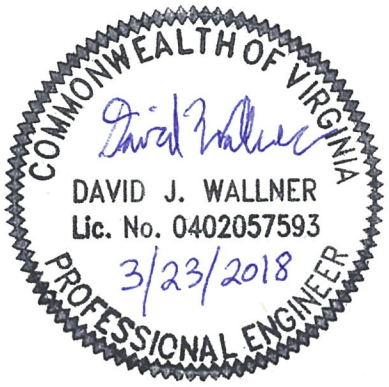
By virtue of this seal and signature, all supporting documents included in this package are accurate and support the design presented herein.

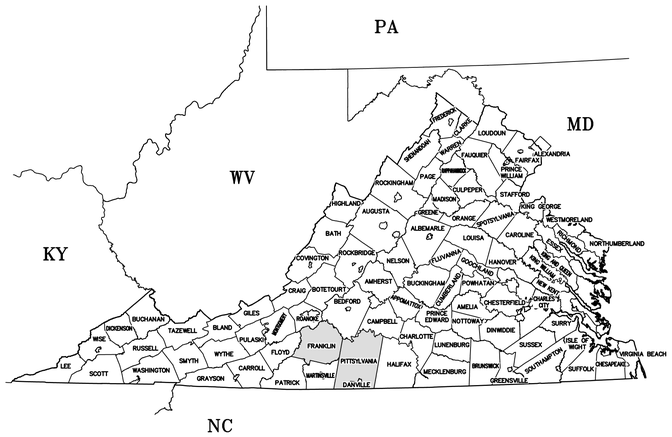


MOUNTAIN VALLEY PIPELINE, LLC

EROSION & SEDIMENT CONTROL PLAN

MVP PIPELINE PROJECT
FRANKLIN COUNTY TO PITTSYLVANIA COUNTY
SPREAD 11

DRAWING INDEX	
SHEET No.	DRAWING TITLE
GENERAL SET	
0.00	COVER SHEET
0.01 TO 0.21	EROSION AND SEDIMENT CONTROL DETAILS
0.22 TO 0.23	GENERAL NOTES AND LEGEND
SPREAD 11	
15.00A	VARIANCE AND EXEMPTION REQUESTS
15.01–15.03	KEY PLAN
15.04EX TO 15.93EX	EXISTING CONDITIONS
15.04ES TO 15.99ES	EROSION & SEDIMENT CONTROL PLANS
15.04PC TO 15.93PC	POST CONSTRUCTION STORMWATER AND RESTORATION PLANS



LOCATION MAP
N.T.S.

A CERTIFIED CONSTRUCTION RECORD DRAWING FOR PERMANENT SWM FACILITIES SHALL BE SUBMITTED TO DEQ FOR APPROVAL. CONSTRUCTION INSPECTIONS AND SURVEYS, PERFORMED BY A LICENSED PROFESSIONAL, SHALL BE REQUIRED AT EACH STAGE OF INSTALLATION (CONSTRUCTION) AS NECESSARY TO CERTIFY THAT THE SWM FACILITY HAS BEEN BUILT IN ACCORDANCE WITH THE APPROVED PLAN AND DESIGN SPECIFICATIONS. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF TWO (2) BUSINESS DAYS' NOTICE TO THE CERTIFYING PROFESSIONAL TO ALLOW FOR CRITICAL INSPECTIONS.

WATERS OF THE U.S. PERMITS CERTIFICATION

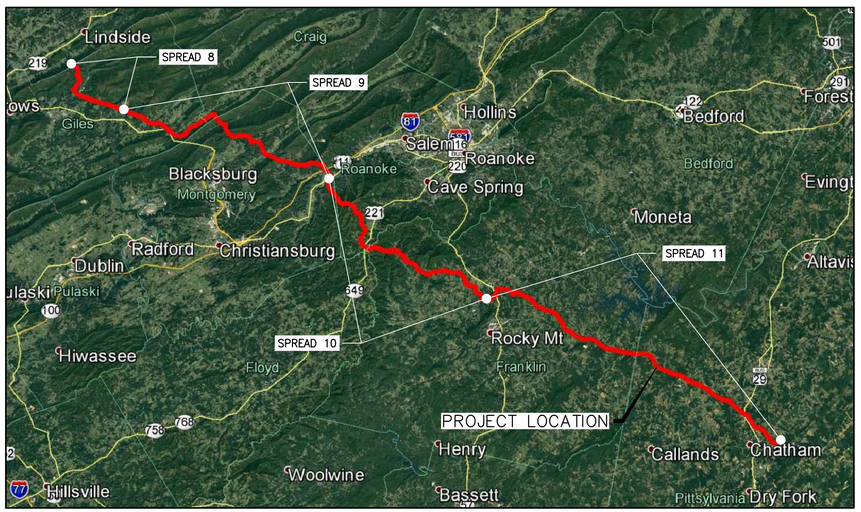
I HEREBY CERTIFY THAT ALL WETLAND AND WATERBODY PERMITS REQUIRED BY LAW WILL BE OBTAINED PRIOR TO COMMENCING WITH LAND DISTURBING ACTIVITIES.

SIGNATURE _____

OWNER/DEVELOPER _____

NAME TITLE

NOTE: PERMITS MUST BE PRESENTED TO THE COUNTY INSPECTOR PRIOR TO LAND DISTURBANCE.



LOCATION MAP
MVP PIPELINE PROJECT
GILES COUNTY, VIRGINIA TO PITTSYLVANIA COUNTY, VIRGINIA

va811.com Dig With CARE

THREE DAYS BEFORE YOU DIG

CALL VA ONE CALL
SYSTEM TOLL FREE
811
OR
1-800-552-7001

CONTRACTOR IS RESPONSIBLE TO IDENTIFY ALL UTILITIES. THE UTILITY LINES SHOWN ON THE PLAN ARE FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT SURVEYED LINE INFORMATION.

NO.:	DATE:	DWN.:	CHKD.:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

TETRA TECH
complex world | CLEAR SOLUTIONS™
661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

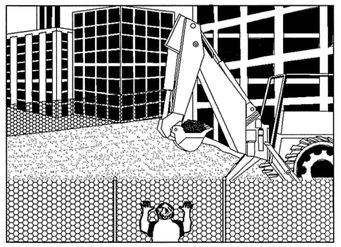
COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
REVISION	
SHT. NO.	0.00 OF 0.23

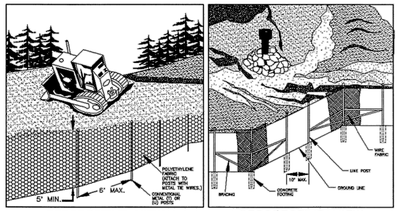
TETRA TECH CAD FILE PATH: X:\CADD_Pittsburgh\EQT\7157 – MVP\00 – General\E&S\Spread 11\7157ES000(S11).dwg PLOTTED ON: 2/3/2018 7:58 AM PLOTTED BY: Rickabaugh, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb

1992 3.01

SAFETY FENCE



PERSPECTIVE VIEW



PERSPECTIVE VIEW
PLASTIC FENCE

PERSPECTIVE VIEW
METAL FENCE

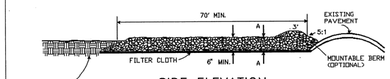
Source: Adapted from Conwed Plastics and VDOT Road and Bridge Standards

Plate 3.01-1

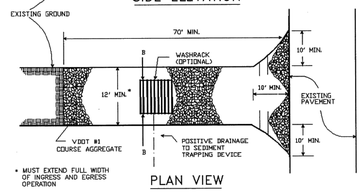
SAFETY FENCE
TAKEN FROM VADEQ 1992 MANUAL

1992 3.02

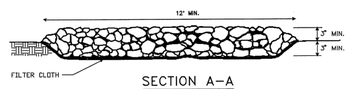
STONE CONSTRUCTION ENTRANCE



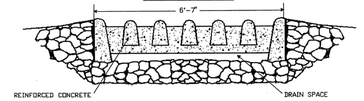
SIDE ELEVATION



PLAN VIEW



SECTION A–A



SECTION B–B

Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC

Plate 3.02-1

STONE CONSTRUCTION ENTRANCE
TAKEN FROM VADEQ 1992 MANUAL

WASH RACK SHALL BE 20 FEET (MIN.) WIDE OR TOTAL WIDTH OF ACCESS.

WASH RACK SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE ANTICIPATED CONSTRUCTION VEHICULAR TRAFFIC.

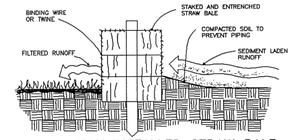
A WATER SUPPLY SHALL BE MADE AVAILABLE TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.

MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FURTHER USE OF THE RACK. ALL SEDIMENT DEPOSITED ON ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

AT A MINIMUM, ROCK CONSTRUCTION ENTRANCES WITH WASH RACKS SHOULD BE CONSTRUCTED TO THE LENGTH, WIDTH, AND THICKNESS DIMENSIONS SHOWN ON STANDARD CONSTRUCTION DETAIL #3-2. A METAL WASH RACK OR LIVESTOCK GRATE IS AN ACCEPTABLE ALTERNATIVE TO THE REINFORCED CONCRETE ONE SHOWN IN THE STANDARD DETAIL. APPROACHES TO THE WASH RACK SHOULD BE LINED WITH AASHTO #1 AT A MINIMUM OF 25' ON BOTH SIDES. THE WASH RACK SHOULD DISCHARGE TO A SEDIMENT REMOVAL FACILITY, SUCH AS A CHANNEL LEADING TO A SEDIMENT REMOVAL DEVICE (E.G. A SEDIMENT TRAP OR SEDIMENT BASIN). ROCK CONSTRUCTION ENTRANCES WITH WASH RACKS SHOULD BE MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK WHEN NECESSARY AT THE END OF EACH WORKDAY. A STOCKPILE OF ROCK MATERIAL SHOULD BE MAINTAINED ON SITE FOR THIS PURPOSE.
SEDIMENT DEPOSITED ON PAVED ROADWAYS SHOULD BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.
NOTE: WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.
DAMAGED WASH RACKS SHOULD BE REPAIRED AS NECESSARY TO MAINTAIN THEIR EFFECTIVENESS.

1992 3.04

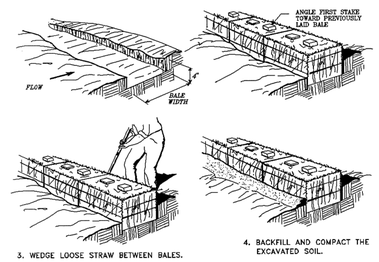
STRAW BALE BARRIER



PROPERLY INSTALLED STRAW BALE
(CROSS SECTION)

1. EXCAVATE THE TRENCH.

2. PLACE AND STAKE STRAW BALES.



3. WEDGE LOOSE STRAW BETWEEN BALES.

4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

CONSTRUCTION OF STRAW BALE BARRIER

Source: Va. DSWC

Plate 3.04-1

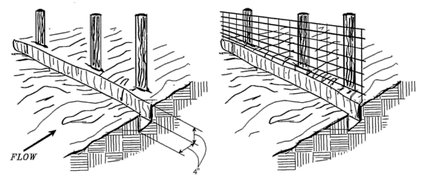
STRAW BALE BARRIER
TAKEN FROM VADEQ 1992 MANUAL

1992 3.05

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)

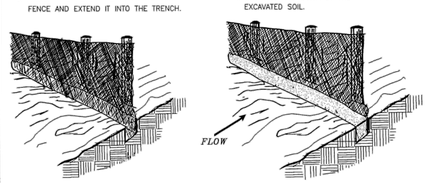
1. SET POSTS AND EXCAVATE A 4"X4" TRENCH UPSLOPE ALONG THE LINE OF POSTS.

2. STAPLE WIRE FENCING TO THE POSTS.

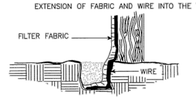


3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.

4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



EXTENSION OF FABRIC AND WIRE INTO THE TRENCH.



Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-1

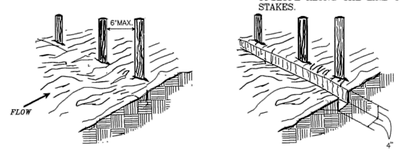
CONSTRUCTION OF SILT FENCE
(WITH WIRE SUPPORT)
TAKEN FROM VADEQ 1992 MANUAL

1992 3.05

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

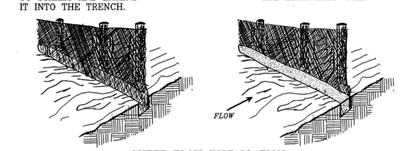
1. SET THE STAKES.

2. EXCAVATE A 4"X 4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.

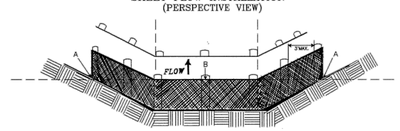


3. STAPLE FILTER MATERIAL TO STAKES AND EXTEND IT INTO THE TRENCH.

4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)



POINTS A SHOULD BE HIGHER THAN POINT B.

DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)

Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

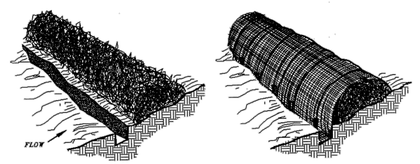
Plate 3.05-2

CONSTRUCTION OF SILT FENCE
(WITHOUT WIRE SUPPORT)
TAKEN FROM VADEQ 1992 MANUAL

1992 3.06

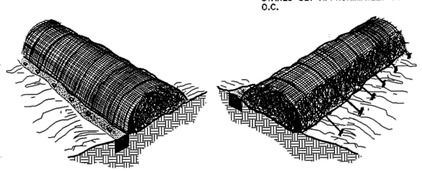
CONSTRUCTION OF A BRUSH BARRIER COVERED BY FILTER FABRIC

(TREE/RESIDUAL MATERIAL WITH DIAMETER > 6")



1. EXCAVATE A 4"X 4" TRENCH ALONG THE UPHILL EDGE OF THE BRUSH BARRIER.

2. DRAPE FILTER FABRIC OVER THE BRUSH BARRIER AND INTO THE TRENCH. FABRIC SHOULD BE SECURED IN THE TRENCH WITH STAKES SET APPROXIMATELY 36" O.C.



3. BACKFILL AND COMPACT THE EXCAVATED SOIL.

4. SET STAKES ALONG THE DOWN-HILL EDGE OF THE BRUSH BARRIER, AND ANCHOR BY TYING TWINE FROM THE FABRIC TO THE STAKES.

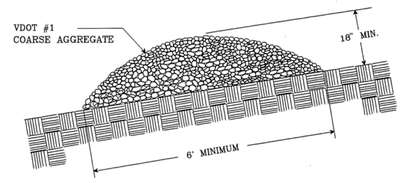
Source: Va. DSWC

Plate 3.06-1

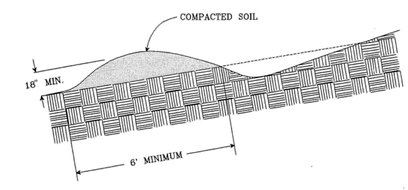
CONSTRUCTION OF A BRUSH BARRIER
TAKEN FROM VADEQ 1992 MANUAL

1992 3.11

TEMPORARY RIGHT-OF-WAY DIVERSIONS



TYPICAL GRAVEL STRUCTURE



TYPICAL EARTHEN STRUCTURE

Source: Va. DSWC

Plate 3.11-1

TEMPORARY RIGHT-OF-WAY DIVERSION
DEVELOPED FROM VADEQ 1992 MANUAL

NO.:	DATE:	DWN.:	CHKD:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

TETRA TECH
complex world | CLEAR SOLUTIONS™
661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

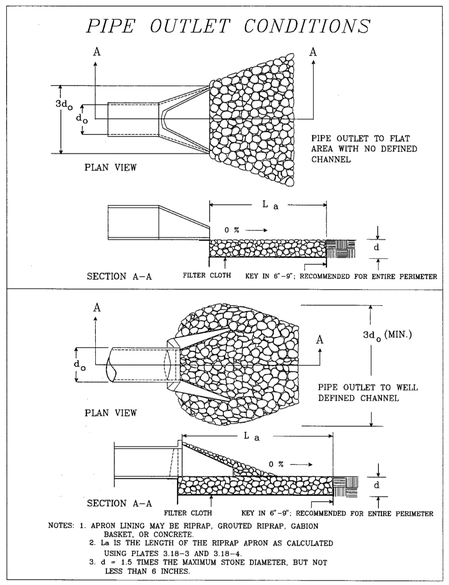
GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.01 OF 0.23

REVISION

PIPE OUTLET CONDITIONS



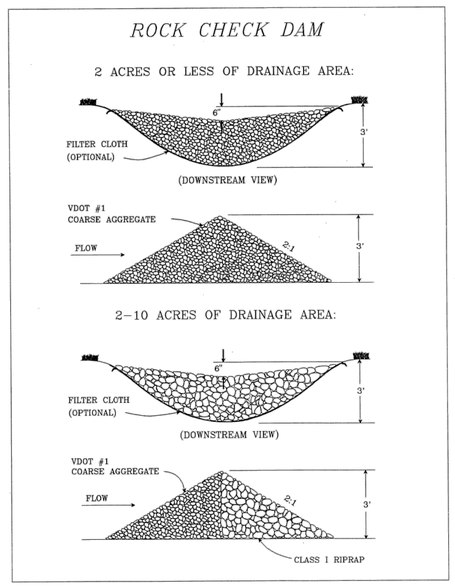
NOTES: 1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, GABION BASKET, OR CONCRETE.
2. La IS THE LENGTH OF THE RIPRAP APRON AS CALCULATED USING PLATES 3.18–3 AND 3.18–4.
3. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6 INCHES.

Source: Va. DSWC

Plate 3.18-1

PIPE OUTLET CONDITIONS
TAKEN FROM VADEQ 1992 MANUAL

ROCK CHECK DAM



Source: Va. DSWC

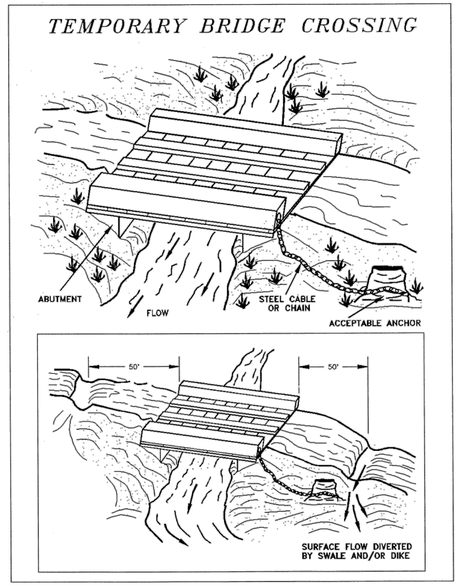
Plate 3.20-1

ROCK CHECK DAM
DEVELOPED FROM VADEQ 1992 MANUAL

NOTES:
NO FORMAL DESIGN IS REQUIRED FOR A CHECK DAM, HOWEVER THE FOLLOWING CRITERIA SHOULD BE ADHERED TO WHEN SPECIFYING CHECK DAMS:

1. THE DRAINAGE AREA OF THE DITCH OR SWALE BEING PROTECTED SHALL NOT EXCEED 2 ACRES WHEN VDOT #1 COARSE AGGREGATE IS USED ALONE AND SHALL NOT EXCEED 10 ACRES WHEN A COMBINATION OF CLASS I RIPRAP (ADDED FOR STABILITY) AND VDOT #1 COARSE AGGREGATE IS USED.
2. THE MAXIMUM HEIGHT OF THE DAM SHALL BE 3.0 FEET.
3. THE CENTER OF THE CHECK DAM MUST BE AT LEAST 6 INCHES LOWER THAN THE OUTER EDGES. FIELD EXPERIENCE HAS SHOWN THAT MANY DAMS ARE NOT CONSTRUCTED TO PROMOTE THIS "WEIR" EFFECT. STORMWATER FLOWS ARE THEN FORCED TO THE STONE-SOIL INTERFACE, THEREBY PROMOTING SCOUR AT THE POINT AND SUBSEQUENT FAILURE OF THE STRUCTURE TO PERFORM ITS INTENDED FUNCTION.
4. FOR ADDED STABILITY, THE BASE OF THE CHECK DAM CAN BE KEYED INTO THE SOIL APPROXIMATELY 6 INCHES.
5. THE MAXIMUM SPACING BETWEEN THE DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM.
6. HAND OR MECHANICAL PLACEMENT WILL BE NECESSARY TO ACHIEVE COMPLETE COVERAGE OF THE DITCH OR SWALE AND TO INSURE THAT THE CENTER OF THE DAM IS LOWER THAN THE EDGES.
7. FILTER CLOTH MAY BE USED UNDER THE STONE TO PROVIDE A STABLE FOUNDATION AND TO FACILITATE THE REMOVAL OF THE STONE.

TEMPORARY BRIDGE CROSSING

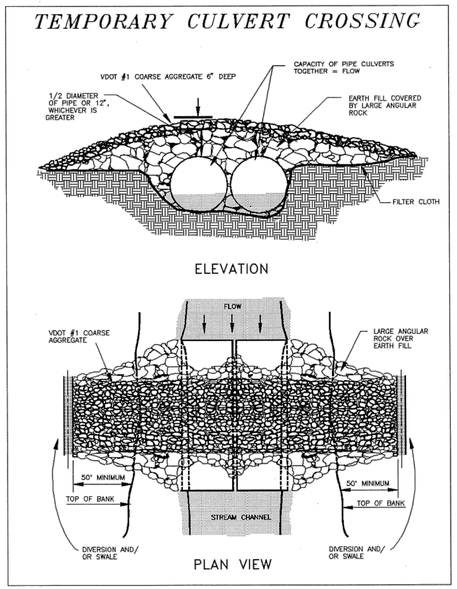


Source: 1983 Maryland Standards and Specifications for Soil Erosion and Sediment Control

Plate 3.24-1

TEMPORARY BRIDGE CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL

TEMPORARY CULVERT CROSSING



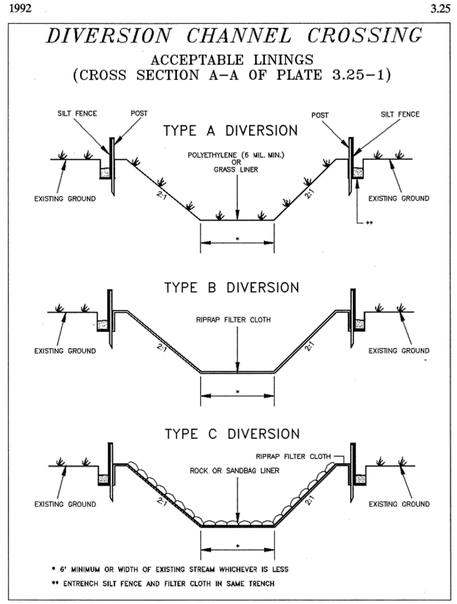
Source: Va. DSWC

Plate 3.24-2

TEMPORARY CULVERT CROSSING
TAKEN FROM VADEQ 1992 MANUAL

DIVERSION CHANNEL CROSSING

ACCEPTABLE LININGS
(CROSS SECTION A–A OF PLATE 3.25–1)



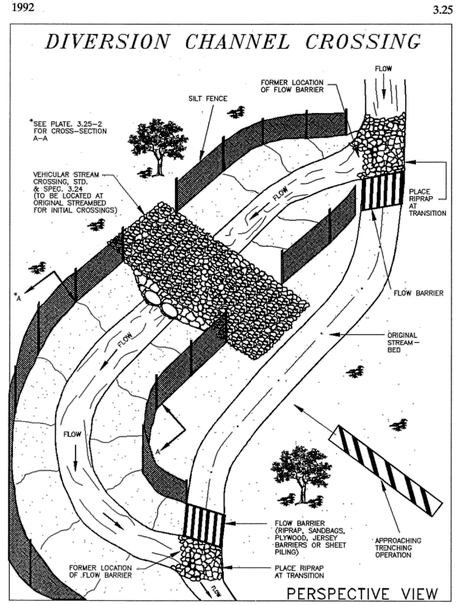
* 6' MINIMUM OR WIDTH OF EXISTING STREAM WHICHEVER IS LESS
** ENTRENCH SILT FENCE AND FILTER CLOTH IN SAME TRENCH

Source: Adapted from VDOT Standard Sheets

Plate 3.25-2

DIVERSION CHANNEL CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL

DIVERSION CHANNEL CROSSING

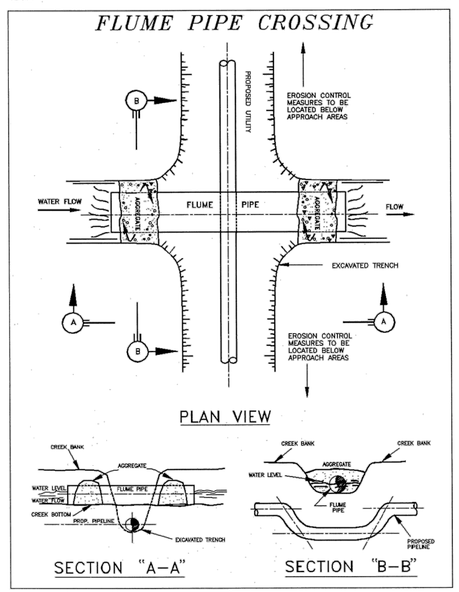


Source: Va. DSWC

Plate 3.25-1

DIVERSION CHANNEL CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL

FLUME PIPE CROSSING



Source: Va. DSWC

Plate 3.25-3

FLUME PIPE CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL

NO.:	DATE:	DWN.:	CHKD.:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
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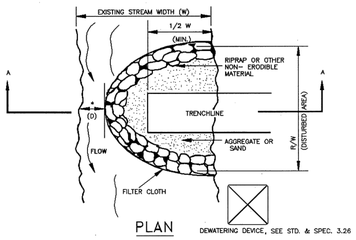
1992 3.25

COFFERDAM CROSSING

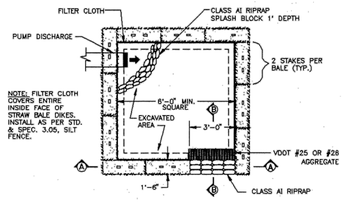


Source: Va. DSWC Plate 3.25-4

COFFERDAM STREAM CROSSING
TAKEN FROM VADEQ 1992 MANUAL

1992 3.26

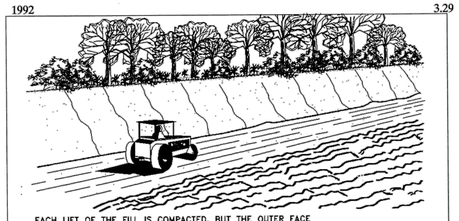
STRAW BALE/SILT FENCE PIT



Source: Va. DSWC Plate 3.26-3

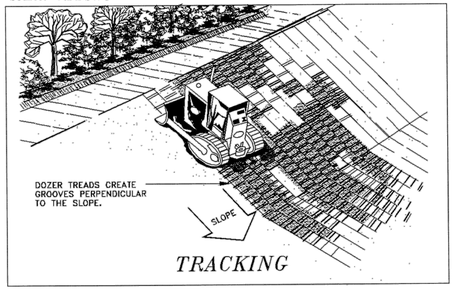
STRAW BALE/SILT FENCE PIT
DEVELOPED FROM VADEQ 1992 MANUAL

1992 3.29



FILL SLOPE TREATMENT

Source: Va. DSWC Plate 3.29-3



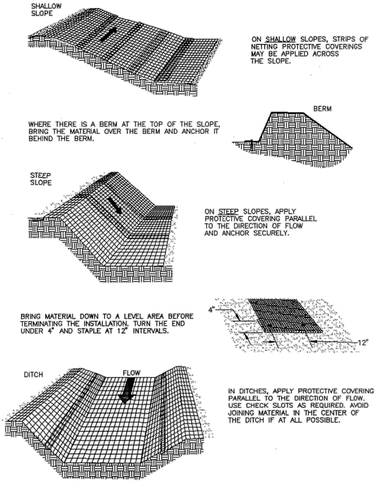
TRACKING

Source: Michigan Soil Erosion and Sedimentation Guide Plate 3.29-4

FILL SLOPE TREATMENT & TRACKING
TAKEN FROM VADEQ 1992 MANUAL

1992 3.36

TYPICAL ORIENTATION OF TREATMENT - 1 (SOIL STABILIZATION BLANKET)

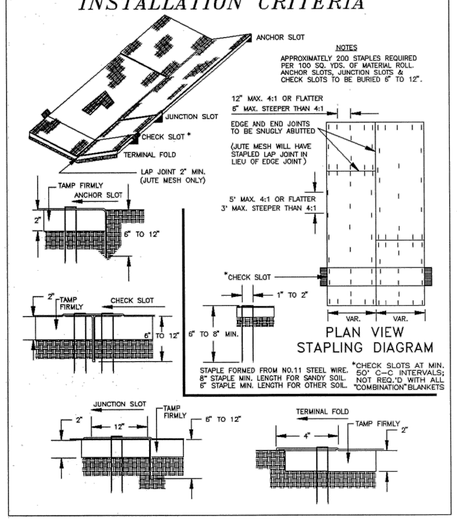


Source: Adapted from Ludlow Products Brochure Plate 3.36-1

TYPICAL ORIENTATION OF TREATMENT
SOIL STABILIZATION BLANKET
DEVELOPED FROM VADEQ 1992 MANUAL

1992 3.36

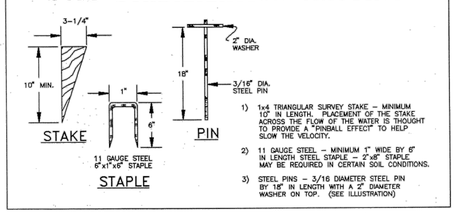
TYPICAL TREATMENT - 1 (SOIL STABILIZATION BLANKET) INSTALLATION CRITERIA



Source: VDOT Road and Bridge Standards Plate 3.36-2

SOIL STABILIZATION BLANKET
INSTALLATION CRITERIA
DEVELOPED FROM VADEQ 1992 MANUAL

STAKES, STAPLES, & PINS FOR INSTALLATION OF TREATMENT - 2 SOIL STABILIZATION MATTING



Source: Product literature from Greenstreak, Inc. Plate 3.36-3

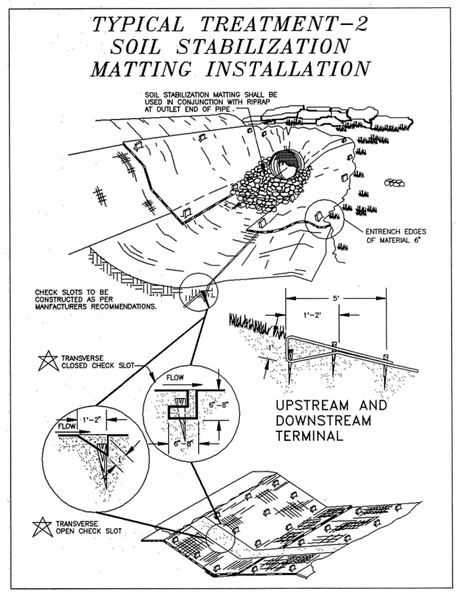
Installation Requirements

Site Preparation - After site has been shaped and graded to approved design, prepare a friable seedbed relatively free from clods and rocks more than 1 inch in diameter, and any foreign material that will prevent contact of the soil stabilization mat with the soil surface. If necessary, redirect any runoff away from the ditch or slope during installation.

STAKES, STAPLES, & PINS FOR INSTALLATION
OF SOIL STABILIZATION MATTING
DEVELOPED FROM VADEQ 1992 MANUAL

1992 3.36

TYPICAL TREATMENT-2 SOIL STABILIZATION MATTING INSTALLATION



Source: VDOT Road and Bridge Standards Plate 3.36-4

TYPICAL TREATMENT
SOIL STABILIZATION MATTING INSTALLATION
DEVELOPED FROM VADEQ 1992 MANUAL

NO.:	DATE:	DWN.:	CHKD.:	APPD.:	DESCRIPTION:
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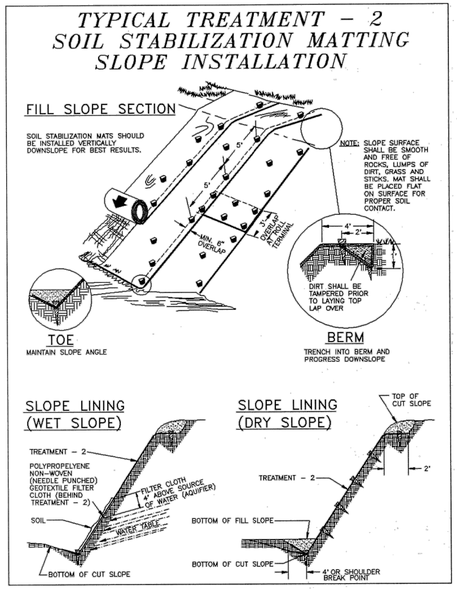
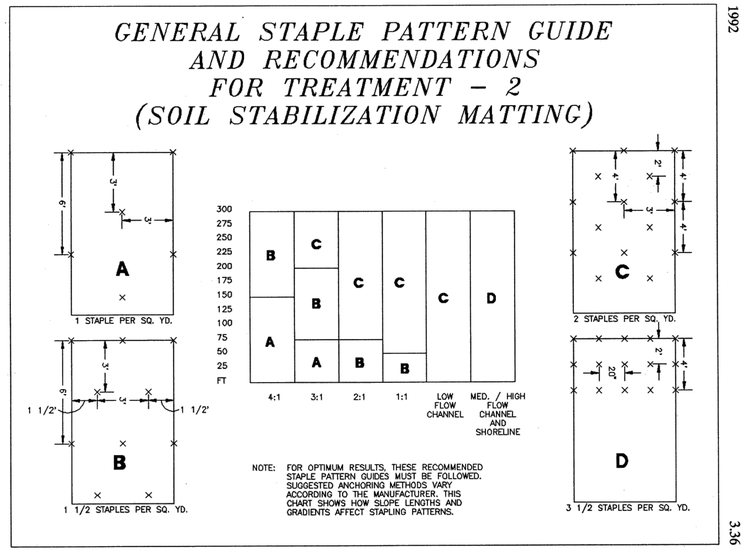


Source: VDOT Road and Bridge Standards Plate 3.36-5

SOIL STABILIZATION MATTING SLOPE

NOTE:
FOR LANDS ON THE JEFFERSON NATIONAL FOREST, IF THE USE OF STABILIZATION NETTING IS REQUIRED/PERMITTED, WILDLIFE FRIENDLY GEOTEXTILES MUST BE USED. THESE PRODUCTS MUST EITHER NOT CONTAIN NETTING, OR NETTING MUST BE MADE OF 100% BIODEGRADABLE NON-PLASTIC MATERIALS SUCH AS JUTE, SISAL, OR COIR FIBER. PLASTIC NETTING (SUCH AS POLYPROPYLENE, NYLON, POLYETHYLENE, AND POLYESTER), EVEN IF ADVERTISED AS BIODEGRADABLE, IS NOT ACCEPTED ALTERNATIVE. ANY NETTING USED MUST ALSO HAVE A LOOSE-WEAVE DESIGN WITH MOVABLE JOINTS BETWEEN HORIZONTAL AND VERTICAL TWINES TO REDUCE THE CHANCE FOR WILDLIFE ENTANGLEMENT, INJURY, OR DEATH. (CA COASTAL COMMISSION, 2012)

Source: Product literature from North American Green III - 368 Plate 3.36-6



GENERAL STAPLE PATTERN GUIDE & RECOMMENDATIONS FOR TREATMENT

DEVELOPED FROM VADEQ 1992 MANUAL

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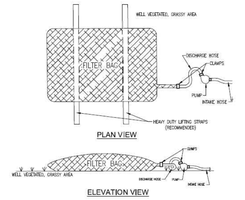

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED 'J' TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

Property	Test Method	Minimum Standard
Avg. Wide Width Strength	ASTM D-4884	60 lb/in
Grab Tensile	ASTM D-4632	205 lb
Puncture	ASTM D-4833	110 lb
Mullen Burst	ASTM D-3786	350 psi
UV Resistance	ASTM D-4355	70%
AOS % Retained	ASTM D-4751	80 Sieve

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME ½ FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.

NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN TMDL WATERSHEDS, CLASS V AND 'A' TROUT STREAMS AND STREAMS IN STATE AND FEDERAL FORESTS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR ½ THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

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PUMPED WATER FILTER BAG

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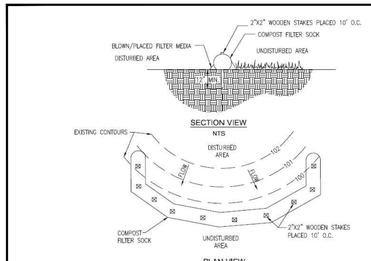

SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2.

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN SOCK ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY SOCK SHALL NOT EXCEED MAXIMUM PERMISSIBLE SLOPE LENGTH ABOVE COMPOST FILTER SOCKS. STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE SOCK IF SO SPECIFIED BY THE MANUFACTURER.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.

ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

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ENVIRONMENTAL DETAIL

COMPOST FILTER SOCK

DRAWING NO. MVP–ES3 | REV. 0

TABLE 4.1

Compost Sock Fabric Minimum Specifications

Material Type	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MFPP)	Heavy Duty Multi-Filament Polypropylene (HDMFPP)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12"	12"	12"	12"	12"
	18"	18"	18"	18"	18"
		24"	24"	24"	24"
		32"	32"	32"	32"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Tensile Strength		26 psi	26 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years
Two-ply systems					
Inner Containment Netting		HDPE biaxial net			
		Continuously wound			
		Fusion-welded junctures			
		3/4" X 3/4" Max. aperture size			
Outer Filtration Mesh		Composite Polypropylene Fabric (Woven layer and non-woven fleece mechanically fused via needle punch)			
		3/16" Max. aperture size			

Sock fabrics composed of burlap may be used on projects lasting 6 months or less.

TABLE 4.2

Compost Standards

Organic Matter Content	80% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - 8.0
Moisture Content	35% - 55%
Particle Size	98% pass through 1" screen
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

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ENVIRONMENTAL DETAIL

COMPOST FILTER SOCK TABLES

DRAWING NO. MVP–ES3.1 | REV. 0

Slope Percent	Maximum Slope Length for Compost Filter Sock in Feet Note: Table developed from Filtrexx Sediment Control product cut sheet by Filtrexx International, LLC. As a general reference. Refer to manufacturers specifications for brand of compost filter sock used.				
	8 in	12 in	18 in	24 in	32 in
2 (or less)	600	750	1000	1300	1650
5	400	500	550	650	750
10	200	250	300	400	500
15	140	170	200	325	450
20	100	125	140	260	400
25	80	100	110	200	275
30	60	75	90	130	200
35	60	75	80	115	150
40	60	75	80	100	125
45	40	50	60	80	100
50	40	50	55	65	75

MAXIMUM SLOPE LENGTH ABOVE COMPOST FILTER SOCK AND RECOMMENDED DIAMETER

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COMPOST FILTER SOCK TABLES

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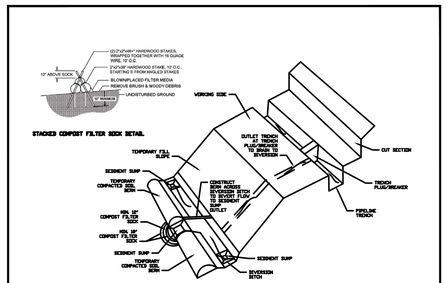

NOTES:

1. TEMPORARY RIGHT OF WAY DIVERSION AND OUTLET INTENDED FOR USE IN LIEU OF SILT FENCING OR COMPOST FILTER SOCK ALONG STRAIGHT SECTIONS OF RIGHT OF WAY LOCATED NEAR RIDGE LINES OR OTHER UPLAND AREAS WHICH ARE 200 FT OR MORE UPSLOPE OF IDENTIFIED STREAMS OR WETLANDS.
2. ROLLED EROSION CONTROL PRODUCT AND/OR MULCHING SHALL BE USED TO STABILIZE THE TEMPORARY COMPACTED SOIL BERM, DIVERSION DITCH, AND TEMPORARY FILL SLOPE.
3. THE DIVERSION DITCH SHALL BE SIZED BASED ON THE DRAINAGE AREA AND STD & SPEC 3.12 CDIVERSIONS DETAILED IN THE VESCH.
4. SPOIL FROM THE PIPELINE TRENCH TO BE USED TO CONSTRUCT THE TEMPORARY SOIL BERM.
5. OUTLET TRENCH TO BE CUT FROM THE PIPELINE TRENCH TO THE DIVERSION DITCH AT TRENCH PLUGS/BREAKERS AND AT LOW POINTS IN THE PIPELINE TRENCH.
6. TEMPORARY FILL SLOPE TO BE CONSTRUCTED NO STEEPER THAN 2H:1V.
7. SIDE SLOPES OF TEMPORARY SOIL BERM AND DIVERSION DITCH SHALL BE NO STEEPER THAN 2H:1V.
8. ENDS OF COMPOST FILTER SOCK AT SUMP OUTLET TO BE TURNED UPSLOPE AND BUTTED UP AGAINST THE BERM TO PREVENT FLOW FROM PASSING AROUND COMPOST FILTER SOCK.

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TEMPORARY RIGHT OF WAY DIVERSION AND OUTLET DETAIL

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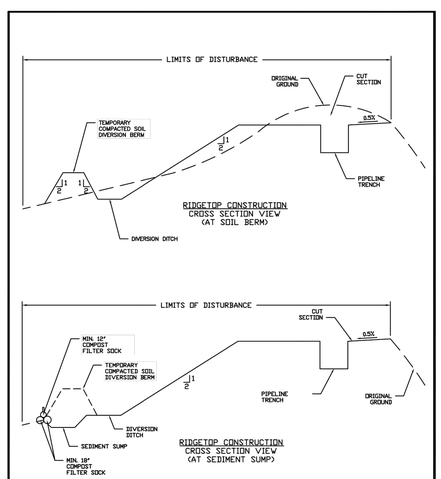

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Mountain Valley PIPELINE — DESIGN ENGINEERING

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TEMPORARY RIGHT OF WAY DIVERSION AND OUTLET NOTES

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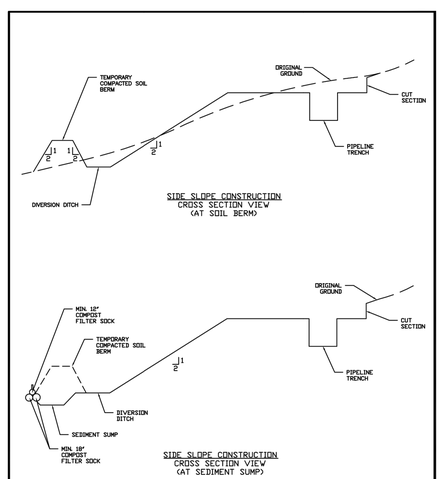

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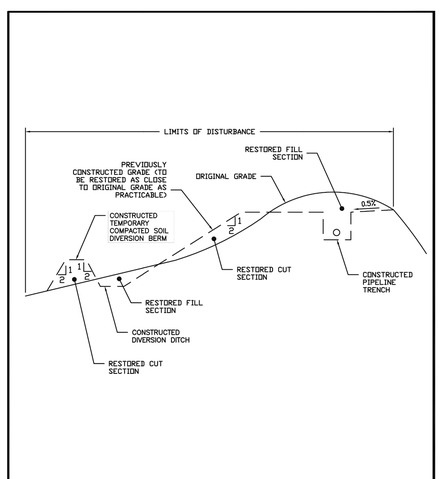

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POST CONSTRUCTION RIDGETOP RECLAMATION DETAIL

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REVISION

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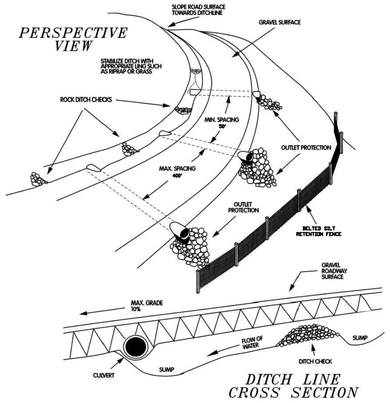
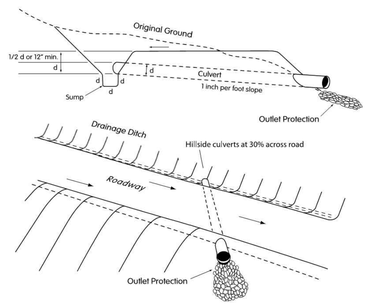


DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		PROPOSED ACCESS ROAD TYPICAL LAYOUT
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES6 REV.
JOB NO.			
PROJECT ID: MVP – VA PORTION			



NOTE:

CULVERTS TO BE INSTALLED ON NEW OR PERMANENTLY WIDENED EXISTING ACCESS ROADS. ALL DITCH RELIEF CULVERTS WILL BE INSTALLED PER THE TABLES CONTAINED ON MVP-ES7.1.

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		DITCH RELIEF CULVERT
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES7 REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			

TABLE 3.3- Sizing and Spacing of Ditch Relief Culverts for Temporart Access Roads

Road Grade (%)	Culvert Spaceing* (ft)	Length of Upslope Drainage (ft)				
		<300	300-400	400-500	500-600	>600
		Minimum Culvert Size (in)				
2	300	12	15	15	15	18
3	235	12	15	15	15	18
4	200	12	15	15	15	18
5	180	12	12	15	15	15
6	165	12	12	12	15	15
7	155	12	12	12	12	15
8	150	12	12	12	12	15
9	145	12	12	12	12	15
10	140	12	12	12	12	15
12	135	12	12	12	12	15

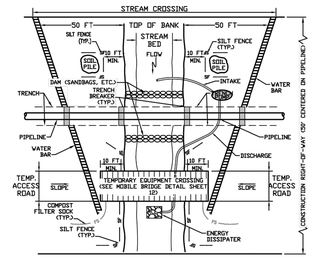
*Culvert spacing may be adjusted slightly to take advantage of natural drainage courses

TABLE 3.4 - Recommended Maximum Spacing of Ditch Relief Culverts (18" dia. CMP) For Permanent Access Roads

Road Grade Percent	Soil Type in Ditch				
	Gravel, Sandy Gravels, Aggregate Surfacing	Silty Gravels, Clayey Gravels	Plastic and Nonplastic Inorganic Clays	Inorganic Silts, Silty or Clayey Sands	Sands, Silty Sands, and Gravelly Sands
	Culvert Spacing Feet*				
2	390	315	245	170	95
4	335	275	210	145	85
6	285	230	180	125	75
8	240	195	150	105	65
10	200	160	125	90	55
12	160	130	105	75	45
14	135	110	85	60	35

*Culvert spacing may be adjusted slightly to take advantage of natural drainage courses

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		DITCH RELIEF CULVERT SPACING
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES7.1 REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			

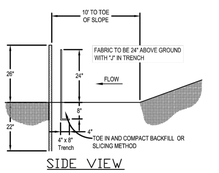


PLAN VIEW

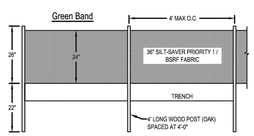
NOTES:

1. INSTALL COMPOST FILTER SOCKS, TRENCH BREAKERS, PUMP, ENERGY DISSIPATER, AND DAMS BEFORE TRENCHING STREAM.
2. PUMP MUST BE OF SUFFICIENT CAPACITY TO CONVEY NORMAL AND/OR EXISTING STREAM FLOW OVER TRENCH. A BACK-UP PUMP OF EQUAL CAPACITY MUST BE AVAILABLE ON-SITE DURING CONSTRUCTION OF THE PIPELINE CROSSING.
3. INSTALL DAMS AT LOCATIONS SHOWN AND FAR FROM TOP OF BANK.
4. INSTALL WATER BARS AT APPROACHES TO STREAM CROSSING AND COMPOST FILTER SOCKS, SILT FENCE, OR SUPER SILT FENCE (AS INDICATED ON PLAN SHEETS).
5. MAINTAIN SURFACE OF TEMPORARY EQUIPMENT CROSSING TO PREVENT SOIL DISCHARGES TO STREAM.
6. APPROACHES TO CROSSINGS ARE NOT TO EXCEED A DEPTH OF 6 INCHES ABOVE ORIGINAL GRADE.
7. RESTORE AREA TO ORIGINAL CONTOURS.

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		STREAM CROSSING PUMP STATION
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES8 REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			



SIDE VIEW



FRONT ELEVATION

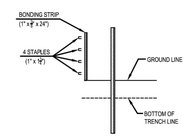
PRIORITY 1

TAKEN FROM SILT-SAVER, INC OR EQUAL

NOTES:

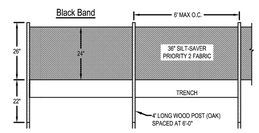
THE TYPE OF REINFORCED FILTRATION DEVICE (PRIORITY 1 OR PRIORITY 2) WILL BE SELECTED BASED ON FIELD CONDITIONS DURING CONSTRUCTION

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		BELTED SILT RETENTION FENCE (BSRF)
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES9 REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			



POST (OAK)

(1-3/4" X 1-1/4" X 48")



FRONT ELEVATION

PRIORITY 2

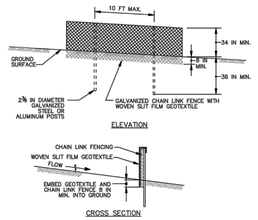
TAKEN FROM SILT-SAVER, INC OR EQUAL

NOTES:

THE TYPE OF REINFORCED FILTRATION DEVICE (PRIORITY 1 OR PRIORITY 2) WILL BE SELECTED BASED ON FIELD CONDITIONS DURING CONSTRUCTION

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		BELTED SILT RETENTION FENCE (BSRF)
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES9.1 REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			

DETAIL E-3 SUPER SILT FENCE — STANDARD SYMBOL SSF



CONSTRUCTION SPECIFICATIONS

1. INSTALL 2½ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND SIX FOOT LENGTH SPACED NO FURTHER THAN 10 FEET APART. DRIVE THE POSTS A MINIMUM OF 36 INCHES INTO THE GROUND.
2. FASTEN 9 GAUGE OR HEAVIER GALVANIZED CHAIN LINK FENCE (2¼ INCH MAXIMUM OPENING) 42 INCHES IN HEIGHT SECURELY TO THE FENCE POSTS WITH WIRE TIES OR HOG RINGS.
3. FASTEN WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H–1 MATERIALS, SECURELY TO THE UPSLOPE SIDE OF CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND CHAIN LINK FENCE A MINIMUM OF 8 INCHES INTO THE GROUND.
4. WHERE ENDS OF THE GEOTEXTILE COME TOGETHER, THE ENDS SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED TO PREVENT SEDIMENT BY PASS.
5. EXTEND BOTH ENDS OF THE SUPER SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SUPER SILT FENCE.
6. PROVIDE MANUFACTURER CERTIFICATION TO THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H–1 MATERIALS.
7. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL CHAIN LINK FENCING AND GEOTEXTILE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		SUPER SILT FENCE
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES9.2 REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			

Table E.3: Super Silt Fence Design Constraints

Average Slope Steepness	Maximum Slope Length	Maximum Super Silt Fence Length
Flatter than 10:1 (0 - <10%)	Unlimited	Unlimited
10:1 to 5:1 (10 - 20%)	200 feet	1,500 feet
<5:1 to 3:1 (>20 - 33%)	150 feet	1,000 feet
<3:1 to 2:1 (>33 - 50%)	100 feet	500 feet
Steeper than 2:1 (>50%)	50 feet	250 feet

1. Super silt fence should be placed on the contour. No section of super silt fence is to exceed a grade of 5% for a distance of more than 50 feet.
2. Super silt fence should be used with caution in areas where rocky soils may prevent trenching.
3. The use of super silt fence must conform to the design constraints listed in Table E.3 above.
4. Extend both ends of the silt fence a minimum five (5) feet horizontally upslope at 45 degrees to the main fence alignment to prevent runoff from going around the ends of the silt fence.

Maintenance

Accumulated sediment and debris must be removed when bulges develop in the fence or when sediment reaches 25 percent of the fence height. The geotextile must be replaced if torn. If undermining occurs, reinstall chain link fencing and geotextile.

Table H.1: Geotextile Fabrics

		WOVEN SLIT FILM GEOTEXTILE	WOVEN MONOFILAMENT GEOTEXTILE		NONWOVEN GEOTEXTILE	
		MINIMUM AVERAGE ROLL VALUE[1]				
PROPERTY	TEST METHOD	MD	CD	MD	CD	MD	CD
Grab Tensile Strength	ASTM D-4632	200 lb	200 lb	370 lb	250 lb	200 lb	200 lb
Grab Tensile Elongation	ASTM D-4632	15%	10%	15%	15%	50%	50%
Trapezoidal Tear Strength	ASTM D-4533	75 lb	75 lb	100 lb	60 lb	80 lb	80 lb
Puncture Strength	ASTM D-6241	450 lb		900 lb		450 lb	
Apparent Opening Size[2]	ASTM D-4751	U.S. Sieve 30 (0.59 mm)		U.S. Sieve 70 (0.21 mm)		U.S. Sieve 70 (0.21 mm)	
Permittivity	ASTM D-4491	0.05 sec^{-1}		0.28 sec^{-1}		1.1 sec^{-1}	
Ultraviolet Resistance Retained at 500 hours	ASTM D-4355	70% strength		70% strength		70% strength	

[1] All numeric values except apparent opening size (AOS) represent minimum average roll values (MARV). MARV is calculated as the typical minus two standard deviations. MD is machine direction; CD is cross direction.

[2] Values for AOS represent the average maximum opening.

DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE		SUPER SILT FENCE
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES9.2A REV. 0
JOB NO.			
PROJECT ID: MVP – VA PORTION			

NO.:	DATE:	DWN.:	CHKD:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

TETRA TECH
complex world | CLEAR SOLUTIONS™
661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.06 OF 0.23

REVISION

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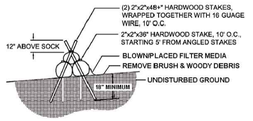

NOTES:
THE TYPE OF REINFORCED FILTRATION DEVICE (PRIORITY 1 OR PRIORITY 2) WILL BE SELECTED BASED ON FIELD CONDITIONS DURING CONSTRUCTION

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
STACKED COMPOST FILTER SOCK DETAIL CROSS SECTION VIEW

DRAWING NO. MVP–ES9.3 | REV. 0

Forest Regeneration Woody Seed Mix and Application Rates.

Species	Common Name	Seeding Rate (lbs/acre)
Oak-Hickory Forest a|		
Fagus grandifolia	American Beech	0.3
Liriodendron tulipifera	Tulip Poplar	0.3
Pinus strobus	White Pine	0.3
Pinus virginiana	Virginia Pine	0.3
Prunus serotina	Black Cherry	0.3
Amelanchier canadensis	Canadian Serviceberry	0.3
Carcis canadensis	Eastern Redbud	0.3
Cornus florida	Flowering Dogwood	0.3
Diospyros virginiana	Persimmon	0.3
Ilex opaca	American Holly	0.3
Nyssa sylvatica	Black Gum	0.3
Sassafras albidum	Sassafras	0.3
Hamamelis virginiana	Witch Hazel	0.3
Lindera benzoin	Spicebush	0.3
Vaccinium angustifolium	Lowbush Blueberry	0.3
Viburnum acerifolium	Mapleleaf Viburnum	0.3
Vitis aestivalis	Grape	0.3

a\| Oak and hickory species to be planted as bare root seedlings in addition to this mix. Refer to Section 5.9 Bare Roost Seedling Planting for more information. At minimum, 3 of the 5 overstory, 4 of the 7 understory, and 2 of the 4 shrub species will comprise the woody seed mix for Oak-Hickory Forests.

NOTE:
WOODY SEED MIX TO BE USED IN COMBINATION WITH MVP-ES11.2 UPLAND MEADOW SEED MIX.

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
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Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
FOREST REGENERATION WOODY SEED MIX AND APPLICATION RATES

DRAWING NO. MVP–ES11.1 | REV. 0

Upland Meadow Seed Mix and Application Rates in Virginia.

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Elymus virginicus	Virginia Wildrye	4.00	5.0 - 7.4	June to October
Schizachyrium scoparium	Little Bluestem	11.68	5.0 - 8.4	July to October
Sorghastrum nutans	Indiangrass	1.00	5.0 - 7.8	August to October
Asclepias syriaca	Common Milkweed	0.10		June to August
Asclepias tuberosa	Butterfly Milkweed	0.10	4.8 - 6.8	June to August
Chamaecrista fasciculata	Partridge Pea	0.60	5.5 - 7.5	July to September
Chamaecrista nictitans	Sensitive Partridge Pea	0.06		June to October
Coreopsis lanceolata	Lanceleaf Coreopsis	0.44	6.0 - 7.0	April to July
Eupatorium coelestinum	Mistflower	0.04	5.5 - 7.5	July to October
Heliopsis helianthoides	Oxeye Sunflower	0.40		July to August
Lespedeza virginica	Slender Bushclover	0.10		July to September
Liatris graminifolia	Grassleaf Blazing Star	0.10	5.8 - 6.8	August to October
Monarda fistulosa	Wild Bergamot	0.10	6.0 - 8.0	June to September
Penstemon laevigatus	Appalachian Beardtongue	0.10		late May to late August
Pycnanthemum incanum	Hoary Mountainmint,	0.20		May to June
Rudbeckia fulgida var. fulgida	Orange Coneflower	0.02	< 6.8	summer
Rudbeckia hirta	Blackeyed Susan	0.04		July to October

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Senna hebecarpa	Wild Senna	0.60	6.0 - 7.0	May to July
Solidago juncea	Early Goldenrod	0.10		July to August
Solidago nemoralis	Gray Goldenrod	0.04		June to July
Tradescantia ohiensis	Ohio Spiderwort	0.04	6.5 - 7.5	August to September
Tradescantia virginiana	Virginia Spiderwort	0.10		late April to mid-July
		20.00		

TEMPORARY SEED MIX:
9/1 - 2/15: 50/50 MIX ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM) AND WINTER RYE (SECALE CEREALE) (50-100 LBS/AC)
2/16 - 4/30: ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM) (60-100 LBS/AC)
5/1 - 8/31: GERMAN MILLET (SETARIA ITALICA) (50 LBS/AC)

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
UPLAND MEADOW SEED MIX AND APPLICATION RATES

DRAWING NO. MVP–ES11.2 | REV. 0

Upland Steep Slope Seed Mix and Application Rates in Virginia.

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Agrostis perennans	Autumn Bentgrass	3.15	5.5 - 7.5	Midsummer
Elymus virginicus	Virginia Wildrye	9.05	5.0 - 7.4	June to October
Panicum clandestinum	Deertongue	4.50	4.0 - 7.5	May to September
Schizachyrium scoparium	Little Bluestem	11.25	5.0 - 7.4	July to October
Sorghastrum nutans	Indiangrass	14.40	5.0 - 7.8	August to October
Asclepias syriaca	Common Milkweed	0.09		June to August
Aster pilosus	Heath Aster	0.05	5.4 - 7.0	After fall frost
Chamaecrista fasciculata	Partridge Pea	0.45	5.5 - 7.5	July to September
Coreopsis lanceolata	Lanceleaf Coreopsis	0.45	6.0 - 7.0	April to July
Eupatorium coelestinum	Mistflower	0.05	5.5 - 7.5	July to October
Heliopsis helianthoides	Oxeye Sunflower	0.45		July to August
Liatris graminifolia	Grassleaf Blazing Star	0.09	5.8 - 6.8	August to October
Monarda fistulosa	Wild Bergamot	0.23	6.0 - 8.0	June to September
Pycnanthemum incanum	Hoary Mountainmint	0.05	< 6.8	summer
Rudbeckia hirta	Blackeyed Susan	0.45	6.0 - 7.0	May to July
Senna hebecarpa	Wild Senna	0.23		July to August
Solidago nemoralis	Gray Goldenrod	0.05	6.5 - 7.5	August to September
Tradescantia ohiensis	Ohio Spiderwort	0.05		late April to mid-July
		45.00		

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
UPLAND STEEP SLOPE SEED MIX AND APPLICATION RATES

DRAWING NO. MVP–ES11.3 | REV. 0

Wetlands Seed Mix and Application Rates in Virginia.

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Alisma subcordatum	Mud Plantain	0.04		
Carex gynandra	Fringed Sedge	0.10	5.0 - 7.0	Midsummer
Carex lupulina	Hop Sedge	1.00		May to June
Carex lurida	Shallow Sedge	3.00	6.2 - 7.0	June to October
Carex scoparia	Blunt Broom Sedge	1.00	4.9 - 6.8	June to July
Carex vulpinoidea	Fox Sedge	6.90	4.6 - 6.9	July to August
Cinna arundinacea	Wood Reedgrass	0.40	6.8 - 8.9	June to August
Elymus virginicus	Virginia Wildrye	4.00	4.0 - 8.5	August to September
Juncus effusus	Soft Rush	0.60	5.0 - 7.4	June to October
Onoclea sensibilis	Sensitive Fern	0.20	5.5 - 7.0	May to June
Scirpus cyperinus	Woolgrass	0.20		June to October

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Scirpus polyphyllus	Many Leaved Bulrush	0.20	4.8 - 7.2	July to September
Asclepias incarnata	Swamp Milkweed	0.40		July to August
Eupatorium coelestinum	Mistflower	0.10	5.0 - 8.0	June to July
Eupatorium fistulosum	Joe Pye Weed	0.14	5.5 - 7.5	July to October
Eupatorium perfoliatum	Boneset	0.20	4.5 - 7.0	July to September
Helenium autumnale	Common Sneezeweed	0.10		July to October
Heliopsis helianthoides	Oxeye Sunflower	0.40	4.0 - 7.5	August to September
Ludwigia alternifolia	Seedbox	0.10		July to August
Mimulus ringens	Square Stemmed Monkeyflower	0.10		August to September
Verbena hastata	Blue Vervain	0.72		June to September
Vernonia noveboracensis	New York Ironweed	0.10		June to October
		20.00		

NOTE:
1. ANNUAL RYEGRASS WILL BE USED AT A RATE OF 40 LBS/AC FOR STABILIZATION OF WETLANDS DISTURBED BY THE PROJECT.
2. FOLLOWING RESTORATION AND TEMPORARY STABILIZATION WITH ANNUAL RYEGRASS, SHOULD THE NATIVE SEEDBANK PRESENT IN THE TOPSOIL NOT REESTABLISH THE WETLAND, MVP WILL APPLY THIS SEED MIX TO SUPPLEMENT AND PERMANENTLY STABILIZE THE WETLAND.

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
WETLAND SEED MIX AND APPLICATION RATES

DRAWING NO. MVP–ES11.4 | REV. 0

Riparian Seed Mix and Application Rates in Virginia.

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Agrostis perennans	Autumn Bentgrass	0.04	5.0 - 7.0	Midsummer
Andropogon gerardii	Big Bluestem	0.10		May to June
Elymus virginicus	Virginia Wildrye	1.00	6.2 - 7.0	June to October
Juncus effusus	Soft Rush	3.00	4.9 - 6.8	June to July
Juncus tenuis	Path Rush	1.00	4.6 - 6.9	July to August
Panicum clandestinum	Deertongue	6.90	6.8 - 8.9	June to August
Sorghastrum nutans	Indiangrass	0.40	4.0 - 8.5	August to September
Asclepias incarnata	Swamp Milkweed	4.00	5.0 - 7.4	June to October
Chamaecrista fasciculata	Partridge Pea	0.60	5.5 - 7.0	May to June
Eupatorium coelestinum	Mistflower	0.20		June to October
Eupatorium fistulosum	Joe Pye Weed	0.20	4.8 - 7.2	July to September
Eupatorium perfoliatum	Boneset	0.20		July to August
Geum canadense	White Avens	0.40	5.0 - 8.0	June to July
Helenium autumnale	Common Sneezeweed	0.10	5.5 - 7.5	July to October
Heliopsis helianthoides	Oxeye Sunflower	0.14	4.5 - 7.0	July to September
Monarda fistulosa	Wild Bergamot	0.20		July to October
Pycnanthemum tenuifolium	Slender Mountainmint	0.10	4.0 - 7.5	August to September
Rudbeckia hirta	Blackeyed Susan	0.40		July to August
Senna hebecarpa	Wild Senna	0.10		August to September
Verbena hastata	Blue Vervain	0.10		June to September
Vernonia noveboracensis	New York Ironweed	0.72		June to October
		20.00		

TEMPORARY SEED MIX:
9/1 - 2/15: 50/50 MIX ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM) AND WINTER RYE (SECALE CEREALE) (50-100 LBS/AC)
2/16 - 4/30: ANNUAL RYEGRASS (LOLIUM MULTI-FLORUM) (60-100 LBS/AC)
5/1 - 8/31: GERMAN MILLET (SETARIA ITALICA) (50 LBS/AC)

Revised 1/24/18

DRAWN	DATE
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PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
RIPARIAN SEED MIX AND APPLICATION RATES

DRAWING NO. MVP–ES11.5 | REV. 0

Native tree and shrub species for bare root plantings within riparian areas and forested wetlands.

Species	Common Name	Indicator Status	Riparian Planting[1]	Forested Wetland Planting[2]
Native Trees				
Acer rubrum	Red Maple	FAC	X	X
Acer saccharinum	Silver Maple	FACW	X	X
Betula nigra	River Birch	FACW	X	X
Carpinus caroliniana	American Hornbeam	FAC	X	X
Carya glabra	Pignut Hickory	FACU	X	
Carya ovata	Shagbark Hickory	FACU	X	
Chionanthus virginicus	White Fringe Tree	FAC+	X	
Diospyros virginiana	Common Persimmon	FAC-	X	

Species	Common Name	Indicator Status	Riparian Planting[1]	Forested Wetland Planting[2]
Fraxinus pennsylvanica	Green Ash	FACW	X	X
Juniperus virginiana	Eastern Red Cedar	FACU	X	X
Liquidambar styraciflua	Sweet Gum	FAC	X	X
Liriodendron tulipifera	Tuliptree	FACU	X	X
Nyssa sylvatica	Black Gum	FAC	X	
Platanus occidentalis	American Sycamore	FACW-	X	X
Populus deltoids	Eastern Cottonwood	FAC	X	
Quercus bicolor	Swamp White Oak	FACW+	X	X
Quercus falcata	Cherrybark Red Oak	FACW	X	X
Quercus phellos	Willow Oak	FAC+	X	X
Quercus nigra	Water Oak	FAC	X	
Quercus palustris	Pin Oak	FACW	X	X
Salix nigra	Black Willow	FACW	X	X
Ulmus americana	American Elm	FACW-	X	X

NOTE:
1. REFER TO MVP-ES11.8 AND MVP-ES11.9 FOR LOCATIONS OF BARE ROOT PLANTINGS.

DRAWN	DATE
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SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
NATIVE TREE AND SHRUB SPECIES FOR BARE ROOT PLANTINGS WITHIN RIPARIAN AREAS AND FORESTED WETLANDS

DRAWING NO. MVP–ES11.6 | REV. 0

Native Shrubs				
Alnus serrulata	Brook-side Alder	OBL		X
Amelanchier canadensis	Canada Serviceberry	FAC	X	
Aronia arbutifolia	Red Chokecherry	FACW	X	X
Baccharis halimifolia	Groundsel Bush	FACW-	X	X
Cephalanthus occidentalis	Buttonbush	OBL		X
Cornus amomum	Silky Dogwood	FACW	X	X
Cornus stolonifera	Red-osier Dogwood	FAC	X	X
Hamamelis virginiana	American Witchhazel	FAC-	X	
Ilex verticillata	Common Winterberry	FACW+	X	X
Itea virginica	Virginia Willow	OBL		X
Iva frutescens	Marsh Elder	FACW+	X	X
Leucothoe racemosa	Fetter-bush	FACW	X	X
Lindera benzoin	Spicebush	FACW-	X	X
Lyonia ligustrina	Maleberry	FACW	X	X
Magnolia virginiana	Sweetbay Magnolia	FACW+	X	X
Physocarpus opulifolius	Eastern Ninebark	FACW-	X	X
Sambucus canadensis	American Elder	FACW-	X	X
Vaccinium corymbosum	Highbush Blueberry	FACW-	X	X
Viburnum dentatum	Arrow-wood	FAC	X	
Viburnum prunifolium	Black-haw	FACU	X	

DRAWN	DATE
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APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
NATIVE TREE AND SHRUB SPECIES FOR BARE ROOT PLANTINGS WITHIN RIPARIAN AREAS AND FORESTED WETLANDS

DRAWING NO. MVP–ES11.7 | REV. 0

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

TETRA TECH
complex world | CLEAR SOLUTIONS™
661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.07 OF 0.23

REVISION

TETRA TECH CAD FILE PATH: X:\CAD_Pittsburgh\EQT\7157 – MVP\00 – General\E&S\Spread 11\7157ES007.dwg PLOTTED ON: 2/3/2018 7:59 AM PLOTTED BY: Rickobough, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb

Stream crossings proposed for bare-root seedling plantings.

Waterbody Name	MP	County	State	Valuable Resource
Kimballton Branch	199.1, 199.4	Giles	VA	headwaters of wild trout stream, coldwater stream

Waterbody Name	MP	County	State	Valuable Resource
Stony Creek	200.4	Giles	VA	candy darter, green floater, coldwater stream, wild trout stream
Little Stony Creek	204.4	Giles	VA	coldwater stream, wild trout stream
Sinking Creek	211.2	Giles	VA	candy darter, green floater, coldwater stream, wild trout stream, non-listed mussels
UNT Craig Creek	219.2	Montgomery	VA	Headwaters of James spinymussel occurrences, USFS lands area
UNT Craig Creek	219.3	Montgomery	VA	Headwaters of James spinymussel occurrences, USFS lands area
Craig Creek	219.7	Montgomery	VA	Headwaters of James spinymussel occurrences, USFS lands area
Craig Creek	219.7	Montgomery	VA	Headwaters of James spinymussel occurrences, USFS lands area
UNT Craig Creek	219.8	Montgomery	VA	Headwaters of James spinymussel occurrences, USFS lands area
UNT Craig Creek	220.0	Montgomery	VA	Headwaters of James spinymussel occurrences, USFS lands area
Mill Creek	222.2	Montgomery	VA	upstream of Roanoke logperch suitable habitat, orangefin madtom, coldwater stream, wild trout
North Fork Roanoke River	227.2	Montgomery	VA	Roanoke logperch present, non-listed mussels present, orangefin madtom, coldwater stream, wild trout
North Fork Roanoke River	227.4	Montgomery	VA	Roanoke logperch present, non-listed mussels present, orangefin madtom, coldwater stream, wild trout
Bradshaw Creek	230.7	Montgomery	VA	Roanoke logperch suitable habitat, orangefin madtom, coldwater stream, wild trout
Bradshaw Creek	231.5	Montgomery	VA	Roanoke logperch suitable habitat, orangefin madtom, coldwater stream, wild trout
Roanoke River	235.4	Montgomery	VA	Roanoke logperch present, orangefin madtom, non-listed mussels present
Bottom Creek	241.1	Roanoke	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Bottom Creek	242.5	Roanoke	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Mill Creek	245.1	Roanoke	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Green Creek	247.1	Franklin	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Green Creek	247.4	Franklin	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
North Fork Blackwater River	249.7	Franklin	VA	Roanoke logperch suitable habitat, coldwater stream wild trout stream

Waterbody Name	MP	County	State	Valuable Resource
Teels Creek	258.2	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	260.3	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	261.0	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	261.8	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	262.3	Franklin	VA	Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek contributing sediment impacts
Little Creek	262.6	Franklin	VA	Roanoke logperch suitable habitat, numerous crossings upstream contributing sediment impacts
Little Creek	263.3	Franklin	VA	Roanoke logperch suitable habitat, non-listed mussels present, numerous crossings upstream contributing sediment impacts
Maggodee Creek	269.4	Franklin	VA	Roanoke logperch suitable habitat.
Blackwater River	269.7	Franklin	VA	Roanoke logperch present, non-listed mussels present
UNT to Jacks Creek	278.8	Franklin	VA	orangefin madtom
Turkey Creek	280.5	Franklin	VA	orangefin madtom
Strawfield Creek	282.3	Franklin	VA	orangefin madtom
Parrot Branch	282.9	Franklin	VA	orangefin madtom
Jonnikin Creek	284.4	Pittsylvania	VA	orangefin madtom
UNT to Rocky Creek	287.1	Pittsylvania	VA	orangefin madtom
Pigg River	289.1	Pittsylvania	VA	Roanoke logperch present, orangefin madtom, mussels present including yellow lampmussel (VA threatened)
Harpen Creek	289.9	Pittsylvania	VA	Roanoke logperch suitable habitat, orangefin madtom
Harpen Creek	292.0	Pittsylvania	VA	orangefin madtom

Upland Area Seed Mixes within the Jefferson National Forest

Scientific Name	Common Name	Growth Habit	pH Preference
Upland Areas - Non-native Species for Erosion Control			
Lolium perenne subsp. *multiflorum*	Italian ryegrass; Annual ryegrass	Graminoid	5.0 – 7.9
Urochloa ramosa (*Panicum ramosum*)	Browntop millett	Graminoid	5.5 – 6.9
Secale cereale	Cereal rye	Graminoid	5.2 – 8.0
Setaria italica	Foxtail millet	Graminoid	5.3 – 6.9
Upland Areas - Native Species			
Chasmanthium laxum[2]	Slender woodoats	Graminoid	4.5 – 7.0
Eragrostis spectabilis[3]	Purple lovegrass	Graminoid	4.0 – 7.5
Panicum virgatum	Switchgrass	Graminoid	4.5 – 8.0
Sorghastrum nutans	Indiangrass	Graminoid	5.0 – 7.8
Tridens flavus[2]	Purpletop	Graminoid	4.5 – 6.5
Apocynum cannabinum[2]	Indian hemp	Forb	4.5 – 7.0
Chamaecrista fasciculata	Partridge pea	Forb	5.5 – 7.5
Desmodium canadense	Showy ticktrefoil	Forb	wide tolerance
Desmodium paniculatum	Panicledleaf ticktrefoil	Forb	6.0 – 7.0
Elymus virginicus[5]	Virginia wildrye	Graminoid	5.0 – 7.4
Geum canadense[2]	White avens	Forb	4.5 – 7.5
Heliopsis helianthoides	Oxeye sunflower; Smooth oxeye	Forb	unknown
Monarda fistulosa[5]	Wild bergamot	Forb	6.0 – 8.0
Pycnanthemum spp.[1]	Mountain mint	Forb	unknown
Rubus allegheniensis[2]	Common blackberry; Allegheny blackberry	Forb/ Subshrub	4.6 – 7.5
Rudbeckia hirta	Blackeyed Susan	Forb	6.0 – 7.0
Solidago canadensis[2]	Canada goldenrod	Forb	4.8 – 7.5
Tradescantia virginiana[2]	Virginia spiderwort	Forb	4.0 – 8.0

Riparian Seed Mixes within Jefferson National Forest

Scientific Name	Common Name	Habit	pH Preference
Non-native Species for Erosion Control			
Lolium perenne subsp. multiflorum	Italian ryegrass; Annual ryegrass	Graminoid	5.0 – 7.9
Urochloa ramosa (Panicum ramosum)	Browntop millett	Graminoid	5.5 – 6.9
Secale cereale	Cereal rye	Graminoid	5.2 – 8.0
Setaria italica	Foxtail millet	Graminoid	5.3 – 6.9
Native Species			
Agrostis perennans	Autumn bentgrass; upland bentgrass	Graminoid	5.5 – 7.5
Elymus virginicus	Virginia Wildrye	Graminoid	5.0 - 7.4
Sorghastrum nutans	Indiangrass	Graminoid	5.0 – 7.8
Asclepias incarnata	Swamp milkweed	Forb	5.0 – 8.0
Chamaecrista fasciculata	Partridge pea	Forb	5.5 – 7.5
Eutrochium fistulosum (Eupatorium fistulosum)	Joe pye weed	Forb	4.5 – 7.0
Eupatorium maculatum	Spotted joe pye weed	Forb	5.5 – 7.0
Eupatorium perfoliatum	Boneset	Forb	unknown
Helenium autumnale	Common sneezeweed	Forb	4.0 – 7.5
Senna hebecarpa	Wild senna; American senna	Forb	unknown
Senna marilandica	Maryland senna	Forb / Subshrub	4.0 – 7.0
Vernonia noveboracensis	New York ironweed	Forb	4.5 -8.0

Species for hydroseed mixes within the Jefferson National Forest.

Scientific Name	Common Name	Growth Habit	pH Preference
Non-native Species for Temporary Erosion Control			
Lolium perenne subsp. multiflorum	Italian ryegrass; Annual ryegrass	Graminoid	5.0 – 7.9
Urochloa ramosa (Panicum ramosum)	Browntop millett	Graminoid	5.5 – 6.9
Secale cereale	Cereal rye	Graminoid	5.2 – 8.0
Setaria italica	Foxtail millet	Graminoid	5.3 – 6.9
Native – Highly Preferred			
Sorghastrum nutans	Indiangrass	Graminoid	5.0 – 7.8
Tridens flavus	Purpletop	Graminoid	4.5 – 6.5
Native – Preferred			
Agrostis perennans	Autumn bentgrass; Upland bentgrass	Graminoid	5.5 – 7.5
Dichanthelium clandestinum	Deertongue	Graminoid	4.0 – 7.5
Elymus canadensis	Canada wildrye	Graminoid	5.0 – 7.9
Desmodium canadense	Showy ticktrefoil	Forb	wide tolerance
Heliopsis helianthoides	Oxeye sunflower; Smooth oxeye	Forb	unknown
Lespedeza virginica	Slender bushclover; Slender lespedeza	Forb	acid tolerant
Liatris spicata	Dense blazing star; Spiked gayfeather	Forb	5.6 - 7.5
Senna hebecarpa	Wild senna; American senna	Forb	unknown
Native – Moderately Preferred			
Panicum virgatum	Switchgrass	Graminoid	4.5 – 8.0
Chamaecrista fasciculata	Partridge pea	Forb	5.5 – 7.5
Rudbeckia hirta	Blackeyed Susan	Forb	6.0 – 7.0

Name	Ph preference	Wetland Indicator Status
Annual Ryegrass (Lolium Multiflorum (L. perenne var. italicum))	5.0–7.9	NI/moderate
German/Foxtail Millet (Setaria italica)	5.3–6.9	FACU
Cereal Rye (Secale cereale)	5.2–8.0	NI/damp
Browntop Millet (Panicum ramosum) (introduced in VA & south; possibly ok for WV?)	5.5–6.9	FACU

NOTES:

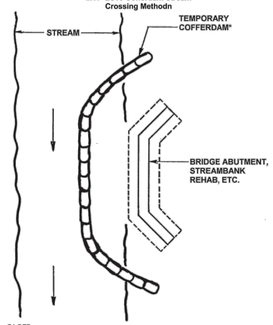
1): A MINIMUM OF (2) OF THE ABOVE LISTED SPECIES SHALL BE UTILIZED

2): APPLY WHENEVER EROSION CONTROL IS NEEDED OUTSIDE OF NORMAL (PERMANENT) SEEDING SEASONS

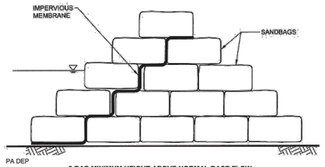
3): APPLY CONCURRENT WITH PERMANENT EROSION CONTROL

4): APPLY PRIOR TO PERMANENT SEEDING WITH WILDLIFE MIXES

MVP-ES13 Cofferdam Stream Crossing Methodn

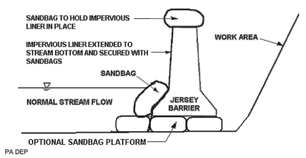


* **Sandbags (Standard Construction Detail #3-15), Jersey barriers (Figure 3.13) or other non-erosive material, no earth fill.**



2 BAG MINIMUM HEIGHT ABOVE NORMAL BASE FLOW

FIGURE 3.13
Jersey Barrier Cofferdam – End View



NOTES: AT NO TIME, SHOULD MORE THE 60% OF THE STREAM CHANNEL WIDTH BE DIVERTED DURING PIPELINE INSTALLATION.

GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP-OF-BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION. TRENCH BREAKERS SHALL BE INSTALLED WITHIN THE TRENCH ON BOTH SIDES OF THE STREAM CHANNEL (MVP TYPICAL DETAIL MVP-20). WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A PUMPED WATER FILTER BAG OR SEDIMENT TRAP PRIOR TO DISCHARGING INTO ANY RECEIVING SURFACE WATER.
HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE TOP OF STREAMBANK. ALL EXCESS EXCAVATED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM THE STREAM CROSSING AREA.
ALL DISTURBED AREAS WITHIN 50 FEET OF TOP-OF-BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED.

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

	DRAWING NO.	REV.
STREAM CROSSINGS PROPOSED FOR BARE ROOT SEEDING PLANTINGS	MVP–ES11.8	0
STREAM CROSSINGS PROPOSED FOR BARE ROOT SEEDING PLANTINGS	MVP–ES11.9	0
US FOREST SERVICE (NATIONAL FOREST) LANDS UPLAND AREA SEED MIX	MVP–ES12.1	0
US FOREST SERVICE (NATIONAL FOREST) LANDS RIPARIAN SEED MIX	MVP–ES12.2	0
US FOREST SERVICE (NATIONAL FOREST) LANDS HYDROSEED MIX	MVP–ES12.3	0
US FOREST SERVICE (NATIONAL FOREST) LANDS TEMPORARY EROSION CONTROL SPECIES	MVP–ES12.4	0
COFFERDAM STREAM CROSSING METHOD	MVP–ES13.1	P
COFFERDAM STREAM CROSSING METHOD	MVP–ES13.2	P

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
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4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/16/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

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661 ANDERSEN DRIVE
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GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.08 OF 0.23

REVISION

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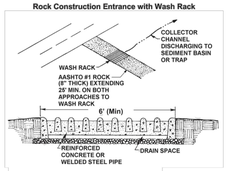
Rock Construction Entrance with Wash Rack



Modified from Smith Cattleguard Company

IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 70 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK.

Wash rack shall be 20 feet (min.) wide or total width of access.

Wash rack shall be designed and constructed to accommodate anticipated construction vehicular traffic.

A water supply shall be made available to wash the wheels of all vehicles exiting the site.

MAINTENANCE: Rock construction entrance thickness shall be constantly maintained to the specified dimensions by adding rock. A stockpile of rock material shall be maintained on site for this purpose. Drain space under wash rack shall be kept open at all times. Damage to the wash rack shall be repaired prior to further use of the rack. All sediment deposited on roadways shall be removed and returned to the construction site immediately. Washing the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable.

A metal wash rack or livestock grate is an acceptable alternative to the reinforced concrete one shown in the standard detail. Approaches to the wash rack should be lined with aashto #1 at a minimum of 25' on both sides. The wash rack should discharge to a sediment removal facility, such as a vegetated filter strip or into a channel leading to a sediment removal device (e.g. a sediment trap or sediment basin). Rock construction entrances with wash racks should be maintained to the specified dimensions by adding rock when necessary at the end of each workday. A stockpile of rock material should be maintained on site for this purpose. Sediment deposited on paved roadways should be removed and returned to the construction site.

NOTE: Washing the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable. Damaged wash racks should be repaired as necessary to maintain their effectiveness. In lieu of washrack installation, MVP will extend the RCE by 70' increments until mud tracking condition is alleviated.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

ROCK CONSTRUCTION ENTRANCE WITH WASH RACK

DRAWING NO. MVP–ES20 REV. P

EARTHEN LEVEL SPREADER

LOCATION - Earthen level spreaders are normally used where diversion ditches or dikes outlet onto areas of established vegetation — grass, typically not brush or forested. They are **not** to be used below sediment traps, sediment basins, or stormwater pipes.

Earthen level spreaders may be used for drainage areas less than or equal to 1 acre where sediment-free stormwater runoff can be released in sheet flow down a stabilized slope without causing erosion. Where the downstream slope is stabilized with grass, a minimum uniform cover of 90% is required. Wooded areas, with little or no grass cover, are not considered stabilized areas for this purpose. Earthen level spreaders should only be used where there will be no construction traffic over the level spreader.

To avoid reconcentrating flow downstream of the spreader, the maximum distance from the earthen level spreader to an existing or constructed defined drainage course is 100 feet with a 6% maximum slope and where very uniform and very stable site conditions exist. Greater distances may be considered on a case-by-case basis for very mild slopes and heavily vegetated areas but should not normally exceed 150 feet.

Earthen level spreaders should be constructed on soil, not on fill.

MAXIMUM DRAINAGE AREA - Maximum drainage area to an earthen level spreader should not exceed 1 acre.

MAXIMUM DISCHARGE and MINIMUM LENGTH - The maximum discharge for earthen level spreaders should be 1 cfs per foot of length based on the peak rate of flow from a ten-year frequency rainfall event. An acceptable simplified method to determine the length (L_{min}) is that L_{min} is equal to five feet per acre of drainage area.

DESIGN - The grade of the last 20 feet of the diversion channel that feeds the earthen level spreader should create a smooth transition from the channel grade to the earthen level spreader and, where possible, should be less than or equal to 1 percent. Construct earthen level spreaders on zero percent grades to insure uniform spreading of sediment-free runoff. Minimum width of earthen level spreaders should be 6 feet. A transition section should be constructed between the diversion channel and the earthen level spreader if the widths are different.

Protect the lip of an earthen level spreader with an erosion-resistant material, such as a reinforced erosion control blanket or TRM, to prevent erosion and enable vegetation to become established. For a permanent installation, a rigid lip of non-erodible material, such as pressure-treated timbers or concrete curbing, should be used. A smooth transition should be provided between the level spreader and the native ground downslope.

For a vegetated lip, the erosion-control matting should be a minimum of 4 feet wide and extend 6 inches over the level lip. The upstream edge should be buried at least six inches deep in a vertical trench. The downstream edge should be securely held in place with closely spaced, heavy-duty staples, at least 12 inches long. A rigid level lip should be entrenched at least 2 inches below the ground surface and securely anchored to prevent displacement. Immediately after the earthen level spreader is constructed, the entire area of the spreader should be appropriately seeded and mulched.

Typical details of earthen level spreaders are shown on Standard Construction Detail MVP–ES24.2.

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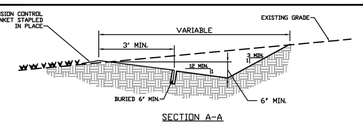
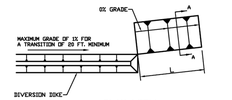
ENVIRONMENTAL DETAIL

EARTHEN LEVEL SPREADER

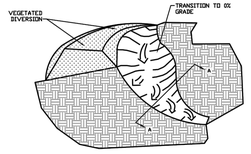
DRAWING NO. MVP–ES24.1 REV. P



SECTION A–A



PLAN VIEW



ISOMETRIC VIEW

Level Spreader Schedule		
Drainage Area	ID No.	Design Length (ft)
DA-GI-021	LS-GI8-001	14

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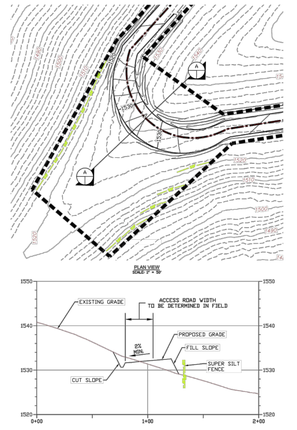
Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

EARTHEN LEVEL SPREADER

DRAWING NO. MVP–ES24.2 REV. P



PROFILE VIEW A-A
SCALE: 1"=50'

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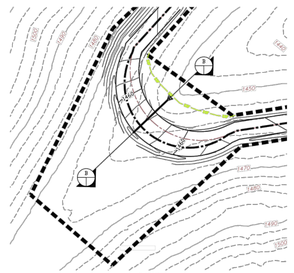
Mountain Valley PIPELINE — DESIGN ENGINEERING

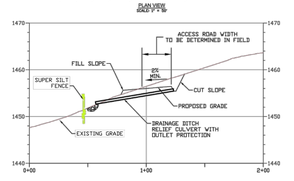
ENVIRONMENTAL DETAIL

ATWS VEHICLE TURNING RADIUS NOSE DETAIL

DRAWING NO. MVP–ES31 REV. P



PLAN VIEW
SCALE: 1" = 50'



PROFILE VIEW B-B
SCALE: 1"=50'

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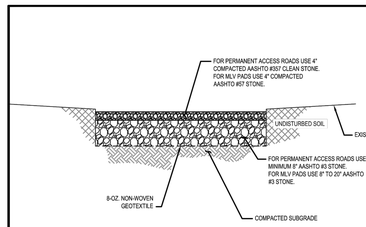
Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

ATWS VEHICLE TURNING RADIUS VALLEY DETAIL

DRAWING NO. MVP–ES32 REV. P



NOTES:

1. THICKNESS OF AASHTO #3 STONE/AGGREGATE LAYER FOR MLV PADS TO BE BETWEEN 9" AND 20" DEPENDING ON THE STORAGE VOLUME NEEDED TO MEET STORMWATER QUANTITY REQUIREMENTS.
2. THICKNESS OF ASSHTO #3 STONE/AGGREGATE LAYER FOR ACCESS ROADS TO BE A MINUMUM OF 9" OR MORE AS DIRECTED.
3. COMPACT SUBGRADE PRIOR TO BACKFILL PLACEMENT. FOR BACKFILL, A MIN. 95% COMPACTION (ASTM D 698) IS REQUIRED.
4. UNSUITABLE MATERIAL SHALL BE REMOVED PRIOR TO SUBGRADE COMPACTION AND BACKFILL PLACEMENT. ADDITIONAL SUBGRADE COMPACTION NOT REQUIRED FOR MLV PADS.

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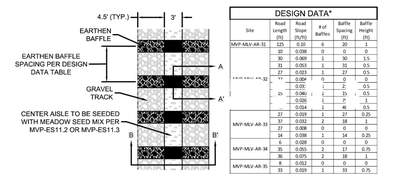
Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

GAP GRADED GRAVEL DETAIL FOR MAINLINE VALVE PADS & PERMANENT ACCESS ROADS

DRAWING NO. MVP–ES33 REV. P



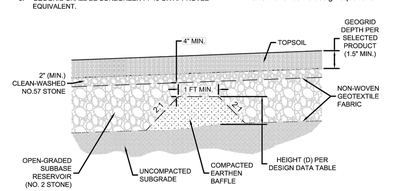
PLAN VIEW
NOT TO SCALE

NOTES:
1. INSTALLATION OF GEOGRID SHALL BEGIN AT 5-FEET FROM THE EDGE OF PUBLIC / VDOT ROADS TO ACCOMMODATE ANY CULVERTS AND TURNING OF TIRES.
2. GEOGRID SHALL NOT BE INSTALLED IN THE MAIN LINE VALVE PAD AREAS.
3. GEOGRID SHALL BE SUREGREEN PP40 OR APPROVED EQUIVALENT.

DESIGN DATA*

Site	Road Length (ft)	Road Slope (ft/ft)	# of Baffles	Baffle Spacing (ft)	Baffle Height (ft)
MVP-MLV-AR-31	125	0.10	6	20	1
	10	0.038	0	0	0
	30	0.069	1	30	1.5
	31	0.053	1	31	0.5
	27	0.023	1	27	0.5
MVP-MLV-AR-32	**	0.004	0	0	0
	10	0.00	1	2	0.5
	10	0.040	1	21	0.5
		0.026	1	7	1
		0.054	1	41	0.5
	27	0.019	1	27	0.25
MVP-MLV-AR-33	37	0.032	2	18	1
	27	0.008	0	0	0
	14	0.038	1	14	0.25
MVP-MLV-AR-34	6	0.028	0	0	0
	35	0.051	2	17	0.75
	36	0.075	2	18	1
MVP-MLV-AR-35	8	0.012	0	0	0
	33	0.023	1	33	0.75
MVP-PI-343	90	0.002	0	0	0
	437	0.05	10	43	1
	416	0.009	3	138	1
	270	0.052	5	54	1
	228	0.026	1	228	1
	75	0.187	1	75	1
	51	0.12	1	51	1
	75	0.06	1	75	1
	200	0.013	1	200	1
	186	0.045	1	186	1
	103	0.0098	1	103	1

*Refer to Stormwater Management Narrative for baffle design equations.



XS: A-A'
NOT TO SCALE

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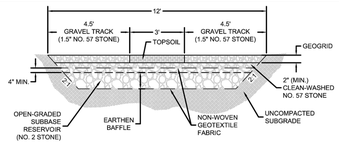
Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

GAP GRADED GRAVEL DETAIL FOR MAINLINE VALVE PADS & PERMANENT ACCESS ROADS

DRAWING NO. MVP–ES33.1 REV. P



XS: B-B'
NOT TO SCALE

CONSTRUCTION SEQUENCE

1. CONSTRUCTION OF THE ACCESS ROAD BAFFLES SHALL ONLY BEGIN AFTER THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED.
2. INFILTRATION TESTS SHALL BE PERFORMED AT THE RATE OF ONE INFILTRATION TEST PER SOIL GROUP OR AT THE RATE OF ONE PER 500 LINEAR FEET OF ACCESS ROAD, WHICHEVER IS GREATER.
3. WHERE POSSIBLE, EXCAVATORS OR BACKHOES SHOULD WORK FROM THE SIDES TO EXCAVATE THE RESERVOIR LAYER TO ITS APPROPRIATE DESIGN DEPTH AND DIMENSIONS TO PREVENT COMPACTION.
4. NATIVE SOILS ALONG THE BOTTOM AND SIDES SHOULD BE SCARIFIED OR TILLED TO A DEPTH OF 3 TO 4 INCHES PRIOR TO THE PLACEMENT OF THE FILTER FABRIC.
5. INSTALL COMPACTED EARTHEN BAFFLES TO THE SPECIFIED DESIGN HEIGHT.
6. FILTER FABRIC SHOULD BE INSTALLED ON THE BOTTOM AND THE SIDES OF THE RESERVOIR LAYER, AND THE COMPACTED EARTHEN BAFFLE. FILTER FABRIC STRIPS SHOULD OVERLAP DOWN-SLOPE BY A MINIMUM OF 2-FEET, AND BE SECURED A MINIMUM OF 4-FEET BEYOND THE EDGE OF THE EXCAVATION. EXCESS FILTER FABRIC SHOULD NOT BE TRIMMED UNTIL THE SITE IS FULLY STABILIZED.
7. MOISTEN AND SPREAD 6-INCH LIFTS OF OPEN-GRADED NO. 2 STONE SUBBASE RESERVOIR. MAINTAIN A 4-INCH MINIMUM DEPTH OF NO. 2 STONE LAYER OVER COMPACTED EARTHEN BAFFLE.
8. INSTALL FILTER FABRIC ON TOP OF SUBBASE RESERVOIR.
9. INSTALL 2-INCH LAYER OF CLEAN-WASHED CHOKER STONE.
10. PLACE GEOGRID AND FILL WITH GRAVEL AND TOPSOIL PER GRAVEL TRACK WIDTHS AND CENTER AISLE WIDTH. GRAVEL TRACKS SHALL BE NO. 57 STONE.
11. SEED CENTER AISLE WITH MEADOW SEED MIX PER MVP-ES11.2 OR MVP-ES11.3.

CONSTRUCTION INSPECTION

1. DAILY INSPECTION SHALL INCLUDE NUMBER AND LOCATION OF BAFFLES AS WELL AS CLEANLINESS AND SIZING OF STONE FOR ROAD AND MLV PADS. IN ADDITION GEOTEXTILE WILL BE INSPECTED FOR MATERIAL PROPERTIES AND CORRECT INSTALLATION.

MAINTENANCE

1. DURING MAIN LINE VALVE ANNUAL MAINTENANCE ACTIVITIES, PERFORM A VISUAL INSPECTION OF THE ACCESS ROAD TO IDENTIFY EROSION ISSUES, SEDIMENT DEPOSITION, ORGANIC DEBRIS AND STAINING OR PONDING THAT MAY INDICATE CLOGGING.
2. GRASSED CENTER AISLE SHALL BE MOWED AT THE SAME INTERVAL AS MAIN LINE VALVE MAINTENANCE ACTIVITIES.
3. GRASSED CENTER AISLE WILL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM AND MATURE ENOUGH TO SURVIVE AND INHIBIT EROSION.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

GAP GRADED GRAVEL DETAIL FOR MAINLINE VALVE PADS & PERMANENT ACCESS ROADS

DRAWING NO. MVP–ES33.2 REV. P

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
8	03/21/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

TETRA TECH
complex world | CLEAR SOLUTIONS™

661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.09 OF 0.23

REVISION

TETRA TECH CAD FILE PATH: X:\CAD_Pittsburgh\EGT\7157 – MVP\00 – General\E&S\Spread 11\7157ES009.dwg PLOTTED ON: 3/21/2018 1:52 PM PLOTTED BY: Kusiowski, Jim PLOT FILE: ENVIRONMENTAL_COLOR.ctb

MLV ACCESS ROADS SITE SPECIFIC DETAILS TO BE DEVELOPED WITH STORMWATER MANAGEMENT PLANS

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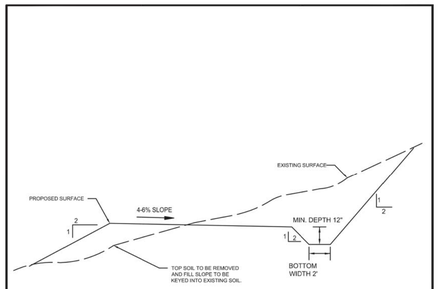
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

GAP GRADED GRAVEL DETAIL FOR MAINLINE VALVE PADS & PERMANENT ACCESS ROADS

DRAWING NO. MVP–ES33.3 REV. P



NOTE:

1. INSLOPE WITH DITCH SECTION FOR USE ON STEEP SLOPE AND AREAS WITH POOR SOILS.
2. EROSION CONTROL MATTING TO BE INSTALLED ON CUT AND FILL SLOPES STEEPER THAN 3H:1V. SLOPES LESS THAN 3H:1V WILL BE MULCHED PER MVP-ES45 TO MVP-ES45.5.

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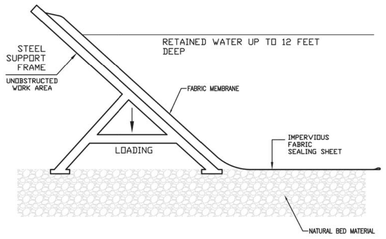
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

PROPOSED ACCESS ROAD TYPICAL SECTION

DRAWING NO. MVP–ES34 REV. P



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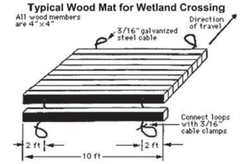
Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

POSTADAM DETAIL

DRAWING NO. MVP–ES36 REV. P



University of Minnesota FS 07009
A geotextile underlayment shall be used under the wood mat.

Source: PaDEP, E&S Pollution Control Manual, March 2012

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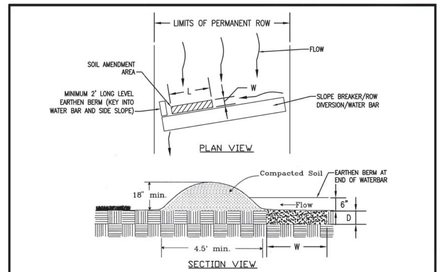
Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

TIMBER MAT/WETLAND CROSSING

DRAWING NO. MVP–ES37 REV. P



NOTES

1. WIDTH "W" OF SOIL AMENDMENT PER PERMANENT DIVERSION DIKE/WATERBAR WITH SOIL AMENDMENT SCHEDULE.
2. SOIL INCORPORATION DEPTH "D" IS ASSUMED TO BE 1 FT PER TABLE 4.3 IN VA DEQ STORMWATER DESIGN SPEC #4. AN INCORPORATION DEPTH OF 2 FT IS USED IN CASES WHERE ADDITIONAL STORAGE CAPACITY IS NEEDED IN ORDER TO MEET WATER QUANTITY REQUIREMENTS.
3. DEVELOPED FROM VA. DSWC PLATE 3.09-1.
4. SEE SHEET 6.7, TEMPORARY RIGHT OF WAY DIVERSION/WATERBAR ADDITIONAL DETAILS FOR PLAN VIEW.

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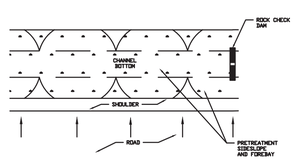
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

DIVERSION DIKE/WATERBARS WITH COMPOST

DRAWING NO. MVP–ES38 REV. P



NOTES:

1. GRASS LINED CHANNEL TO BE SIZED PER VIRGINIA BMP CLEARINGHOUSE SPECIFICATION NO. 3.

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DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

PERMANENT GRASS–LINED CHANNEL

DRAWING NO. MVP–ES39 REV. P

NOTES:

A BONDED FIBER MATRIX (BMF) IS AN EFFECTIVE METHOD OF STABILIZING STEEP SLOPES WHEN USED PROPERLY. BMFs MAKE USE OF A CROSS-LINKED HYDROCOLLOID TACKIFIER TO BOND THERMALLY PROCESSED WOOD FIBERS. APPLICATION RATES VARY ACCORDING TO SITE CONDITIONS. FOR SLOPES UP TO 3H:1V THE BFM SHOULD BE APPLIED AT A RATE OF 3,000 LBS/ACRE. STEEPER SLOPES MAT NEED AS MUCH AS 4,000 LBS/ACRE.

BFMs SHOULD ONLY BE USED WHEN NO RAIN IS FORECASTED FOR AT LEAST 48 HOURS FOLLOWING HE APPLICATION. THIS IS TO ALLOW THE TACKIFIER SUFFICIENT TIME TO CURE **PROPERLY.** ONCE PROPERLY APPLIED, A BFM IS TYPICALLY 90% EFFECTIVE IN PREVENTING ACCELERATED EROSION. BFMs SHOULD NOT BE APPLIED BETWEEN SEPTEMBER 30 AND APRIL 1.

A POLYMER STABILIZED FIBER MATRIX (PSFM) CAN ALSO BE AN EFFECTIVE METHOD OF STABILIZING STEEP SLOPES WHEN USED PROPERTY. PSFMs MAKE USE OF A LINEAR SOIL STABILIZING TACKIFIER THAT WORKS DIRECTLY ON SOIL TO MAINTAIN SOIL STRUCTURE, MAINTAIN PORE SPACE CAPACITY AND FLOCCULATE DISLODGED SEDIMENT THAT WILL SIGNIFICANTLY REDUCE RUNOFF TURBIDITY. PROPERLY APPLIED, A PSFM MAY BE AS MUCH AS 99% EFFECTIVE.

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ENVIRONMENTAL DETAIL

BONDED FIBER MATRIX

DRAWING NO. MVP–ES40 REV. P

Typical Polymer Stabilized Fiber Matrix Application Rates

Maximum Rainfall of ≤ 20" SLOPE	6:1	5:1	4:1	3:1	2:1	1.5:1	1:1
Soil Stabilizer (gals/acre)	4	5	6	7	8	9	10
Fiber (lb/acre)	1,500	1,500	1,500	1,800	2,000	2,500	3,000

Maximum Rainfall of > 20" and for Site Winterization SLOPE	≤5:1	4:1	≥3:1
Soil (gals			
Fiber (lb/acre			

NOTES:

UNLIKE ROLLED BLANKETS, [illegible] APPLICATION OF HYDRAULICALLY APPLIED BLANKETS. IN FACT SOME ROUGHENING OF THE SURFACE, EITHER NATURAL OR MECHANICALLY APPLIED, IS PREFERABLE. HOWEVER LARGE ROCKS, THOSE > 8 , APPLICATION. TRACKING OF WATER FLOWS DURING A STORM EVENT. SLOPE INTERRUPTION DL STEP GRADING OR BENCHING SHOULD BE APPLIED PRIOR TO THE . AND APPLICATION RATES SHO

HYDRAULICALLY APPLIED SPECIFICALLY RECOMM MANUFACTURER. THE SEI IF THE SEED IS APPLIED AT THE SAME TIME AS THE HYDRAULICALLY BONDED FIBERS MAY KEEP THE SEED FROM MAKING SUFFICIENT C TO GERMINATE. AFTEI BE SPRAYED OVER THE [illegible] EA AT THE REQUIRED APPLICATION RATE

HYDRAULIC EROSION CO SUITABLE FOR WILDLIFE

DRAWN	DATE
CHECKED	DATE
APP'D	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE
DESIGN ENGINEERING

ENVIRONMENTAL DETAIL

DRAWING NO. MVP–ES40.1 REV. P

NO.	DATE:	DWN.:	CHKD.:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
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661 ANDERSEN DRIVE
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GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.10 OF 0.23

REVISION

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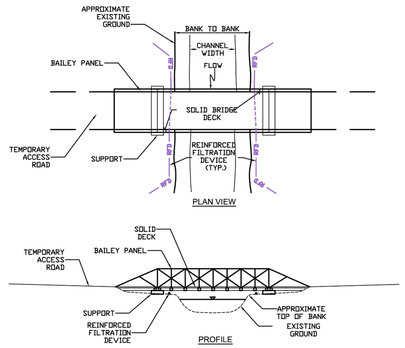
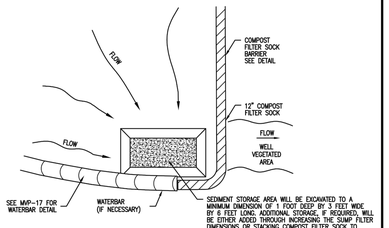


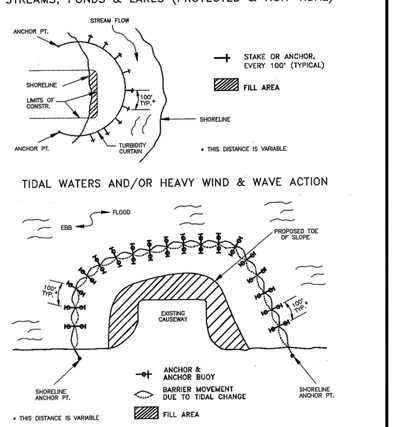
DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE		MODULAR TEMPORARY BAILEY BRIDGE	
APP'D	DATE 08/11/17			
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES41	REV. P
JOB NO.				
PROJECT ID: MVP – VA PORTION				



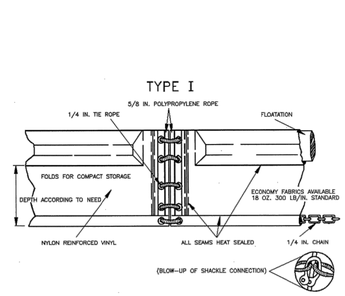
NOTES:

1. SUMP FILTER MAY BE USED IN CONJUNCTION WITH TEMPORARY WATERBAR (AS DIRECTED BY OWNER REPRESENTATIVE).
2. SUMP FILTER SHALL BE LOCATED ENTIRELY WITHIN THE LIMITS OF DISTURBANCE.
3. BMP SHOULD BE CHECKED EVERY 4 BUSINESS DAYS FOR SEDIMENT ACCUMULATION, PROPER OPERATION, AND COMPOST FILTER SOCK INTEGRITY.
4. ADDITIONAL COMPOST FILTER SOCKS MAY BE NECESSARY BEYOND WHAT IS SHOWN ON DETAIL TO MEET INTENDED BMP REQUIREMENTS.

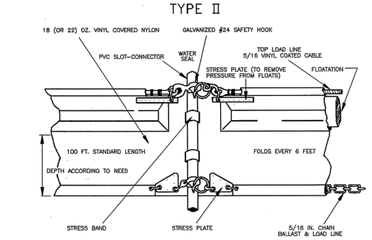
DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE		TYPICAL SUMP FILTER	
APP'D	DATE 08/11/17			
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES42	REV. P
JOB NO.				
PROJECT ID: MVP – VA PORTION				



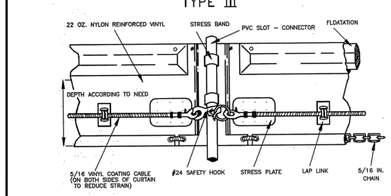
DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE		TURBIDITY CURTAIN DETAIL	
APP'D	DATE 08/11/17			
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES43	REV. P
JOB NO.				
PROJECT ID: MVP – VA PORTION				



DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE		TURBIDITY CURTAIN DETAIL	
APP'D	DATE 08/11/17			
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES43.1	REV. P
JOB NO.				
PROJECT ID: MVP – VA PORTION				



DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE		TURBIDITY CURTAIN DETAIL	
APP'D	DATE 08/11/17			
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES43.2	REV. P
JOB NO.				
PROJECT ID: MVP – VA PORTION				



DRAWN	DATE	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE		TURBIDITY CURTAIN DETAIL	
APP'D	DATE 08/11/17			
SCALE N.T.S.	SHEET 1 OF 1	DESIGN ENGINEERING	DRAWING NO. MVP-ES43.3	REV. P
JOB NO.				
PROJECT ID: MVP – VA PORTION				

POST-CONSTRUCTION STREAM CROSSING STABILIZATION FOR M.V.P.

Definition

A series of erosion and sediment control measures to limit the formation of rills and/or gullies in the landscape approaching the edge of a stream, river and other waterbody, within the permanent natural gas pipeline right-of-way.

Purpose

To minimize erosion potential along the edge of stream, river or other water body as a result of the change in land use in the permanent right-of-way of a pipeline.

Conditions Where Practice Applies

Applicable to stream, river or other water body crossings within the natural gas pipeline right-of-way.

Planning Considerations

Permanent water bars with compost filter socks and sump filters with discretionary streambank swales are required at all stream, river and other waterbody crossings in accordance with the spacing and sizing requirements shown on Plates 1-4

Based on visual observation of the post-construction field conditions by MVP Design Engineering and the MVP Environmental Inspector, the necessity for and location of streambank swales will be determined. Considerations will include but are not limited to locations where there is visual evidence of existing (or formation of) rills and/or gullies along the streambank and/or concentrated flow along the streambank with anticipated potential for erosion.

Sediment must be periodically removed from the sump filter and compost filter sock to maintain the required depth. Plans shall detail how excavated sediment is to be disposed of, such as by use in fill areas on site or removal to an approved off-site location.

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JOB NO.				
PROJECT ID: MVP – VA PORTION				

Design Criteria

As detailed on Plates 1-3, design criteria per specific erosion and sediment control measures include:

Water Bars / Slope Breakers

Permanent water bars will be installed twenty-five (25) feet from edge of stream, river or other waterbody crossing as shown on Plate 2. Slopes greater than 65% may require site specific stabilization measures based on field conditions as approved by MVP Design Engineering and MVP Environmental Inspector.

Excavation of Sump Filter

Side slopes of sump filter should be no steeper than 1:1. The minimum depth of excavation should be one (1) foot.

Compost Filter Sock

Since the sump filter will function as a pre-treatment for sediment removal, calculation of the 2-year velocity over the compost filter sock size conservatively assumes that the sump filter is full of sediment and in need of maintenance and that no flow is occurring through the sock due to clogging or sediment deposition.

The outfall velocity from this BMP should be non-erosive for the 2-year design storm. The 2-year velocities shall meet the criteria in Table 3.99-D-A. Due to the anticipated small size of contributing drainage area, the Rational Method shall be used to calculate discharge:

$$Q = CiA$$

where,

$Q = discharge\ (ft^3/sec)$
$i = Rainfall\ intensity\ (inches/hour)$
$A = Contributing\ drainage\ area\ (acres)$

Discharge over the compost filter sock is calculated using the broad-crested weir equation:

$$Q = C_d L H^{3/2}$$

where,

$Q = Discharge\ over\ weir\ (ft^3/sec)$
$C_d = Weir\ Coefficient$
$L = Length\ of\ weir\ crest\ (ft)$
$H = Overtopping\ depth\ (ft)$

The velocity over the weir is calculated using the following equation:

$$v = Q/A$$

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JOB NO.				
PROJECT ID: MVP – VA PORTION				

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7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
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3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.11 OF 0.23

REVISION

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where,

$v = Velocity\ (ft/sec)$
$Q = Discharge\ over\ weir\ (ft^3/sec)$
$A = Flow\ area\ over\ weir\ (ft^2)$

TABLE 3.99-D-A
PERMISSIBLE VELOCITES FOR EARTH LININGS

Soil Types	Corrected Permissible Velocities (ft./sec.)
Fine Sand (noncolloidal)	2.0
Sandy Loam (noncolloidal)	2.0
Silt Loam (noncolloidal)	2.4
Ordinary Firm Loam	2.8
Fine Gravel	4.0
Stiff Clay (very colloidal)	4.0
Graded, Loam to Cobbles (noncolloidal)	4.0
Graded, Silt to Cobbles (colloidal)	4.4
Alluvial Silts (noncolloidal)	4.4
Alluvial Silts (colloidal)	4.0
Coarse Gravel (noncolloidal)	4.8
Cobbles and Shingles	4.4
Shales and Hard Pans	4.8

NOTE: Correction factor value = 0.8 for flow depths less than one foot has been applied to original table.
Source: Chapter 5, Engineering Calculations: Table 5-22 and Plate 5-39, *Virginia Erosion and Sediment Control Handbook*, 3rd Ed., 1992.

Example

Given: A one-acre drainage area in Giles County, an 18-inch diameter compost filter sock with an effective level weir length of 8 feet, in a Sandy Loam soil installed per details in Plate 2.

Solution:

1. Calculate the discharge:
$$Q = CIA = 0.9 * 4.07\ inches/hour * 1\ acre = 3.66\ ft^3/sec$$
2. Rearranging the weir equation to solve for overtopping depth:
$$H = (Q/(C_D * L))^{\frac{2}{3}} = (3.66\ ft^3/sec\ /(2.99 * 8\ ft))^{2/3} = 0.29\ ft$$
3. Calculate the velocity over the compost filter sock:

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.2 REV. P

$$v = Q/A = 3.66\ ft^3/_{sec}\ /(0.29\ ft * 8\ ft) = 1.60\ ft/sec$$

4. Verify that the velocity is non-erosive in Table 3.99-D-A for Sandy Loam soil.
$1.60\ ft/sec < 2.0\ ft/sec$

Streambank Swale

Minimum thickness (T, as shown on Streambank Swale Typical Cross Section on Plate 3) shall be two (2) times the D_{50}. For drainage areas one (1) acre or less, rock shall have a minimum D_{50} = 6" and T = 12 inches for stream banks with a slope of 1:1 or flatter (i.e. S_o=1.0 ft/ft). If the contributing drainage area is greater than one (1) acre or if the swale is steeper than 1:1 (1.0 ft/ft), the plans shall provide calculations to determine an appropriate size stone and minimum thickness. Rock may be salvaged on-site materials and may contain topsoil, fines, sand, gravel in a mix with at least 60% rock with a D_{50} of at least 6".

Calculations (from VDOT Drainage Manual Appendix 7B-5)

Given: A one-acre drainage area in Giles County from previous example.

Solution:
CHANNEL DATA

Q = 3.66 (cfs) P = 3.02 (ft.) n = 0.069

S_o = 1.00 (ft/ft) R = 0.18 (ft.)

d_o = 0.37 (ft.) V_o = 6.81 (fps)

A = 0.54 (ft^2) Side Slope = 4:1

ASSUMED ROCK SIZE - D50 = 0.5 ft

VERIFY ASSUMED ROCK SIZE

ϕ = 41.2° (Appendix 7E-1)

Side Slope = 4: 1 θ = 14°

$K_1 = [1 - (\sin^2\theta / \sin^2\phi)]^{0.5}$

$K_1 = [1 - (\sin^2 14° / \sin^2 41.5°)]^{0.5} = 0.93$

For Specific Gravity = 2.65 and Stability Factor = 1.2

$D50 = 0.001 * V_o^2 / (d_{reg}^{0.5} * K_1^{1.5})$

$D50 = 0.001 * 6.81^2 / (0.5^{0.5} * 0.93^{1.5}) = 0.45$ ft.

D50 Computed (0.45) < D50 Assumed (0.5)

Therefore, assumed D50 is appropriate.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.3 REV. P

Construction Specifications

General

1. All trees, brush, stumps, roots, obstructions and other unsuitable material shall be removed and disposed of properly.
2. Disturbed areas will be returned to pre-construction contours. Topsoil shall be replaced in accordance with the Mountain Valley Pipeline Project Specific Standards and Specifications.
3. Existing suitable stream substrate shall be salvaged and replaced to streambed at pre-construction contours.
4. The swale shall be excavated or shaped to the proper grade and cross-section.
5. Any excess soil shall be removed and disposed of properly.

Water Bars / Slope Breakers

1. Water bars / slope breakers shall be installed in accordance with WATER BAR, TYPICAL SLOPE BREAKER (SB), Std. & Spec. MVP-17 and MVP-18.
2. Permanent water bars are required at all stream, river and other waterbody crossings, as well as upslope from roadway and roadbed cut slopes.
3. Construct permanent water bars with compost filter sock after completion of grading in accordance with the water bar spacing and sizing requirements shown on plan and in table on Plate 3.
4. Water bar closest to stream top of bank shall be located twenty-five (25) feet maximum upslope from top of bank.
5. Water bars shall have a slope of one to four percent.
6. Water bars on retired roadways, skidtrails, and right-of-ways shall be left in place after permanent stabilization has been achieved.

Compost Filter Socks

1. Compost filter socks shall be installed in accordance with COMPOST FILTER SOCK, Std. & Spec. MVP ES-3.
2. Compost filter socks shall extend at least ten feet upslope from the uppermost limit of the sump filter.

Sump Filters

1. Sump filters to be installed at end of water bars. Refer to sump filter detail on Plate 2.
2. Sump filter shall be located entirely within the permanent right-of-way.
3. Sediment storage area shall be excavated to a minimum dimension of one-foot-deep by three-feet-wide by six-feet-long. Additional storage, if required due to a larger contributing drainage area, will either be added through increasing the sump filter dimension or stacking compost filter sock to increase BMP height.

Streambank Swales

Streambank swales shall be installed at locations determined by MVP Design Engineering and the MVP Environmental Inspector based on their visual observation of the post-construction field conditions.

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JOB NO.	
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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.4 REV. P

Locations shall include but are not limited to locations where there is visual evidence of formation of rills and/or gullies along the streambank and/or evidence of concentrated flow along the streambank with anticipated potential for erosion.

1. On-site salvaged rock and/or riprap, if on-site rock is not salvageable, shall be installed in accordance with RIPRAP, Std. & Spec. 3.19.
2. Erosion control fabric shall be installed along the edges of the riprap-lined channel as shown on Plate 3 in accordance with SOIL STABILIZATION BLANKETS AND MATTING, Std. & Spec. 3.36.

Inspections and Maintenance

1. Inspections shall be conducted at a frequency of (i) at least once every four business days or (ii) at least once every five business days and no later than 48-hours following a measurable storm event.
2. Damaged or eroded water bars shall be restored to original dimensions within 24-hours of inspection.
3. Compost filter sock shall be inspected for sediment accumulation, integrity, and maintained as necessary. Accumulated sediment shall be removed when it reaches no more than half the aboveground height of the sock and disposed in the manner described elsewhere in the plan. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.
4. Sump filter shall be inspected for sediment accumulation and proper operation. Sediment shall be removed and the sump filter restored to original dimensions when sediment has accumulated to half the design depth. Sediment removal from the sump shall be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.
5. Streambank swales shall be inspected for integrity and proper operation. Damaged or eroded streambank swales shall be restored to original dimension within 24-hours of inspection.
6. If during inspection, additional rills and/or gullies are observed, streambank swales shall be installed in accordance with the construction specifications herein at these locations within 24-hours of inspection.
7. Maintenance of water bars, compost filter socks and sump filters shall be provided until roadway, skidtrail, or right-of-way has achieved permanent stabilization.

Post Stabilization

Once permanent stabilization has been achieved, sediment storage should be seeded with permanent seed mix in accordance with the Mountain Valley Pipeline Project Specific Standards and Specifications. Compost filter socks shall remain to decompose in place and streambank swales shall remain in place.

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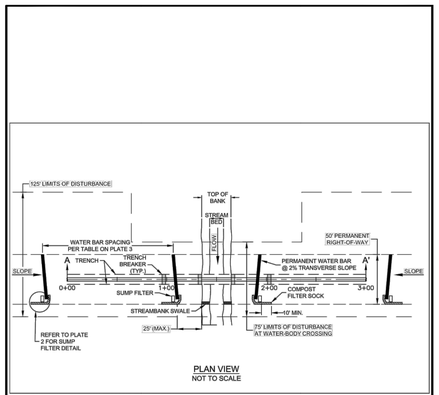
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.5 REV. P



PLAN VIEW
NOT TO SCALE

POST-CONSTRUCTION STREAM CROSSING STABILIZATION DETAIL PLATE 1

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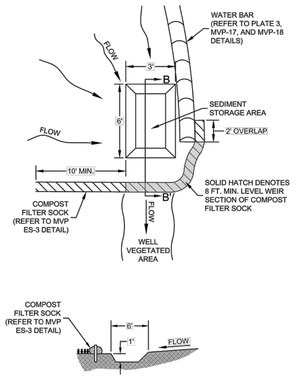
Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.6 REV. P



XS: B-B'

SUMP FILTER DETAIL
NOT TO SCALE

POST-CONSTRUCTION STREAM CROSSING STABILIZATION DETAIL PLATE 2

DRAWN	DATE
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Mountain Valley PIPELINE — DESIGN ENGINEERING

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POST CONSTRUCTION STREAM CROSSING STABILIZATION

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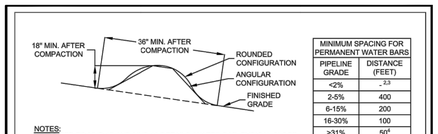
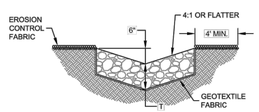


MINIMUM SPACING FOR PERMANENT WATER BARS	
PIPELINE GRADE	DISTANCE (FEET)
<2%	^{2,3}
2-5%	400
6-15%	200
16-30%	100
>31%	50[4]

NOTES:
1. REFER TO MVP-17 AND MVP-18 DETAILS (WATER BAR, TYPICAL SLOPE BREAKERS).
2. PERMANENT WATER BARS WILL BE INSTALLED AS NEEDED BASED ON FIELD CONDITIONS.
3. PERMANENT WATER BARS WILL BE INSTALLED 25 FEET FROM EACH WATERBODY BOUNDARY REGARDLESS OF SLOPE CONDITIONS.
4. SLOPES GREATER THAN 65% MAY REQUIRE SITE SPECIFIC STABILIZATION MEASURES BASED ON FIELD CONDITIONS AS APPROVED BY MVP DESIGN ENGINEERING AND MVP ENVIRONMENTAL INSPECTOR.

PERMANENT WATER BAR DETAIL
NOT TO SCALE



NOTES:
1. IF THE CONTRIBUTING DRAINAGE AREA IS GREATER THAN 1 ACRE OR IF THE SWALE IS STEEPER THAN 1:1 (1.0 FT/FT), THE PLANS SHALL PROVIDE CALCULATIONS TO DETERMINE AN APPROPRIATE SIZE STONE, MINIMUM THICKNESS, AND CHANNEL SIZE.
2. MINIMUM THICKNESS, T, SHALL BE TWO TIMES THE D50.
3. FOR DRAINAGE AREAS 1 ACRE OR LESS, D50 = 6 INCHES AND T = 12 INCHES.
4. SWALE SIDE SLOPES SHALL BE 4:1 OR FLATTER.

STREAMBANK SWALE TYPICAL CROSS SECTION
NOT TO SCALE

POST-CONSTRUCTION STREAM CROSSING STABILIZATION DETAIL PLATE 3

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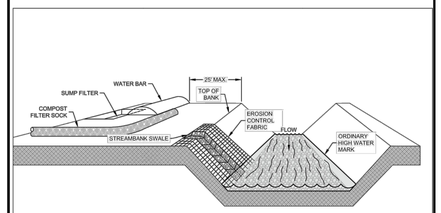
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.8 REV. P



PERSPECTIVE VIEW
NOT TO SCALE

POST-CONSTRUCTION STREAM CROSSING STABILIZATION DETAIL PLATE 4

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APP'D	DATE 08/11/17
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PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL
POST CONSTRUCTION STREAM CROSSING STABILIZATION

DRAWING NO. MVP–ES44.9 REV. P

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.12 OF 0.23

REVISION

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MULCHING

Definition

Application of plant residues or other suitable materials to the soil surface.

Purposes

1. To prevent erosion by protecting the soil surface from raindrop impact and reducing the velocity of overland flow.
2. To foster the growth of vegetation by increasing available moisture and providing insulation against extreme heat and cold.

Conditions Where Practice Applies

1. Areas which have been permanently seeded (see Appendix B – Typical Construction Details MVP-ES11.1 through ES12.3) should be mulched immediately following seeding.
2. Areas which cannot be seeded because of the season should be mulched to provide some protection to the soil surface. An organic mulch should be used, and the area then seeded as soon weather or seasonal conditions permit. It is not recommended that fiber mulch be used alone for this practice; at normal application rates it just simply does not provide the protection that is achieved using other types of mulch.
3. Mulch may be used together with plantings of trees, shrubs, or certain ground covers which do not provide adequate soil stabilization by themselves.
4. Mulch shall be used in conjunction with temporary seeding operations as specified in TEMPORARY SEEDING, Std. & Spec. 3.31

Planning Considerations

Mulches are applied to the soil surface to conserve a desirable soil property or to promote plant growth. A surface mulch is one of the most effective means of controlling runoff and erosion on disturbed land.

Mulches can increase the infiltration rate of the soil, reduce soil moisture loss by evaporation, prevent crusting and sealing of the soil surface, modify soil temperatures, and provide a suitable microclimate for seed germination.

Organic mulch materials, such as straw, wood chips, bark, and fiber mulch have been found to be the most effective.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — MULCHING

DRAWING NO. MVP–ES45 — REV. P

Chemical soil stabilizers or soil binders should not be used alone for mulch. These materials are useful to bind organic mulches together to prevent displacement.

A variety of manufactured SOIL STABILIZATION BLANKETS AND MATTING (see Std. & Spec. 3.36) have been developed for erosion control in recent years. Some of these products can be used as mulches, particularly in critical areas such as waterways. They also may be used to hold other mulches to the soil surface.

The choice of materials for mulching will be based on the type of soil to be protected, site conditions, season and economics. It is especially important to mulch liberally in mid-summer and prior to winter, and on cut slopes and southern slope exposures.

Organic Mulches

Straw - The mulch most commonly used in conjunction with seeding. The straw should come from wheat or oats (free of troublesome weed seeds) and may be spread by hand or machine. Straw can be windblown and must be anchored down by an acceptable method.

Hay – Hay shall not be used as mulch for Project activities.

Corn Stalks - These should be shredded into 4- to 6-inch lengths. Stalks decompose slowly and are resistant to displacement.

Wood Chips - Suitable for areas that will not be closely mowed, and around ornamental plantings. Chips decompose slowly and do not require tacking. They must be treated with 12 pounds of nitrogen per ton to prevent nutrient deficiency in plants; however, can be a very inexpensive mulch if chips are obtained from trees cleared on the site.

Bark Chips, Shredded Bark - These are by-products of timber processing which are used in landscaped plantings. Bark is also a suitable mulch for areas planted to grasses and not closely mowed. It may be applied by hand or mechanically and is not usually toxic to grasses or legumes; additional nitrogen fertilizer is not required.

Fiber Mulch - Used in hydroseeding operations and applied as part of the slurry. It creates the best seed-soil contact when applied over top of (as a separate operation) newly seeded areas. These fibers do not require tacking, although tacking agents or binders are sometimes used in conjunction with the application of fiber mulch. This form of mulch does not provide sufficient protection to highly erodible soils. Additionally, fiber mulch will not be considered adequate mulch when used during the dry summer months or when used for late fall mulch cover. Use straw mulch during these periods. Fiber mulch may be used to tack (anchor) straw mulch. This treatment is well suited for steep slopes, critical areas, and areas susceptible to displacement.

There are other organic materials which make excellent mulches but are only available locally or seasonally. Creative use of these materials can reduce costs.

Chemical Mulches and Soil Binders

A wide range of synthetic, spray-on materials are marketed to stabilize and protect the soil surface. These are emulsions or dispersions of vinyl compounds, rubber or other substances which are mixed with water and applied to the soil. They may be used alone in some cases as temporary stabilizers, or in conjunction with fiber mulches or straw.

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ENVIRONMENTAL DETAIL — MULCHING

DRAWING NO. MVP–ES45.1 — REV. P

When used alone, chemical mulches do not have the capability to insulate the soil or retain soil moisture that organic mulches have. This soil protection is also easily damaged by traffic. Application of these mulches is usually more expensive than organic mulching, and the mulches decompose in 60-90 days.

Blankets and Matting

Field experience has shown that plastic netting, when used alone, does not retain soil moisture or modify soil temperature. In some cases it may stabilize the soil surface while grasses are being established, but is primarily used in grassed waterways and on slopes to hold straw or similar mulch in place.

Jute mesh and other soil stabilization blankets are good choices for mulching on difficult slopes and in minor drainage swales. Most of the soil stabilization mattings (used to create a permanent matrix for root growth within the soil) must receive mulching in order to properly stabilize an area. Notably, some manufacturers have recently developed permanent mattings which include self-contained, temporary mulching materials; however, these measures will have to meet the requirements noted in Std. & Spec. 3.36, SOIL STABILIZATION BLANKETS AND MATTING, before they can be recommended for use on steep slopes and in channel flow situations.

The most critical aspect of installing blankets and mats is obtaining firm, continuous contact between the material and the soil. Without such contact, the material may fail and thereby allow erosion to occur. It is important to use an adequate number of staples and make sure the material is installed properly in order to maximize soil protection. These products are discussed in more detail in Std. & Spec. 3.36, SOIL STABILIZATION BLANKETS & MATTING.

MVP will utilize hydraulically applied soil stabilization blankets and matting (i.e. Earthguard, Flexterra, or equivalent) as an alternate to the rolled ESC blanket material identified under STD & SPEC 3.36. Information regarding the hydraulically applied blankets is provided under Appendix B MVP-ES40 and MVP-ES40.1.

Specifications

Organic Mulches

Organic mulches may be used in any area where mulch is required, subject to the restrictions noted in Table 3.35-A.

Materials: Select mulch material based on site requirements, availability of materials, and availability of labor and equipment. Table 3.35-A lists the most commonly used organic mulches. Other materials, such as peanut hulls and cotton burs, may be used with the permission of the local Plan-Approving Authority.

Prior to mulching: Complete the required grading and install needed sediment control practices.

Lime and fertilizer should be incorporated and surface roughening accomplished as needed. Seed should be applied prior to mulching except in the following cases:

a. Where seed is to be applied as part of a hydroseeder slurry containing fiber mulch.

b. Where seed is to be applied following a straw mulch spread during winter months.

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ENVIRONMENTAL DETAIL — MULCHING

DRAWING NO. MVP–ES45.2 — REV. P

TABLE 3.35-A

ORGANIC MULCH MATERIALS AND APPLICATION RATES

MULCHES:	RATES: Per Acre	RATES: Per 1000 sq. ft.	NOTES:
Straw	1 ½ - 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

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ENVIRONMENTAL DETAIL — MULCHING

DRAWING NO. MVP–ES45.3 — REV. P

Application: Mulch materials shall be spread uniformly, by hand or machine.

When spreading straw mulch by hand, divide the area to be mulched into approximately 1,000 sq. ft. sections and place 70-90 lbs. (n to 2 bales) of straw in each section to facilitate uniform distribution.

Mulch Anchoring: Straw mulch must be anchored immediately after spreading to prevent displacement. Other organic mulches listed in Table 3.35-A do not require anchoring. The following methods of anchoring straw may be used:

1. Mulch anchoring tool (often referred to as a Krimper or Krimper Tool): This is a tractor-drawn implement designed to punch mulch into the soil surface. This method provides good erosion control with straw. It is limited to use on slopes no steeper than 3:1, where equipment can operate safely. Machinery shall be operated on the contour.
2. Fiber Mulch: A very common practice with widespread use today. Apply fiber mulch by means of a hydroseeder at a rate of 500-750 lbs/acre over top of straw mulch. It has an added benefit of providing additional mulch to the newly seeded area.
3. Liquid mulch binders: Application of liquid mulch binders and tackifiers should be heaviest at edges of areas and at crests of ridges and banks, to prevent displacement. The remainder of the area should have binder applied uniformly. Binders may be applied after mulch is spread or may be sprayed into the mulch as it is being blown onto the soil.

   The following types of binders may be used:

   a. Synthetic binders - Formulated binders or organically formulated products may be used as recommended by the manufacturer to anchor mulch.

   b. *Asphalt - Any type of asphalt thin enough to be blown from spray equipment is satisfactory. Recommended for use are rapid curing (RC-70, RC-250, RC-800), medium curing (MC-250, MC-800) and emulsified asphalt (SS-1, CSS-1, CMS-2, MS-2, RS-1, RS-2, CRS-1, and CRS-2).

      Apply asphalt at 0.10 gallon per square yard (10 gal./1000 sq. ft. or 430 gal./acre). Do not use heavier applications as it may cause the straw to "perch" over rills. All asphalt designations are from the Asphalt Institute Specifications.

      *Note: This particular method is not used as commonly today as it once was in the past. The development of hydraulic seeding equipment promoted the industry to turn to synthetic or organically based binders and tackifiers. When this method is used, environmental concerns should be addressed to ensure that petroleum-based products do not enter valuable water supplies. Avoid applications into waterways or channels.

4. Mulch nettings: Lightweight plastic, cotton, or paper nets may be stapled over the mulch according to manufacturer's recommendations.
5. Peg and twine: Because it is labor-intensive, this method is feasible only in small areas where other methods cannot be used. Drive 8- to 10-inch wooden pegs to within 3 inches of the soil surface, every 4 feet in all directions. Stakes may be driven before or after straw is spread. Secure mulch by stretching twine between pegs in a criss-cross-within-a square pattern. Turn twine 2 or more times around each peg.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — MULCHING

DRAWING NO. MVP–ES45.4 — REV. P

Chemical Mulches

Chemical mulches* may be used alone only in the following situations:

a. Where no other mulching material is available.

b. In conjunction with temporary seeding during the times when mulch is not required for that practice.

c. From March 15 to May 1 and August 15 to September 30, provided that they are used on areas with slopes no steeper than 4:1, which have been roughened in accordance with SURFACE ROUGHENING, Std. & Spec. 3.29. If rill erosion occurs, another mulch material shall be applied immediately.

*Note: Chemical mulches may be used to bind other mulches or with fiber mulch in a hydroseeded slurry at any time. Manufacturer's recommendations for application of chemical mulches shall be followed.

Maintenance

All mulches and soil coverings should be inspected periodically (particularly after rainstorms) to check for erosion. Where erosion is observed in mulched areas, additional mulch should be applied. Nets and mats should be inspected after rainstorms for dislocation or failure. If washouts or breakage occur, re-install netting or matting as necessary after repairing damage to the slope or ditch. Inspections should take place up until grasses are firmly established. Where mulch is used in conjunction with ornamental plantings, inspect periodically throughout the year to determine if mulch is maintaining coverage of the soil surface; repair as needed.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — MULCHING

DRAWING NO. MVP–ES45.5 — REV. P

TOPSOILING & SOIL HANDLING FOR M.V.P.

Definition

Methods of preserving and using the surface layer of undisturbed soil, often enriched in organic matter, in order to obtain a more desirable planting and growth medium.

Purposes

To provide a suitable growth medium for final site stabilization with vegetation and promote successful reforestation.

Conditions Where Practice Applies

1. Where the preservation or importation of topsoil is determined to be the most effective method of providing a suitable growth medium.
2. Where the subsoil or existing soil presents the following problems:
   a. The texture, pH, or nutrient balance of the available soil cannot be modified by reasonable means to provide an adequate growth medium.
   b. The soil material is too shallow to provide an adequate root zone and to supply necessary moisture and nutrients for plant growth.
   c. The soil contains substances potentially toxic to plant growth.
3. Only on slopes that are 2:1 or flatter unless other measures are taken to prevent erosion and sloughing.

Planning Considerations

Topsoil is the surface layer of the soil profile, generally characterized as being darker than the subsoil due to the presence of organic matter. It is the major zone of root development, carrying much of the nutrients available to plants, and supplying a large share of the water used by plants.

Although topsoil provides an excellent growth medium, there are disadvantages to its use. Stripping, stockpiling, and reapplying topsoil, or importing topsoil, may not always be cost-effective. Topsoiling can delay seeding or sodding operations, increasing the exposure time of denuded areas. Most topsoil contains weed seeds, and weeds may compete with desirable species.

Advantages of topsoil include its high organic matter content and friable consistence, water-holding capacity, and nutrient content.

In site planning, the option of topsoiling should be compared with that of preparing a seedbed in subsoil. The clay content of subsoils does provide high moisture availability and deter leaching of nutrients and, when properly limed and fertilized, subsoils may provide a good growth medium which is generally free

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ENVIRONMENTAL DETAIL — TOPSOILING & SOIL HANDLING

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of weed seeds. In many cases topsoiling may not be required for the establishment of less demanding, lower maintenance plant material. Topsoiling is strongly recommended where ornamental plants or high-maintenance turf will be grown. Topsoiling is a required procedure when establishing vegetation on shallow soils, soils containing potentially toxic materials, and soils of critically low pH (high acid) levels.

If topsoiling is to be done, the following items should be considered:

1. Whether an adequate volume of topsoil exists on the site. Topsoil will be spread at a compacted depth of 2 to 4 inches (depths closer to 4 inches are preferred).
2. Location of the topsoil stockpile so that it meets specifications and does not interfere with work on the site.
3. Allow sufficient time in scheduling for topsoil to be spread and bonded prior to seeding or planting.
4. Care must be taken not to apply topsoil to subsoil if the two soils have contrasting textures. Clayey topsoil over sandy subsoil is a particularly poor combination, as water may creep along the junction between the soil layers, causing the topsoil to slough. Sandy topsoil over a clay subsoil is equally as likely to fail.
5. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. Topsoiling of steep slopes should be discouraged unless good bonding of soils can be achieved.

Specifications

Materials

Field exploration of the site shall be made to determine if there is sufficient surface soil of good quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, clay loam). It shall be free of debris, trash, stumps, rocks, roots, and noxious weeds, and shall give evidence of being able to support healthy vegetation. It shall contain no substance that is potentially toxic to plant growth.

In areas where revegetation is of concern based on existing soil conditions and determined by the MVP Environmental Inspector (EI), topsoil samples shall be taken for analysis. Samples will be collected by the MVP EI and sent to a recognized laboratory for analysis of the following criteria:

Organic matter content shall be not less than 1.5% by weight.

pH range shall be from 6.0-7.5. If pH is less than 6.0, lime shall be added in accordance with soil test results or in accordance with the recommendations of the vegetative establishment practice being used.

Soluble salts shall not exceed 500 ppm.

Soil samples collected and sent for analysis will be identified by the MVP Constructions Spread # and pipeline station from which the sample was obtained. Areas that fail to revegetate following restoration will be sampled and analyzed based on the above parameters.

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Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — TOPSOILING & SOIL HANDLING

DRAWING NO. MVP–ES46.1 — REV. P

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6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
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3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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REVISION

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Topsoil Importing

Topsoil would be imported as needed in residential areas only. If additional off-site topsoil is needed, it must meet the standards stated above.

Stripping

Topsoil operations should not be performed when the soil is wet or frozen. Stripping shall be confined to the immediate construction area. A 4-to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All perimeter dikes, basins, and other sediment controls shall be in place prior to stripping.

Stockpiling

Topsoil shall be stockpiled in such a manner that natural drainage is not obstructed and no off-site sediment damage shall result. Stabilize or protect stockpiles in accordance with MS #2.

Excavated subsoil shall be stockpiled separately from topsoil.

Side slopes of the stockpile shall not exceed 2:1.

Perimeter controls must be placed around the stockpile immediately; seeding of stockpiles shall be completed within 7 days of the formation of the stockpile, in accordance with Std. & Spec. 3.31, TEMPORARY SEEDING if it is to remain dormant for longer than 14 days (refer to MS #1 and MS #2).

Site Preparation Prior to and Maintenance During Topsoiling and Excavation

Before topsoiling or excavation, establish needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, level spreaders, waterways, sediment basins, etc. These practices must be maintained during topsoiling and excavation.

Grading: Previously established grades on the areas to be topsoiled shall be maintained according to the approved plan.

Liming: Where the pH of the subsoil is 6.0 or less, or the soil is composed of heavy clays, agricultural limestone shall be spread in accordance with the soil test or the vegetative establishment practice being used.

Bonding: After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by disking or scarifying to a depth of at least 4-6 inches to ensure bonding of the topsoil and subsoil. Refer to 2.8.3 Soil Compaction Mitigation within the Project Standards and Specifications for additional information.

Applying Topsoil

Topsoil shall not be placed while in a frozen or muddy condition, when topsoil or subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading or seeding. The topsoil shall be uniformly distributed to a minimum compacted depth of 2 inches on 3:1 or steeper slopes and 4 inches on flatter slopes or to mimic existing conditions present in the adjacent undisturbed areas. (See Table 3.30-A to determine volume of topsoil required for application to various depths). Any irregularities in the surface, resulting from topsoiling or other operations, shall be corrected in order to prevent the formation of depressions or water pockets.

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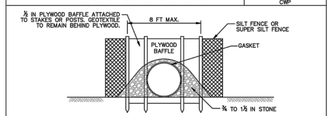
ENVIRONMENTAL DETAIL — TOPSOILING & SOIL HANDLING

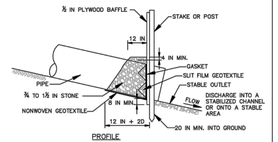
DRAWING NO. MVP–ES46.2 REV. P

DETAIL E-4 CLEAR WATER PIPE THROUGH SILT FENCE OR SUPER SILT FENCE

STANDARD SYMBOL: CWP



CROSS SECTION – LOOKING DOWNGRADE



PROFILE

CONSTRUCTION SPECIFICATIONS

1. INSTALL SILT FENCE OR SUPER SILT FENCE IN ACCORDANCE WITH DETAIL E–1 OR DETAIL E–2.
2. AT THE PIPE LOCATION, CUT AND PULL BACK THE WOVEN SLIT FILM GEOTEXTILE AND CHAIN LINK FENCING. SECURE GEOTEXTILE TO PIPE WITH GASKET. INSTALL ADDITIONAL STAKES OR POSTS IF NECESSARY TO ACCOMMODATE THE INSTALLATION OF THE BAFFLE BOARD.
3. ENTRENCH ⅜ INCH PLYWOOD BAFFLE A MINIMUM OF 8 INCHES AND SECURE TO THE UPGRADE SIDE OF THE FENCE STAKES OR POSTS. BAFFLE SHOULD BE AT LEAST THE HEIGHT OF THE FENCE.
4. PLACE ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE BEHIND THE PLYWOOD BAFFLE ON NONWOVEN GEOTEXTILE AND EXTEND 12 INCH MIN. ALONG TOP OF PIPE AND TO A HEIGHT OF 4 INCHES ABOVE THE TOP OF PIPE.
5. USE NONWOVEN AND WOVEN SLIT FILM GEOTEXTILES AS SPECIFIED IN SECTION H–1 MATERIALS.
6. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN SEDIMENT REACHES 6 INCHES IN HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL BAFFLE, CHAIN LINK, AND GEOTEXTILE. REPLACE STONE IF DISPLACED. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

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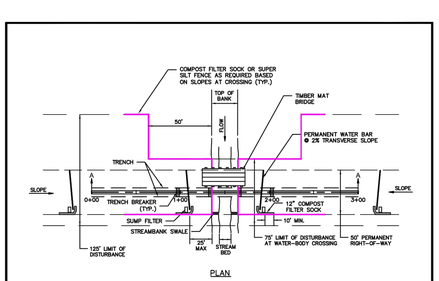
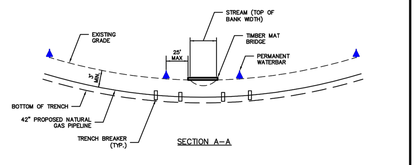
Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — CLEAR WATER PIPE THROUGH SILT FENCE OR SUPER SILT FENCE

DRAWING NO. MVP–ES48 REV. P



PLAN



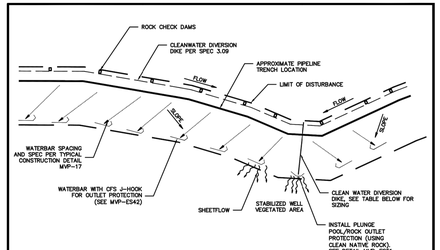
SECTION A–A

DRAWN	DATE 10/13/17
CHECKED	DATE 10/13/17
APP'D	DATE 10/13/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — TIMBER MAT BRIDGE STREAM CROSSING

DRAWING NO. MVP–ES49 REV. P



NOTES:

1) CLEAN WATER DIVERSION DIKE TO BE CONSTRUCTED PER VESCH STD & SPEC 3.09
2) AS NEEDED ON STEEP SLOPES INSTALL ROCK CHECK DAMS PER VESCH STD & SPEC 3.20, EXCEPT THAT NATIVE ROCK PRODUCED DURING EXCAVATION WILL BE SUBSTITUTED FOR THE STONE AND RIP RAP.
3) PER VESCH STD & SPEC 3.15 THE DIVERSION DIKE MUST BE 6–INCHES HIGHER THAN THE PIPE ON THE INLET SIDE AND THE DIKE MUST SLOPE NO GREATER THAN 3:1 TO RE–JOIN THE ADJACENT DIKE HEIGHT.

Number of Temporary Slope Drains Spaced Across Diversion Dike[1,2,3]			
Average Slope (%)	12	18	24
10%	4	2	1
20%	3	1	1
30%	3	1	1
40%	2	1	1

[1]Maximum allowable drainage area of 5-acres assumed for sizing purposes per VESCH Std & Spec 3.15 - Temporary Slope Drain
[2]Temporary slope drains designed for the 10-yr storm using the rational method in lue of the VESCH Std & Spec 3.15 slope drain sizing table (Table 3.15-A)
[3]Pipe flow capacity taken as 1/2 of the capacity when flowing half full to ensure no build-up of water within diversion dike

DRAWN	DATE 10/13/17
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APP'D	DATE 10/13/17
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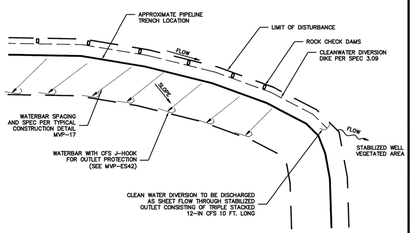
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — CLEAN WATER DIVERSION WITH CLEAN WATER PIPE

DRAWING NO. MVP–ES50 REV. P



NOTES:

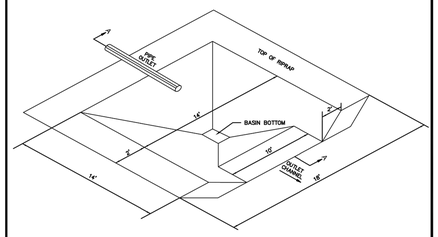
1) CLEAN WATER DIVERSION DIKE TO BE CONSTRUCTED PER VESCH STD & SPEC 3.09
2) AS NEEDED ON STEEP SLOPES INSTALL ROCK CHECK DAMS PER VESCH STD & SPEC 3.20, EXCEPT THAT NATIVE ROCK PRODUCED DURING EXCAVATION WILL BE SUBSTITUTED FOR THE STONE AND RIP RAP

DRAWN	DATE 10/13/17
CHECKED	DATE 10/13/17
APP'D	DATE 10/13/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — CLEAN WATER DIVERSION WITH END RELEASE

DRAWING NO. MVP–ES50.1 REV. P



NOTE:

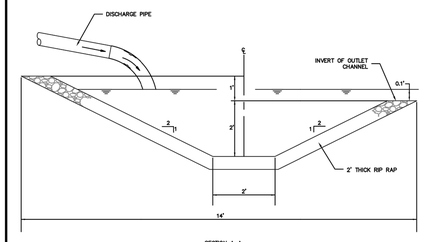
1. PLUNGE POOL OUTLET TO BE CONSTRUCTED WITHIN THE LIMITS OF DISTURBANCE.
2. PLUNGE POOL TO BE KEYED INTO CONSTRUCTED SLOPE. STEEP SLOPES MAY REQUIRE ADDITIONAL MEASURES IF SITE CONDITIONS CREATE EROSION CONDITIONS.

DRAWN	DATE 10/13/17
CHECKED	DATE 10/13/17
APP'D	DATE 10/13/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — PLUNGE POOL OUTLET ISOMETRIC VIEW

DRAWING NO. MVP–ES51 REV. P



SECTION A–A

NOTE:

1. USE NATIVE ROCK OR IMPORTED RIP–RAP SIZE D50 6–INCH, PLACEMENT THICKNESS 2–FEET.

DRAWN	DATE 10/13/17
CHECKED	DATE 10/13/17
APP'D	DATE 10/13/17
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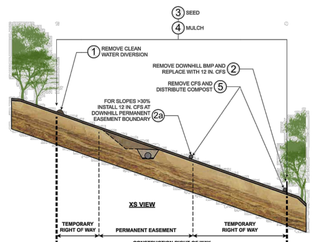
JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — PLUNGE POOL OUTLET

DRAWING NO. MVP–ES51.1 REV. P



RESTORATION BMP PHASING

The following is the sequence of erosion and sediment control best management practice removal and installation related to restoration activities. This work will occur between restoration of pipeline limit of disturbance to pre-construction grades and final closure of the project defined as "achieving vegetative stabilization". The sequence is:

1) Remove and grade out the clean water diversion dike.

2) Remove downslope BMPs utilized during construction and immediately replace with 12-in compost filter sock. On slopes greater than 30%, an additional intermediate 12-in compost filter socks will be placed per the slope spacing (MVP-ES3.2) to attenuate the velocity of runoff in the reclaimed area.

3) Where seed is not included in the mulch (step 4), seed the area using the seed types and rates MVP-ES11.1 to MVP-ES11.9 and MVP-ES12.1 to MVP-ES12.4.

4) Apply mulch in the form of organic mulch (per MVP-ES45), soil stabilization matting (per VADEQ STD & SPEC 3.36), or hydraulic erosion control product (per MVP-ES40).

5) Following a determination that the site has achieved vegetative stabilization, the compost filter sock will be "opened" and the mulch contained within will be spread within the LOD.

DRAWN	DATE 10/13/17
CHECKED	DATE 10/13/17
APP'D	DATE 10/13/17
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JOB NO.	
PROJECT ID:	MVP – VA PORTION

Mountain Valley PIPELINE — DESIGN ENGINEERING

ENVIRONMENTAL DETAIL — RESTORATION DETAIL

DRAWING NO. MVP–ES52 REV. P

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:	DW
7	01/31/18	KAL	RE		ADDED DETAILS FOR ROADS AND PADS	DW
6	01/26/18	KAL	RE		ADDRESS VADEQ COMMENTS	DW
5	01/08/18	KAL	RE		ADDRESS VADEQ COMMENTS	DW
4	11/28/17	KAL	RE		ADDRESS VADEQ COMMENTS	DW
3	11/01/17	KAL	RE		ADDRESS VADEQ COMMENTS	DW
2	08/18/17	KAL	RE		ADDRESS VADEQ COMMENTS	DW

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
CANONSBURG, PA 15317

TETRA TECH
complex world | CLEAR SOLUTIONS™
661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.14 OF 0.23

REVISION

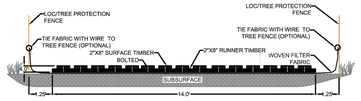
TETRA TECH CAD FILE PATH: X:\CAD_Pittsburgh\EQT\7157 – MVP\00 – General\E&S\Spread 11\7157ES014.dwg PLOTTED ON: 2/3/2018 8:00 AM PLOTTED BY: Rickobough, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb

ACCESS ROAD DECK MAT
NOT TO SCALE

NOTES:
1. MAT SHALL BE "DECK MAT" BY CAROLINA MAT INCORPORATED OR APPROVED EQUAL.

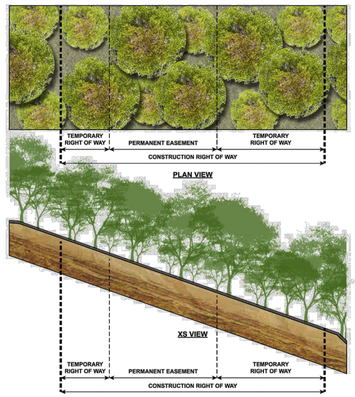
2. MATS SHALL BE INSTALLED SUCH THAT THE SURFACE TIMBER RUNS PARALLEL WITH THE VEHICLE TREAD. SUBSEQUENT MATS SHALL BE INSTALLED SUCH THAT THEY BUTT UP AGAINST EACH OTHER.

EXAMPLE INSTALLATION
USING 10' WIDE DECK MAT



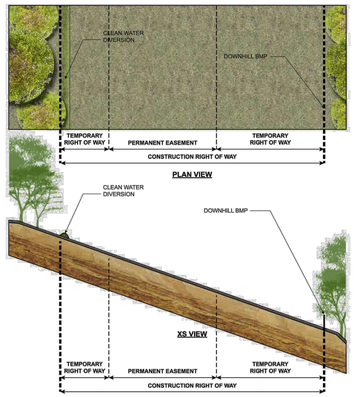
SECTION A-A'
NOT TO SCALE

DRAWN	DATE 10/13/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 10/13/17		DECK MAT
APP'D	DATE 10/13/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES55 REV. P



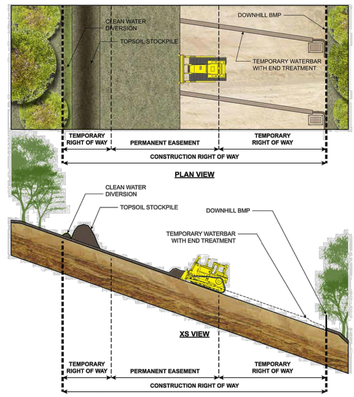
CONSTRUCTION ACTIVITIES DURING STEP 1
- SURVEY AND STAKE CONSTRUCTION ROW

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 1 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.1 REV. P



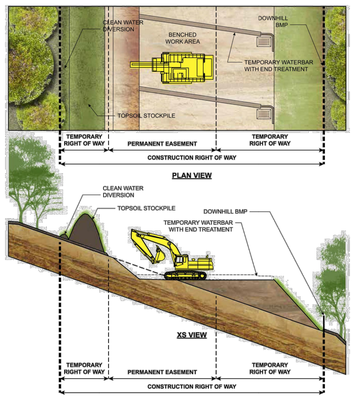
CONSTRUCTION ACTIVITIES DURING STEP 2
- CLEAR CONSTRUCTION ROW
- INSTALL PERIMETER E&S CONTROLS
- SEED AND MULCH CLEAN WATER DIVERSION

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 2 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.2 REV. P



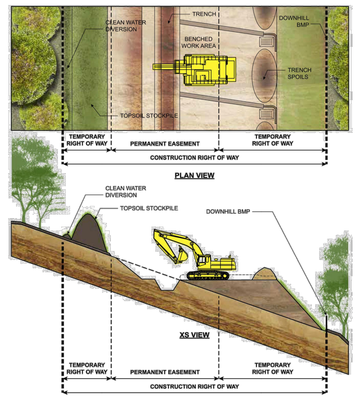
CONSTRUCTION ACTIVITIES DURING STEP 3
- STRIP AND STOCKPILE TOPSOIL FROM CONSTRUCTION ROW
- SEED AND MULCH TOPSOIL STOCKPILE
- WATERBARS INSTALLED AT THE END OF EACH DAY FOLLOWING EARTH DISTURBANCE

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 3 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.3 REV. P



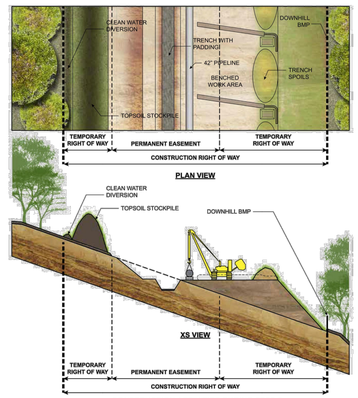
CONSTRUCTION ACTIVITIES DURING STEP 4
- BENCH WORK AREA
- TEMPORARY SEED AND MULCH FILL SLOPE
- TEMPORARY WATERBAR IS REMOVED AT THE START OF EACH WORK DAY IN AREAS OF ACTIVE CONSTUCTION. IT IS REINSTALLED AT THE END OF EACH DAY PRIOR TO LEAVING THE SITE.

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 4 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.4 REV. P



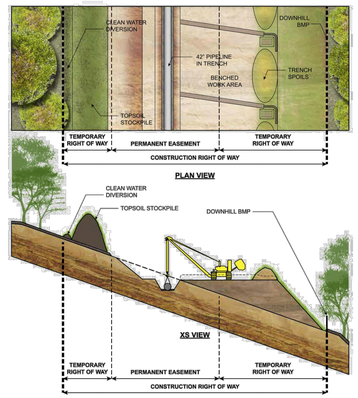
CONSTRUCTION ACTIVITIES DURING STEP 5
- EXCAVATE TRENCH
- TEMPORARY SEED AND MULCH SPOIL STOCKPILE
- TEMPORARY WATERBARS ARE RE-INSTALLED AT THE END OF EACH DAY ONCE EARTH DISTURBING ACTIVITIES HAVE COMMENCED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 5 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.5 REV. P



CONSTRUCTION ACTIVITIES DURING STEP 6
- PAD TRENCH BOTTOM, STRING AND FIELD BEND PIPE
- LINE-UP, INITIAL WELDING
- AS-BUILT FOOTAGE
- X-RAY INSPECTION, WELD REPAIR
- COAT FIELD WELDS
- INSPECTION AND REPAIR OF COATING
- TEMPORARY WATERBARS ARE RE-INSTALLED AT THE END OF EACH DAY ONCE EARTH DISTURBING ACTIVITIES HAVE COMMENCED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 6 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.6 REV. P



CONSTRUCTION ACTIVITIES DURING STEP 7
- LOWER PIPE INTO TRENCH
- AS-BUILT SURVEY
- TEMPORARY WATERBARS ARE RE-INSTALLED AT THE END OF EACH DAY ONCE EARTH DISTURBING ACTIVITIES HAVE COMMENCED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17		CONSTRUCTION SEQUENCE STEP 7 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–ES56.7 REV. P

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
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6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
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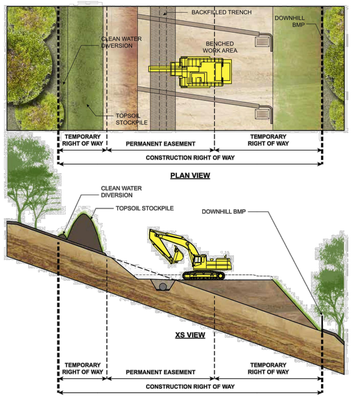
GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

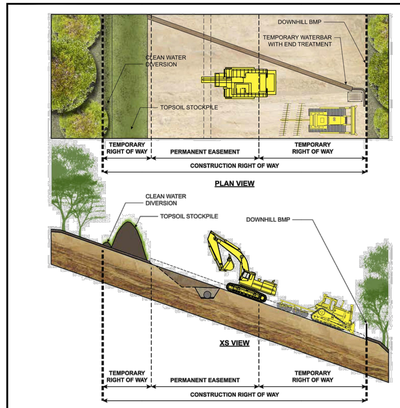
DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.15 OF 0.23

REVISION



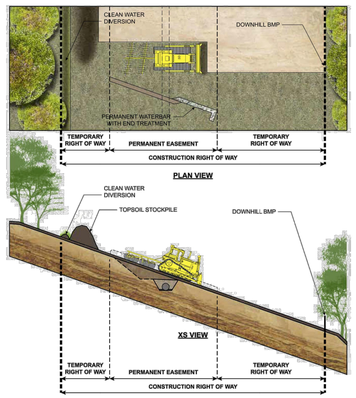
CONSTRUCTION ACTIVITIES DURING STEP 8
- BACKFILL TRENCH
- HYDROSTATIC TESTING
- TEMPORARY WATERBARS ARE RE-INSTALLED AT THE END OF EACH DAY ONCE EARTH DISTURBING ACTIVITIES HAVE COMMENCED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 8 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.8	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			



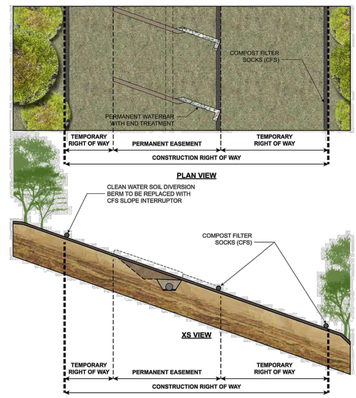
CONSTRUCTION ACTIVITIES DURING STEP 9
- BACKFILL WORK AREA
- DISK SUBSOIL
- TEMPORARY WATERBARS ARE RE-INSTALLED AT THE END OF EACH DAY ONCE EARTH DISTURBING ACTIVITIES HAVE COMMENCED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 9 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.9	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			



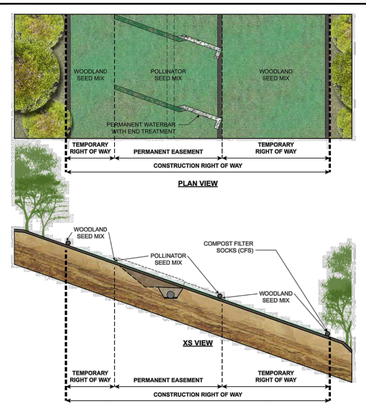
CONSTRUCTION ACTIVITIES DURING STEP 10
- RESPREAD TOPSOIL AND DISK
- FINAL CLEAN-UP
- INSTALL PERMANENT WATERBARS

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 10 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.10	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			



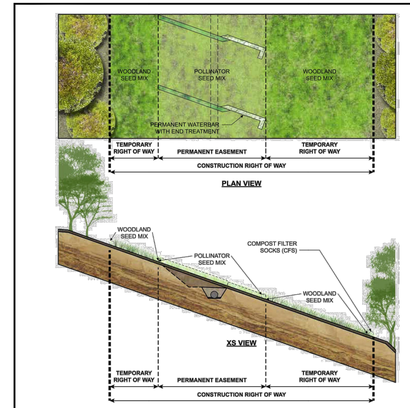
CONSTRUCTION ACTIVITIES DURING STEP 11
- REMOVE CLEAN WATER DIVERSION ANS REPLACE WITH 12" CFS
- REMOVE DOWNHILL BMP AND REPLACE WITH 12" CFS
- FOR SLOPES >30% INSTALL 12" CFS AT DOWNHILL PERMANENT EASEMENT BOUNDARY AS WELL
- AREAS WITH 3:1 OR STEEPER SLOPES WILL HAVE HECP APPLIED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 11 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.11	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			



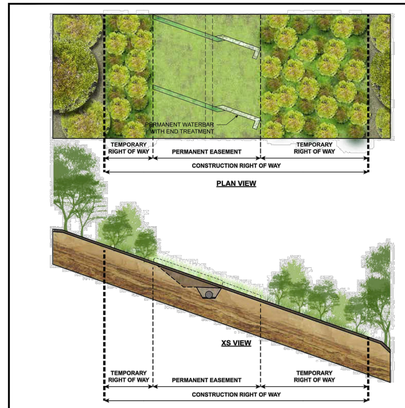
CONSTRUCTION ACTIVITIES DURING STEP 12
- APPLY PERMANENT SEED AND MULCH
- SEE MVP STANDARDS AND SPECIFICATIONS (MVP-ES11.1 - MVP-ES11.7, MVP-ES12.1 - MVP-ES12.3)

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 12 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.12	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			



CONSTRUCTION ACTIVITIES DURING STEP 13
- REMOVE CFS AND DISTRIBUTE COMPOST
- RESEED AS NEEDED

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 13 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.13	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			



CONSTRUCTION ACTIVITIES DURING STEP 14
- MAINTAIN PERMANENT EASEMENT AS POLLINATOR MEADOW

DRAWN	DATE 12/19/17	Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL
CHECKED	DATE 12/19/17	DESIGN ENGINEERING	CONSTRUCTION SEQUENCE STEP 14 OF 14
APP'D	DATE 12/19/17		
SCALE N.T.S.	SHEET 1 OF 1	DRAWING NO. MVP-ES56.14	REV. P
JOB NO.			
PROJECT ID: MVP – VA PORTION			

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
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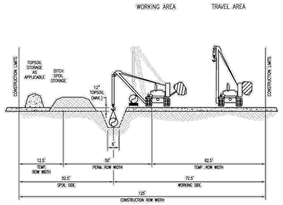
GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.16 OF 0.23

REVISION

TETRA TECH CAD FILE PATH: X:\CAD_Pittsburgh\EQT\7157 – MVP\00 – General\E&S\Spread 11\7157ES016.dwg PLOTTED ON: 2/3/2018 8:01 AM PLOTTED BY: Rickabough, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb



THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

DRAWN JL	DATE 10/8/2016
CHECKED MMF	DATE 10/8/2016
APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
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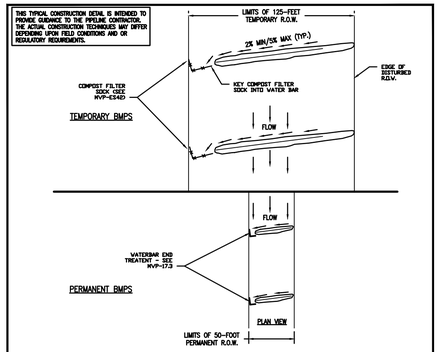
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

MAINLINE CONSTRUCTION
NON-PARALLEL CONSTRUCTION WITH TOPSOIL SEGREGATION

DRAWING NO. MVP–2 | REV. 0



THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

NOTES:

1. SLOPE BREAKERS SHALL BE CONSTRUCTED OF COMPACTED NATIVE SOIL AND INSTALLED AT LOCATIONS AS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE COMPANY'S INSPECTOR.
2. SLOPE BREAKERS SHALL BE ORIENTED AS SHOWN OR OTHER PATTERN AS DIRECTED BY THE COMPANY'S INSPECTOR TO DIRECT THE WATER OFF THE R.O.W.
3. SLOPE BREAKERS SHALL BE CONSTRUCTED BETWEEN 2% MINIMUM AND 5% MAXIMUM GRADIENT ACROSS THE SLOPE.
4. THE SLOPE BREAKERS SHALL BE 18" DEEP (AS MEASURED FROM THE TROUGH TO THE TOP OF THE SLOPE BREAKER). THE TROUGH WILL BE A MINIMUM OF 5' WIDE ACROSS THE WIDTH OF THE RIGHT-OF-WAY, PER DETAIL MVP-17.1.
5. PERMANENT SLOPE BREAKERS SHALL BE 18" MINIMUM HEIGHT AFTER COMPACTION, PER DETAIL MVP-17.1.
6. THE OUTLET OF THE SLOPE BREAKER MUST FREELY DISCHARGE RUNOFF OFF FROM THE DISTURBED RIGHT-OF-WAY INTO COMPOST FILTER SOCK J HOOK OR WATERBAR END TREATMENT.

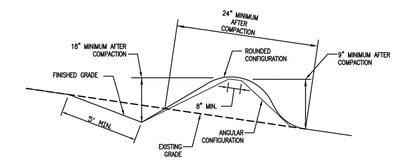
DRAWN JL	DATE 10/8/2016
CHECKED MMF	DATE 10/8/2016
APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

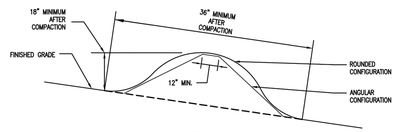
TYPICAL CONSTRUCTION DETAIL

SLOPE BREAKER/RIGHT-OF-WAY DIVERSION/WATERBAR

DRAWING NO. MVP–17 | REV. 0



SECTION A–A
(TEMPORARY INSTALLATION)



SECTION A–A
(PERMANENT INSTALLATION)

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DRAWN JL	DATE 10/8/2016
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APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

SLOPE BREAKER/RIGHT-OF-WAY DIVERSION/WATERBAR

DRAWING NO. MVP–17.1 | REV. 0

RECOMMENDED MAXIMUM SPACING FOR PERMANENT SLOPE BREAKERS	
PIPELINE GRADE	DISTANCE (FEET)
<2%	[1]
2-5%	400
6-15%	200
16-30%	100
>31%	50 [3]

[1] PERMANENT SLOPE BREAKERS WILL BE INSTALLED AS NEEDED BASED ON FIELD CONDITIONS.

[2] PERMANENT SLOPE BREAKERS WILL BE INSTALLED 25 FEET FROM EACH WATERBODY BOUNDARY REGARDLESS OF SLOPE CONDITIONS.

[3] SLOPES GREATER THAN 65% MAY REQUIRE SITE SPECIFIC STABILIZATION MEASURES BASED ON FIELD CONDITIONS AS APPROVED BY MVP DESIGN ENGINEERING AND MVP ENVIRONMENTAL INSPECTOR.

NOTES:

1. WATERBARS SHALL BE INSPECTED EVERY 4 BUSINESS DAYS (DAILY ON ACTIVE ROADS). DAMAGED OR ERODED WATERBARS SHALL BE RESTORED TO ORIGINAL DIMENSIONS WITHIN 24 HOURS OF INSPECTION
2. MAINTENANCE OF WATERBARS SHALL BE PROVIDED UNTIL ROADWAY, SKIDTRAIL, OR RIGHT-OF-WAY HAS ACHIEVED PERMANENT STABILIZATION
3. WATERBARS ON RIGHT-OF-WAYS SHALL BE LEFT IN PLACE AFTER PERMANENT STABILIZATION HAS BEEN ACHIEVED
4. SUMP FILTERS TO BE INSTALLED AT END OF TEMPORARY WATERBARS. REFER TO SUMP FILTER DETAIL MVP-ES42.
5. OUTLET PROTECTION/COMPOST FILTER SOCK SHOULD BE INSTALLED AT THE OUTLET OF ALL TEMPORARY WATERBARS PER DETAIL MVP-ES42.
6. WATERBAR END TREATMENTS WILL BE INSTALLED FOR PERMANENT WATERBARS PER DETAILS MVP-17.3 THROUGH MVP-17.7.

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DRAWN JL	DATE 10/8/2016
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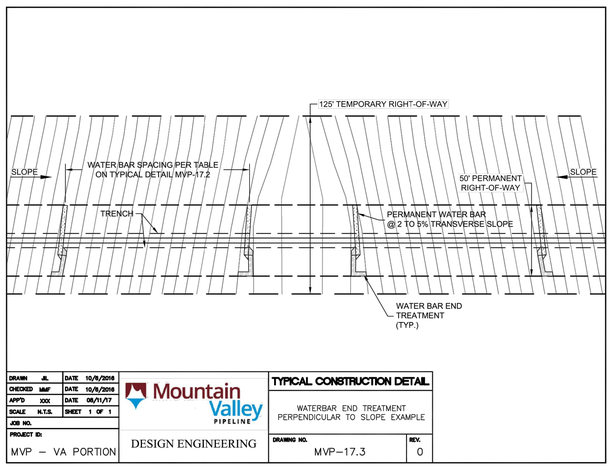
APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

SLOPE BREAKER/RIGHT-OF-WAY DIVERSION/WATERBAR

DRAWING NO. MVP–17.2 | REV. 0



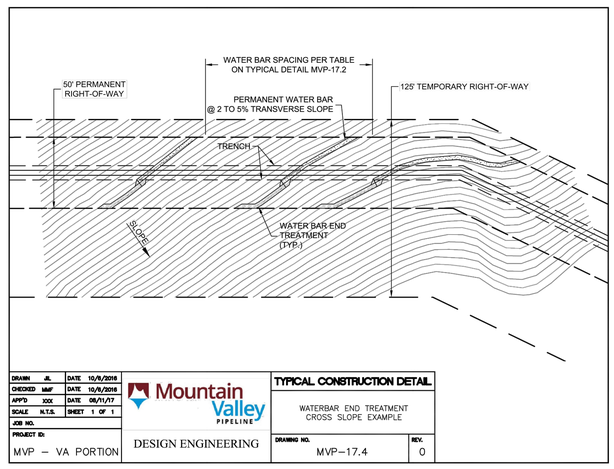
DRAWN JL	DATE 10/8/2016
CHECKED MMF	DATE 10/8/2016
APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

WATERBAR END TREATMENT PERPENDICULAR TO SLOPE EXAMPLE

DRAWING NO. MVP–17.3 | REV. 0



DRAWN JL	DATE 10/8/2016
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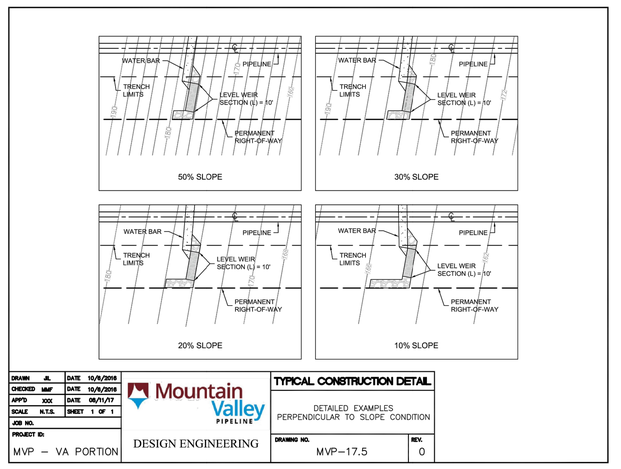
APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

WATERBAR END TREATMENT CROSS SLOPE EXAMPLE

DRAWING NO. MVP–17.4 | REV. 0



DRAWN JL	DATE 10/8/2016
CHECKED MMF	DATE 10/8/2016
APP'D XXX	DATE 08/11/17
SCALE N.T.S.	SHEET 1 OF 1
JOB NO.	
PROJECT ID: MVP – VA PORTION	

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

DETAILED EXAMPLES PERPENDICULAR TO SLOPE CONDITION

DRAWING NO. MVP–17.5 | REV. 0

NO.:	DATE:	DWN.:	CHKD.:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
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PROFESSIONAL ENGINEER

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SCALE:	AS SHOWN
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REVISION

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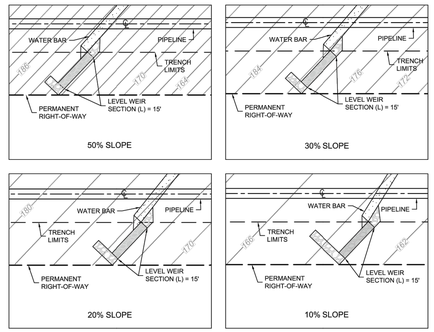


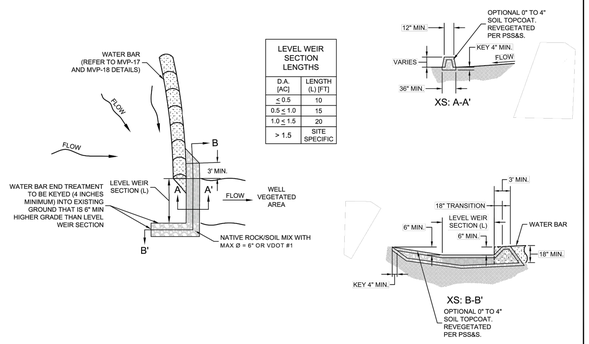
DRAWN	JL	DATE	10/8/2016
CHECKED	MMF	DATE	10/8/2016
APP'D	XXX	DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

DETAILED EXAMPLES CROSS SLOPE CONDITION

DRAWING NO.	REV.
MVP–17.6	0



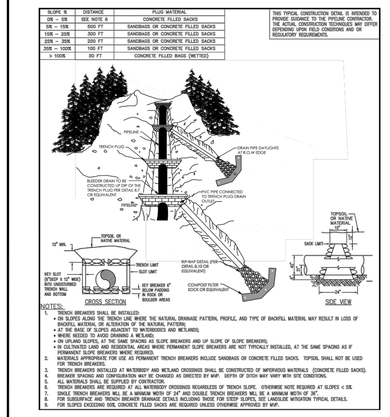
DRAWN	JL	DATE	10/8/2016
CHECKED	MMF	DATE	10/8/2016
APP'D	XXX	DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

WATERBAR END TREATMENT DETAIL

DRAWING NO.	REV.
MVP–17.7	0



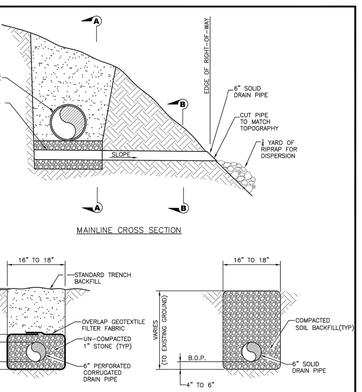
DRAWN	JL	DATE	10/8/2016
CHECKED	MMF	DATE	10/8/2016
APP'D	XXX	DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

TYPICAL TRENCH BREAKER REQUIREMENTS

DRAWING NO.	REV.
MVP–20	0



NOTES

1. LOW POINT DITCH DRAINS SHALL BE INSTALLED AT LOCATIONS SPECIFIED IN THE APPROVED EROSION & SEDIMENTATION CONTROL PLAN, AND AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
2. FILL STONE SHOULD BE 1" AGGREGATE WITHOUT FINES, CRUSHER RUN WITHOUT FINES, OR EQUIVALENT.
3. DRAIN PIPE TO BE CONNECTED USING STANDARD PIPE COLLARS.

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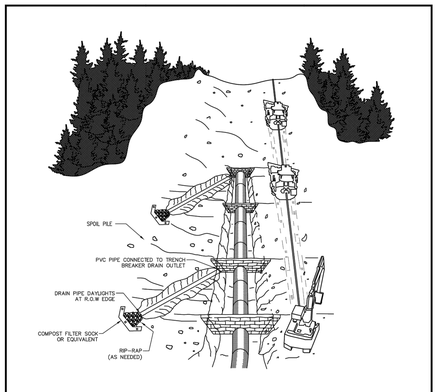
DRAWN	JL	DATE	10/8/2016
CHECKED	MMF	DATE	10/8/2016
APP'D	XXX	DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

SIDEHILL LOW-POINT DRAIN TYPICAL

DRAWING NO.	REV.
MVP–24	0



NOTES:

1. WINCHES MAY BE REQUIRED FOR MOVING EQUIPMENT AND MATERIAL AND DURING CONSTRUCTION ON STEEP LONGITUDINAL SLOPES.
2. WINCHES WILL EITHER BE FIXED WINCHES OR TRACKED EQUIPMENT WITH WINCHES.
3. WINCHES WILL TYPICALLY BE REQUIRED FOR SLOPES OF 30% (17°) AND UP.

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DRAWING ASSUMES TYPE "B" SOIL

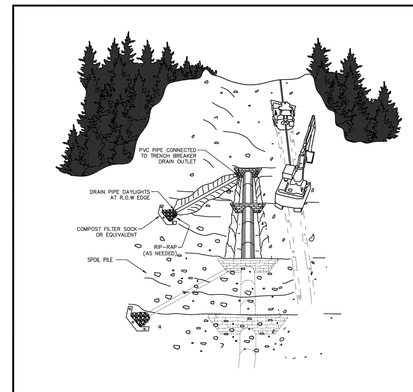
DRAWN	JDM	DATE	03/28/16
CHECKED	RRR	DATE	04/06/16
APP'D	RLM	DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

MAINLINE CONSTRUCTION STEEP HILL PARALLEL CONSTRUCTION NO TOP SOIL SEGREGATION

DRAWING NO.	REV.
MVP–31	0



NOTES:

1. WINCHES MAY BE REQUIRED FOR MOVING EQUIPMENT AND MATERIAL, AND DURING CONSTRUCTION ON STEEP LONGITUDINAL SLOPES.
2. WINCHES WILL EITHER BE FIXED WINCHES OR TRACKED EQUIPMENT WITH WINCHES.
3. WINCHES WILL TYPICALLY BE REQUIRED FOR SLOPES OF 30% (17°) AND UP.

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DRAWING ASSUMES TYPE "B" SOIL

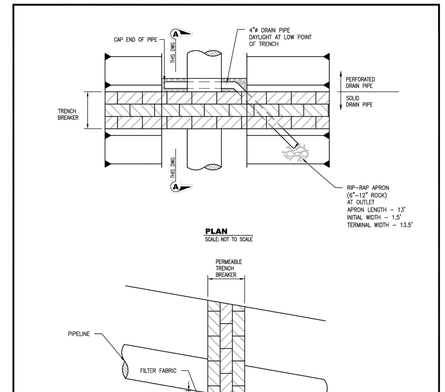
DRAWN	JL	DATE	06/23/16
CHECKED	RRR	DATE	06/23/16
APP'D	RLM	DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

MAINLINE CONSTRUCTION STEEP HILL STOVE PIPE CONSTRUCTION JEFFERSON NATIONAL FOREST NO TOP SOIL SEGREGATION

DRAWING NO.	REV.
MVP–32	0



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DRAWN	TDO	DATE	2/03/2016
CHECKED	MMF	DATE	2/03/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:	MVP – VA PORTION		

Mountain Valley PIPELINE — DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

TRENCH BREAKER DAYLIGHT DRAIN

DRAWING NO.	REV.
MVP–35	0

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
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4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

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Mountain Valley PIPELINE

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MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.18 OF 0.23

REVISION

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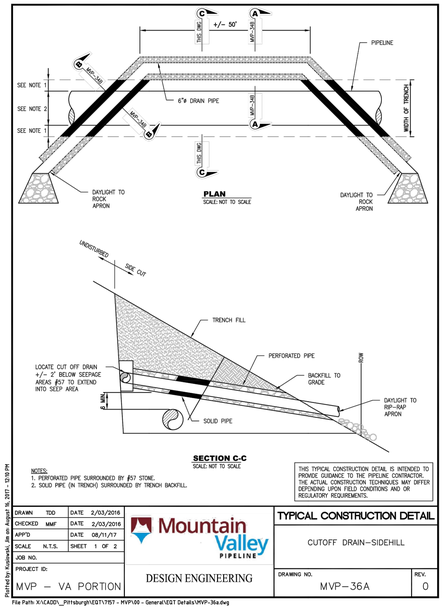

NOTES:
1. PERFORATED PIPE SURROUNDED BY #57 STONE.
2. SOLID PIPE (IN TRENCH) SURROUNDED BY TRENCH BACKFILL.

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DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		CUTOFF DRAIN–SIDEHILL
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 2		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–36A / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

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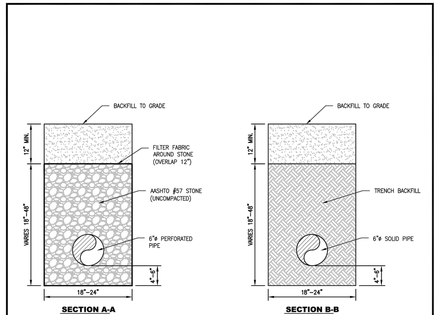

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DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		CUTOFF DRAIN–SIDEHILL
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 2 OF 2		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–36B / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

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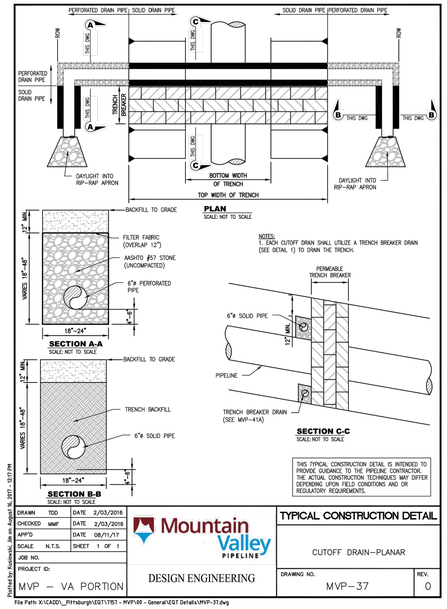

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		CUTOFF DRAIN–PLANAR
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–37 / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

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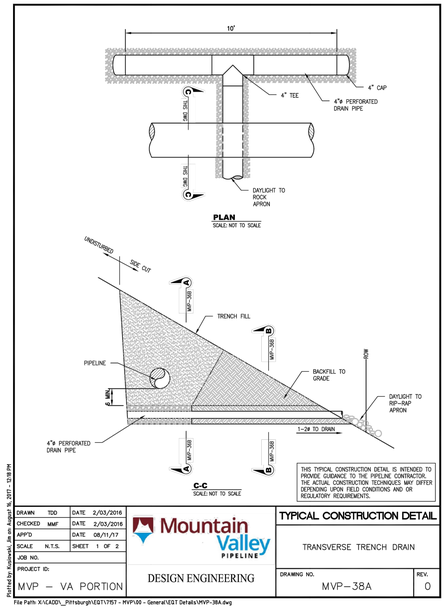

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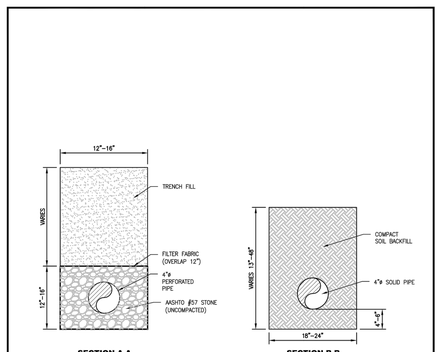
DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		TRANSVERSE TRENCH DRAIN
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 2		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–38A / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-38A.dwg



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DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		TRANSVERSE TRENCH DRAIN
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 2 OF 2		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–38B / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

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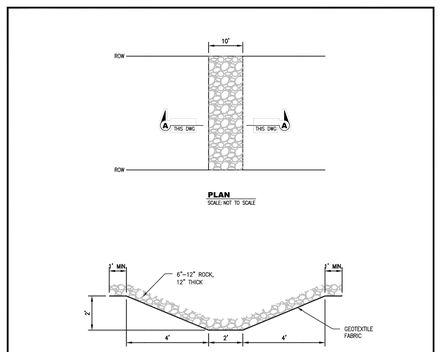

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DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		ROCK LINED SWALE
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–39 / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

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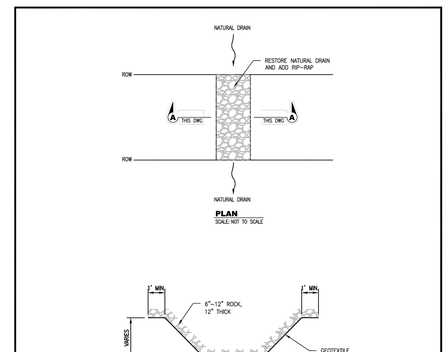

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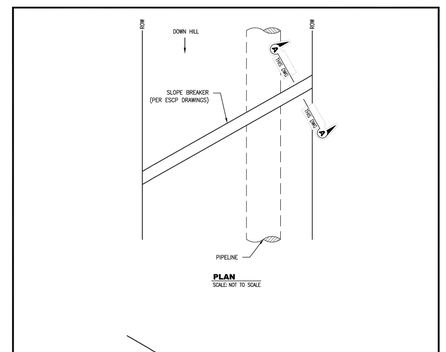
DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		RIP–RAP NATURAL DRAIN
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–40 / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\References\10-12-16 Added To Set - Copy\MVP-40.dwg



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DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		RIP–RAP SLOPE BREAKERS
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–41 / REV. 0

Plotted by Kirkobough, Greg on August 14, 2017 - 12:51 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\References\10-12-16 Added To Set - Copy\MVP-41.dwg

NO.:	DATE:	DWN.:	CHKD:	APPD.:	DESCRIPTION:
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5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
555 SOUTHPOINTE BOULEVARD, SUITE 200
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661 ANDERSEN DRIVE
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PITTSBURGH, PA 15220

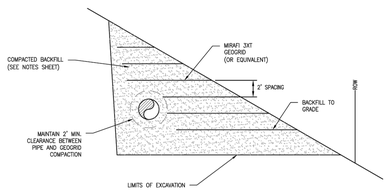
GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.19 OF 0.23

REVISION

TETRA TECH CAD FILE PATH: X:\CADD_Pittsburgh\EQT\7157 – MVP\00 – General\E&S\Spread 11\7157ES019.dwg PLOTTED ON: 2/3/2018 8:01 AM PLOTTED BY: Rickobough, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb



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DRAWN	TDD	DATE	2/03/2016
CHECKED	MMF	DATE	2/03/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 3
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

GEOGRID–SIDEHILL

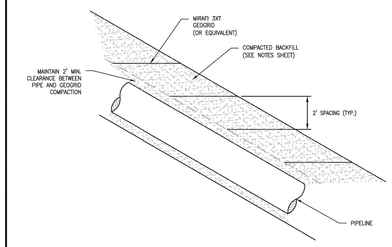
MVP – VA PORTION

DRAWING NO. MVP–42A

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 10:05 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\References\16-12-16 Added to Set - Copy\MVP-42A.dwg



SECTION VIEW
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

DRAWN	TDD	DATE	2/03/2016
CHECKED	MMF	DATE	2/03/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	2 OF 3
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

SLIDE MITIGATION DETAIL

GEOGRID–PLANAR

MVP – VA PORTION

DRAWING NO. MVP–42B

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 10:14 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\References\16-12-16 Added to Set - Copy\MVP-42B.dwg

COMPACTION NOTES

1) ALL ROCKS LARGER THAN 6 INCHES IN SIZE, AND MORE THAN 10 PERCENT BY VOLUME SHOULD BE REMOVED AND PROPERLY DISPOSED FROM THE BACKFILL MATERIAL.
2) THE SUBGRADE AT THE BASE OF THE EXCAVATION SHOULD BE PROOFROLLED WITH A PNEUMATIC TIRED ROLLER OR VEHICLE.
3) THE EXCAVATED AREA SHALL BE BACKFILLED WITH THE CLEANED EXCAVATED SOIL MATERIAL AND COMPACTED IN PLACE.
4) BACKFILL OPERATIONS SHALL BE PERFORMED WHEN SOIL IS SUITABLE FOR COMPACTION (I.E., NOT IMMEDIATELY FOLLOWING A LARGE RAIN, SNOW, OR ICE EVENT). FROZEN FILL SHALL NOT BE USED.
5) THE BACKFILL SHALL BE PLACED IN COMPACTED LIFTS NO GREATER THAN 12 INCHES.
6) MAINTAIN A MINIMUM 2FT CLEARANCE BETWEEN COMPACTION ACTIVITY AND THE GAS PIPELINE.

GRAVEL DRAIN NOTES

1) GEOTEXTILE FABRIC SHALL BE TENCATE MIRAFI 140N OR APPROVED EQUIVALENT.
2) THE GEOTEXTILE FABRIC SHALL BE STORED UNDAMAGED PURSUANT TO MANUFACTURERS RECOMMENDATIONS.
3) DO NOT OPERATE CONSTRUCTION EQUIPMENT DIRECTLY ON THE GEOTEXTILE FABRIC.
4) DRAINAGE AGGREGATE SHALL MEET THE REQUIREMENTS OF AASHTO NO. 57 STONE.
5) DRAINAGE AGGREGATE SHALL NOT BE COMPACTED.

GEOGRID NOTES

1) GEOGRID REINFORCEMENT SHALL BE TENCATE MIRAFI 3XT OR APPROVED EQUIVALENT.
2) THE GEOGRID MATERIAL SHALL BE STORED UNDAMAGED PURSUANT TO MANUFACTURERS RECOMMENDATIONS.
3) GEOGRID SHALL BE PLACED HORIZONTALLY ON THE BACKFILL WITH THE PRINCIPAL STRENGTH DIRECTION PERPENDICULAR TO THE FACE OF THE SLOPE. ADJACENT PIECES OF PRIMARY GEOGRID SHALL NOT OVERLAP BUT ARE TO BE BUTTED SIDE TO SIDE.
4) REMOVE ALL SLACK IN THE GEOGRID MATERIAL AND ANCHOR AS NECESSARY WITH PINS, OR BAGS TO PREVENT SLACK FROM DEVELOPMENT DURING FILL PLACEMENT AND COMPACTION.
5) FILL IS TO BE PLACED AND SPREAD DIRECTLY ON THE GEOGRID MATERIAL WITH RUBBER TIRED EQUIPMENT ONLY. SPEEDS ARE TO BE KEPT SLOW WITH AS FEW STOPS AND TURNS AS PRACTICAL.
6) DO NOT OPERATE TRACKED EQUIPMENT DIRECTLY ON THE GEOGRID MATERIAL.
7) MAINTAIN A MINIMUM 2FT CLEARANCE BETWEEN GEOGRID MATERIAL AND THE GAS PIPELINE.

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DRAWN	TDD	DATE	2/03/2016
CHECKED	MMF	DATE	2/03/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	3 OF 3
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

GEOGRID NOTES

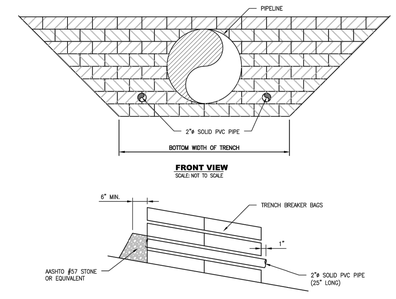
MVP – VA PORTION

DRAWING NO. MVP–42C

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 3:55 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-42C.dwg



FRONT VIEW
SCALE: NOT TO SCALE

SECTION VIEW
SCALE: NOT TO SCALE

NOTES:
1. PLACE PVC DRAIN PIPE ON FIRST LAYER OF TRENCH BREAKER BAGS.
2. PLACE PVC DRAIN PIPE EQUIADISTANT FROM THE OUTSIDE EDGE OF THE 30" GAS PIPE AND THE BOTTOM LIMITS OF THE TRENCH.
3. EXTEND PVC PIPE THROUGH ENTIRE TRENCH BREAKER AND EXTEND APPROX. 1" PAST END OF BREAKER.
4. AASHTO#57 STONE SHALL BE PLACED TO A MINIMUM 6" THICKNESS UPSLOPE OF THE DRAIN PIPE.

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DRAWN	TDD	DATE	4/14/2016
CHECKED	MMF	DATE	4/14/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 2
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

TRENCH BREAKER
PASS–THROUGH DRAIN

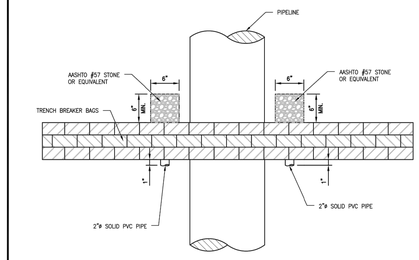
MVP – VA PORTION

DRAWING NO. MVP–43A

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 10:15 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-43A.dwg



PLAN VIEW
SCALE: NOT TO SCALE

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DRAWN	TDD	DATE	4/14/2016
CHECKED	MMF	DATE	4/14/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	2 OF 2
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

TRENCH BREAKER
PASS–THROUGH DRAIN

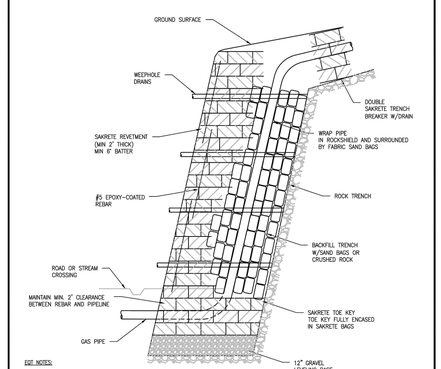
MVP – VA PORTION

DRAWING NO. MVP–43B

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 10:23 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-43B.dwg



EQT NOTES:
1. SAKRETE BAGS SHOULD EXTEND 4 BAGS DEEP PIPE SHOULD BE COMPLETELY SURROUNDED BY SAND BAGS, OR CRUSHED ROCK (MAX 4").
2. SAKRETE BAGS SHOULD BE STAGGERED IN A MASONRY FASHION. THE FACE OF THE WELL SHALL BE INCLINED 6"-10" FROM VERTICAL.
3. #5 REBAR SHOULD BE DRIVEN THROUGH THE SAKRETE BAGS (SEE DETAIL 1).
4. 2"ø PVC WEEPHOLE DRAINS SHALL BE INSTALLED EVERY 15 FT.

SIDE VIEW
SCALE: NOT TO SCALE

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DRAWN	GL	DATE	6/29/2016
CHECKED	MMF	DATE	–
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 2
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

SLIDE MITIGATION
HIGHWALL REVETMENT
SIDE VIEW

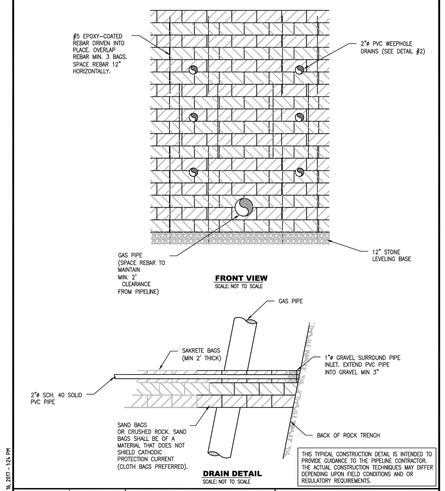
MVP – VA PORTION

DRAWING NO. MVP–44A

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 3:53 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-44A.dwg



FRONT VIEW
SCALE: NOT TO SCALE

DRAIN DETAIL
SCALE: NOT TO SCALE

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DRAWN	GL	DATE	6/29/2016
CHECKED	MMF	DATE	–
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	2 OF 2
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

SLIDE MITIGATION
HIGHWALL REVETMENT
FRONT VIEW AND DRAIN DETAIL

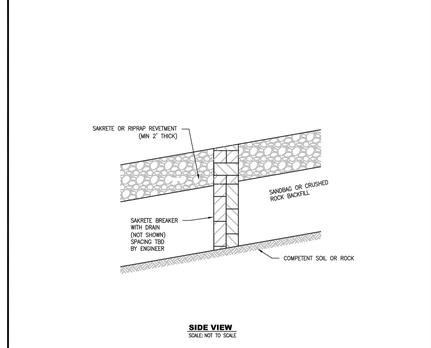
MVP – VA PORTION

DRAWING NO. MVP–44B

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 3:53 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-44B.dwg



SIDE VIEW
SCALE: NOT TO SCALE

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DRAWN	TDD	DATE	2/03/2016
CHECKED	MMF	DATE	2/03/2016
APP'D		DATE	08/11/17
SCALE	N.T.S.	SHEET	1 OF 1
JOB NO.			
PROJECT ID:			

Mountain Valley PIPELINE

DESIGN ENGINEERING

TYPICAL CONSTRUCTION DETAIL

STEEP SLOPE REVETMENT

MVP – VA PORTION

DRAWING NO. MVP–45

REV. 0

Plotted by: Kozlowski, Jim on August 14, 2017 - 3:27 PM

File Path: X:\CADD_Pittsburgh\EQT\7157 - MVP\00 - General\EQT Details\MVP-45.dwg

NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
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6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

MOUNTAIN VALLEY PIPELINE, LLC
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CANONSBURG, PA 15317

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661 ANDERSEN DRIVE
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PITTSBURGH, PA 15220

GENERAL DETAILS SET

COMMONWEALTH OF VIRGINIA
DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
REVISION	
SHT. NO.	0.20 OF 0.23

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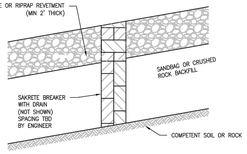

SIDE VIEW
SCALE: NOT TO SCALE

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DRAWN TDD	DATE 2/03/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 2/03/2016		STEEP SLOPE REVETMENT
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–45 / REV. 0

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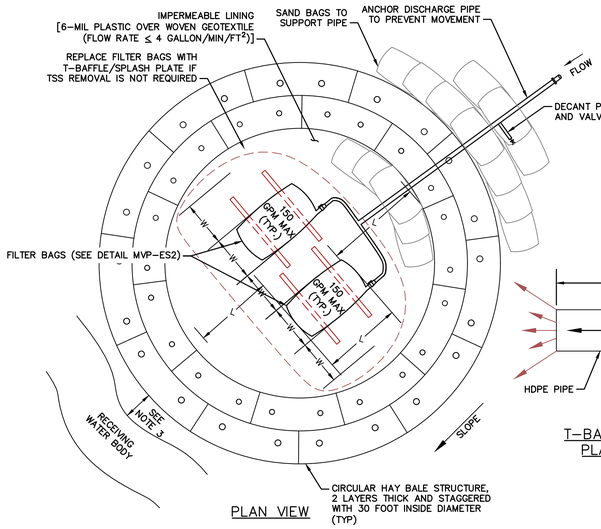
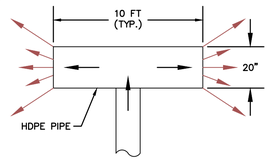
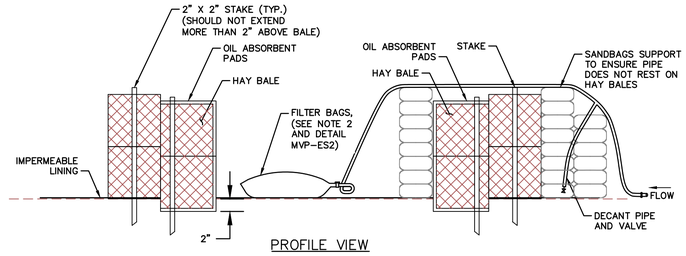


PLAN VIEW



T–BAFFLE/SPLASH PLATE DETAIL



PROFILE VIEW

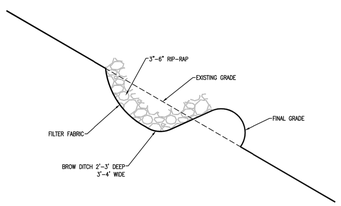
NOTES:

1. NOTICE OF INTENT MUST BE SUBMITTED AND NOTIFICATION OF PERMIT COVERAGE RECEIVED PRIOR TO DISCHARGING HYDROSTATIC TEST WATER.
2. INCREASE SIZE OF DISCHARGE STRUCTURE AND NUMBER OF FILTER BAGS TO MATCH REQUIRED DISCHARGE RATE AND TSS REMOVAL AS LONG AS REQUIRED LAND IS AVAILABLE. ADD ADDITIONAL SMALLER DISCHARGE STRUCTURES IF SPACE IS LIMITED. ELIMINATE FILTER BAG(S) IF TSS REMOVAL NOT REQUIRED AND REPLACE WITH T–BAFFLE/ SPLASH PLATE.
3. HYDROSTATIC WATER DISCHARGE STRUCTURE WILL BE LOCATED AT LEAST 100 FEET FROM THE EDGE OF A DELINEATED WETLAND, AND 50 FEET OR THE CHANNEL WIDTH, WHICHEVER IS GREATER, FROM THE TOP OF BANK OF A RECEIVING STREAM.
4. HYDROSTATIC WATER DISCHARGE STRUCTURE WILL BE LOCATED SUCH THAT IT DRAINS TO A WELL–VEGETATED AREA WITH SLOPES BETWEEN 1% AND 5% TOWARD THE RECEIVING WATERBODY.
5. THE DISCHARGE RATE TO THE STRUCTURE SHOULD BE LIMITED TO THE LOWEST POSSIBLE RATE TO MINIMIZE ANY POTENTIAL IMPACT ON AQUATIC LIFE AND TO REDUCE THE POTENTIAL FOR EROSION (E.G., 150 GPM).
6. IF MUNICIPAL WATER IS USED FOR TESTING, HOLD THE WATER IN THE PIPE FOR AT LEAST 24 HOURS PRIOR TO DISCHARGE TO MEET TOTAL RESIDUAL CHLORINE LIMITS.
7. IMPLEMENT ADDITIONAL EROSION AND SEDIMENT CONTROLS AS REQUIRED IN VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), 3RD ED., 1992.

DISCHARGE STRUCTURES TO BE USED FOR HYDROSTATIC TEST WATER

NOT TO SCALE

TEST BREAK NAME	TEST BREAK COORDINATES		PROPOSED OUTFALL COORDINATES		ANTICIPATED DISCHARGE VOLUME (GAL)	RECOMMENDED DISCHARGE RANGE (GPM)	TIME TO RELEASE (DAYS)	# OF HAY BALE STRUCTURES	RECEIVING WATER NAME
	LATITUDE	LONGITUDE	LATITUDE	LONGITUDE					
11A	37° 02' 52.583"	-79° 53' 43.515"	37° 02' 54.509"	-79° 53' 46.055"	3,830,000	600 to 1200	4 to 2	2 to 4	UNT TO BLACKWATER RIVER
11B	37° 00' 38.316"	-79° 45' 15.476"'	37° 00' 38.797"	-79° 45' 17.255"'	930,000	300 to 600	2 to 1	1 to 2	UNT TO BLACKWATER RIVER
11C	36° 49' 53.750"	-79° 20' 34.420"'	36° 49' 52.137"	-79° 20' 37.560"'	680,000	300 to 600	2 to 1	1 to 2	UNT TO LITTLE CHERRYSTONE CREEK



THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

DRAWN TDD	DATE 7/12/2016	Mountain Valley PIPELINE	TYPICAL CONSTRUCTION DETAIL
CHECKED MMF	DATE 7/12/2016		BROW DITCH DETAIL
APP'D	DATE 08/11/17		
SCALE N.T.S.	SHEET 1 OF 1		
JOB NO.			
PROJECT ID: MVP – VA PORTION		DESIGN ENGINEERING	DRAWING NO. MVP–46 / REV. 0

Last Saved By: Rickabaugh, Greg Date: 2/3/2018 - 7:58 PM
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NO.:	DATE:	DWN.:	CHK'D:	APP'D.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
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2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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GENERAL DETAILS SET

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DAVID J. WALLNER
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APPROVED BY:	RE
DATE:	11/28/2017
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SHT. NO.	0.21 OF 0.23

REVISION

TETRA TECH CAD FILE PATH: X:\CADD_Pittsburgh\EGT\7157 – MVP\00 – General\E&S\Spread 11\7157ES021(S11).dwg PLOTTED ON: 2/3/2018 8:01 AM PLOTTED BY: Rickabaugh, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb

GENERAL CONSTRUCTION SEQUENCE

THE FOLLOWING IS A GENERAL SEQUENCE FOR EARTHMOVING ACTIVITIES ASSOCIATED WITH CONSTRUCTION OF THE PIPELINE:

1. INSTALL TEMPORARY EROSION AND SEDIMENT CONTROLS PRIOR TO EARTH DISTURBANCE. REFER TO BEST MANAGEMENT PRACTICES (BMP) INSTALLATION AND REMOVAL NOTES. APPROPRIATE BMPS SHOULD BE PLACED AROUND SENSITIVE AREAS PRIOR TO EARTH DISTURBANCE. STONE CONSTRUCTION ENTRANCES (SCE) ARE TO BE PROVIDED AT ALL LOCATIONS WHERE ACCESS ROADS AND PIPELINES WILL BE ACCESSING OR CROSSING A PUBLIC ROADWAY. NOTE THAT SILT FENCE, COMPOST FILTER SOCK AND SUPER SILT FENCE IS BEING INSTALLED AS PART OF A "SYSTEM" OF EROSION CONTROL BMPS INCLUDING CLEAN WATER DIVERSIONS, WATERBARS AND BONDED FIBER MATRIX. THIS BMP SYSTEM APPROACH ALLOWS MVP TO MANAGE SLOPE LENGTH LIMITATIONS OF SUPER SILT BY INTRODUCING SLOPE BREAKS AND ADDITIONAL SURFACE EROSION PROTECTION.

2. INSTALL TEMPORARY E&S CONTROLS FOR STREAM CROSSINGS AT LOCATIONS SHOWN ON THE E&S PLAN SHEETS. NO EARTH DISTURBANCE ACTIVITIES WITHIN 50 FEET OF STREAM CHANNELS WILL BE PERFORMED UNTIL MATERIALS NEEDED TO COMPLETE THE CROSSING ARE AT THE NEAREST AVAILABLE LOCATION.

3. GENERAL CLEARING AND GRUBBING OF THE TREES AND BRUSH ALONG THE RIGHT-OF-WAY (ROW) FOR PIPELINE TRENCHING MAY COMMENCE TO THE WIDTH SPECIFIED IN THE ROW AGREEMENTS OR CONSTRUCTION ALIGNMENT SHEETS, WHICHEVER IS LESS. SMALLER DEBRIS, SUCH AS SHRUBS OR LIMBS, ARE TO BE CHIPPED AND UTILIZED ON-SITE AS PART OF THE SOIL STABILIZATION. WHERE CHIPPED MATERIAL IS USED AS MULCH, SPREAD AT A RATE NOT TO EXCEED 1 TON/ACRE. UNLESS OTHERWISE DIRECTED BY THE LANDOWNER, LOGS WILL EITHER BE HAULED OFF-SITE OR GIVEN TO THE LANDOWNER UPON THEIR REQUEST; STUMPS AND/OR LOGS WILL BE GROUND, CHIPPED, WINDROWED, OR HAULED OFF-SITE.

4. INSTALL CLEAN WATER DIVERSIONS AND CLEAN WATER DIVERSION PIPES IN ACCORDANCE WITH VESCH STD & SPEC 3.09 AND MVP-ES50 AND MCP-ES50.1. IN ADDITION, INSTALL OUTLET STRUCTURES FOR CLEAN WATER PIPES IN ACCORDANCE WITH MVP-ES51 AND MVP-ES51.1. FOLLOWING INSTALLATION OF CLEAN WATER DIVERSION BERMS STABILIZE THE UPHILL SIDE OF THE BERM USING TEMPORARY SEED, EROSION CONTROL MATTING OR BONDED FIBER MATRIX. FINALLY INSTALL ROCK CHECK DAMS IN ACCORDANCE WITH VESCH STD & SPEC 3.20 EXCEPT THAT COMPOST FILTER SOCK OR NATIVE ROCK (SIZED APPROPRIATELY PER VESCH STD & SPEC 3.20) EXCAVATED DURING GRADING WILL BE USED FOR CONSTRUCTION.

5. INSTALL TEMPORARY AND PERMANENT RIGHT-OF-WAY DIVERSIONS/WATERBARS IMMEDIATELY AFTER INITIAL DISTURBANCE OF THE SOIL IN ACCORDANCE WITH THE WATERBAR SPACING AND SIZING REQUIREMENTS SHOWN ON THE PLAN AND DETAIL SHEETS (SEE DETAILS VADEQ STD & SPEC 3.11 AND MVP-17). RIGHT-OF-WAY DIVERSIONS/WATERBARS WILL BE CONSTRUCTED OF SOIL, AND USED TO REDUCE RUNOFF VELOCITY AND DIVERT WATER OFF THE PIPELINE ROW. WATERBARS WILL BE INSTALLED WITH SUMP FILTERS (DETAIL MVP-ES42) AT THE DISCHARGE END.

6. EXCAVATE PIPELINE TRENCH AND BEGIN GRADING OF PROPOSED METER AND RECTIFIER ANODE BED SITES. THE PROPOSED CONSTRUCTION ROW AND EXTRA WORKSPACES ARE TO BE USED AS A WORK AREA FOR TRENCH EXCAVATION, EQUIPMENT MOVEMENT AND THE TEMPORARY STORAGE OF SOIL STOCKPILES, AS NEEDED. EQUIPMENT, SOIL STOCKPILES, AND OTHER MATERIALS ARE TO REMAIN UPSLOPE OF BMPS DURING CONSTRUCTION ACTIVITIES. REFER TO BMP INSTALLATION AND REMOVAL SEQUENCE FOR THE BMPS TO BE USED FOR PROTECTION DURING TRENCH EXCAVATION AND AROUND TEMPORARY SOIL STOCKPILES. STOCKPILES AND NON-WORK AREA SLOPES WILL BE STABILIZED THROUGH AN APPLICATION OF EITHER MULCH (ORGANIC, EROSION CONTROL BLANKET OR BONDED FIBER MATRIX) OR TEMPORARY SEED. SEGREGATION OF TOPSOIL AND SUBSOIL WILL BE PERFORMED WHERE TRENCH EXCAVATION TAKES PLACE IN AN AGRICULTURAL, WETLAND, OR RESIDENTIAL AREA.

7. PIPELINE SECTIONS WILL BE TRANSPORTED TO THE WORK AREA AND STRUNG ALONG THE WORKING SIDE OF THE ROW PARALLEL TO THE TRENCH LINE. WELDING CAN OCCUR IN OR OUT OF THE TRENCH. THE PIPELINE WILL BE BENT TO CONFORM TO THE TRENCH CONTOUR, ALIGNED WELDED AND PLACED ON TEMPORARY SUPPORTS ALONGSIDE THE TRENCH. WELDS WILL BE VISUALLY AND RADIO-GRAPHICALLY INSPECTED AND REPAIRED AS NECESSARY. THE PIPE SECTION WILL BE LOWERED INTO THE TRENCH AND PLACED ON PADDING PER MVP CONSTRUCTION STANDARDS. ANY WETNESS ENCOUNTERED DURING CONSTRUCTION WORK WILL BE DEWATERED BY USING PUMPS, HOSES, AND PUMPED BAGS (DETAIL MVP-ES2), AND WILL BE DISCHARGED TO A WELL VEGETATED, UPLAND AREA.

8. STREAM PIPELINE CROSSING CONSTRUCTION METHODS WILL BE INSTALLED AT LOCATIONS SHOWN ON THE E&S PLAN SHEETS AND AS SPECIFIED ON DETAIL SHEET. STREAM BANK STABILIZATION WILL BE INSTALLED IMMEDIATELY FOLLOWING COMPLETION OF PIPELINE INSTALLATION AS SHOWN ON THE DETAIL SHEET.

9. INSTALL TRENCH BREAKERS AT LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED BY MVP AND AS SPECIFIED ON THE DETAIL SHEET (DETAIL MVP-20).

10. THE TRENCH WILL SUBSEQUENTLY BE BACKFILLED WITH SUITABLE EXCAVATED MATERIAL. THE BACKFILL MATERIAL WILL BE SLIGHTLY CROWNED IN UPLAND AREAS TO ALLOW FOR SETTLEMENT THAT MAY OCCUR. CROWNING THE SOIL SLIGHTLY OVER THE PIPELINE WILL HELP PREVENT FUTURE STORM WATER-RELATED PROBLEMS FROM SETTLING OF THE BACKFILLED AREA. NO CROWNING OF SOILS WILL TAKE PLACE IN WETLANDS, STREAMS, OR FLOOD PLAINS. IN AREAS WHERE TOPSOIL HAS BEEN SEGREGATED, THE SUBSOIL WILL BE REPLACED FIRST, AND THEN THE TOPSOIL WILL BE SPREAD OVER THE AREA FROM WHICH IT WAS REMOVED. DISTURBED AREAS WILL BE RESTORED TO THEIR APPROXIMATE ORIGINAL TOPOGRAPHIC CONTOURS.

11. STABILIZE EXPOSED AND UNWORKED SOILS BY APPLICATION OF EFFECTIVE BMPS THAT PROTECT THE SOIL FROM THE EROSIVE FORCES OF RAINDROPS, FLOWING WATER, AND WIND. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. WHERE A DENUDED AREA WILL REMAIN IDLE FOR MORE THAN 7 CALENDAR DAYS, TEMPORARY SEEDING (VA STD & SPEC 3.31, TABLE 3.31-B) WILL BE APPLIED TO THE ROUGH GRADED AREA. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

12. IN THE UNLIKELY EVENT THAT THERE ARE EXCESS EXCAVATED MATERIALS REMAINING AFTER THE TRENCH HAS BEEN BACKFILLED, THE MATERIAL IS TO BE DISPOSED OF WITHIN THE EXISTING ROW IN AN UPLAND AREA OUTSIDE OF THE 100-YEAR FLOOD PLAIN. MATERIAL WILL BE SPREAD IN A THIN LAYER AND TIED INTO EXISTING CONTOURS TO CREATE POSITIVE DRAINAGE FOR STORMWATER RUNOFF.

13. CONSTRUCT PERMANENT RIGHT-OF-WAY DIVERSION/WATERBARS AFTER COMPLETION OF GRADING IN ACCORDANCE WITH THE WATERBAR SPACING AND SIZING REQUIREMENTS SHOWN ON PLAN AND DETAIL SHEETS (DETAIL MVP-17).

14. PRIOR TO SEEDING MVP WILL DISC AREAS TO A DEPTH OF 4-6" TO FACILITATE REVEGETATION. DISCING WILL BE PERFORMED ON SUBSOILS TO A DEPTH OF 4-6" AND AGAIN FOLLOWING TOPSOILING.

15. REVEGETATE DISTURBED AREA PER THE TABLES ON DETAILS MVP-ES11.1 TO 11.9 AND MVP-12.1 TO 12.4 OR PER LANDOWNER REQUEST. FOR 3:1 OR STEEPER SLOPES THE DISTURBED AREA WILL HAVE EROSION CONTROL FABRIC (BLANKETING, HYDROSEEDING, FLEXTERRA, OR APPROVED EQUAL) INSTALLED AS SHOWN ON DETAIL SHEET (DETAILS VA STD & SPEC 3.36, MVP-ES40 AND MVP ES-40.1).

16. RE-ESTABLISH APPROPRIATE DRAINAGE IN EXISTING ROAD CHANNELS PRIOR TO SEEDING AND MULCHING.

17. CONDUCTING INSPECTIONS OF TEMPORARY ESC CONTROLS AND SWM BMPS ON AT LEAST THE FOLLOWING FREQUENCIES:
    A. IN NON-TMDL WATERSHEDS
       - AT LEAST ONCE EVERY FIVE BUSINESS DAYS, OR
       - AT LEAST ONCE EVERY 10 BUSINESS DAYS AND NO LATER THAN 48 HOURS FOLLOWING A MEASURABLE STORM EVENT (OR ON THE NEXT BUSINESS DAY IF THE STORM EVENT OCCURS WHEN THERE ARE MORE THAN 48 HOURS BETWEEN BUSINESS DAYS.

    B. IN TMDL WATERSHEDS:
       - AT LEAST ONCE EVERY FOUR BUSINESS DAYS, OR
       - AT LEAST ONCE EVERY 5 BUSINESS DAYS AND NO LATER THAN 48 HOURS FOLLOWING A MEASURABLE STORM EVENT (OR ON THE NEXT BUSINESS DAY IF THE STORM EVENT OCCURS WHEN THERE ARE MORE THAN 48 HOURS BETWEEN BUSINESS DAYS.

    TEMPORARY BMP'S WILL BE REMOVED UPON ACHIEVING VEGETATIVE STABILIZATION, WHICH IS DEFINED AS "A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION". DISTURBED AREAS NOT ATTAINING AN ACCEPTABLE VEGETATIVE COVER SHALL BE RESEEDED AS NEEDED UNTIL THE ENDPOINT IS ACHIEVED.

18. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND LEGALLY DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF SURFACE WATERS. WOODY DEBRIS MAY BE CHIPPED AND SPREAD ON-SITE.

FOR STREAM CROSSINGS, REFER TO THE FOLLOWING STEPS:

1. INSTALL TEMPORARY EQUIPMENT BRIDGE, BYPASS HOSE, FLUME, PUMP, OR COFFERDAM AS DESCRIBED IN STREAM CROSSING DETAILS AROUND THE WORK AREA.
2. DEWATER WORK AREA UTILIZING PUMP WATER FILTER BAGS. WHERE POSSIBLE, EXCAVATION WILL BE FROM THE TOP OF THE STREAM BANK.
3. INSTALL TRENCH PLUGS, PIPE, AND BACKFILL.
4. STABILIZE CHANNEL EXCAVATION AND STREAM BANKS PRIOR TO REDIRECTING STREAM FLOW.
5. REMOVE BYPASS HOSE, FLUME, PUMP, AND TEMPORARY DAM AS NEEDED.

IF WORKING WITHIN A WETLAND AREA, FOLLOW THE GENERALIZED CONSTRUCTION SEQUENCE BELOW:

1 INSTALL EITHER SUPER SILT FENCE, ORANGE CONSTRUCTION FENCE, OR COMPOST FILTER SOCKS ALONG THE PERIMETERS OF THE SITE AS SHOWN ON THE CONSTRUCTION DRAWINGS.

2. MATS, PADS, OR SIMILAR DEVICES WILL BE USED DURING THE CROSSINGS OF WETLANDS. ORIGINAL GRADES THROUGH WETLANDS MUST BE RESTORED AFTER TRENCHING AND BACKFILLING. ANY EXCESS FILL MATERIALS MUST BE REMOVED FROM THE WETLAND AND NOT SPREAD WITHIN WETLANDS.
3. SOIL EXCAVATED FROM WETLAND AREAS WILL BE CAREFULLY REMOVED WITH THE ROOTS INTACT. THIS SOIL WILL BE PLACED IN A SEPARATE STOCKPILE TO BE REUSED DURING THE WETLAND SURFACE RESTITUTION.
4. DEWATER WORK AREA UTILIZING PUMPED WATER FILTER BAGS.
5. INSTALL PIPE.
6. INSTALL TRENCH PLUGS IN WETLAND AREAS TO PREVENT THE TRENCH FROM DRAINING THE WETLAND OR CHANGING ITS HYDROLOGY.
7. BACKFILL PIPE TRENCH. BACKFILL THE TOP 12-INCHES OF THE EXCAVATED TRENCH WITH THE STOCKPILED WETLAND SOIL TO MATCH ORIGINAL SURFACE GRADES.
8. COMPACT BACKFILL AND GRADE THE SURFACE OF THE TRENCH AREA TO ALLOW FOR POSITIVE DRAINAGE TO SOIL E&SCS AND TO PREPARE DISTURBED AREAS FOR PERMANENT TRENCH RESTORATION.
9. MAINTAIN ALL E&SCS DEVICES UNTIL SITE WORK IS COMPLETE AND A GROUND COVER IS ACHIEVED THAT IS UNIFORM AND MATURE ENOUGH TO SURVIVE AND INHIBIT EROSION.
10. REMOVE ALL SOIL AND E&SC MEASURES UPON ESTABLISHMENT OF A GROUND COVER THAT IS UNIFORM AND MATURE ENOUGH TO SURVIVE AND INHIBIT EROSION. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL E&SCS.

BMP MAINTENANCE

- TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BMPS SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. MAINTENANCE AND REPAIR SHALL BE CONDUCTED IN ACCORDANCE WITH THE APPROVED STANDARDS AND SPECIFICATIONS.
- IN NON-AGRICULTURAL AREAS THE VISUAL SURVEY SHALL BE COMPARED TO THE DENSITY AND COVER OF ADJACENT UNDISTURBED LANDS. IN AGRICULTURAL AREAS, THE VISUAL SURVEY SHALL BE COMPARED TO THE ADJACENT UNDISTURBED PORTIONS OF THE SAME FIELD, UNLESS THE EASEMENT AGREEMENT SPECIFIES OTHERWISE.
- WETLANDS ALONG THE PROPOSED PIPELINE ARE EXPECTED TO EXHIBIT VARYING DEGREES OF SATURATION AND WATER ELEVATION, REQUIRING A VARIETY OF PLANT SPECIES TO BE RE-ESTABLISHED. IN UNSATURATED WETLANDS, MOST VEGETATION WILL BE REPLACED BY SEEDING. SATURATED WETLANDS WILL TYPICALLY BE ALLOWED TO RE-VEGETATE NATURALLY. WETLAND REVEGETATION WILL BE CONSIDERED SUCCESSFUL WHEN THE COVER OF HERBACEOUS AND/OR WOODY SPECIES IS AT LEAST 80 PERCENT OF THE TYPE, DENSITY, AND DISTRIBUTION OF THE VEGETATION IN ADJACENT WETLAND AREAS THAT WERE NOT DISTURBED BY CONSTRUCTION. REVEGETATION EFFORTS WILL CONTINUE UNTIL WETLAND REVEGETATION IS SUCCESSFUL.
- CONDUCTING INSPECTIONS OF TEMPORARY ESC CONTROLS AND SWM BMPS AT LEAST ONCE EVERY FOUR BUSINESS DAYS.
- TEMPORARY EROSION AND SEDIMENT CONTROL BMPS SHOULD BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL RESULTING FROM REMOVAL OF BMPS OR VEGETATION SHALL BE PERMANENTLY STABILIZED.

RESTORATION BMP PHASING

THE FOLLOWING IS THE SEQUENCE OF EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE REMOVAL AND INSTALLATION RELATED TO RESTORATION ACTIVITIES. THIS WORK WILL OCCUR BETWEEN RESTORATION OF PIPELINE LIMIT OF DISTURBANCE TO PRE-CONSTRUCTION GRADES AND FINAL CLOSURE OF THE PROJECT DEFINED AS "ACHIEVING VEGETATIVE STABILIZATION". THE SEQUENCE IS:

1) REMOVE AND GRADE OUT THE CLEAN WATER DIVERSION DIKE.

2) REMOVE DOWNSLOPE BMPS UTILIZED DURING CONSTRUCTION AND IMMEDIATELY REPLACE WITH 12-IN COMPOST FILTER SOCK. ON SLOPES GREATER THAN 30%, AN ADDITIONAL INTERMEDIATE 12-IN COMPOST FILTER SOCKS WILL BE PLACED PER THE SLOPE SPACING (MVP-ES3.2) TO ATTENUATE THE VELOCITY OF RUNOFF IN THE RECLAIMED AREA.

3) APPLY SPECIALTY SEEDS AS REQUIRED THAT WILL NOT BE INCLUDED IN THE MULCH PHASE (STEP 4), SEED THE AREA USING THE SEED MIXES AND RATES SPECIFIED IN MVP-ES11.1 TO MVP-ES11.9 AND MVP-ES12.1 TO MVP-ES12.4.

4) APPLY MULCH IN THE FORM OF ORGANIC MULCH (PER MVP-ES45), SOIL STABILIZATION MATTING (PER VADEQ STD & SPEC 3.36), OR HYDRAULIC EROSION CONTROL PRODUCT (PER MVP-ES40).

5) FOLLOWING A DETERMINATION THAT THE SITE HAS ACHIEVED VEGETATIVE STABILIZATION, THE COMPOST FILTER SOCK WILL BE "OPENED" AND THE MULCH CONTAINED WITHIN WILL BE SPREAD WITHIN THE LIMITS OF DISTURBANCE.

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REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE

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BEST MANAGEMENT PRACTICES (BMP) INSTALLATION & REMOVAL NOTES

TEMPORARY AND PERMANENT BMPS WILL BE USED DURING CONSTRUCTION ACTIVITIES TO AVOID AND/OR MINIMIZE ADVERSE ENVIRONMENTAL EFFECTS OF CONSTRUCTION ACTIVITIES.

THE FOLLOWING ARE GENERAL BMP INSTALLATION NOTES FOR PIPELINE CONSTRUCTION ACTIVITIES.

- A STONE CONSTRUCTION ENTRANCE, PER VESCH STD & SPEC 3.02 AND MVP–ES20, SHALL BE PROVIDED AT ALL LOCATIONS WHERE CONSTRUCTION TRAFFIC WILL BE ACCESSING A PAVED ROAD DIRECTLY FROM A DISTURBED AREA.
- TEMPORARY SEDIMENT BARRIERS, INCLUDING APPROPRIATELY SIZED COMPOST FILTER SOCK, SILT FENCE OR SILT FENCE WILL BE PLACED AROUND SOIL STOCKPILES, AS NEEDED.
- COMPOST FILTER SOCK WILL BE PLACED AROUND WETLANDS AND WATERBODIES IN AND ADJACENT TO THE WORK AREA PRIOR TO ANY TRENCHING ACTIVITIES. COMPOST FILTER SOCK HAS BEEN SIZED PER MVP–ES3 AND THE SIZE IS SPECIFIED ON THE PLAN SETS UTILIZING THE LINE TYPES CONTAINED IN THE LEGEND ON EACH SHEET.
- STOCKPILE SLOPES WILL BE 2:1 OR FLATTER, AND STOCKPILES WILL NOT EXCEED 35 FEET IN HEIGHT.
- TEMPORARY STREAM CROSSINGS SHALL BE INSTALLED AS INDICATED ON THE E&S PLAN SHEETS AND AS PER THE E&S DETAIL SHEETS.
- WATERBARS WILL BE INSTALLED IMMEDIATELY AFTER INITIAL DISTURBANCE OF THE SOIL IN ACCORDANCE WITH THE SPACING AND SIZING REQUIREMENTS SHOWN ON PLAN AND DETAIL SHEET. WATERBARS WILL BE CONSTRUCTED OF SOIL TO REDUCE RUNOFF VELOCITY AND DIVERT WATER OFF THE PIPELINE ROW.
- EXCAVATED TRENCH SPOIL MATERIAL WILL BE USED FOR TEMPORARY RIGHT OF WAY DIVERSIONS AS SHOWN IN THE DETAIL AT THE LOCATIONS INDICATED ON THE PLAN SHEETS.
- TRENCH DEWATERING, IF NEEDED, WILL BE CONDUCTED USING A PUMP AND HOSE. WATER WILL BE RELEASED INTO A FILTER BAG THAT WILL BE LOCATED IN A WELL–VEGETATED UPLAND AREA.
- TRENCH BREAKERS WILL BE INSTALLED ON SLOPES ADJACENT TO STREAMS, WETLANDS, AND ROAD CROSSINGS TO PREVENT SUBSURFACE EROSION. TRENCH BREAKERS WILL BE INSTALLED AS SHOWN ON THE DETAILS.
- THE WORK AREA WILL BE BACKFILLED FOLLOWING PIPELINE INSTALLATION OR OTHER EXCAVATION WORK. IN AREAS WHERE TOPSOIL HAS BEEN SEGREGATED, THE SUBSOIL WILL BE REPLACED FIRST, AND THEN THE TOPSOIL WILL BE SPREAD OVER THE AREA FROM WHICH IT WAS REMOVED. DISTURBED AREAS WILL BE RESTORED TO THEIR ORIGINAL TOPOGRAPHIC CONTOURS.
- PERMANENT WATERBARS, WILL BE CONSTRUCTED WITH A TWO PERCENT (TYPICAL) OUTSLOPE TO DIVERT SURFACE FLOW TO A WELL VEGETATED STABLE AREA.
- IMMEDIATELY FOLLOWING BACKFILLING ALL DISTURBED AREAS WILL BE GRADED IN PREPARATION FOR SEEDING AND MULCHING. PRIOR TO SEEDING MVP WILL DISC AREAS TO A DEPTH OF 4–6" TO FACILITATE REVEGETATION. DISCING WILL BE PERFORMED ON SUBSOILS TO A DEPTH OF 4–6" AND AGAIN FOLLOWING TOPSOILING. THE CONSTRUCTION SITE SHOULD BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. ESTABLISHMENT OF FINAL COVER MUST BE INITIATED NO LATER THAN 7 DAYS AFTER REACHING FINAL GRADE. REFER TO TABLES ON THIS SHEET FOR TEMPORARY AND PERMANENT SEEDING SPECIFICATIONS.
- FOR 3:1 OR STEEPER SLOPES THE DISTURBED AREA WILL HAVE EROSION CONTROL BLANKETING INSTALLED AS INDICATED ON DETAIL SHEET.
- TEMPORARY SEDIMENT BARRIERS WILL BE MAINTAINED UNTIL VEGETATION HAS BECOME ESTABLISHED WITH A GROUND COVER THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION. ONCE THIS COVERAGE HAS BEEN OBTAINED, APPROPRIATE CONTROLS WILL BE REMOVED FROM THE WORK AREA. AREAS DISTURBED DURING THE REMOVAL OF THE EROSION CONTROLS WILL BE STABILIZED IMMEDIATELY.
- ALL WASTE MATERIAL WILL BE TRANSPORTED OFFSITE FOR RECYCLING AND/OR DISPOSAL AT A FACILITY APPROVED TO RECEIVE THE MATERIAL.
- IN NON–AGRICULTURAL AREAS THE VISUAL SURVEY SHALL BE COMPARED TO THE DENSITY AND COVER OF ADJACENT UNDISTURBED LANDS. IN AGRICULTURAL AREAS, THE VISUAL SURVEY SHALL BE COMPARED TO THE ADJACENT UNDISTURBED PORTIONS OF THE SAME FIELD, UNLESS THE EASEMENT AGREEMENT SPECIFIES OTHERWISE.
- WETLANDS ALONG THE PROPOSED PIPELINE ARE EXPECTED TO EXHIBIT VARYING DEGREES OF SATURATION AND WATER ELEVATION, REQUIRING A VARIETY OF PLANT SPECIES TO BE RE–ESTABLISHED. IN UNSATURATED WETLANDS, MOST VEGETATION WILL BE REPLACED BY SEEDING. SATURATED WETLANDS WILL TYPICALLY BE ALLOWED TO RE–VEGETATE NATURALLY. WETLAND REVEGETATION WILL BE CONSIDERED SUCCESSFUL WHEN THE COVER OF HERBACEOUS AND/OR WOODY SPECIES IS AT LEAST 80 PERCENT OF THE TYPE, DENSITY, AND DISTRIBUTION OF THE VEGETATION IN ADJACENT WETLAND AREAS THAT WERE NOT DISTURBED BY CONSTRUCTION. REVEGETATION EFFORTS WILL CONTINUE UNTIL WETLAND REVEGETATION IS SUCCESSFUL.

STREAM CROSSING PROCEDURES

GENERAL:
PROCEDURES THAT WILL BE FOLLOWED AT STREAM CROSSING LOCATIONS INCLUDE THE FOLLOWING:

- MINIMIZE CLEARING AND GRUBBING OF VEGETATION UP TO STREAMS, AS POSSIBLE, UNTIL THE TIME OF THE PIPELINE INSTALLATION;
- ONLY THAT AREA WHICH IS REQUIRED FOR PIPELINE INSTALLATION SHALL BE DISTURBED WITHIN THE PROPOSED LIMIT OF DISTURBANCE OR RIGHT–OF–WAY AT STREAM CROSSINGS; LOCATING STAGING AREAS 50 FEET AWAY FROM THE STREAM, WHERE POSSIBLE;
- STORING CHEMICALS, STORING EQUIPMENT, WASHING EQUIPMENT, OR REFUELING EQUIPMENT MUST BE DONE IN AREAS THAT ARE GREATER THAN 100 FEET AWAY FROM THE STREAM;
- SPOIL PILE PLACEMENT AND BMPS WILL BE MONITORED AT ALL TIMES DURING STREAM CROSSING PROCEDURES; ONCE WORK WITHIN A STREAM AREA IS STARTED, IT WILL BE CONDUCTED CONTINUOUSLY TO COMPLETION; EMPHASIS WILL BE PLACED ON MINIMIZING TIME OF DISTURBANCE;
- SPOILS FROM STREAM CROSSINGS MUST BE PLACED AT LEAST 10 FEET FROM THE WATER'S EDGE; AND
- CONSTRUCTION EQUIPMENT WILL NOT BE ALLOWED IN THE STREAM CHANNEL WHEN EXCAVATION CAN BE DONE FROM EITHER SIDE OR A TEMPORARY CROSSING WHILE WORKING AT THE STREAM CROSSING.
- ESC BMPS WILL BE MONITORED/MAINTAINED AT ALL TIMES FOLLOWING INITIAL EARTH DISTURBANCE AND WILL CONTINUE UNTIL RESTORATION IS DEEMED COMPLETE.

THE FOLLOWING SECTIONS DESCRIBE STREAM CROSSING TECHNIQUES THAT MAY BE USED DURING PIPELINE RELOCATION/INSTALLATION ACTIVITIES. REFER TO THE DETAIL SHEETS AND APPROVED STANDARDS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

DRY CROSSING TECHNIQUES:
THESE TECHNIQUES WILL BE USED TO PERFORM PIPELINE WORK IN A RELATIVELY DRY WORKING CONDITION OR AROUND THE OPEN EXCAVATION. THESE TECHNIQUES INCLUDE PUMP AROUND AND FLUME PIPE CROSSING METHODS. THE LIMITING FACTORS FOR THESE TECHNIQUES ARE USUALLY STREAM SIZE, FLOW, AND WATER DEPTH.

DIRECTIONAL BORING IS ALSO A TECHNIQUE THAT CAN BE UTILIZED AS IT WILL LESSEN THE IMPACTS ON THE WATERBODIES.

E&S CONTROL MEASURES WILL BE INSTALLED PRIOR TO ANY EARTH DISTURBANCE AND MONITORED/MAINTAINED UNTIL CONSTRUCTION AND RESTORATION THROUGH THE WATER–BODY IS COMPLETE.

FLUME PIPE METHOD: PLEASE SEE DETAIL SHEETS AND SWPPP FOR MORE INFORMATION ON THE FLUME PIPE METHOD. THIS PROCEDURE INVOLVES CONSTRUCTING TWO BULKHEADS, EITHER SANDBAGS OR PLASTIC DAMS, TO DIRECT THE STREAM FLOW THROUGH A FLUME PIPE PLACED OVER THE TRENCH PRIOR TO EXCAVATION. THE FLUME SHALL BE ALIGNED AS TO PREVENT BANK EROSION AND BED SCOUR. THE FLUME WILL NOT BE REMOVED DURING TRENCHING, PIPE LAYING OR BACKFILLING.

PUMP AROUND METHOD: PLEASE SEE THE DETAIL SHEETS AND APPROVED STANDARDS AND SPECIFICATIONS FOR MORE INFORMATION ON THE PUMP AROUND METHOD. THIS PROCEDURE INVOLVES CONSTRUCTING TWO BULKHEADS, EITHER SANDBAGS OR PLASTIC DAMS. THE UPSTREAM DAM WILL CAUSE THE WATER TO POND WHERE IT CAN BE PUMPED AROUND THE WORK AREA AND BE DISCHARGED BEHIND THE DOWNSTREAM BULKHEAD. PUMPS OF SUFFICIENT SIZE TO TRANSMIT THE FLOW DOWNSTREAM WILL BE USED. BACKUP PUMPS MUST BE ON–SITE. PUMP INTAKES MUST BE SCREENED. PUMP DISCHARGES MUST NOT CAUSE SCOUR.

TEMPORARY ROAD CROSSINGS:
TEMPORARY ROAD CROSSINGS, CONSISTING OF BRIDGES OF TIMBER MATS OR CLEAN ROCK FILL AND FLUME(S), WILL BE INSTALLED TO CROSS MINOR OR INTERMEDIATE STREAMS. TIMBER MATS SHALL BE USED TO CROSS SMALLER STREAMS WHERE THE SPAN OF THE MAT WILL STRETCH FROM BANK TO BANK. CLEAN ROCK FILL AND FLUMED CROSSINGS WILL BE UTILIZED WHERE IT IS NOT FEASIBLE TO UTILIZE TIMBER MATS. AS AN ALTERNATIVE, PORTABLE BRIDGES MAY BE USED INSTEAD FOR SMALL CROSSINGS. EQUIPMENT WILL NOT BE ALLOWED TO FORD FLOWING STREAMS DURING CONSTRUCTION ACTIVITIES. TEMPORARY ROAD CROSSINGS OF STREAMS MUST MAINTAIN FOR ADEQUATE FLOW DOWNSTREAM.

STREAM BANK STABILIZATION:
PERMANENT STABILIZATION SHALL OCCUR IMMEDIATELY UPON INSTALLATION, BACKFILLING, AND GRADING AT EACH STREAM CROSSING.

LEGEND

- CLEAN WATER DIVERSION DIKE (SEE DETAIL MVP–ES50 AND MVP–ES51
- STREAM
- US FOREST SERVICE (NATIONAL FOREST) LANDS
- APPALACHIAN NATIONAL SCENIC TRAIL (AMST)
- EXISTING ROAD/TRAIL
- EXISTING PROPERTY LINE
- EXISTING STATE LINE
- EXISTING COUNTY LINE
- POND
- WETLAND
- ACID FORMING MATERIAL (AFM)
- AGRICULTURAL LAND USE BOUNDARY (AGR)
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED ACCESS ROAD CENTERLINE
- PROPOSED PIPELINE
- PROPOSED SILT FENCE (SF)
- PROPOSED SUPER SILT FENCE (SEE DETAIL MVP–ES9.2) (SSF)
- PROPOSED REINFORCED FILTRATION DEVICE (SEE DETAILS MVP–ES9, 9.1, 9.2, 9.3) (RFD)
- ORANGE CONSTRUCTION SAFETY FENCE (OCSF)
- PROPOSED 12" COMPOST FILTER SOCK (SEE DETAILS MVP–ES3, 3.1, 3.2)
- PROPOSED 18" COMPOST FILTER SOCK (SEE DETAILS MVP–ES3, 3.1, 3.2)
- PROPOSED 24" COMPOST FILTER SOCK (SEE DETAILS MVP–ES3, 3.1, 3.2)
- GRASS–LINED CHANNEL (SEE DETAIL MVP–ES39)
- CLEAN WATER DIVERSION PIPE
- TIMBER MAT (SEE DETAIL MVP–ES37)
- STEEP SLOPE EROSION CONTROL (SEE NOTE 2)
- STEEP SLOPE AREAS (SEE NOTE 4)
- PROPOSED ROCK CONSTRUCTION ENTRANCE
- PROPOSED TRENCH BREAKER (SEE DETAIL MVP–20)
- TEMPORARY ROW DIVERSION/WATER BAR (VADEQ STD & SPEC 3.11)
- PERMANENT SLOPE BREAKER/ROW DIVERSION/WATER BAR (SEE DETAILS MVP–17, ES38, AND SCHEDULE)

NOTES:

1. TOPSOIL SEGREGATION WILL BE PERFORMED IN ALL–CONSTRUCTION AREAS OF THE PROJECT IN ACCORDANCE WITH DETAIL MVP–ES46.1 THROUGH MVP–ES46.3.
2. FLEXTERRA, EARTHGUARD OR EQUIVALENT MAY BE USED AS A SUBSTITUTE TO EROSION CONTROL BLANKET AS DIRECTED BY MVP.
3. CONTRACTOR IS RESPONSIBLE TO IDENTIFY ALL UTILITIES. THE UTILITY LINES SHOWN ON THE PLAN ARE FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT SURVEYED LINE INFORMATION.
4. SLOPES OF 30° OR GREATER EXIST. CONSTRUCTION FOR STEEP SLOPES TO BE PERFORMED USING STEEP SLOPE TECHNIQUES IDENTIFIED IN THE DETAIL SHEETS. ALSO REFER TO THE SITE–SPECIFIC DESIGN OF STABILIZATION MEASURES IN SELECTED HIGH–HAZARD PORTIONS OF THE ROUTE OF THE PROPOSED MOUNTAIN VALLEY PIPLELINE PROJECT.
5. WHERE CONSTRUCTION CONDITIONS PRECLUDE THE USE OF DIVERSION DITCHES DUE TO SITE CONDITIONS THE CONTRACTOR WILL INSTALL SILT FENCE AT THE DIRECTION OF MVP.
6. IMPROVEMENTS TO PERMANENT AND TEMPORARY ACCESS ROADS WILL BE PERFORMED PER THE SITE SPECIFIC ACCESS ROAD DETAILS.
7. TEMPORARY ACCESS ROAD CROSSING OF STREAMS AND WETLANDS WILL UTILIZE TIMBERMATS. ANY PERMANENT ROAD CROSSINGS WILL BE CONDUCTED VIA CULVERTS.
8. ALL NON VWRC STREAM CROSSINGS WILL BE PERFORMED AS DESCRIBED IN THE STREAM CROSSING TABLE INCLUDED IN THIS PACKAGE.

NO.:	DATE:	DWN.:	CHKD:	APPD.:	DESCRIPTION:
7	01/31/18	KAL	RE	DW	ADDED DETAILS FOR ROADS AND PADS
6	01/26/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
5	01/08/18	KAL	RE	DW	ADDRESS VADEQ COMMENTS
4	11/28/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
3	11/01/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS
2	08/18/17	KAL	RE	DW	ADDRESS VADEQ COMMENTS

REVISIONS:

Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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GENERAL DETAILS SET

COMMONWEALTH OF PENNSYLVANIA
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PROFESSIONAL ENGINEER

DRAWN BY:	KAL
CHECKED BY:	HT
APPROVED BY:	RE
DATE:	11/28/2017
SCALE:	AS SHOWN
SHT. NO.	0.23 OF 0.23

REVISION