ATTACHED IS AVAILABLE. THIS FENCEIS INSTALLED IN A MANNER SIMIULAR TO THAT DESCRIBED ABOVE. WHILE THIS TYPE OF FENCE IS CHEAPER AND EASIER TO INSTALL, IT REQUIRES MORE MAINTENANCE IN ORDER TO PERFORM SATISFACTORILY. (See attached sheets figure 3.27.1 and figure3.28.1)

FIGURE 3.20.3

SIDE HILL CUT AND FILL

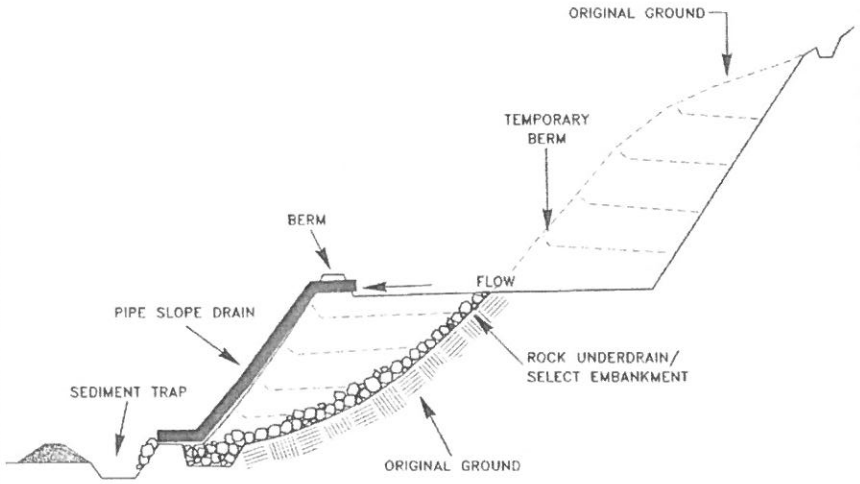
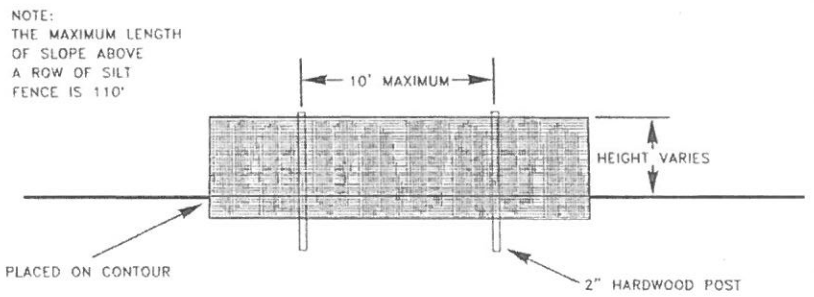
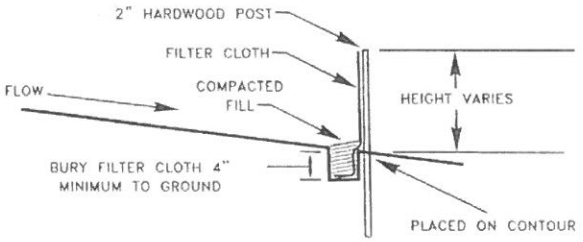


FIGURE 3.27.1

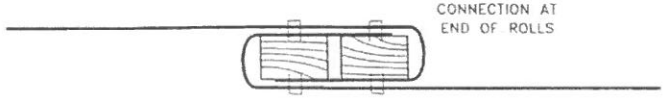
SILT FENCE



FRONT ELEVATION



SIDE ELEVATION



TOP VIEW

FIGURE 3.28.1

SUPER SILT FENCE

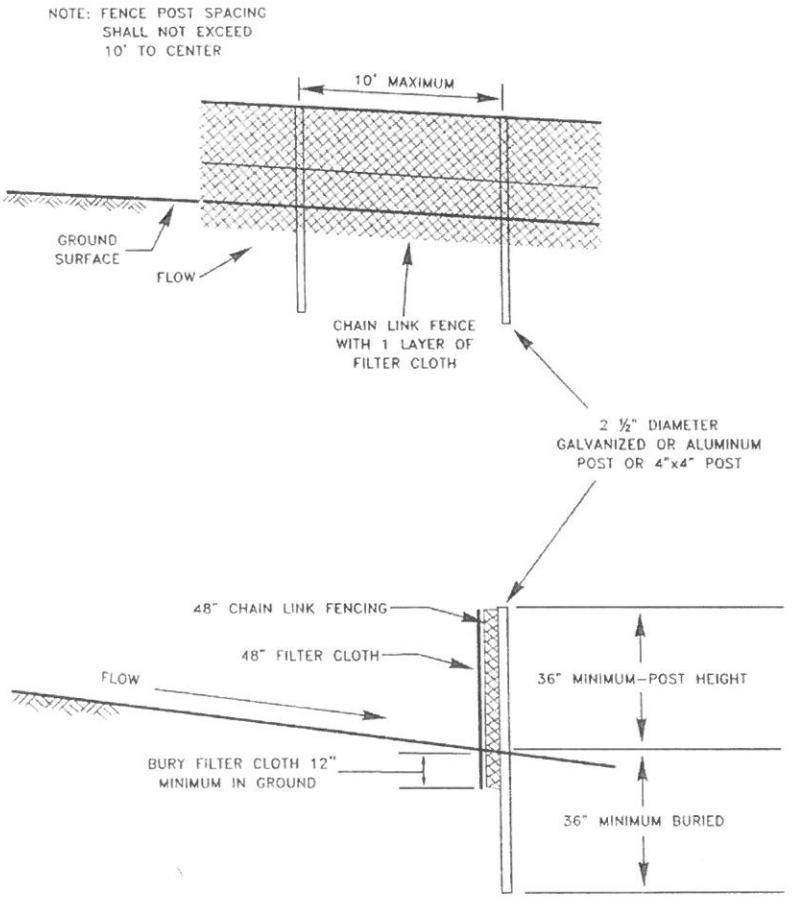
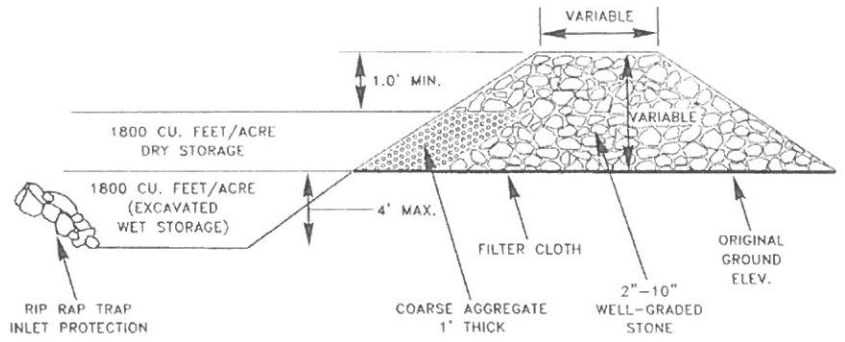
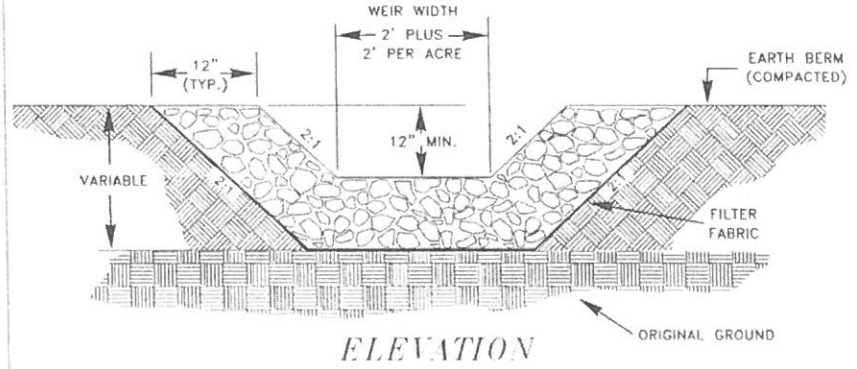


FIGURE 3.29.1

ROCK OUTLET SEDIMENT TRAP



CROSS SECTION



ELEVATION

SOURCE: VA DSWC

Construction Stormwater

Multi-Sector Stormwater

Municipal Separate Storm Sewer Systems

Construction Stormwater General Permits

Construction Stormwater General Permit

Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it picks up pollutants like sediment, debris and chemicals. Polluted stormwater runoff can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat and high volumes of runoff can cause stream bank erosion.

The WV NPDES Stormwater Program requires operators of construction sites that disturb one (1) acre or greater, including smaller sites that are part of a larger common plan of development, to obtain authorization to discharge stormwater under an NPDES Construction Stormwater General Permit.

Who Needs Permit Coverage?

If you are going to disturb one acre or greater you are required to first obtain a stormwater construction permit. The application and instructions for this activity are linked below.

About the Permit

The WV DEP has developed and issued a General WV/NPDES Water Pollution Control Permit to regulate sediment laden stormwater flowing into the waters of the State from discharges associated with construction activities. The General Permit was issued on December 5, 2012, became effective on January 5, 2013. This permit will expire on January 3, 2018, at which time, the DEP will reissue the permit.

Any person proposing a construction activity, three (3) acres or greater of land disturbance in size, shall submit a Site Registration Application Form 60 days prior to commencing the operation.

For projects that will disturb one (1) acre and less than three (3) acres, the responsible party must submit a Notice of Intent (NOI) at least 15 days prior to starting earth disturbing activities.

When the construction activity is owned by one person but operated by another, it is the responsibility of the owner (developer) to obtain the permit.

When the construction activity is completed and all disturbed areas are stabilized, the responsible party must submit a Notice of Termination (NOT) in order to end coverage under the General Permit.

CLICK HERE for Application Forms and Instructions

Oil & Gas Construction Stormwater General Permit

The State of West Virginia, Department of Environmental Protection, Division of Water and Waste Management has issued a State General Water Pollution Control Permit to regulate the discharge of stormwater runoff associated with oil and gas related construction activities. The General Permit authorizes discharges composed entirely of stormwater associated with oil and gas field activities or operations associated with exploration, production, processing or treatment operations or transmission facilities, disturbing one acre or greater of land area, to the waters of the State.

CLICK HERE for Application Forms and Instructions

A list of Tier 3 waters can be found HERE (large pdf).
For additional information regarding Antidegradation rules please see the Water Quality Standards page.

For more information about the Construction Stormwater Program, you may contact the individuals listed below.

Program Manager
Connie Anderson,
Environmental Resouces Program Manager 2
304-926-0499, ext. 1073 Connie.J.Anderson@wv.gov

CSW GP Plan Reviewers

Curtis Hardman
Environmental Resources Specialist
WV DOH Projects
304-465-1938 ext. 3049 Curtis.H.Hardman@wv.gov

Natalie Hardman
Environmental Resources Specialist
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Oil & Gas Construction GP

Joe Cochran
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Sharon.A.Mullins@wv.gov

vacant

Alice Cooper
Environmental Resources Associate
304-926-0499, ext. 1103
Alice.E.Cooper@wv.gov

Site Registration Status
To check the status of your application/registration please use our online search
Water Resources Pending Application Search

Permit Status
To check the status of an issued permit use our online search
Water Resources Permit Search

DEP Offices | Contact Us | DEP Staff Directory | Site Map | Privacy Notice | DOP Homepage | DOP Vacancy Announcements

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