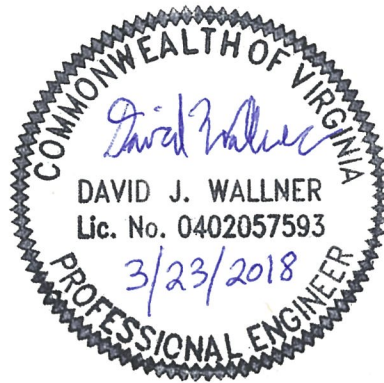


By virtue of this seal and signature, all supporting documents included in this package are accurate and support the design presented herein.



MOUNTAIN VALLEY PIPELINE, LLC

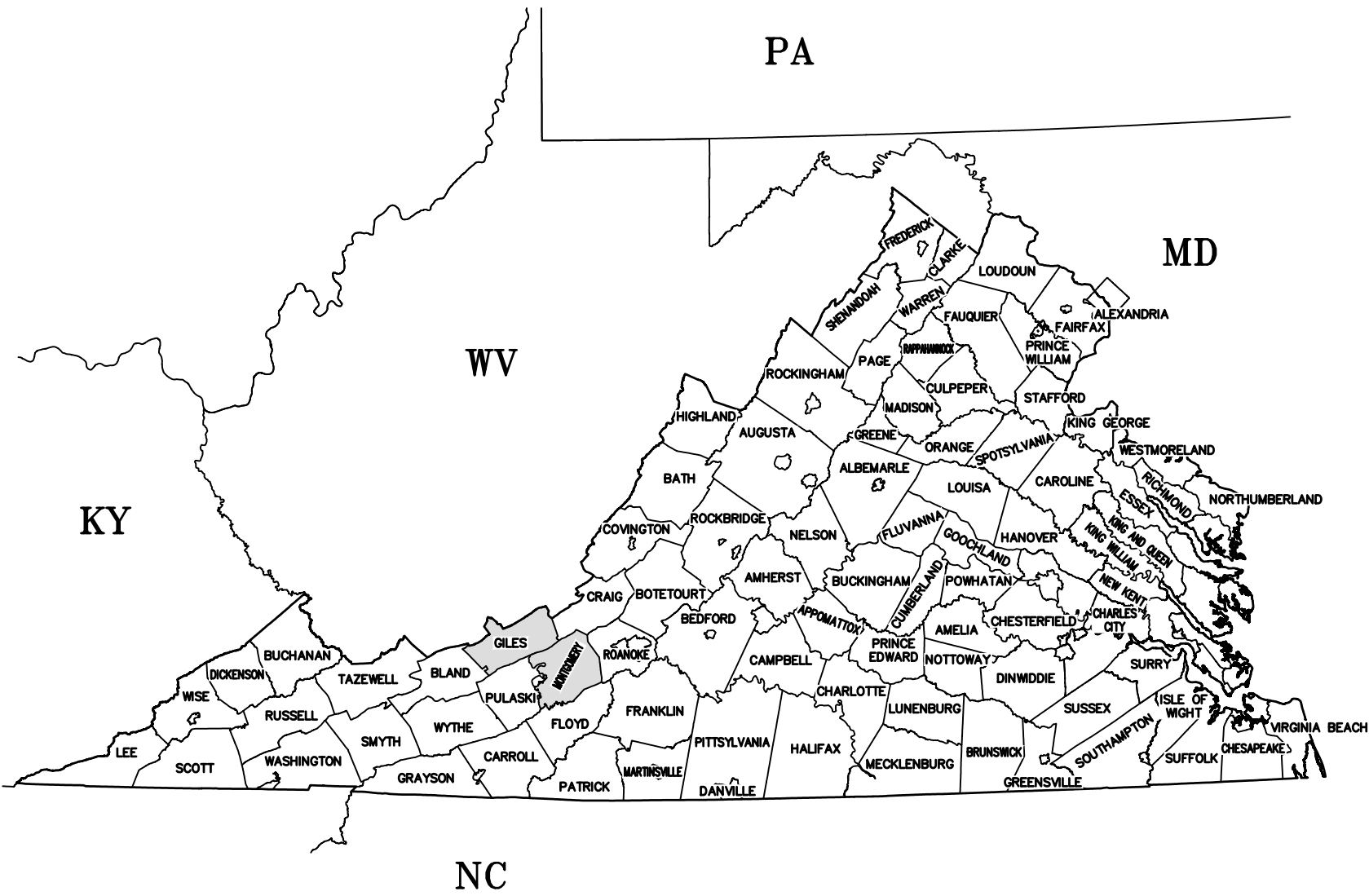
EROSION & SEDIMENT CONTROL PLAN

MVP PIPELINE PROJECT

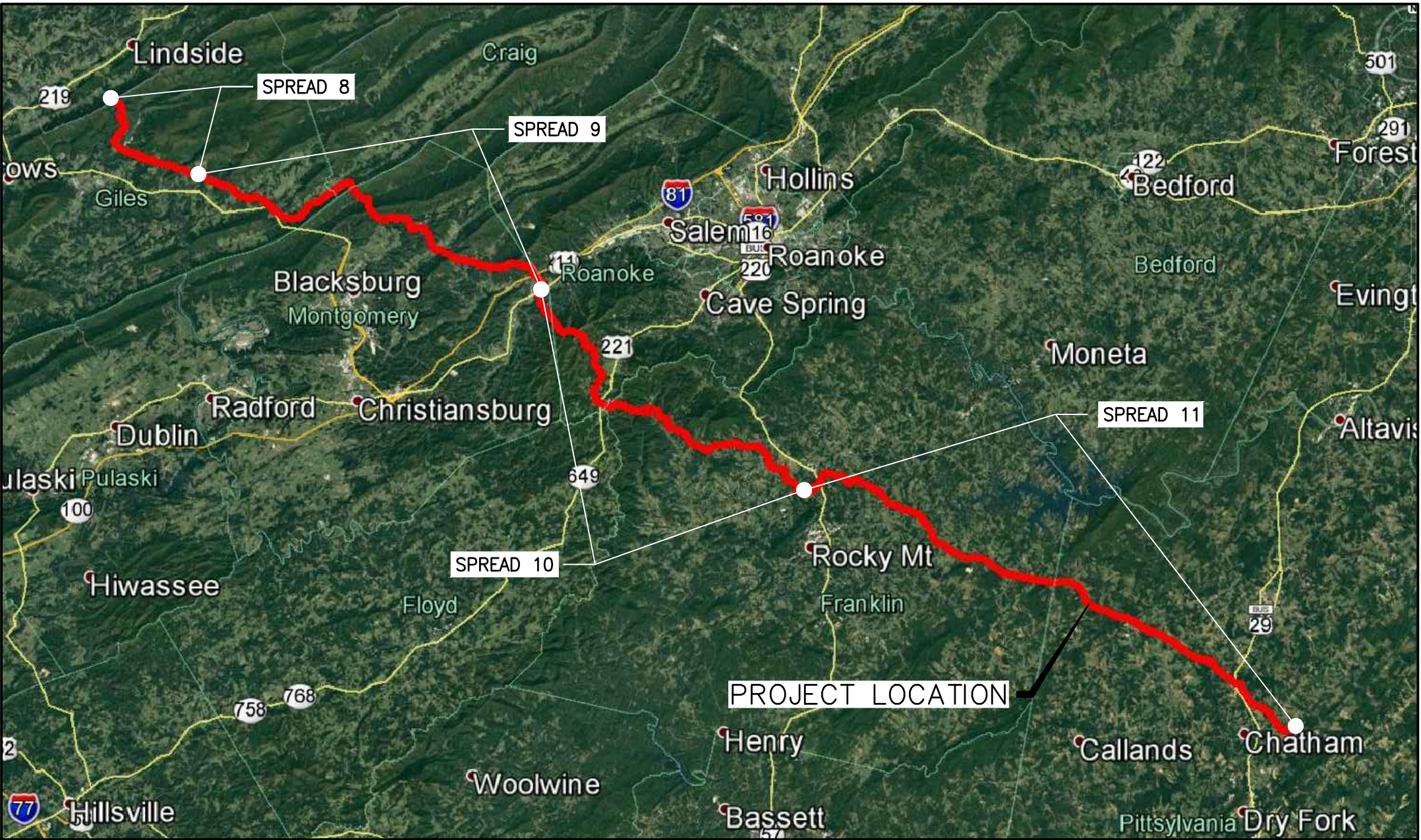
GILES COUNTY TO MONTGOMERY COUNTY

SPREAD 9

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 9	
13.00A	VARIANCE AND EXEMPTION REQUESTS
13.01 TO 13.02	KEY PLAN
13.03EX TO 13.90EX	EXISTING CONDITIONS
13.03ES TO 13.90ES	EROSION & SEDIMENT CONTROL PLANS
13.03PC TO 13.90PC	POST CONSTRUCTION STORMWATER AND RESTORATION PLANS



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.



LOCATION MAP

MVP PIPELINE PROJECT

GILES COUNTY, VIRGINIA TO PITTSYLVANIA COUNTY, VIRGINIA



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.

ADDED DETAILS FOR ROADS AND PADS	
7	DW
6	DW
5	DW
4	DW
3	DW
2	DW
1	DW
NO.:	
DATE:	
CHKD.:	
APPD.:	
DESCRIPTION:	
REVISIONS:	

MOUNTAIN VALLEY PIPELINE, LLC 555 SOUTHPOINTE BOULEVARD, SUITE 200 CANONSBURG, PA 15317	
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE	
EROSION AND SEDIMENT CONTROL PLANS	

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

GENERAL DETAILS SET	
---------------------	--

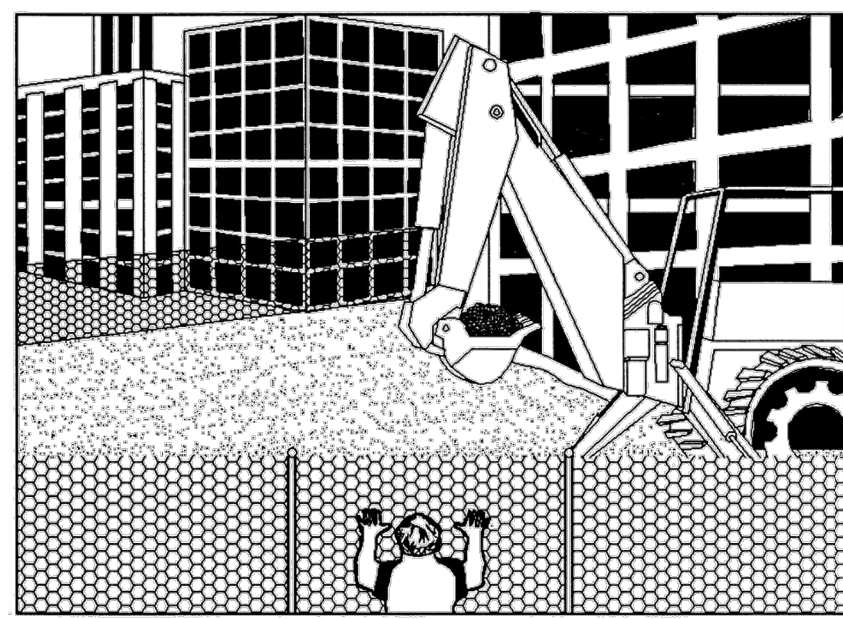
COMMONWEALTH OF VIRGINIA DAVID J. WALLNER Lic. No. 0402057593 Professional Engineer	
--	--

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

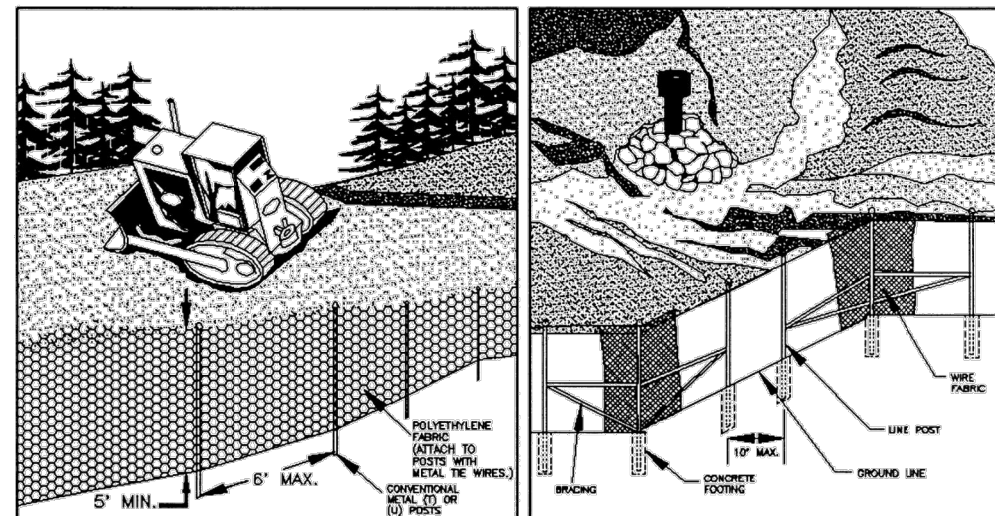
1992

3.01

SAFETY FENCE



PERSPECTIVE VIEW



PERSPECTIVE VIEW
PLASTIC FENCE

PERSPECTIVE VIEW
METAL FENCE

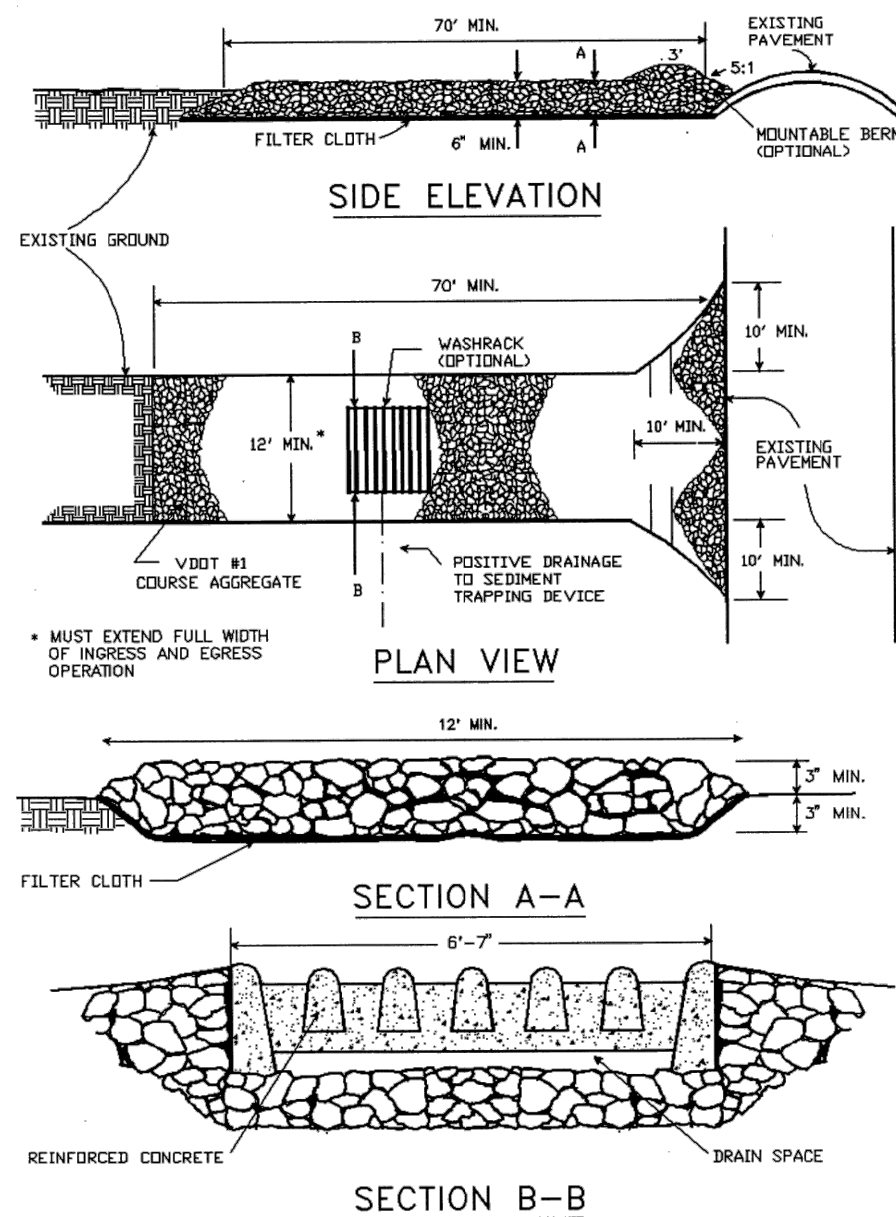
Source: Adapted from Conwed Plastics and
VDOT Road and Bridge Standards Plate 3.01-1

SAFETY FENCE
TAKEN FROM VADEQ 1992 MANUAL

1992

3.02

STONE CONSTRUCTION ENTRANCE



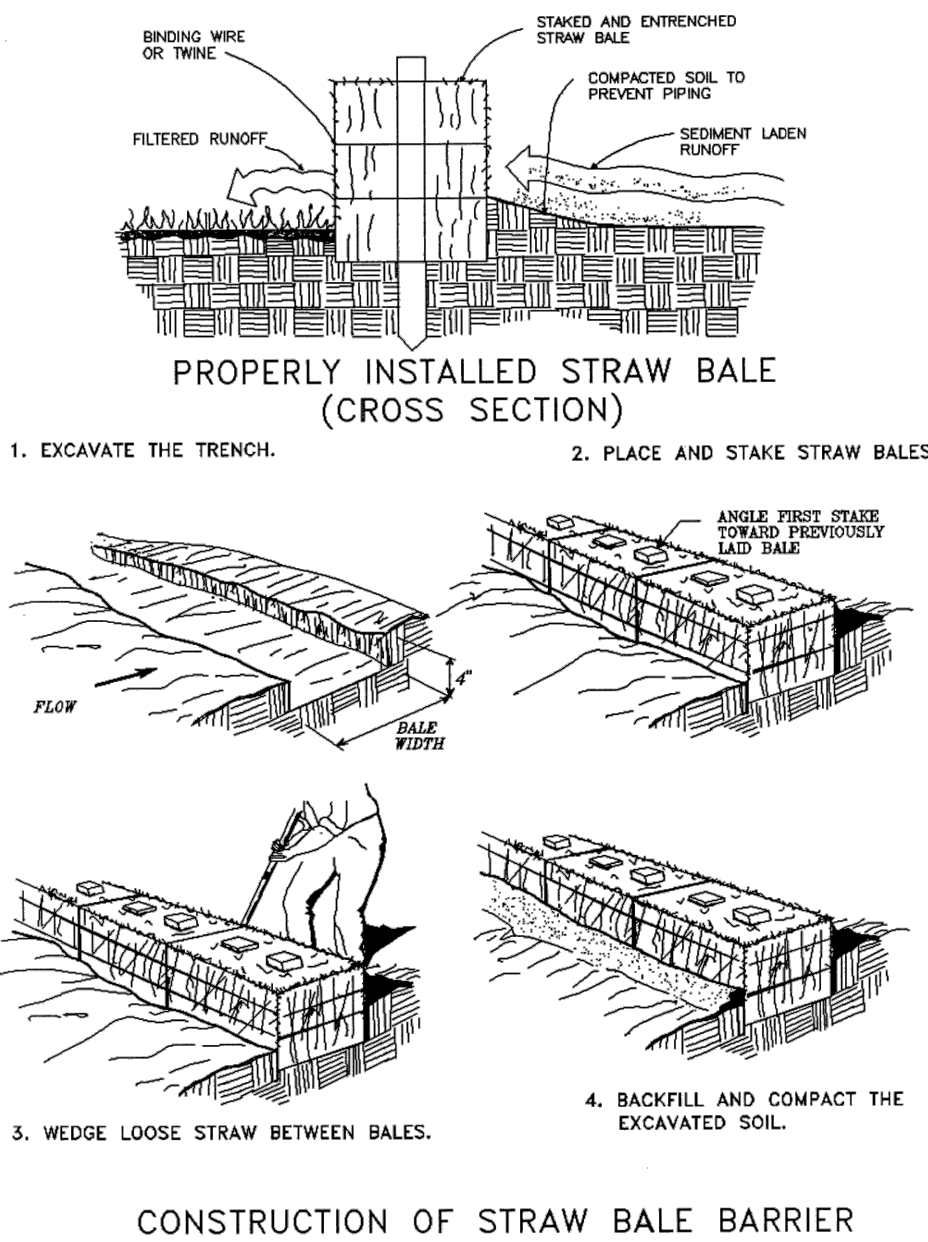
Source: Adapted from 1983 Maryland Standards for Soil
Erosion and Sediment Control, and Va. DSWC Plate 3.02-1

STONE CONSTRUCTION ENTRANCE
TAKEN FROM VADEQ 1992 MANUAL

1992

3.04

STRAW BALE BARRIER



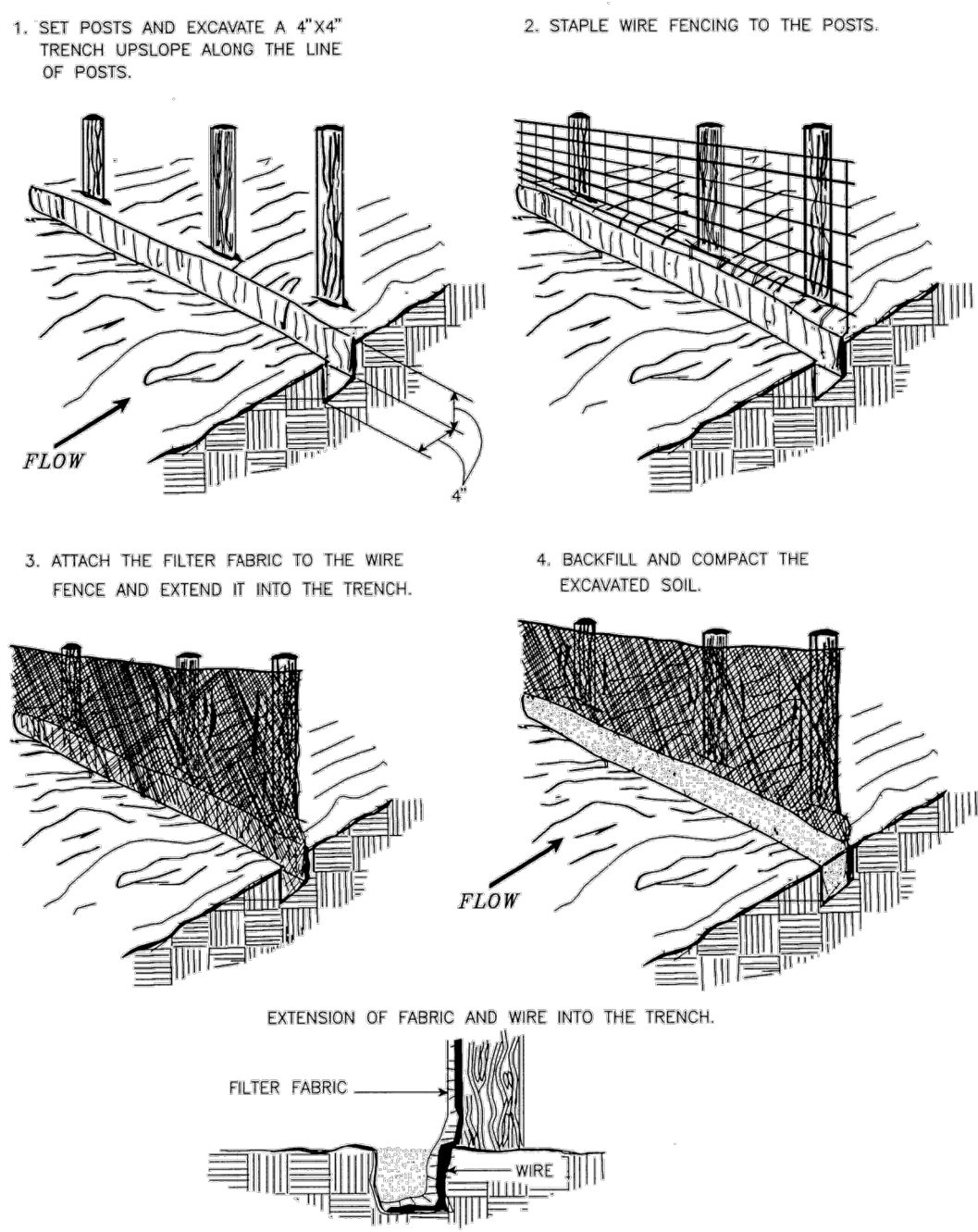
Source: Va. DSWC Plate 3.04-1

STRAW BALE BARRIER
TAKEN FROM VADEQ 1992 MANUAL

1992

3.05

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)



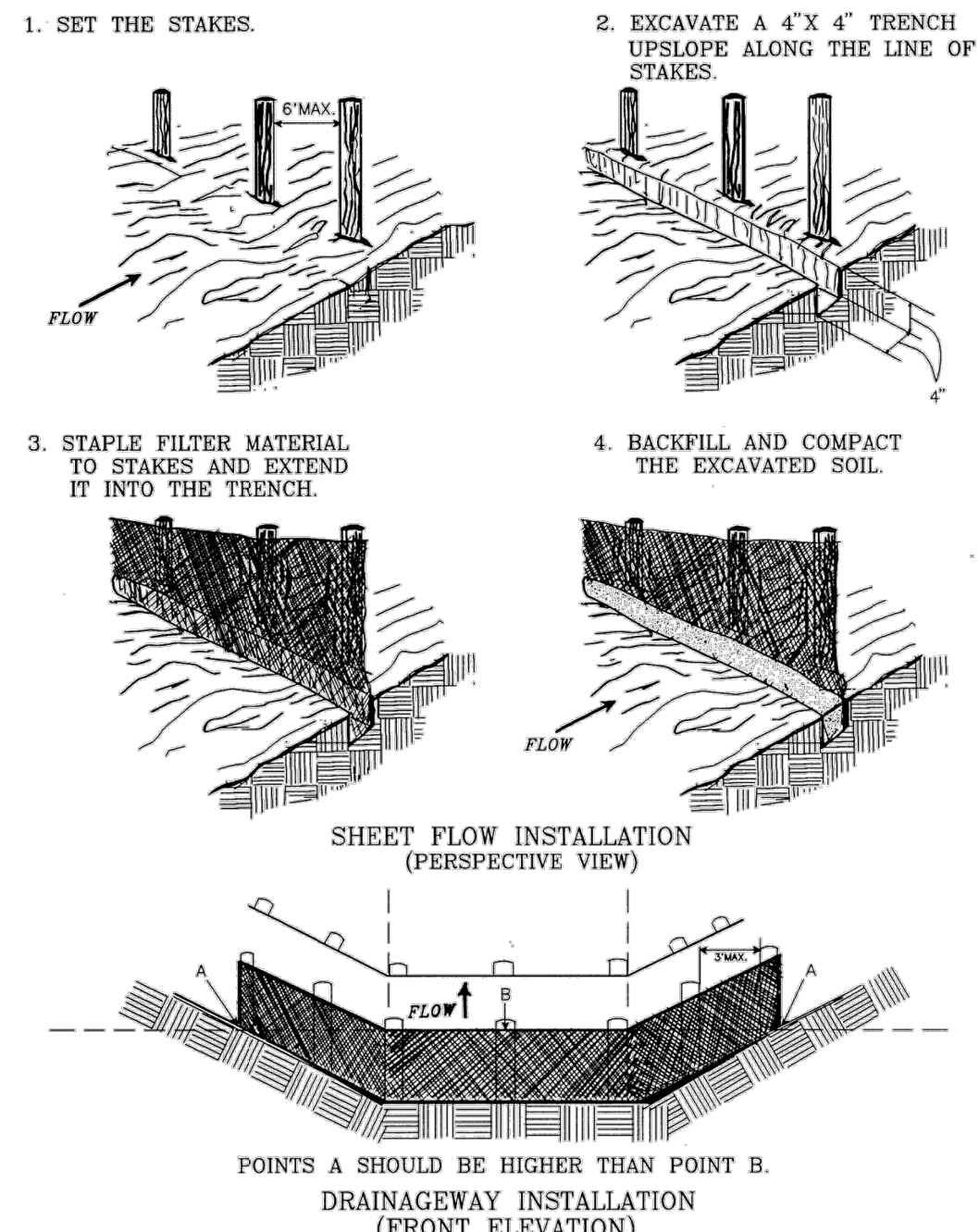
Source: Adapted from Installation of Straw and Fabric Filter
Barriers for Sediment Control, Sherwood and Wyant Plate 3.05-1

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

1992

3.05

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



Source: Adapted from Installation of Straw and Fabric Filter
Barriers for Sediment Control, Sherwood and Wyant Plate 3.05-2

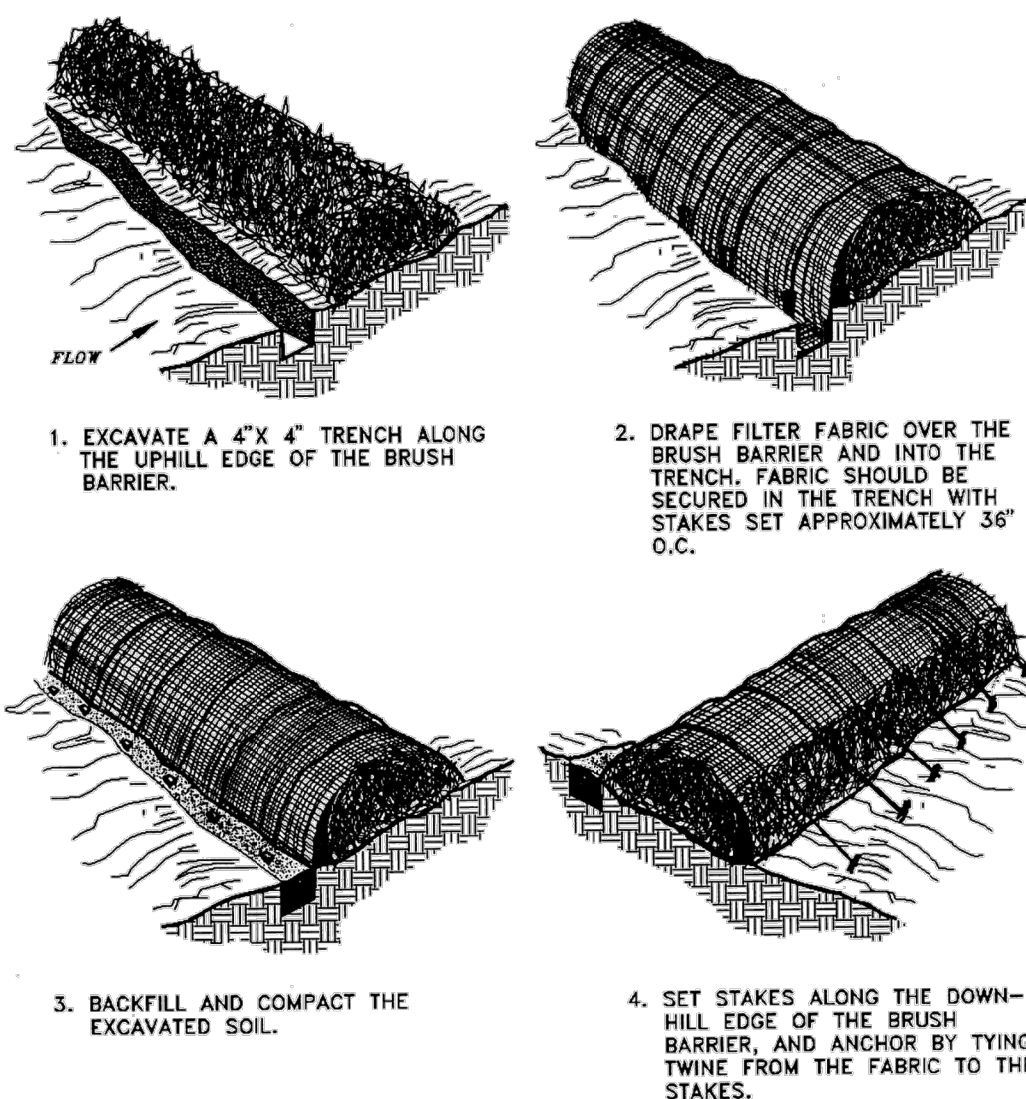
CONSTRUCTION OF SILT FENCE
(WITHOUT WIRE SUPPORT)
TAKEN FROM VADEQ 1992 MANUAL

1992

3.06

CONSTRUCTION OF A BRUSH BARRIER COVERED BY FILTER FABRIC

(TREE/RESIDUAL MATERIAL
WITH DIAMETER > 6")



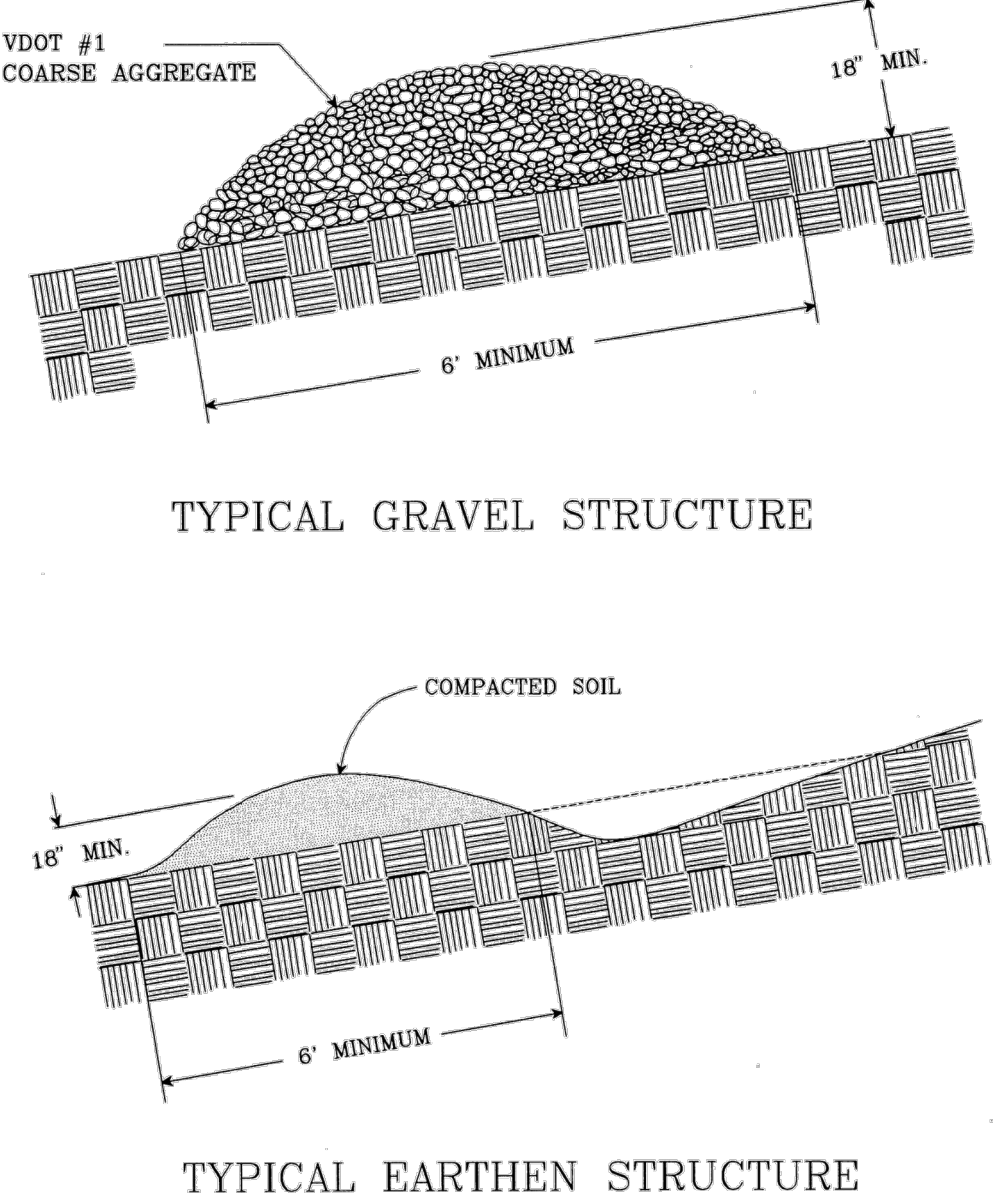
Source: Va. DSWC Plate 3.06-1

CONSTRUCTION OF A BRUSH BARRIER
TAKEN FROM VADEQ 1992 MANUAL

1992


3.11


TEMPORARY RIGHT-OF-WAY DIVERSIONS



Source: Va. DSWC Plate 3.11-1

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

<div><div></div><div><div>EROSION AND SEDIMENT CONTROL PLANS</div><div>MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE</div></div></div>												<div><div><div>MOUNTAIN VALLEY PIPELINE, LLC</div><div>555 SOUTHPOINTE BOULEVARD, SUITE 200</div><div>CANONSBURG, PA 15317</div></div></div>											
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							
NO.												DATE:	DWN.	CHD.	APPD.	DESCRIPTION:							
REVISIONS:																							



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PITTSBURGH, PA 15220

GENERAL DETAILS SET

COMMONWEALTH OF PENNSYLVANIA

DAVID J. WALLNER

Lic. No. 0402057593



PROFESSIONAL ENGINEER

DRAWN BY:

KAL

CHECKED BY:

HT

APPROVED BY:


RE

DATE:

11/28/2017

SCALE:

AS SHOWN



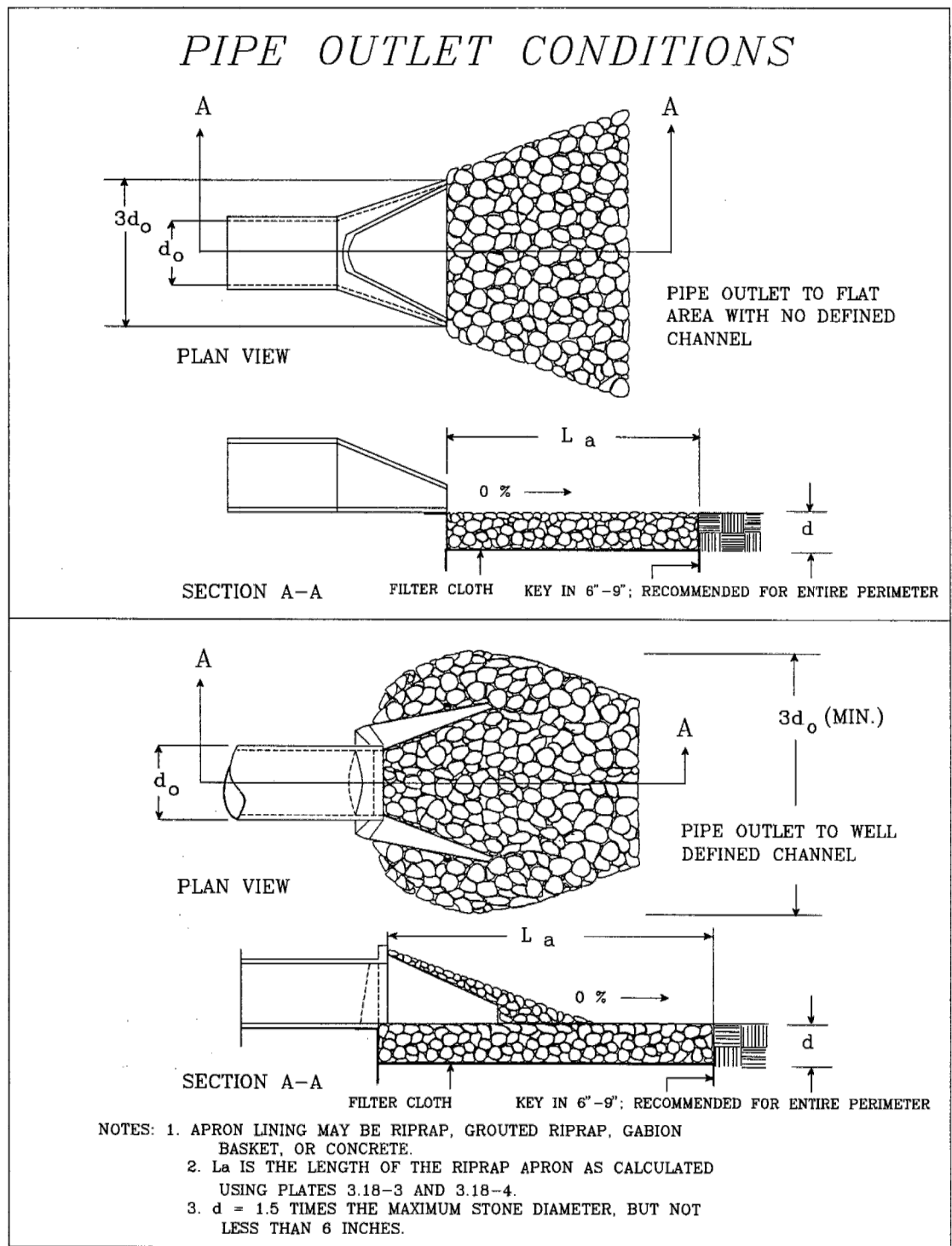
REVISION

SHT. NO.

0.01

OF

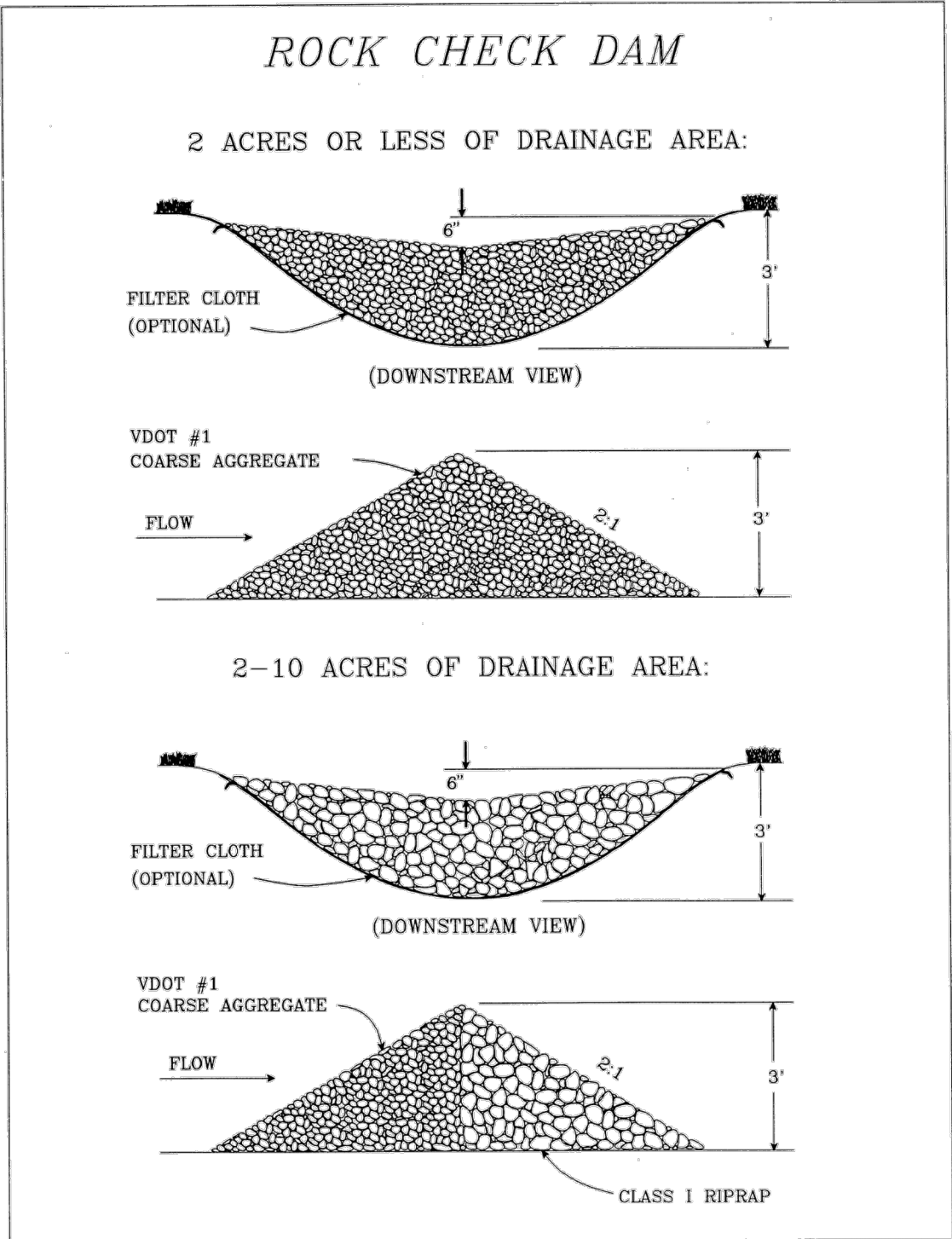
0.23



Source: Va. DSWC

Plate 3.18-1

PIPE OUTLET CONDITIONS
TAKEN FROM VADEQ 1992 MANUAL



Source: Va. DSWC

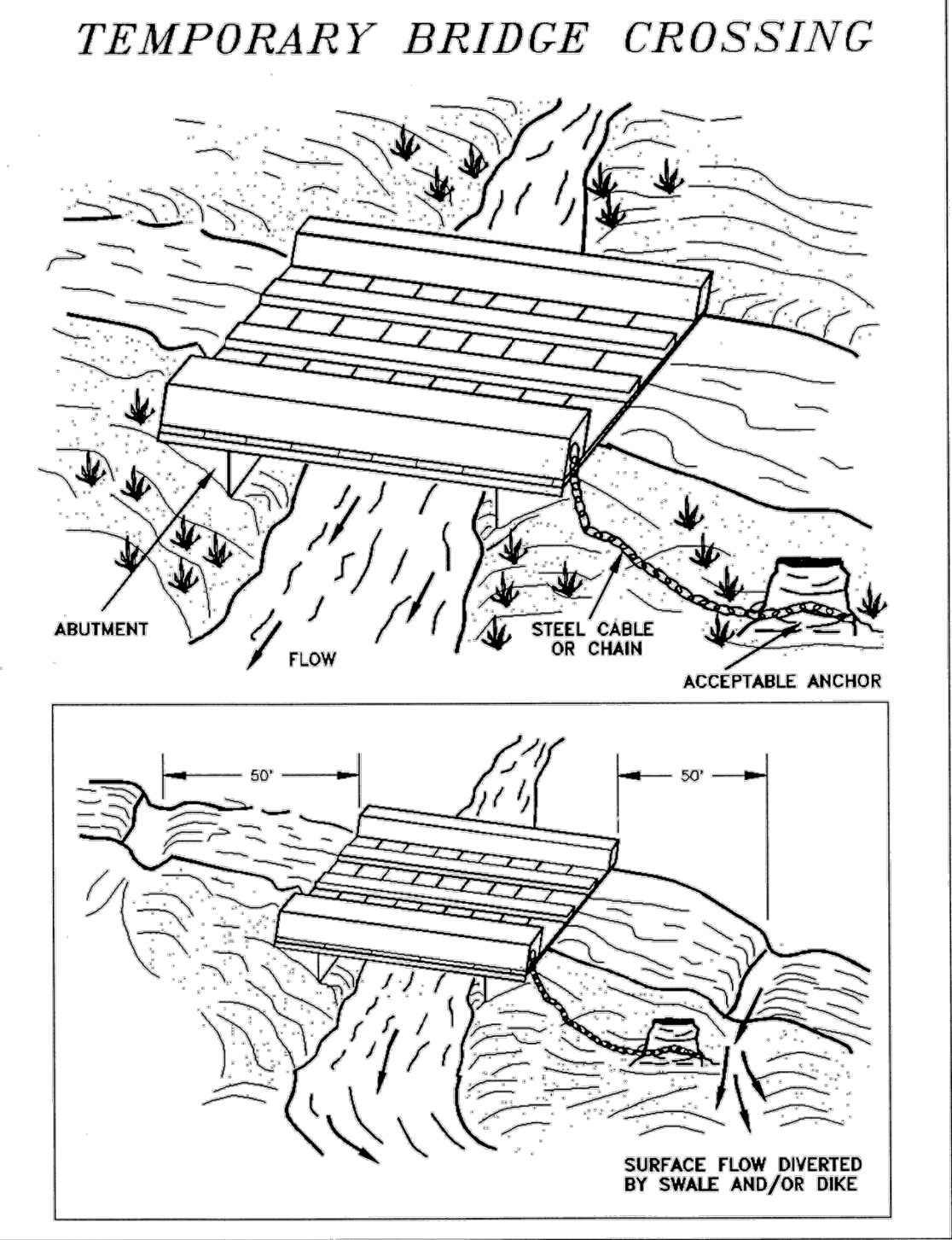
Plate 3.20-1

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:

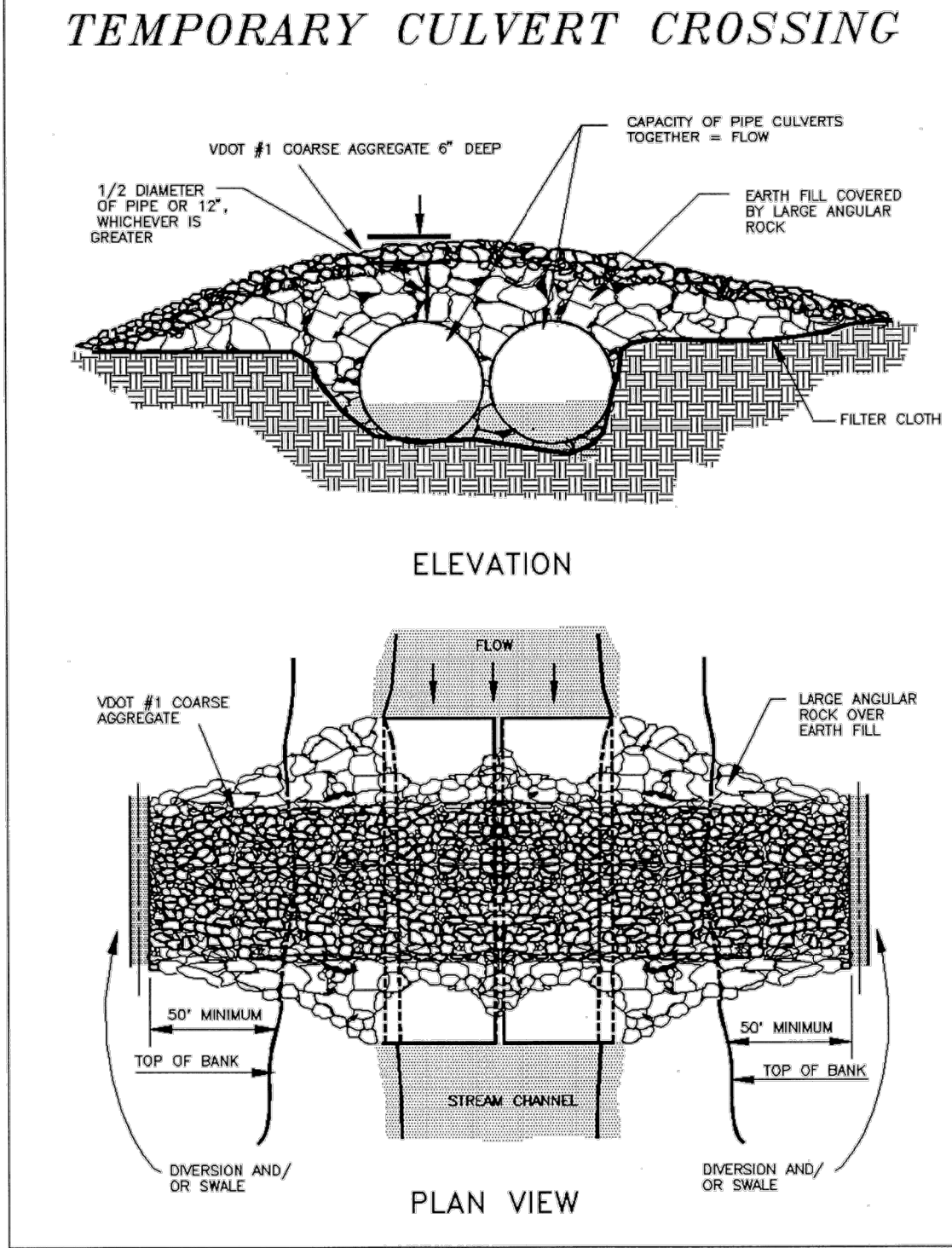
1. THE DRAINAGE AREA OF THE DITCH OR SWALE BEING PROTECTED SHALL NOT EXCEED 2 ACRES WHEN VDOT #1 COARSE AGGREGATE IS USED ALONE AND SHALL NOT EXCEED 10 ACRES WHEN A COMBINATION OF CLASS I RIPRAP (ADDED FOR STABILITY) AND VDOT #1 COARSE AGGREGATE IS USED.
2. THE MAXIMUM HEIGHT OF THE DAM SHALL BE 3.0 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.



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

Plate 3.24-1

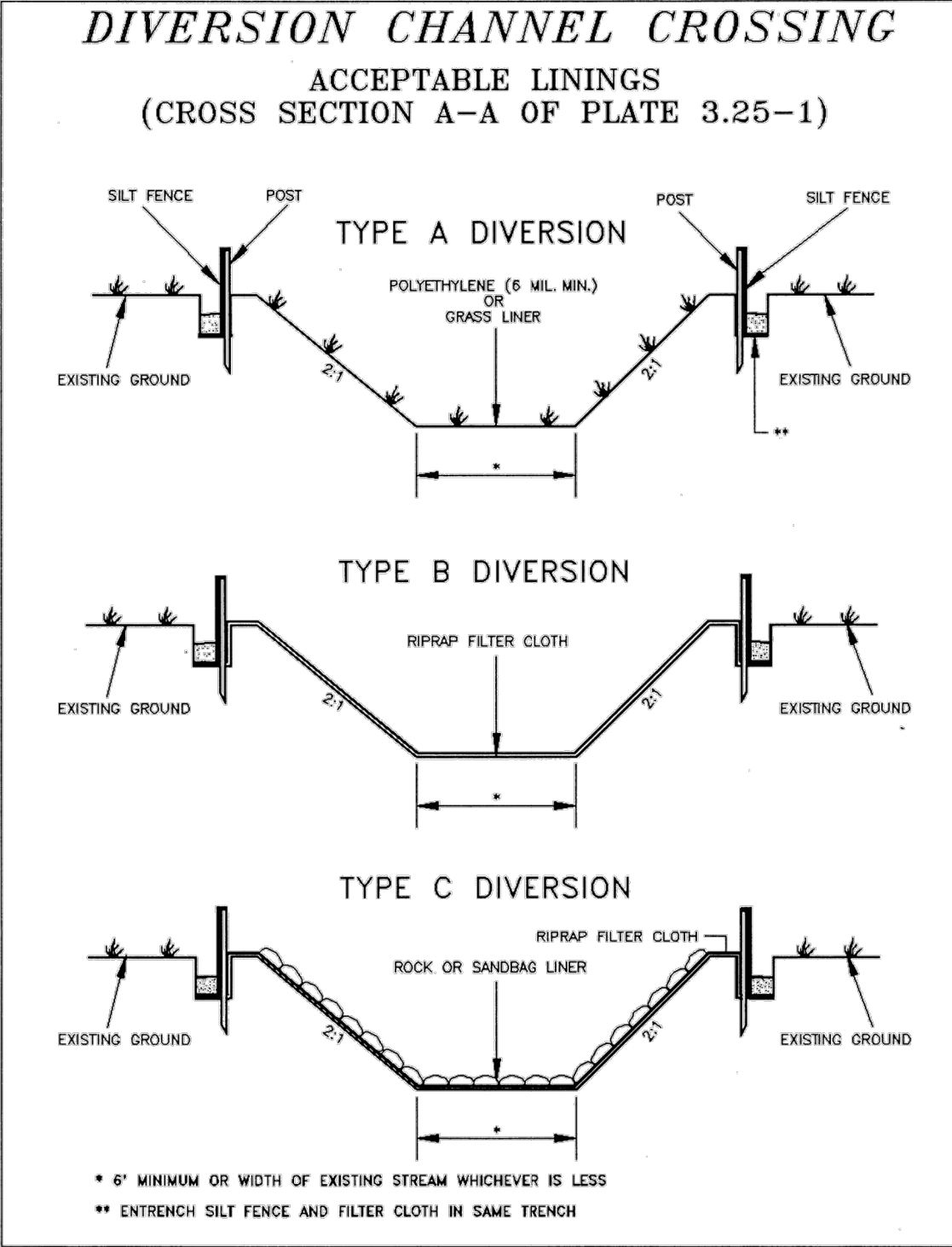
TEMPORARY BRIDGE CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL



Source: Va. DSWC

Plate 3.24-2

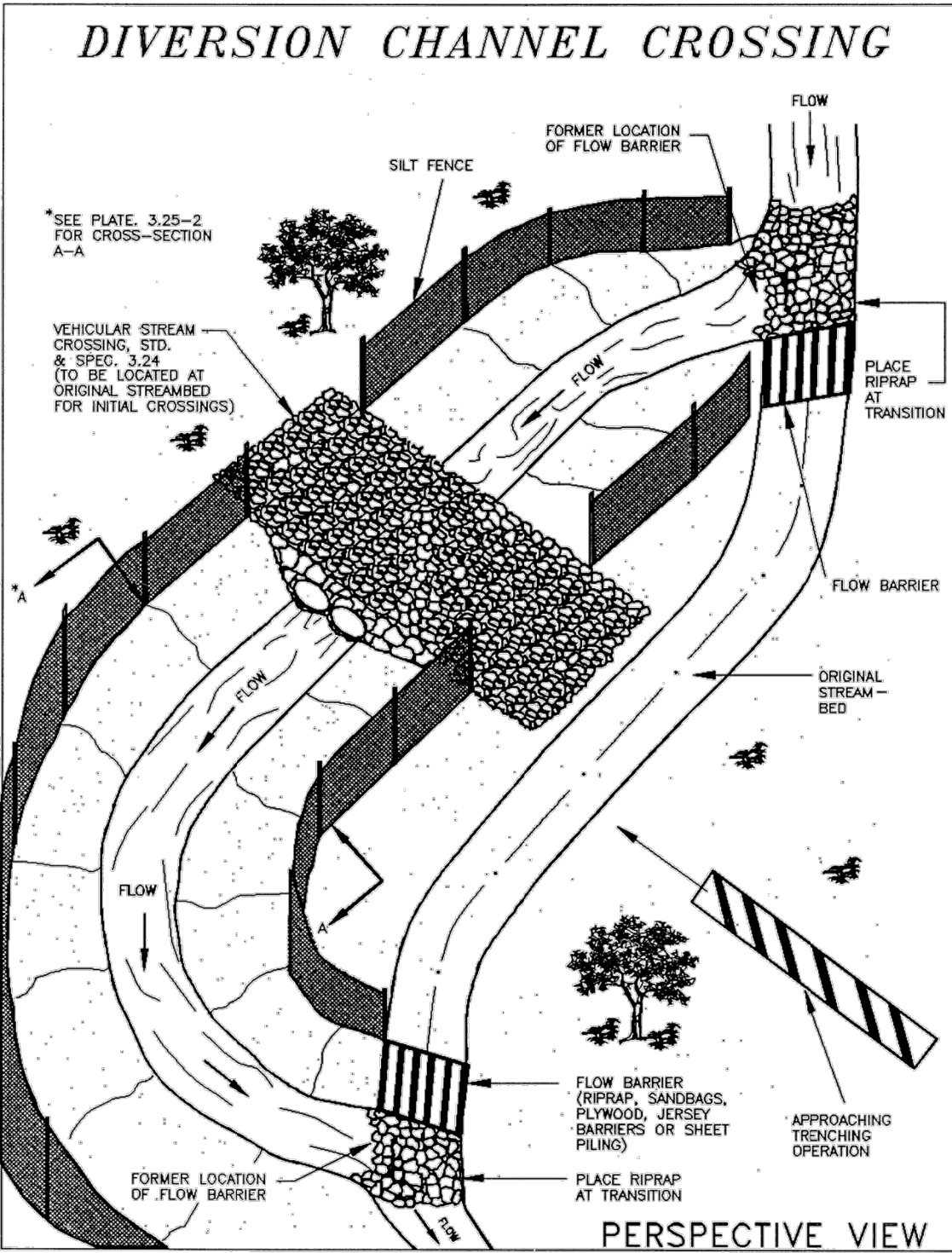
TEMPORARY CULVERT CROSSING
TAKEN FROM VADEQ 1992 MANUAL



Source: Adapted from VDOT Standard Sheets

Plate 3.25-2

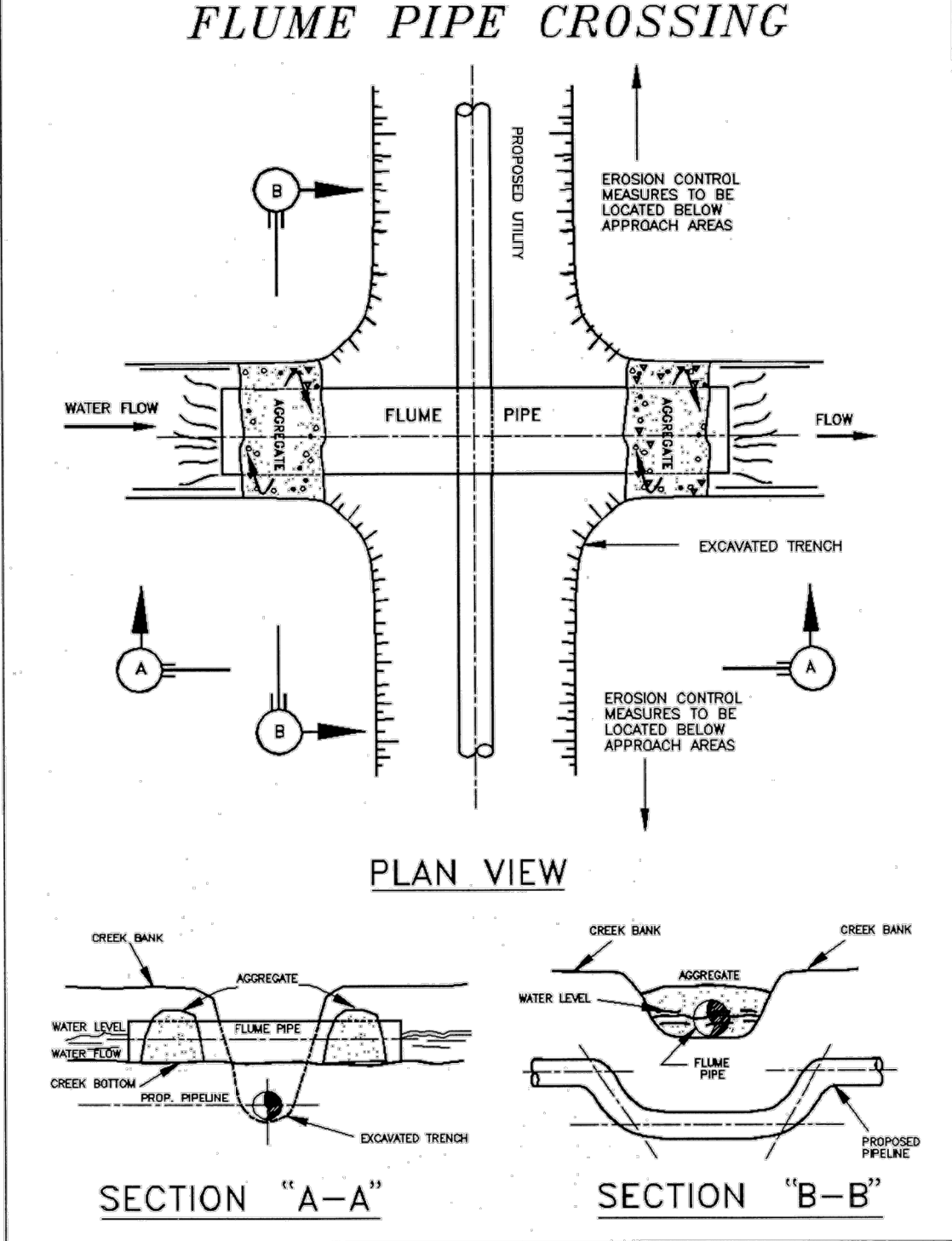
DIVERSION CHANNEL CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL



Source: Va. DSWC

Plate 3.25-1

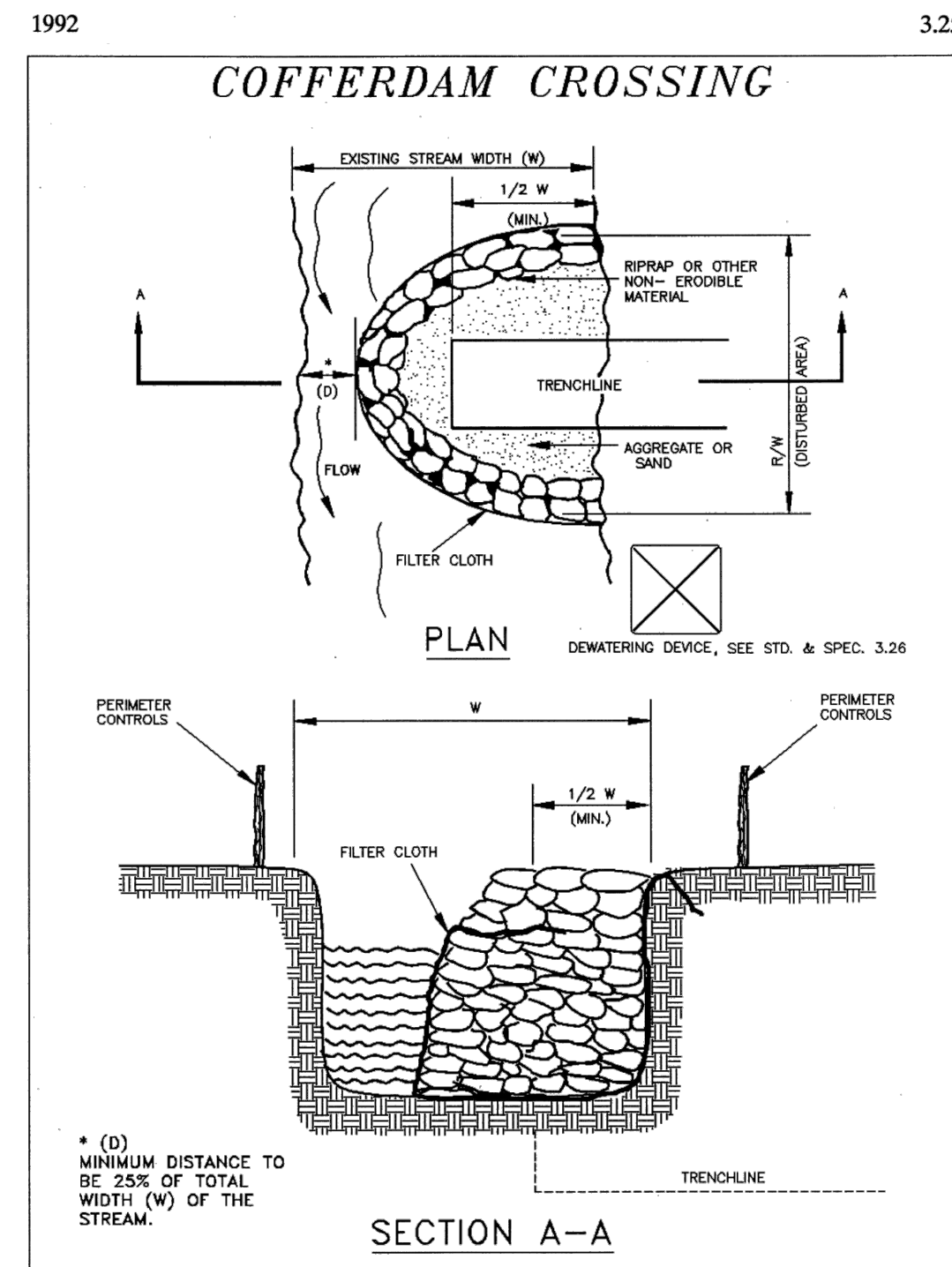
DIVERSION CHANNEL CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL



Source: Va. DSWC

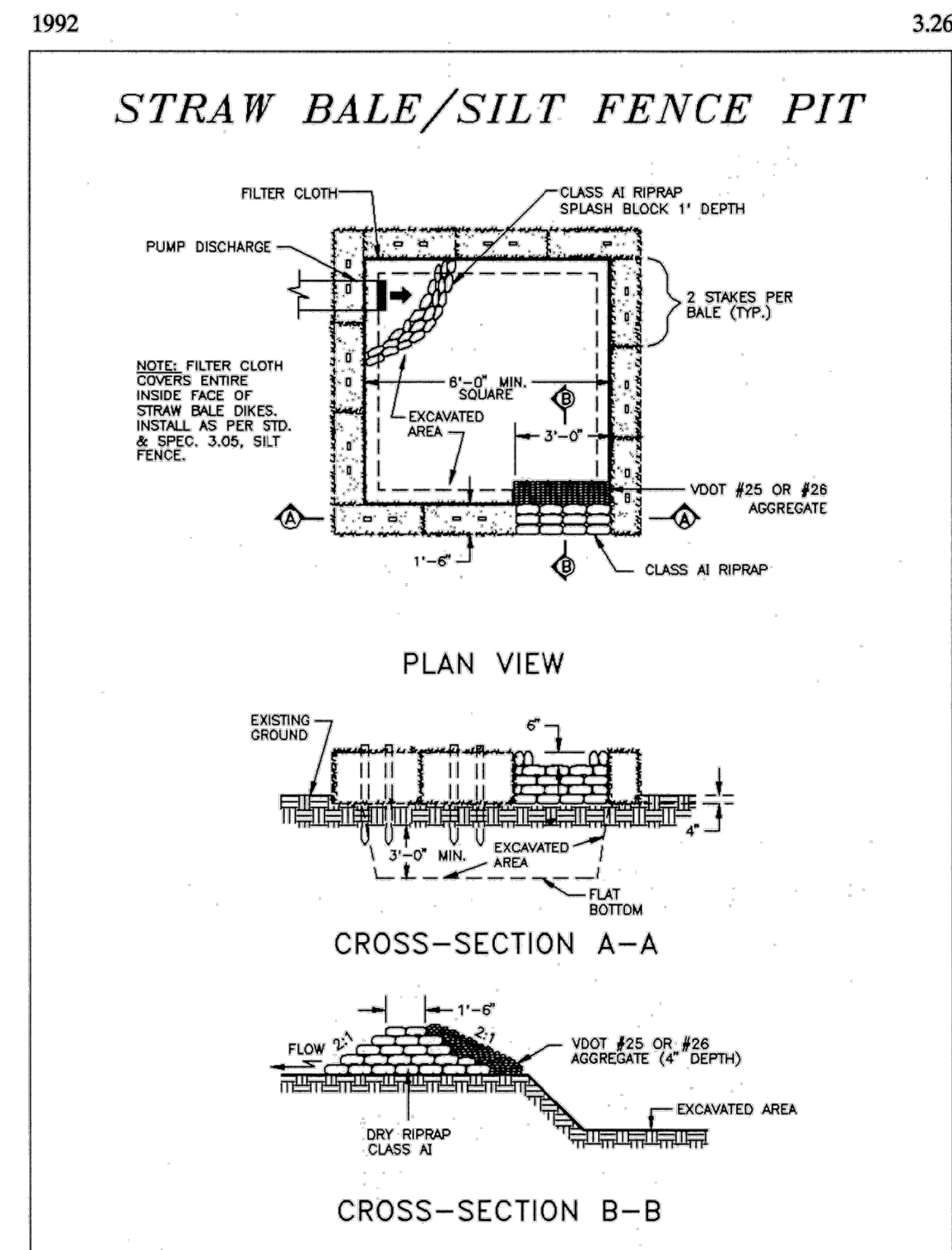
Plate 3.25-3

FLUME PIPE CROSSING
DEVELOPED FROM VADEQ 1992 MANUAL



Source: Va. DSWC Plate 3.25-4

COFFERDAM STREAM CROSSING
TAKEN FROM VADEQ 1992 MANUAL

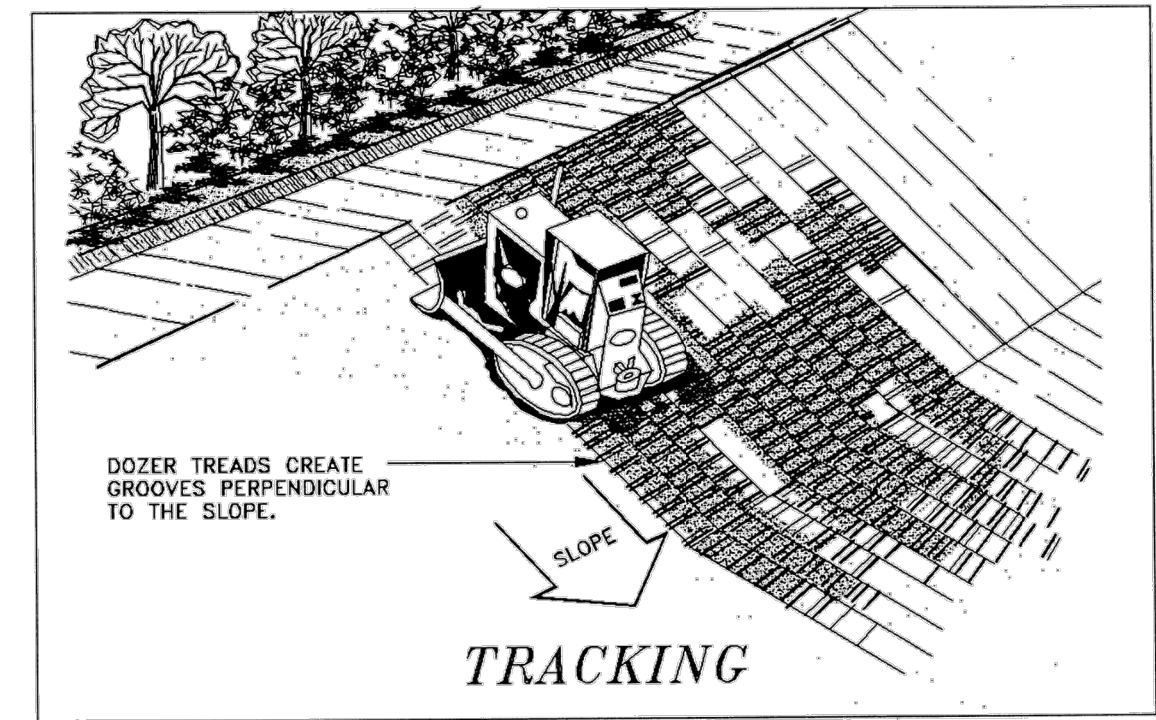


Source: Va. DSWC Plate 3.26-3

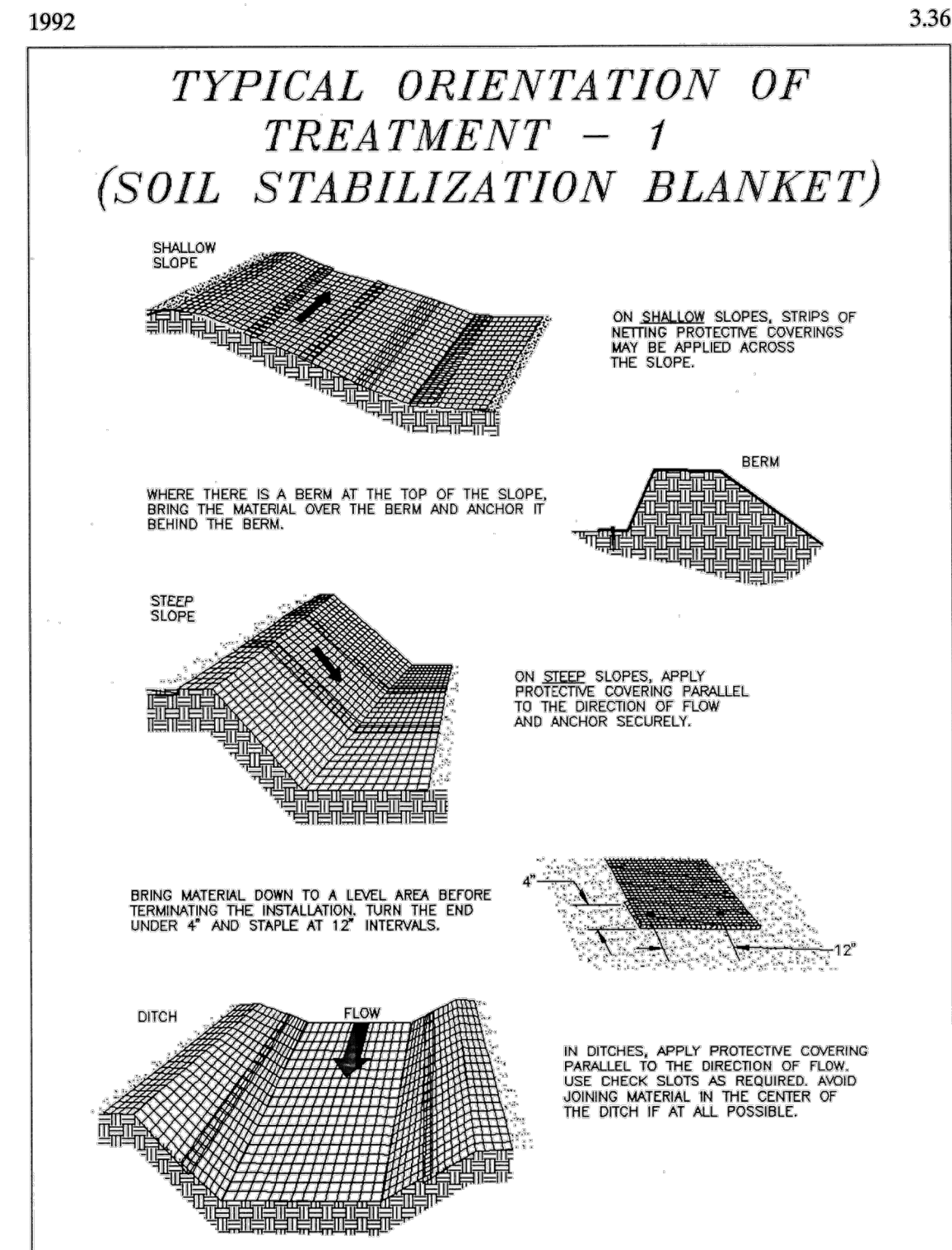
STRAW BALE/SILT FENCE PIT
DEVELOPED FROM VADEQ 1992 MANUAL



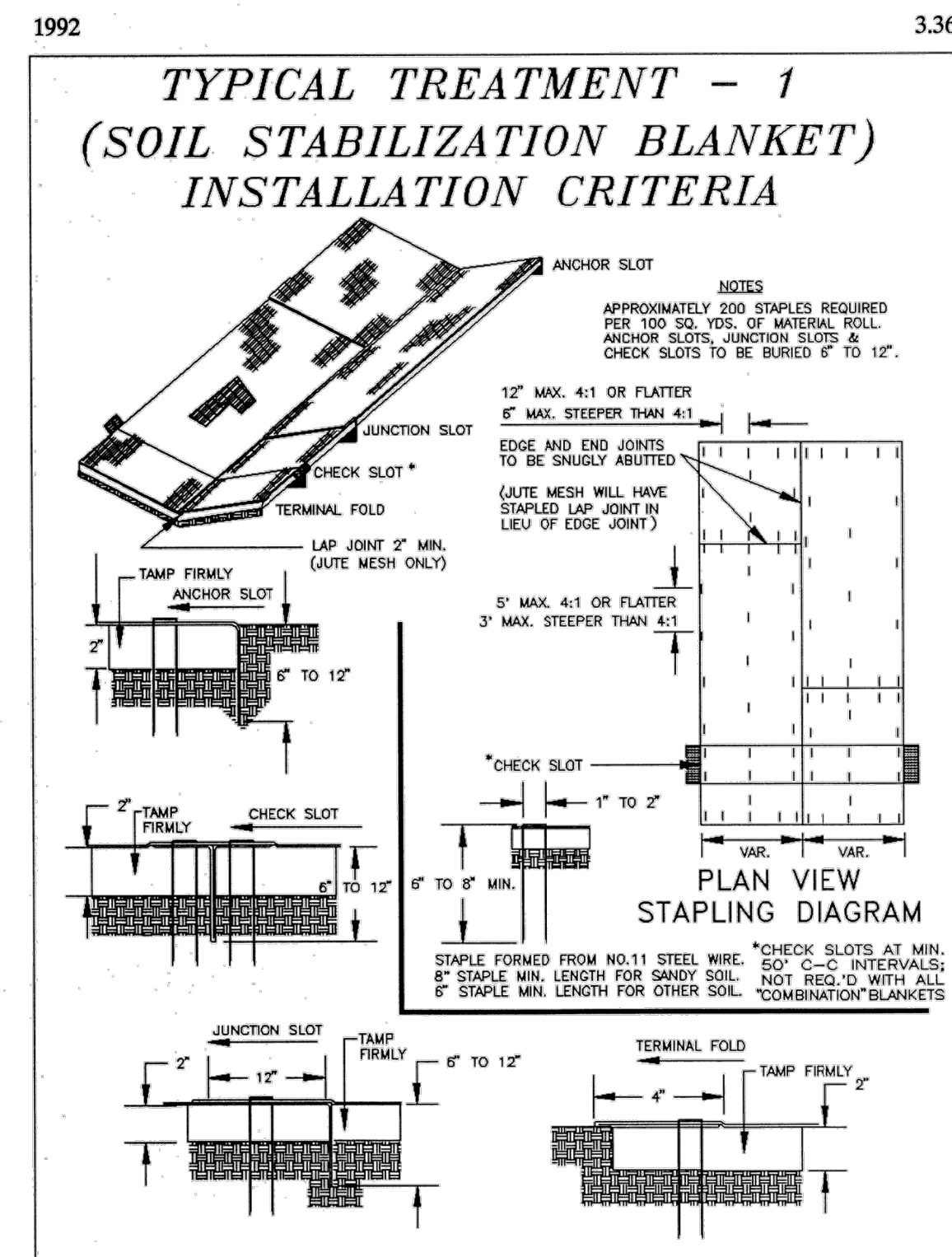
Source: Va. DSWC



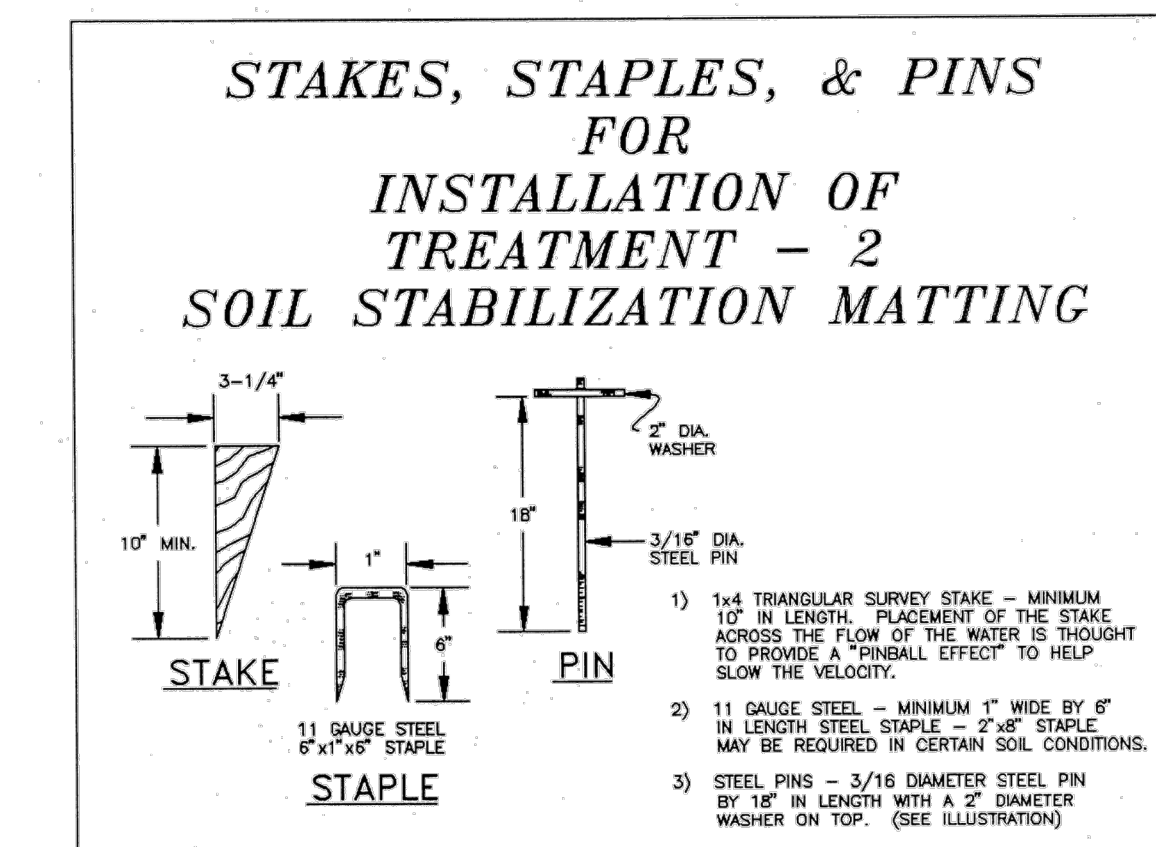
Source: Michigan Soil Erosion and Sedimentation Guide Plate 3.29-4



Source: Adapted from Ludlow Products Brochure



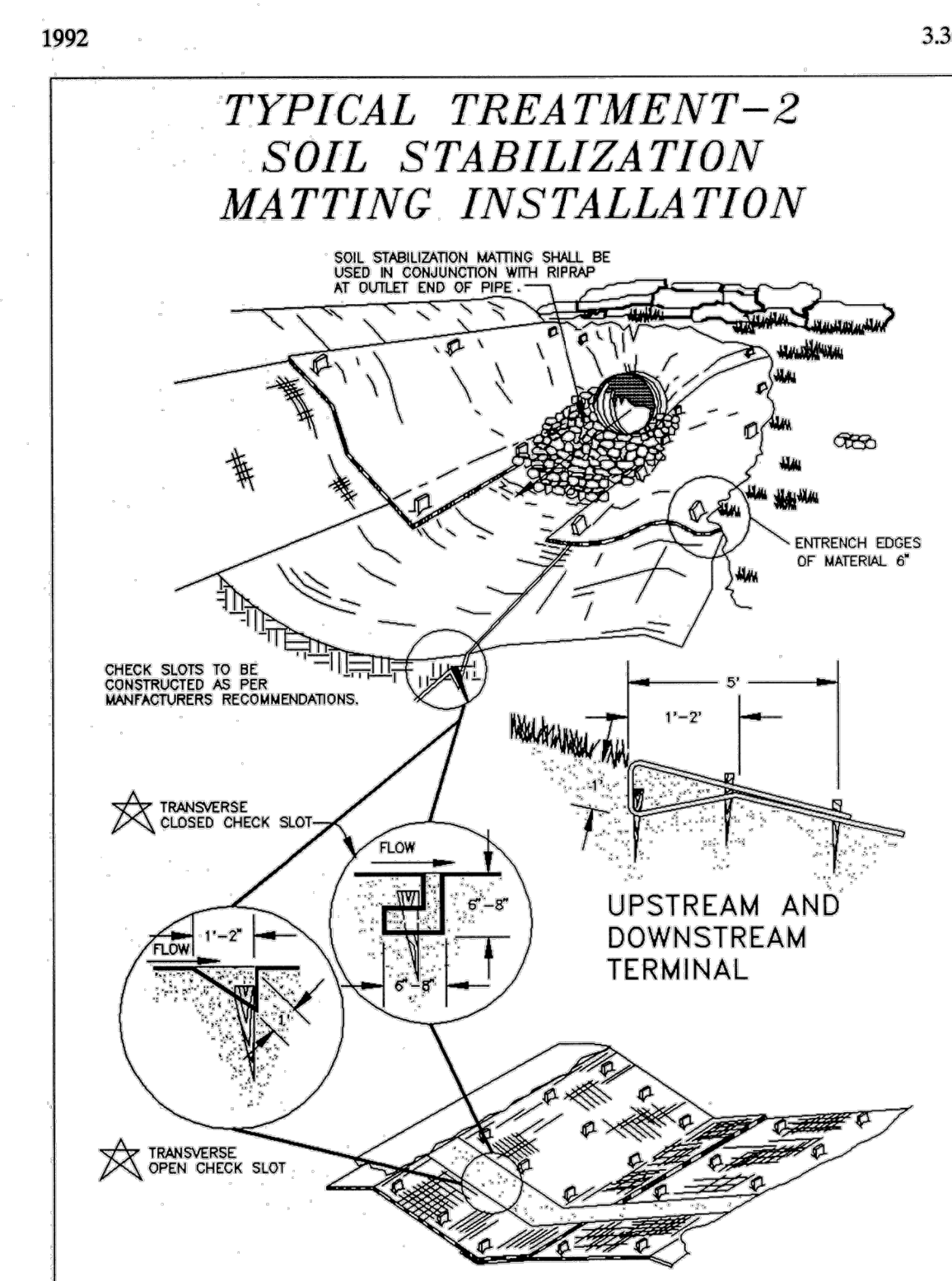
Source: VDOT Road and Bridge Standards Plate 3.36-2



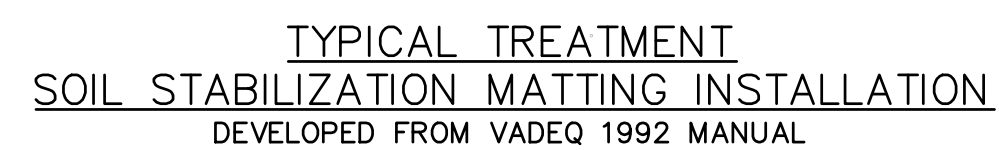
Source: Product literature from Greenstreak, Inc. Plate 3.36-3

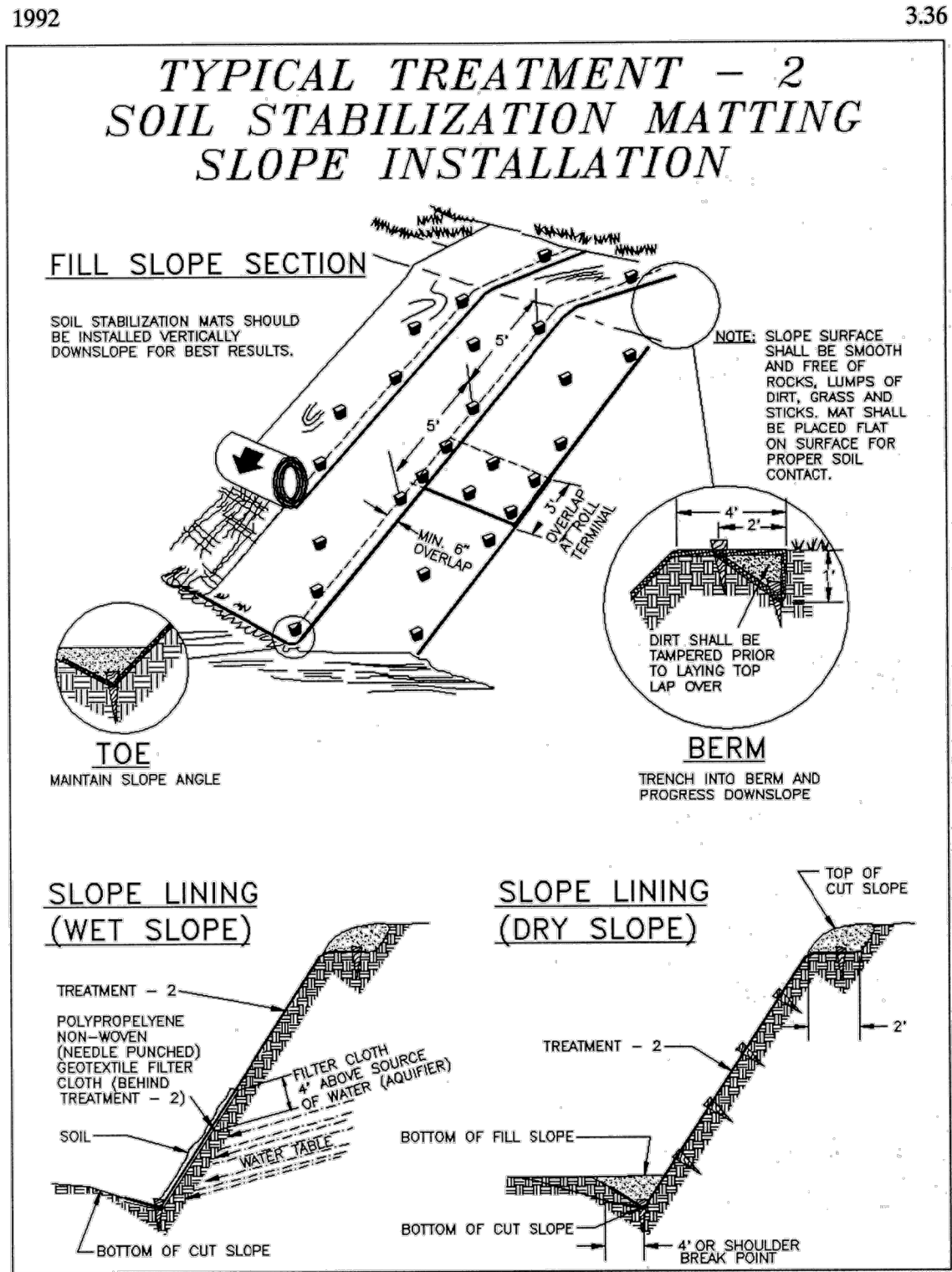
Installation Requirements

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.



Source: VDOT Road and Bridge Standards Plate 3.36-4





Source: VDOT Road and Bridge Standards

Plate 3.36-5

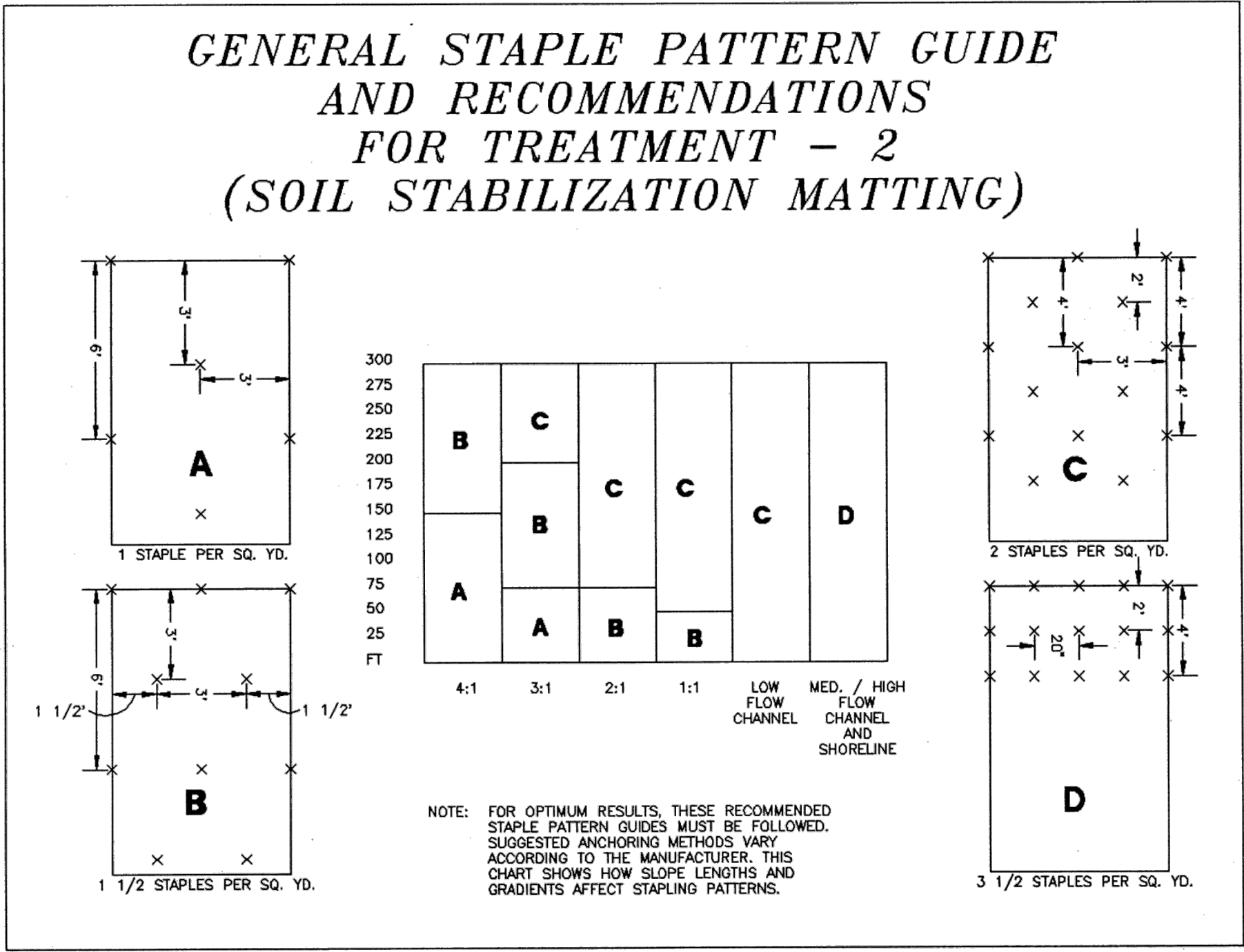
SOIL STABILIZATION MATTING SLOPE

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)

III - 368


Source: Product literature from North American Green

Plate 3.36-6




GENERAL STAPLE PATTERN GUIDE
& RECOMMENDATIONS FOR TREATMENT - 2
DEVELOPED FROM VADEQ 1992 MANUAL

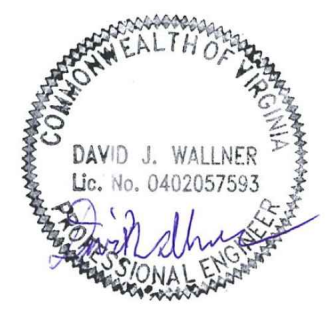
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ADDRESS VADEQ COMMENTS		DW	RE	KAL	11/28/17	4
ADDRESS VADEQ COMMENTS		DW	RE	KAL	11/01/17	3
ADDRESS VADEQ COMMENTS		DW	RE	KAL	08/18/17	2
DESCRIPTION		CHGD.	APPD.	DWN.	DATE	NO.
REVISIONS:						

**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

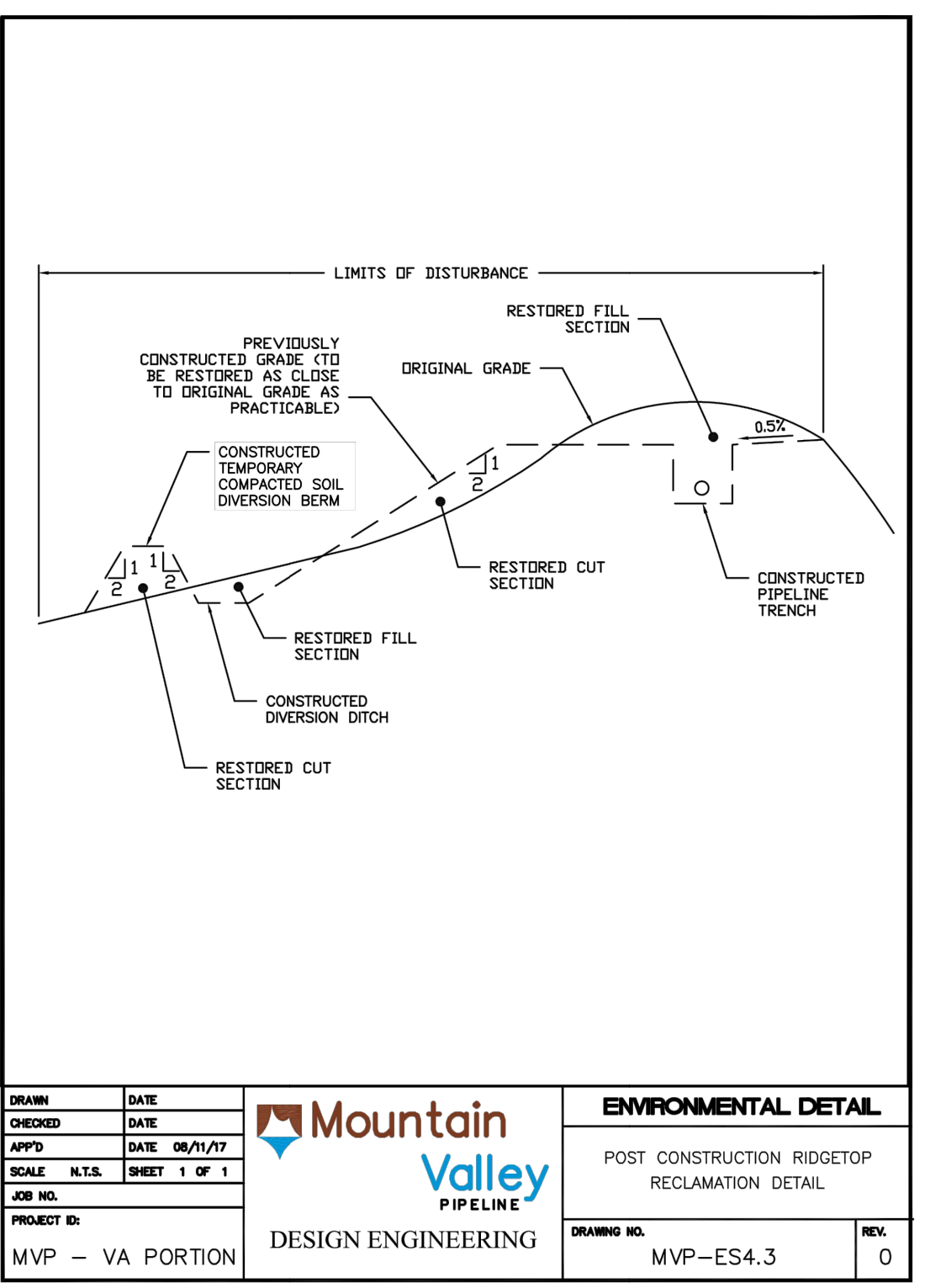
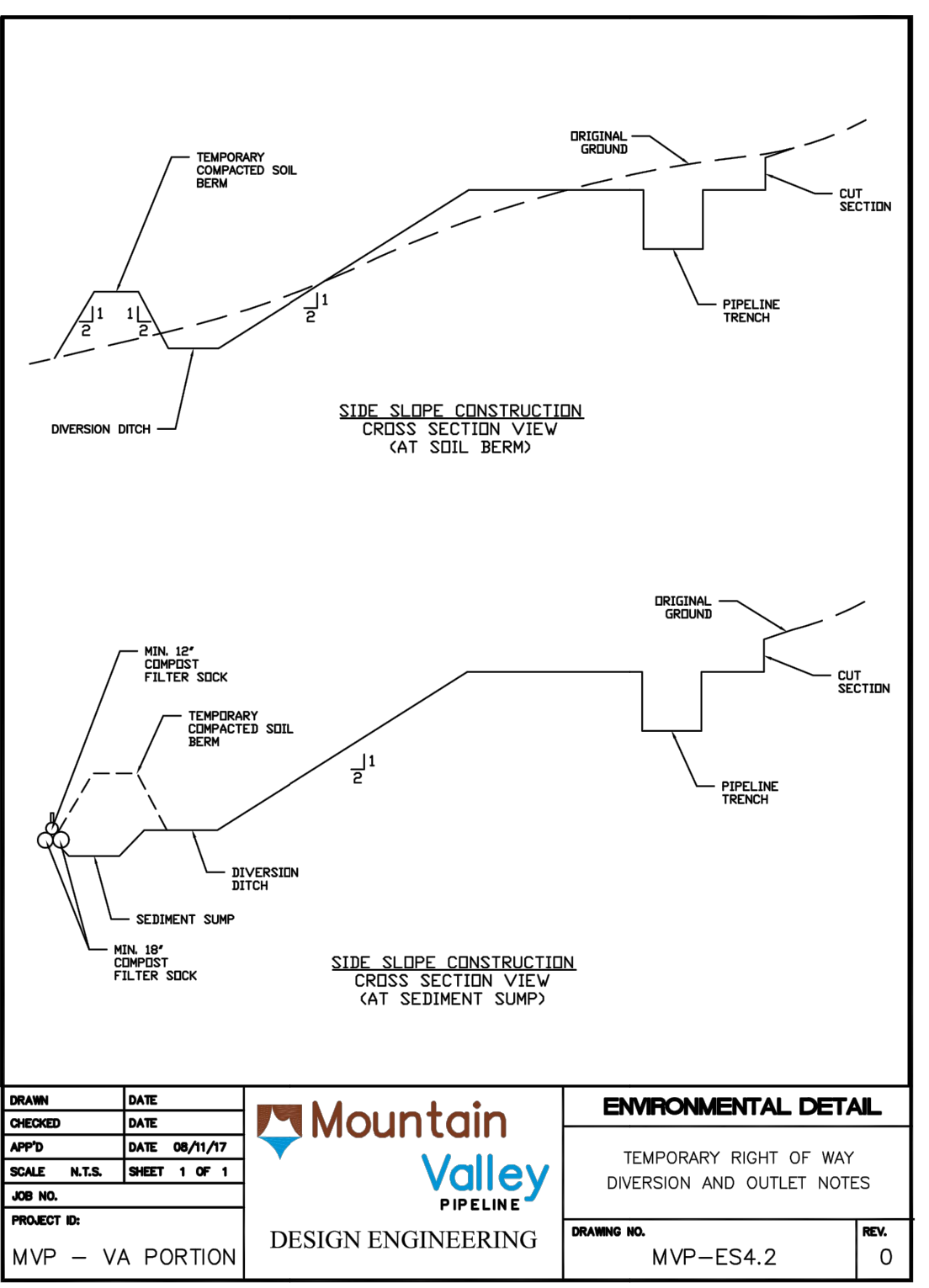
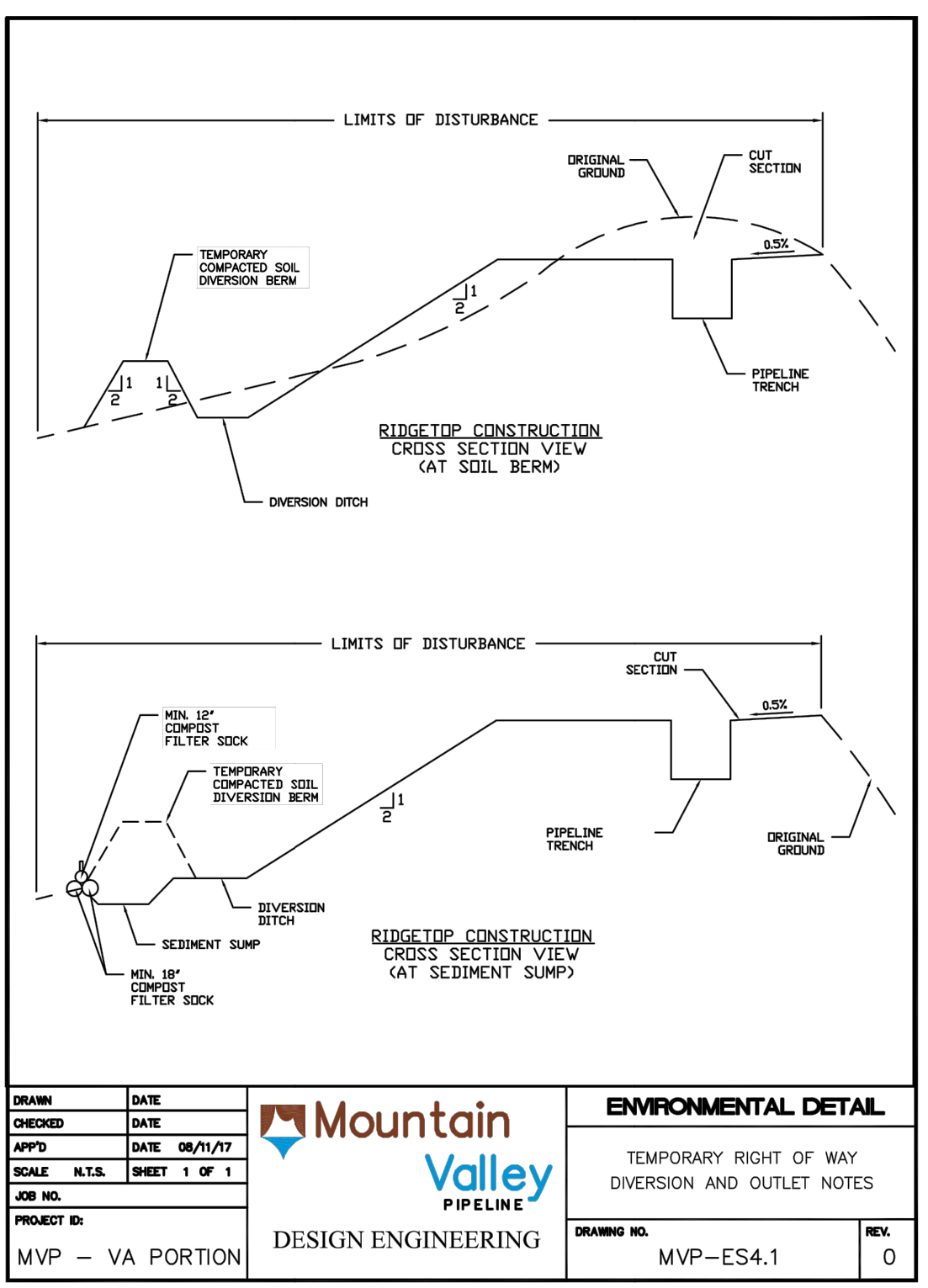
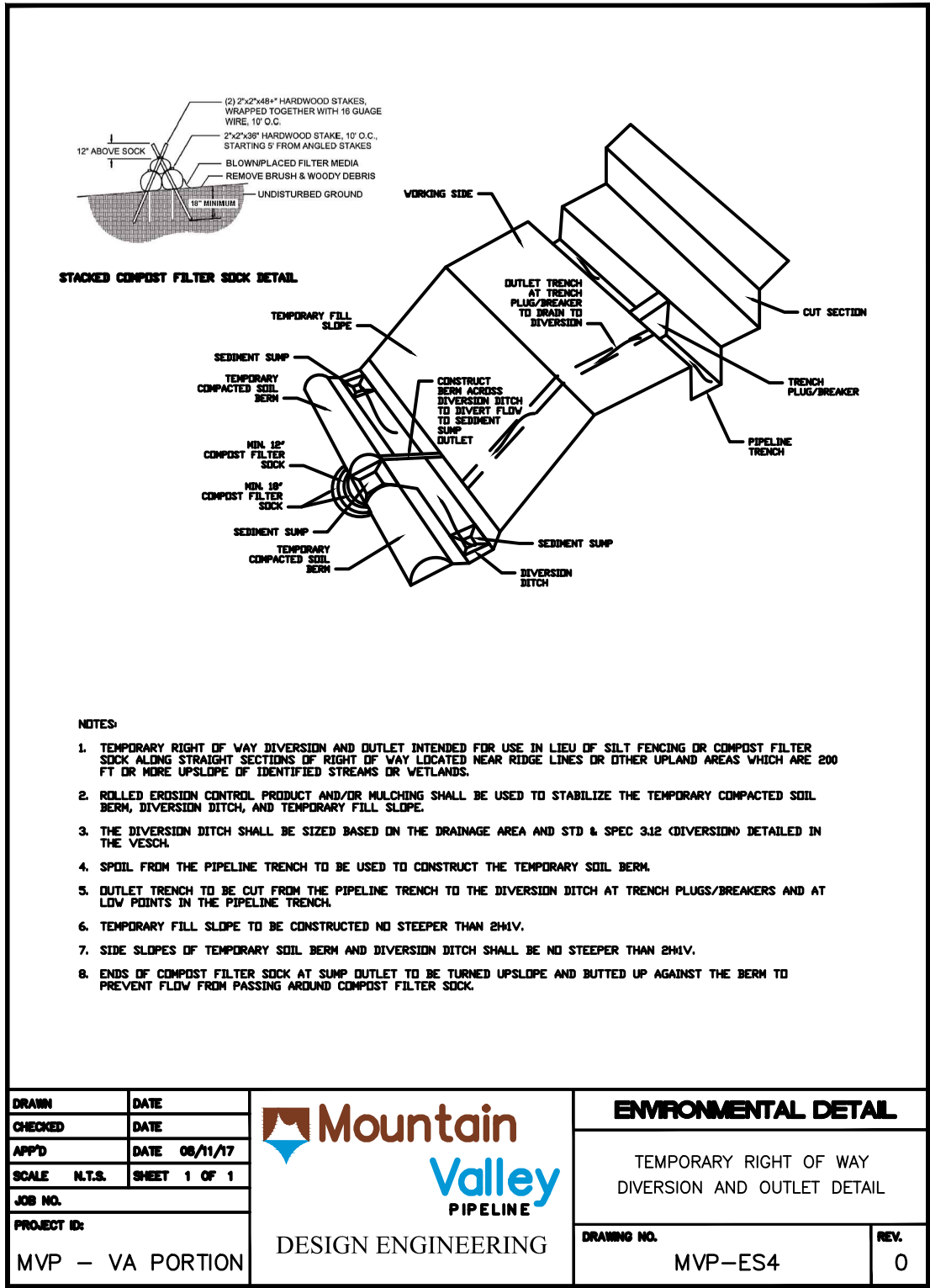
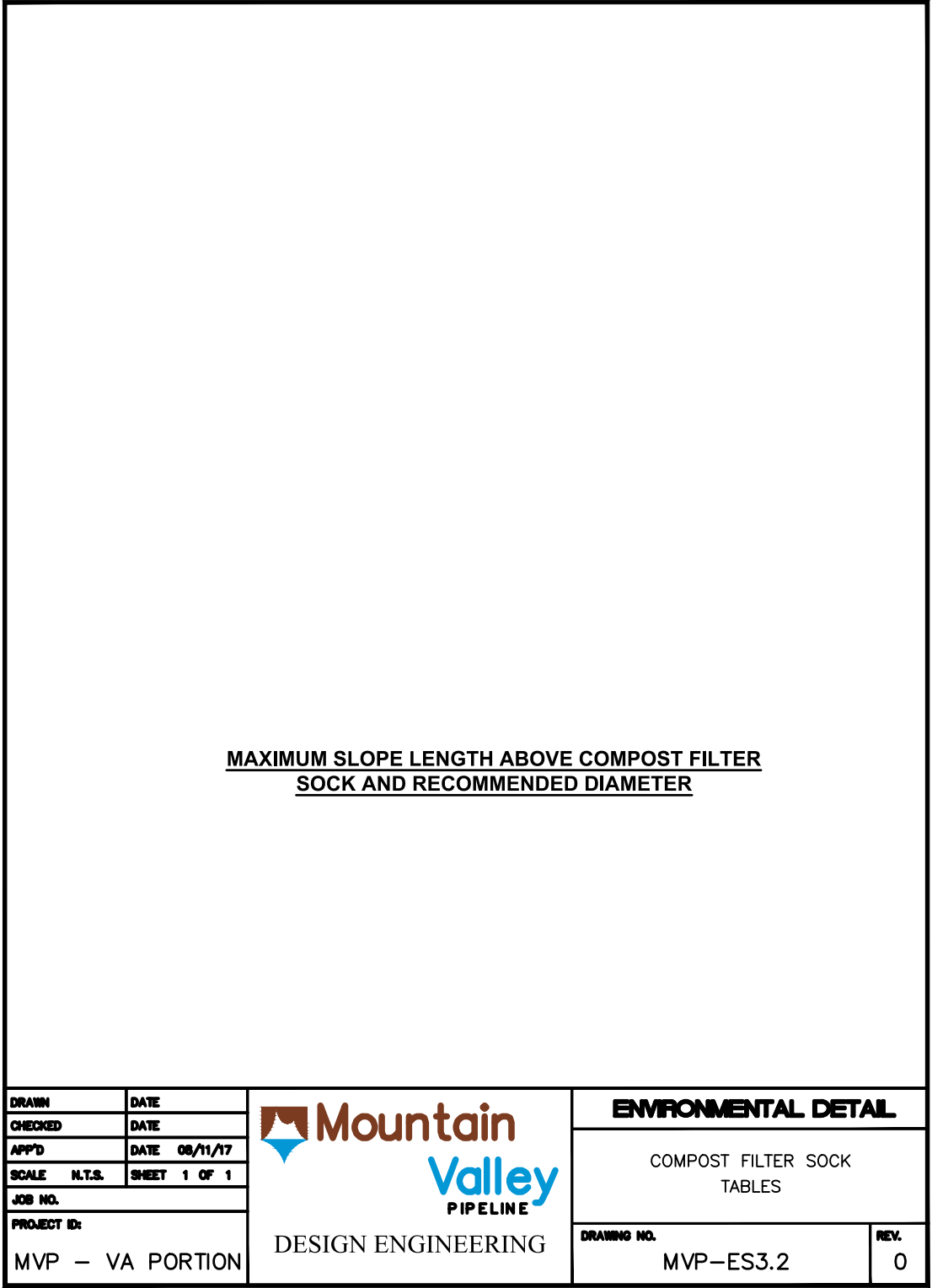
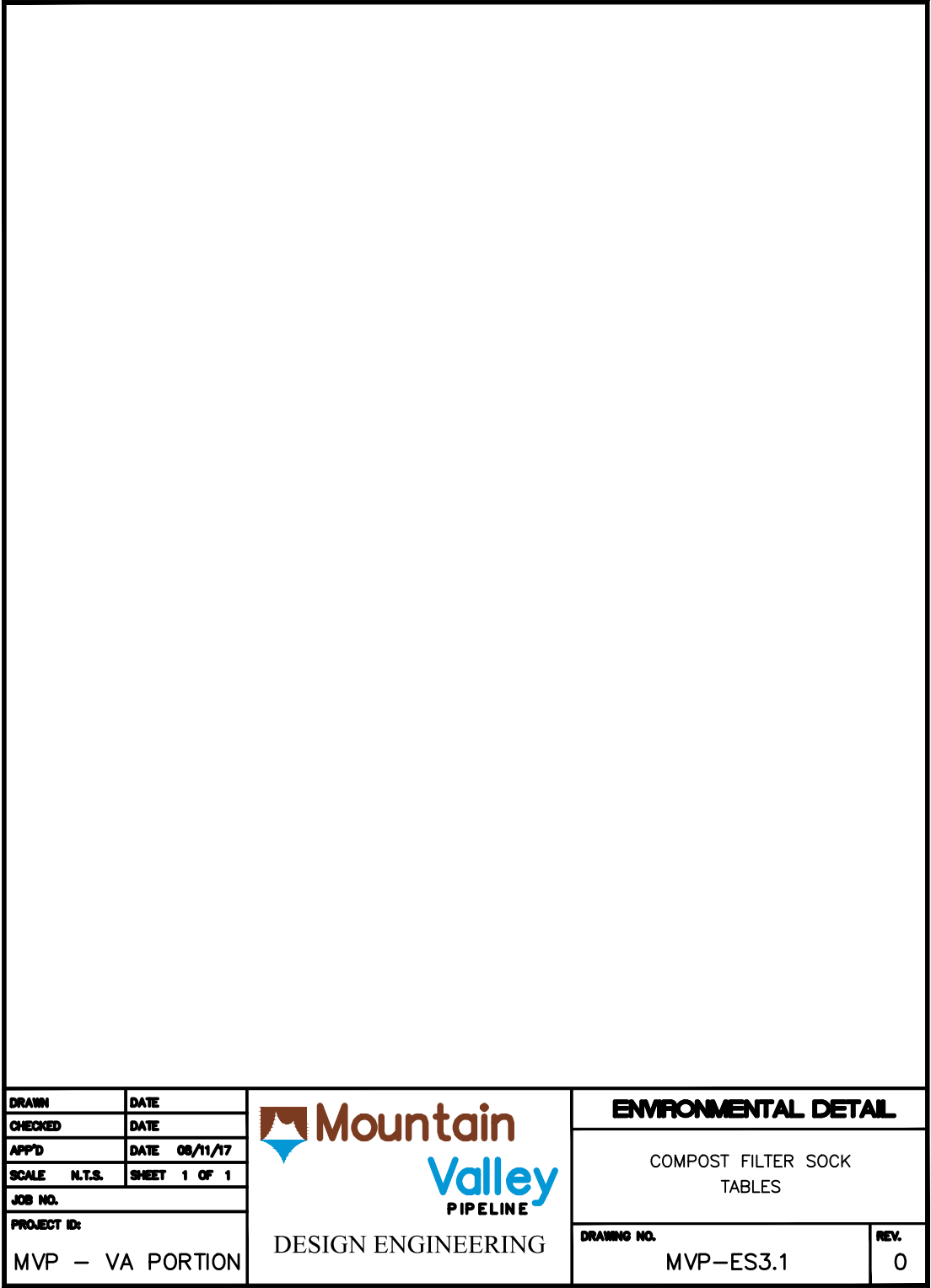
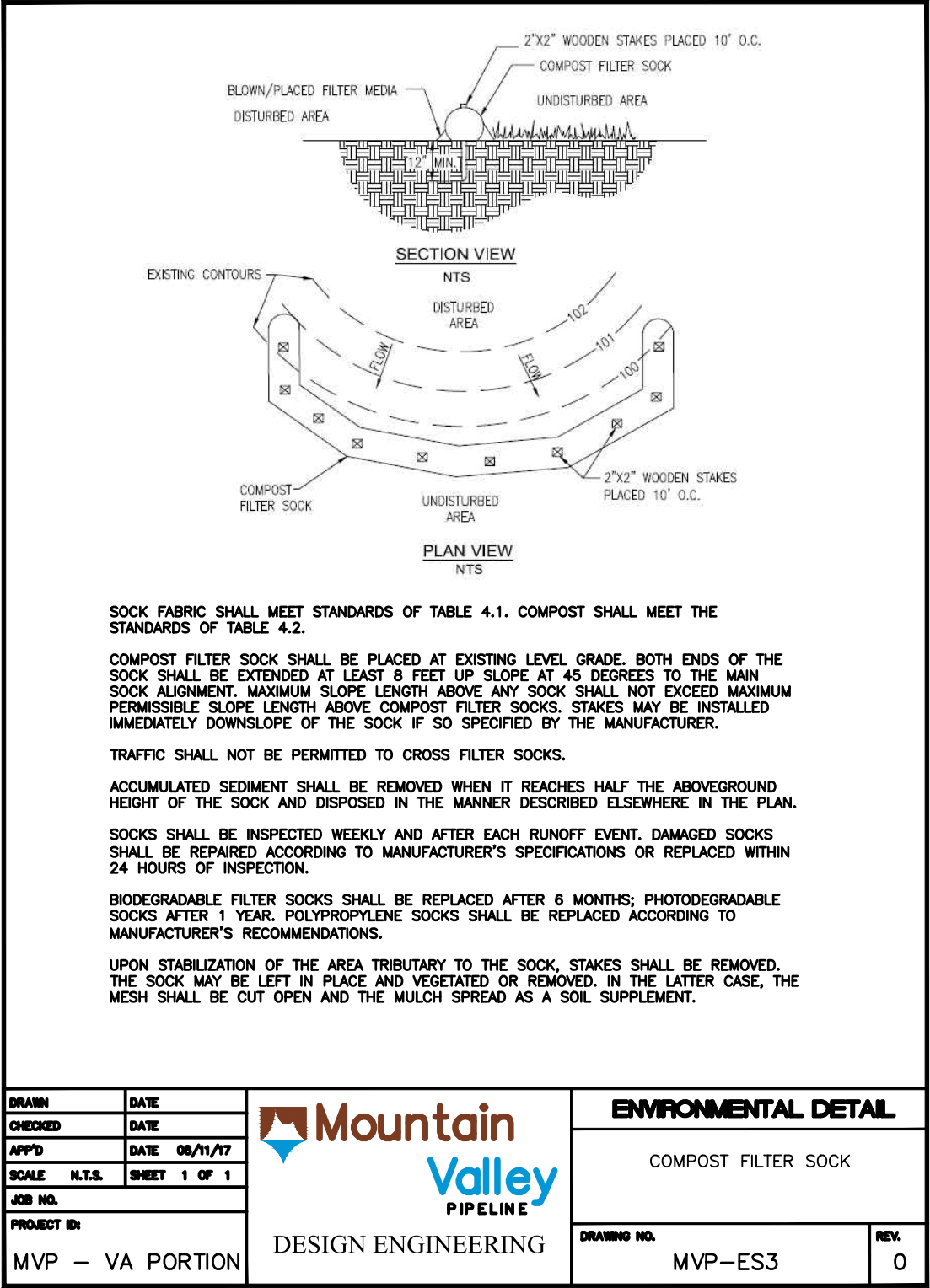
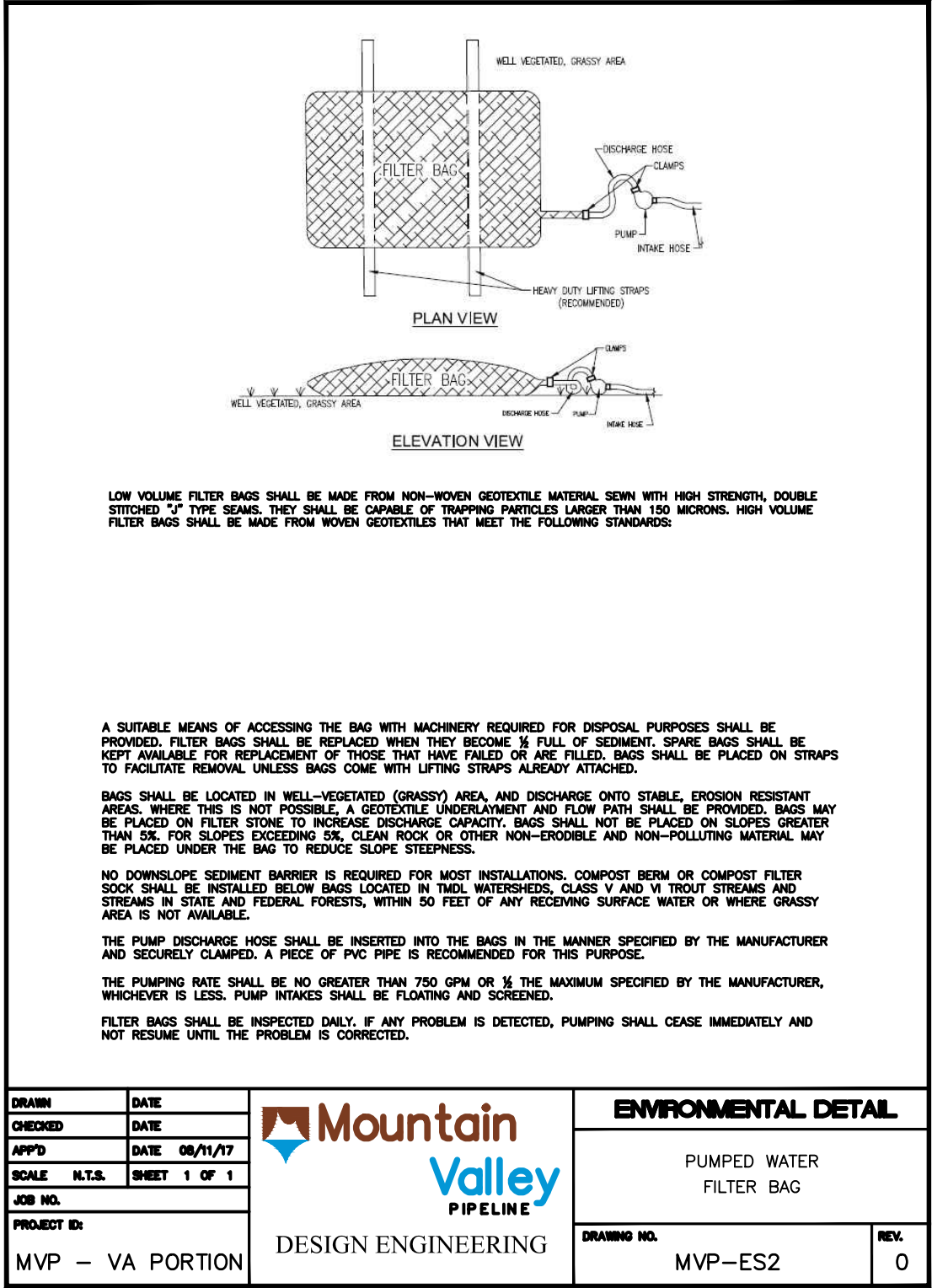
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FOSTER PLAZA 7
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GENERAL DETAILS SET

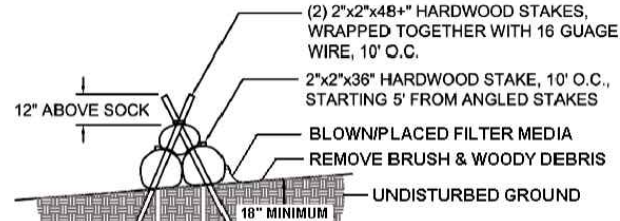


DAVID J. WALLNER
Lic. No. 0402057593
PROFESSIONAL ENGINEER


DRAWN BY:		KAL
CHECKED BY:		HT
APPROVED BY:		RE
DATE:	11/28/2017	
SCALE:	AS SHOWN	
SHT. NO.	0.04	OF 0.23



ADDED DETAILS FOR ROADS AND PADS	DW	RE	KAL	01/31/18	7
ADDRESS VADEQ COMMENTS	DW	RE	KAL	01/26/18	6
ADDRESS VADEQ COMMENTS	DW	RE	KAL	01/08/18	5
ADDRESS VADEQ COMMENTS	DW	RE	KAL	11/28/17	4
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DESCRIPTION:	CHD:	APPD:	DWN:	DATE:	NO:
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					
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661 ANDERSEN DRIVE					
FOSTER PLAZA 7					
PITTSBURGH, PA 15220					
GENERAL DETAILS SET					
COMMONWEALTH OF PENNSYLVANIA					
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.					0.05 OF 0.23



NOTES:
THE TYPE OF REINFORCED FILTRATION DEVICE PRIORITY 1 OR PRIORITY 2 WILL BE SELECTED BASED ON FIELD
CONDITIONS, PAPER CONSTRUCTION.

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		STACKED COMPOST FILTER SOCK DETAIL CROSS SECTION VIEW	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		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
Cercis canadensis	Eastern Redbud	0.3
Cornus florida	Flowering Dogwood	0.3
Diostyros virginiana	Periwinkle	0.3
Ilex opaca	American Holly	0.3
Nyssa sylvatica	Black Gum	0.3
Sassafras albidum	Sassafras	0.3
Hamamelis virginiana	Wild 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 Root 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	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		FOREST REGENERATION WOODY SEED MIX AND APPLICATION RATES	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		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
Schizanthus scoparium	Little Bluestem	11.68	6.0 - 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	0.80	5.5 - 7.5	July to September
Sensitiva Partridge Pea	Sensitive Partridge Pea	0.06		June to October
Coneopsis lanceolata	Lanceleaf Coneopsis	0.44	6.0 - 7.0	April to July
Eupatorium coelestinum	Mistflower	0.04	5.5 - 7.5	July to October
Helopsis helianthoides	Oxeye Sunflower	0.40		July to August
Lespedeza virginica	Slender Bushclover	0.10		July to September
Liatris graminifolia	Grassleaf Liatris	0.10	5.8 - 6.8	August to October
Monarda fistulosa	Wild Bergamot	0.10	6.0 - 8.0	June to September
Penstemon laevis	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	Black-eyed Susan	0.04		July to October

Species	Common Name	Seeding Rate (lbs/acre)	pH	Bloom Period (if applicable)
Senna hebecarpa	Wild Senna	0.00	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 ohioensis	Ohio Spiderwort	0.04	6.5 - 7.5	August to September
Tradescantia virginiana	Virginia Spiderwort	0.10		late April to mid-July

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

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		UPLAND MEADOW SEED MIX AND APPLICATION RATES	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		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	Deergrass	4.50	4.0 - 7.5	May to September
Schizanthus scoparium	Little Bluestem	11.26	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
Coneopsis lanceolata	Lanceleaf Coneopsis	0.45	6.0 - 7.0	April to July
Eupatorium coelestinum	Mistflower	0.05	5.5 - 7.5	July to October
Helopsis helianthoides	Oxeye Sunflower	0.45		July to August
Liatris graminifolia	Grassleaf Liatris	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	Black-eyed 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 ohioensis	Ohio Spiderwort	0.05		late April to mid-July


DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		UPLAND STEEP SLOPE SEED MIX AND APPLICATION RATES	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		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 gymandra	Fringed Sedge	0.10	5.0 - 7.0	Midsummer
Carex lupulina	Hop Sedge	1.00	6.2 - 7.0	May to June
Carex lurida	Shallow Sedge	3.00	6.2 - 7.0	June to October
Carex scoparia	Burnt Brown 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
Oxycodon sessilis	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
Helopsis 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

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 SEED MIX
PRESENT IN THE TOPSOIL NOT REESTABLISH THE WETLAND, MVP WILL APPLY THIS SEED MIX TO SUPPLEMENT AND
PERMANENTLY STABILIZE THE WETLAND.

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		WETLAND SEED MIX AND APPLICATION RATES	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		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 gerardi	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	4.8 - 6.9	June to August
Panicum clandestinum	Deergrass	4.50	6.8 - 8.9	June to July
Sorghastrum nutans	Indiangrass	0.40	4.0 - 8.5	August to September
Asclepias incarnata	Swamp Milkweed	0.40	5.0 - 7.4	June to October
Chamaecrista fasciculata	Partridge Pea	0.80	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 Avena	0.40	5.0 - 8.0	June to July
Helenium autumnale	Common Sneezeweed	0.10	5.5 - 7.5	July to October
Helopsis 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	Black-eyed 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

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


Revised 1/24/18

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		RIPARIAN SEED MIX AND APPLICATION RATES	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		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	FACW	X	X
Acer saccharinum	Silver Maple	FACW	X	X
Betula nigra	River Birch	FACW	X	X
Carpinus caroliniana	American Hornbeam	FACW	X	X
Carya glabra	Pignut Hickory	FACU	X	
Carya ovata	Shagbark Hickory	FACU	X	
Chionanthus virginicus	White Fringe Tree	FAC+	X	
Diostyros virginiana	Common Periwinkle	FAC-	X	
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 deltoides	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	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		NATIVE TREE AND SHRUB SPECIES FOR BARE ROOT PLANTINGS WITHIN RIPARIAN AREAS AND FORESTED WETLANDS	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		DRAWING NO. MVP-ES11.6 REV. 0		

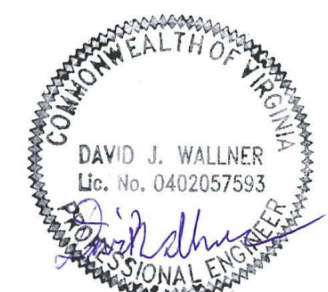
Native Shrubs			
Alnus serrulata	Brook-side Alder	OBL	X
Amelanchier canadensis	Canada Serviceberry	FAC	X
Aspen atrovirens	Red Chokeberry	FACW	X
Baccharis halimifolia	Groundsel Bush	FACW-	X
Cephalanthus occidentalis	Butterbush	OBL	X
Cornus amomum	Silky Dogwood	FACW	X
Cornus stolonifera	Red-osier Dogwood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

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE		NATIVE TREE AND SHRUB SPECIES FOR BARE ROOT PLANTINGS WITHIN RIPARIAN AREAS AND FORESTED WETLANDS	
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		PROJECT ID:		
MVP - VA PORTION		DRAWING NO. MVP-ES11.7 REV. 0		

TETRA TECH

661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET



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


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

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL US FOREST SERVICE (NATIONAL FOREST) LANDS HYDROSEED MIX
CHECKED	DATE		
APP'D	DATE 06/11/17		
SCALE	SHEET 1 OF 1		
JOB NO.			
PROJECT ID:		DRAWING NO.	REV.
MVP – VA PORTION		MVP–ES12.3	0

Name	Ph preference	Wetland Indicator Status
Annual Ryegrass (<i>Lolium Multiflorum</i> (L. perenne var. <i>Italicum</i>))	5.0-7.9	NI/moderate
German/Foxtail Millet (<i>Setaria italica</i>)	5.3-6.9	FACU
Cereal Rye (<i>Secale cereale</i>)	5.2-8.0	NI/damp
Browntop Millet (<i>Panicum ramosum</i>) (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

<table border="1"> <tr> <td>DRAWN</td> <td>DATE</td> </tr> <tr> <td>CHECKED</td> <td>DATE</td> </tr> <tr> <td>APP'D</td> <td>DATE 06/11/17</td> </tr> <tr> <td>SCALE</td> <td>N.T.S.</td> </tr> <tr> <td>SHEET</td> <td>1 OF 1</td> </tr> </table>	DRAWN	DATE	CHECKED	DATE	APP'D	DATE 06/11/17	SCALE	N.T.S.	SHEET	1 OF 1	 <p>DESIGN ENGINEERING</p>	<p>ENVIRONMENTAL DETAIL</p> <p>US FOREST SERVICE (NATIONAL FOREST) LANDS TEMPORARY EROSION CONTROL SPECIES</p>
DRAWN	DATE											
CHECKED	DATE											
APP'D	DATE 06/11/17											
SCALE	N.T.S.											
SHEET	1 OF 1											
<p>PROJECT ID:</p> <p>MVP - VA PORTION</p>		<p>DRAWING NO.</p> <p>MVP-ES12.4</p>										
		<p>REV.</p> <p>0</p>										

MVP-ES13 Cofferdam Stream Crossing Method

STREAM

TEMPORARY COFFERDAM*

BRIDGE ABUTMENT, STREAMBANK REHAB, ETC.

PA DEP

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

DRAWN	DATE	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL
CHECKED	DATE		
APP'D	DATE 06/11/17		
SCALE	N.T.S. SHEET 1 OF 1		
JOB NO.			
PROJECT ID			
MVP - VA PORTION			
		Mountain Valley PIPELINE	COFFERDAM STREAM CROSSING METHOD DRAWING NO. MVP-ES13.1
			REV. P

FIGURE 3.13
Jersey Barrier Cofferdam – End View

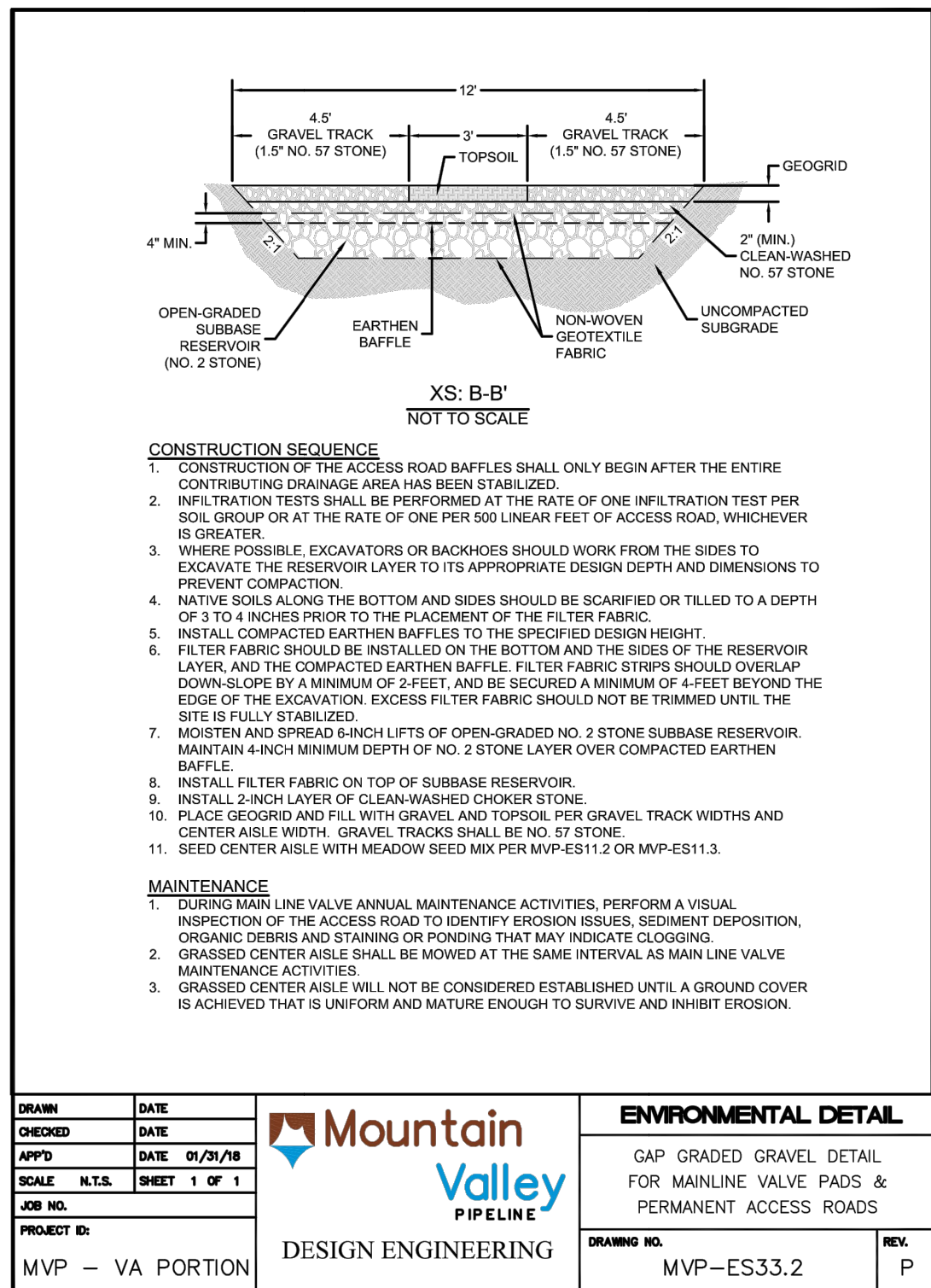
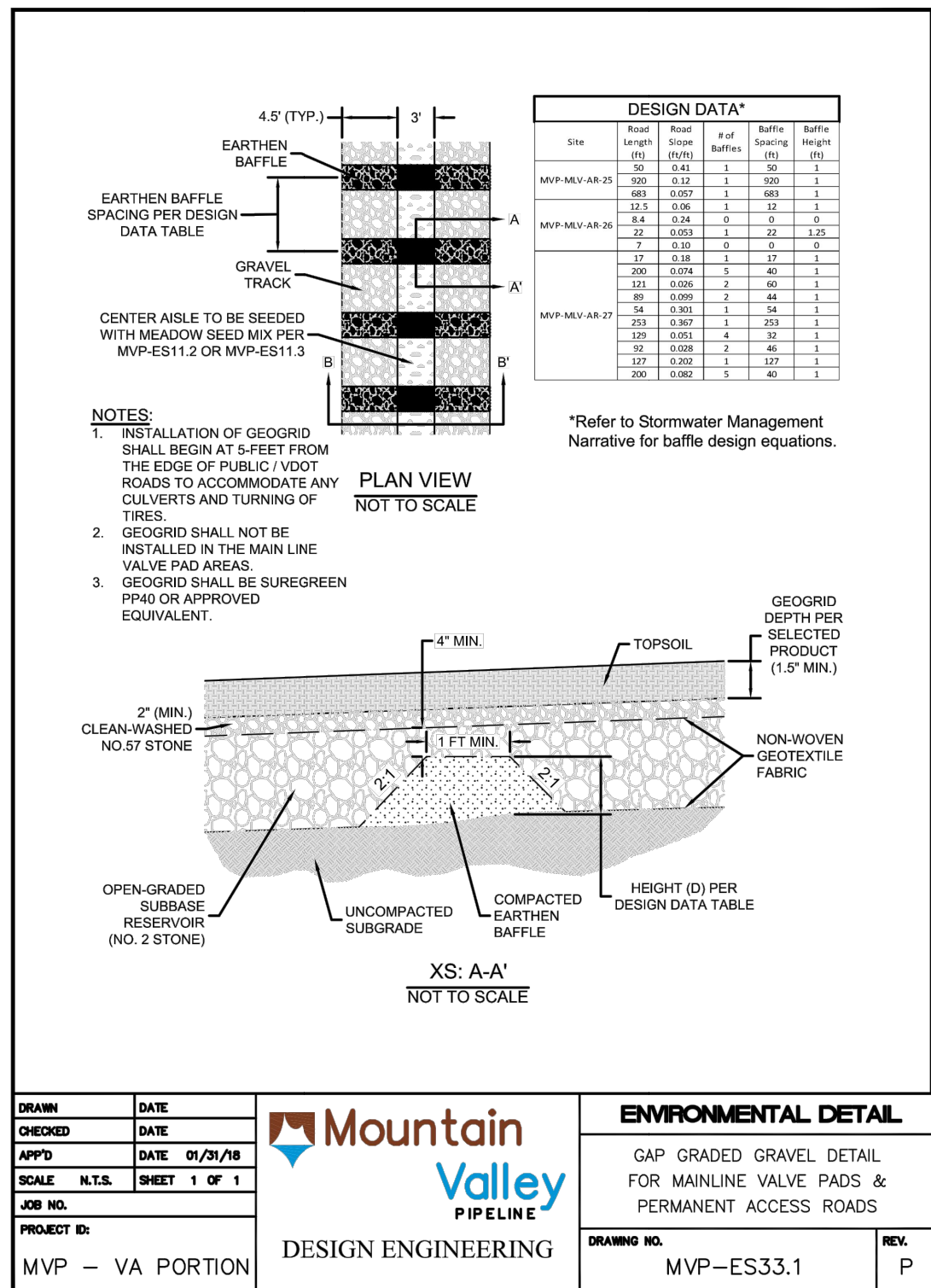
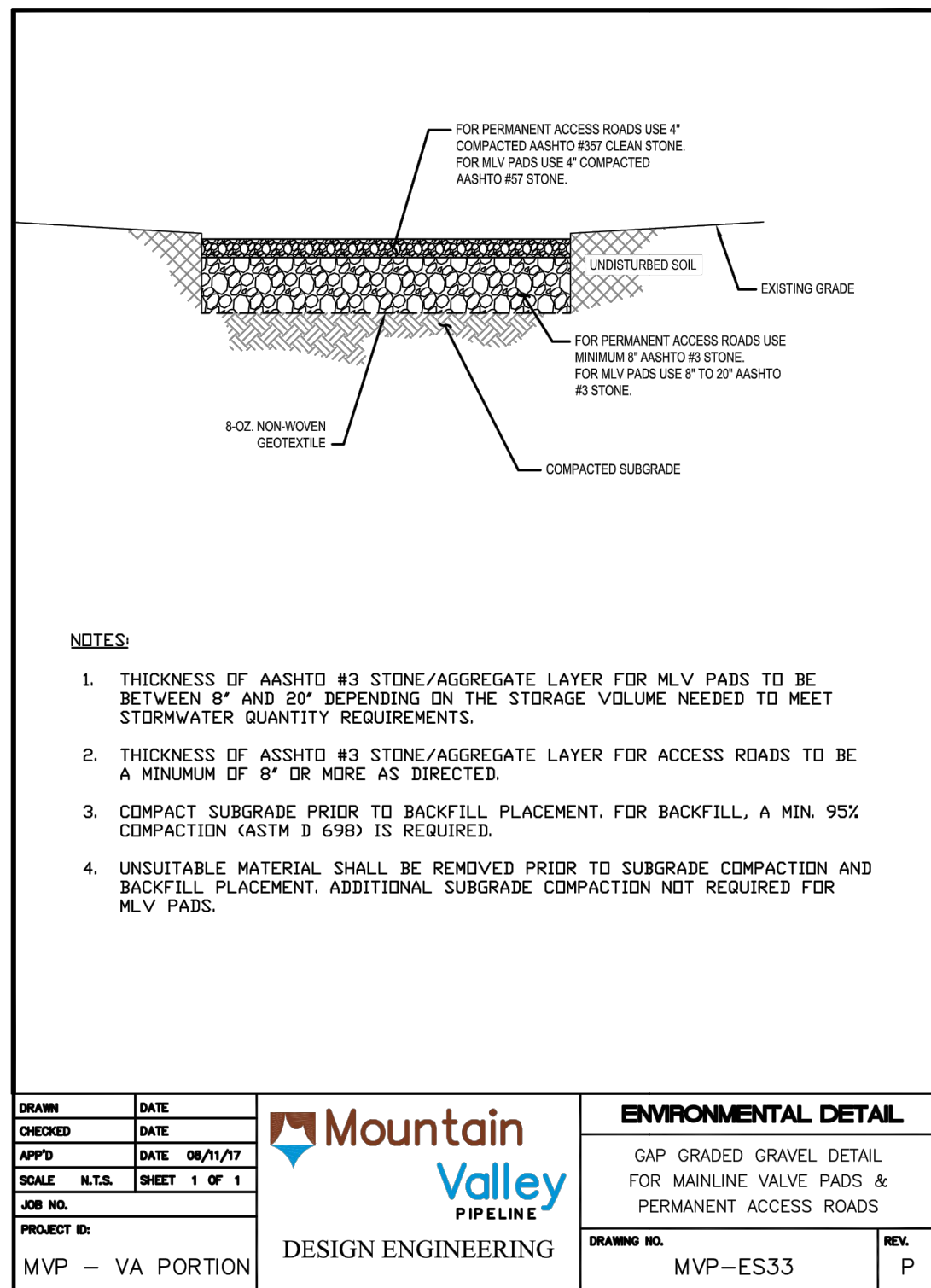
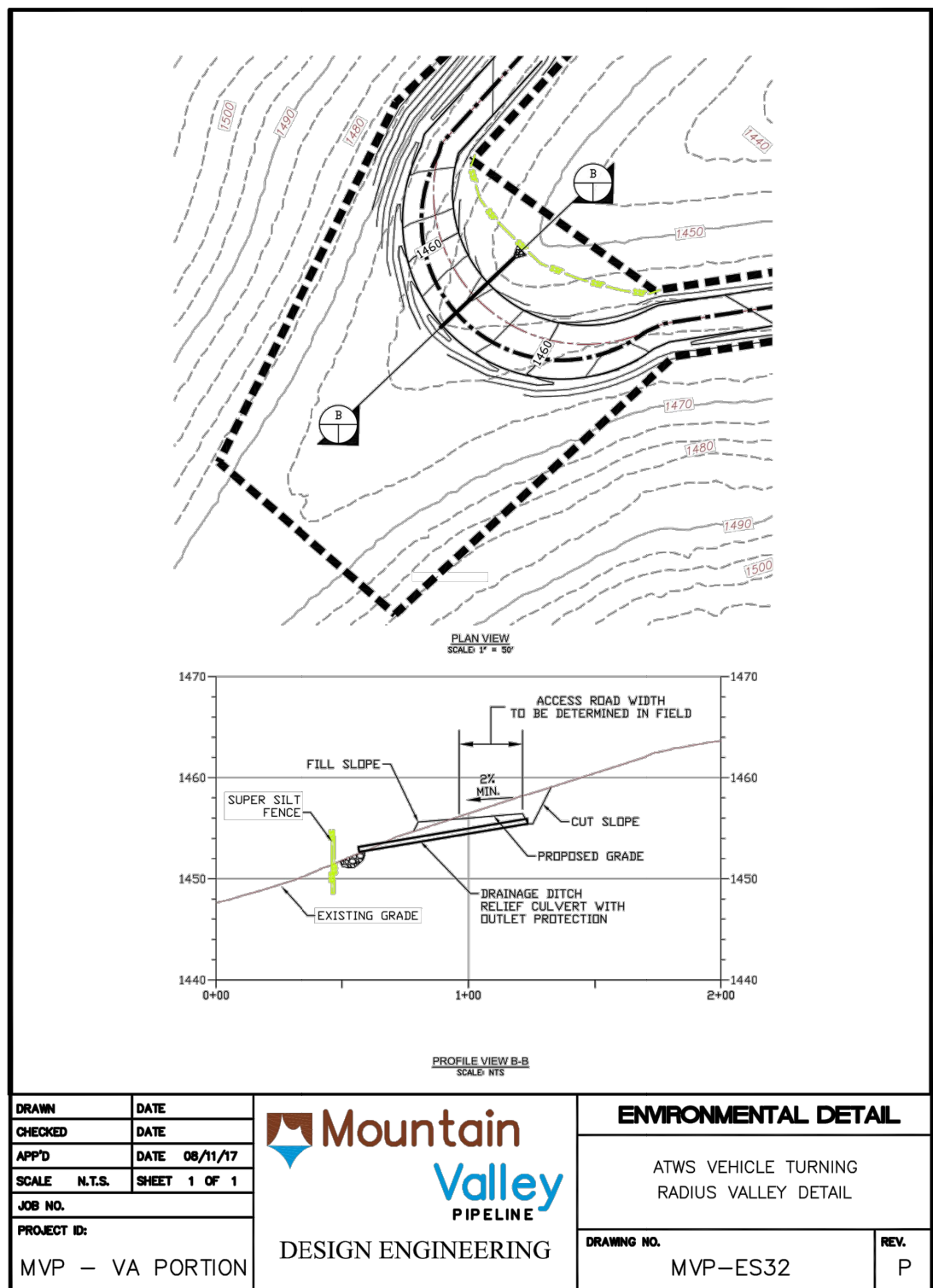
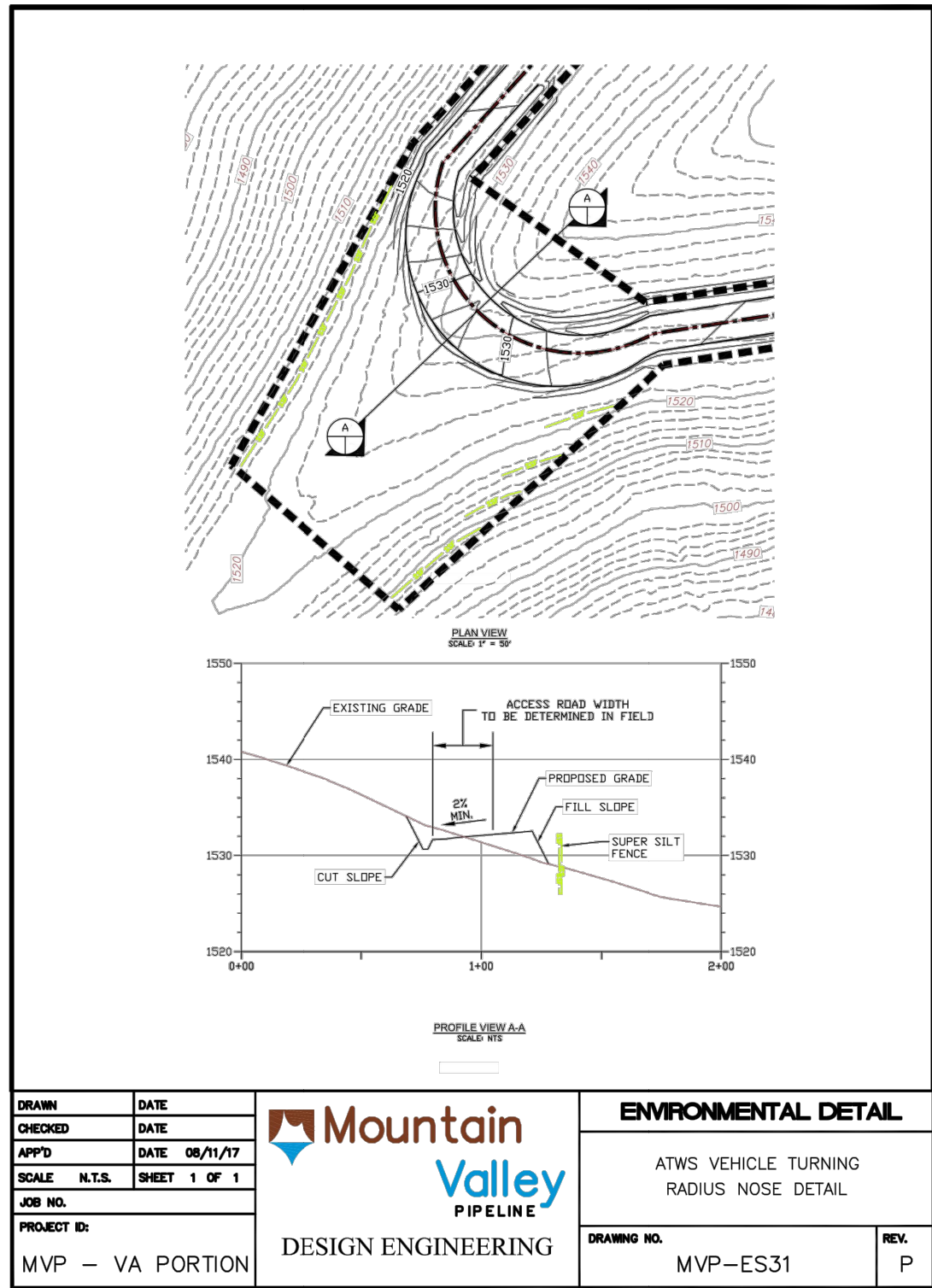
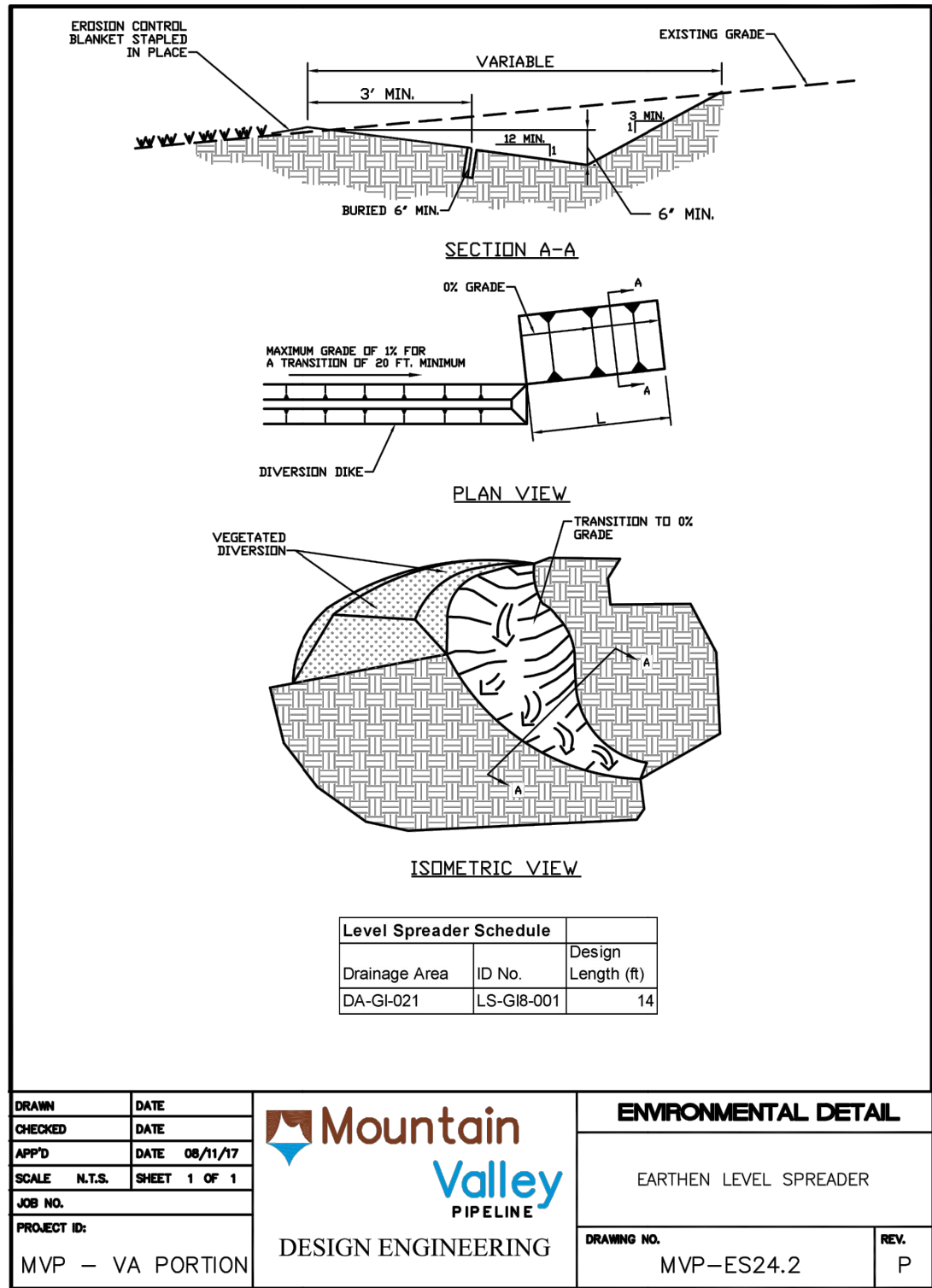
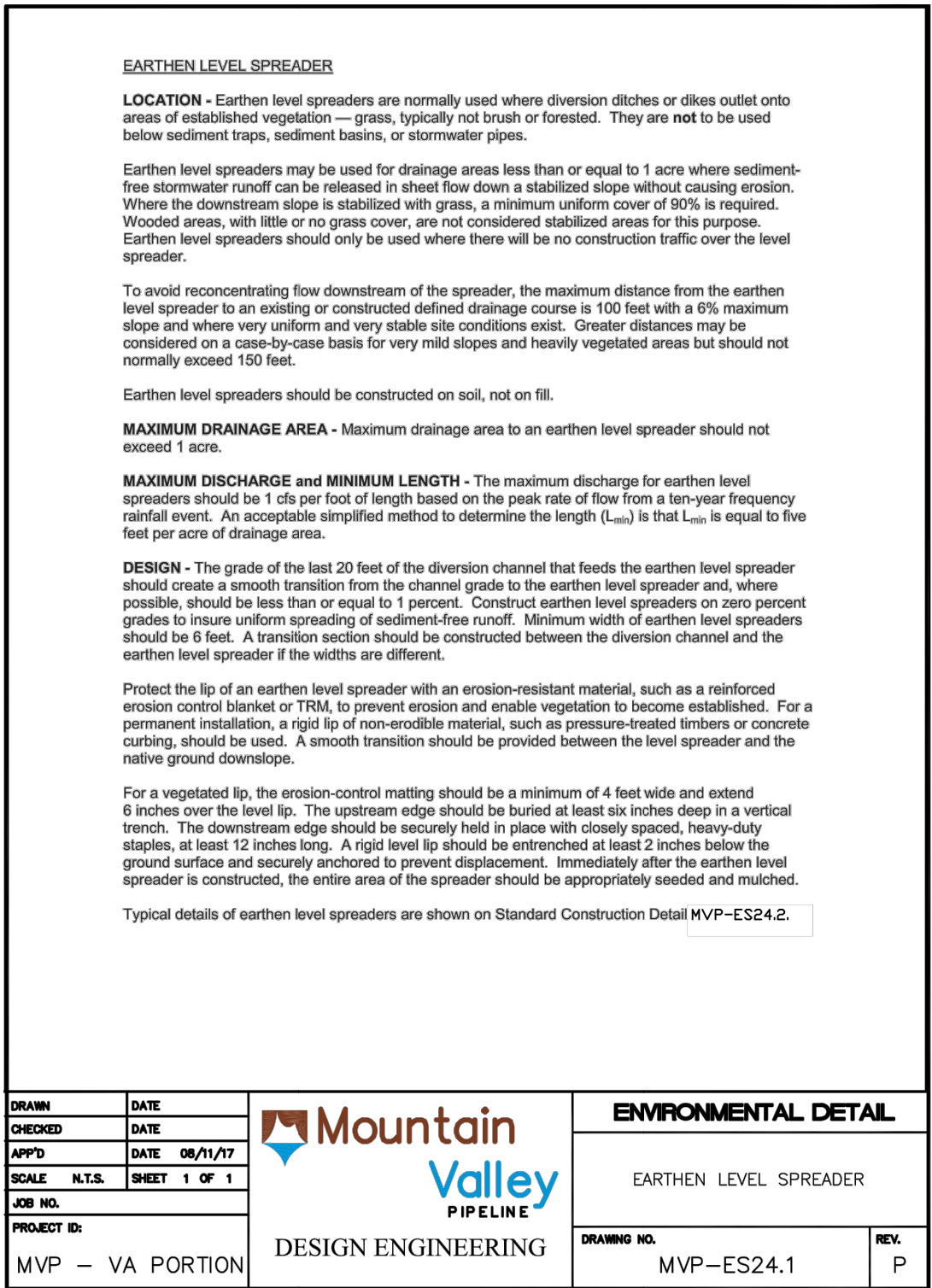
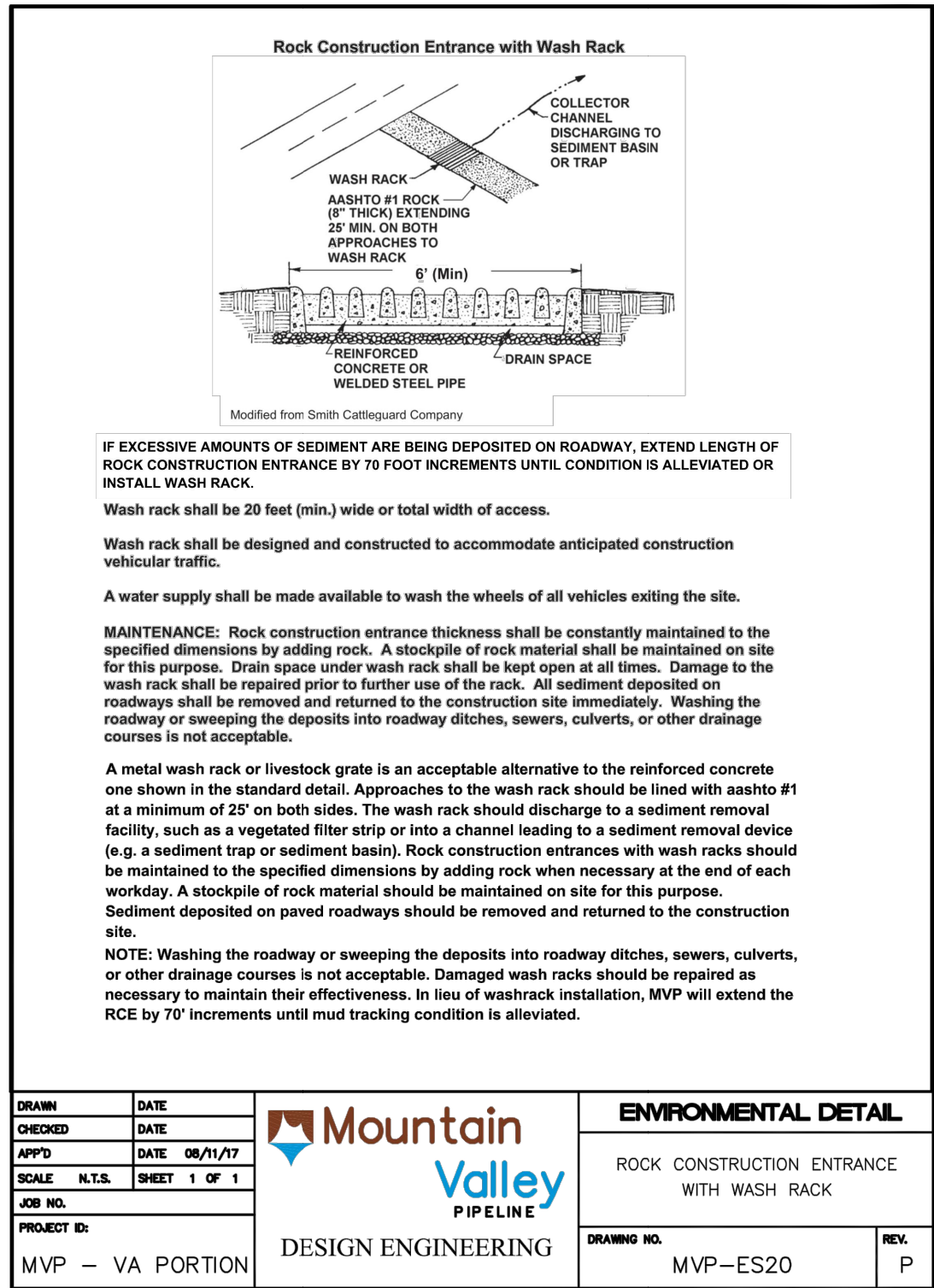
NOTES: AT NO TIME SHOULD MORE THE 60% OF THE STREAM CHANNEL WIDTH BE DIVERTED DURING PIPELINE INSTALLATION.

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 MWP-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.

DRAWING				ENVIRONMENTAL DETAIL	
CHECKED	DATE			COFFERDAM STREAM CROSSING METHOD	
APP'D	DATE	08/17/21			
SCALE	N.T.S.	SHEET	1 OF 1		
JOB NO.				DRAWING NO.	
PROJECT ID:				MVP – ES13.2	
MVP – VA PORTION				DESIGN ENGINEERING	



ADDED DETAILS FOR ROADS AND PADS

ADDRESS VADO COMMENTS

ADDRESS VADO COMMENTS

ADDRESS VADO COMMENTS

ADDRESS VADO COMMENTS

ADDRESS VADO COMMENTS

ADDRESS VADO COMMENTS

NO.: DATE: DWN: APPD: DESCRIPTION:

REVISIONS:

7 01/31/18 KAL RE DW 01/26/18 KAL RE DW 01/08/18 KAL RE DW 11/29/17 KAL RE DW 11/01/17 KAL RE DW 08/18/17 KAL RE DW

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

DAVID J. WALLNER
Lic. No. 0402057593

DRAWN BY: KAL

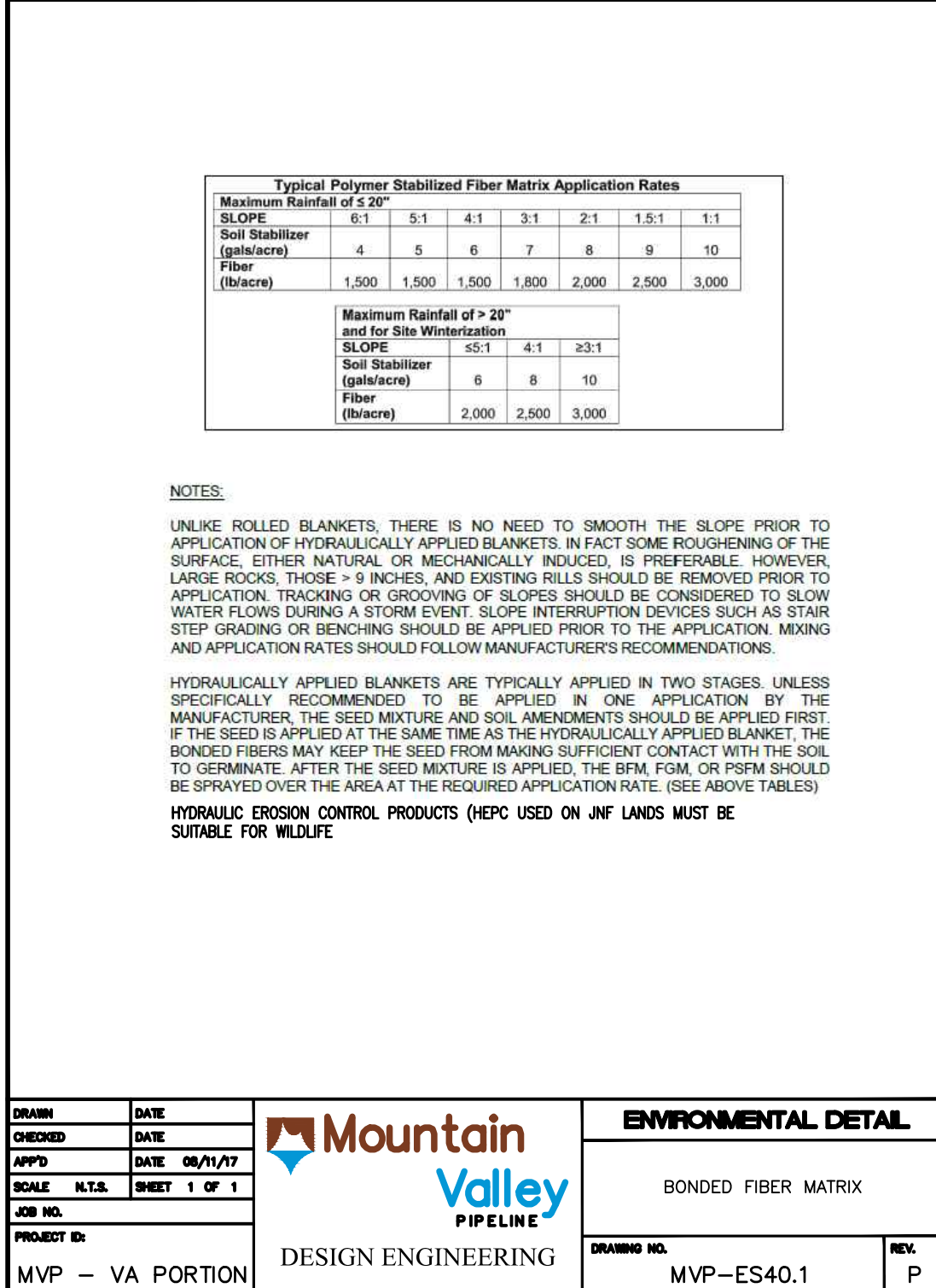
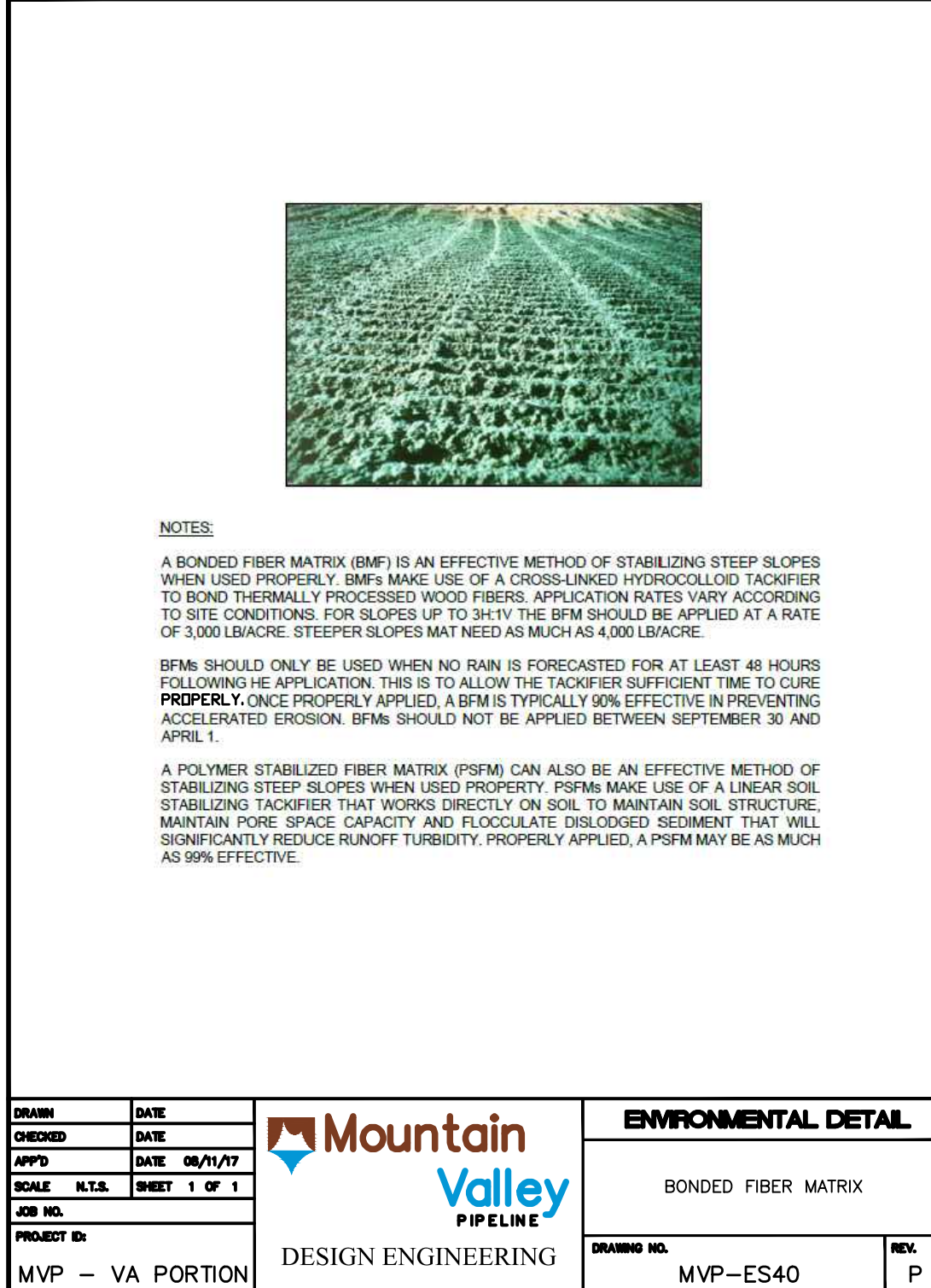
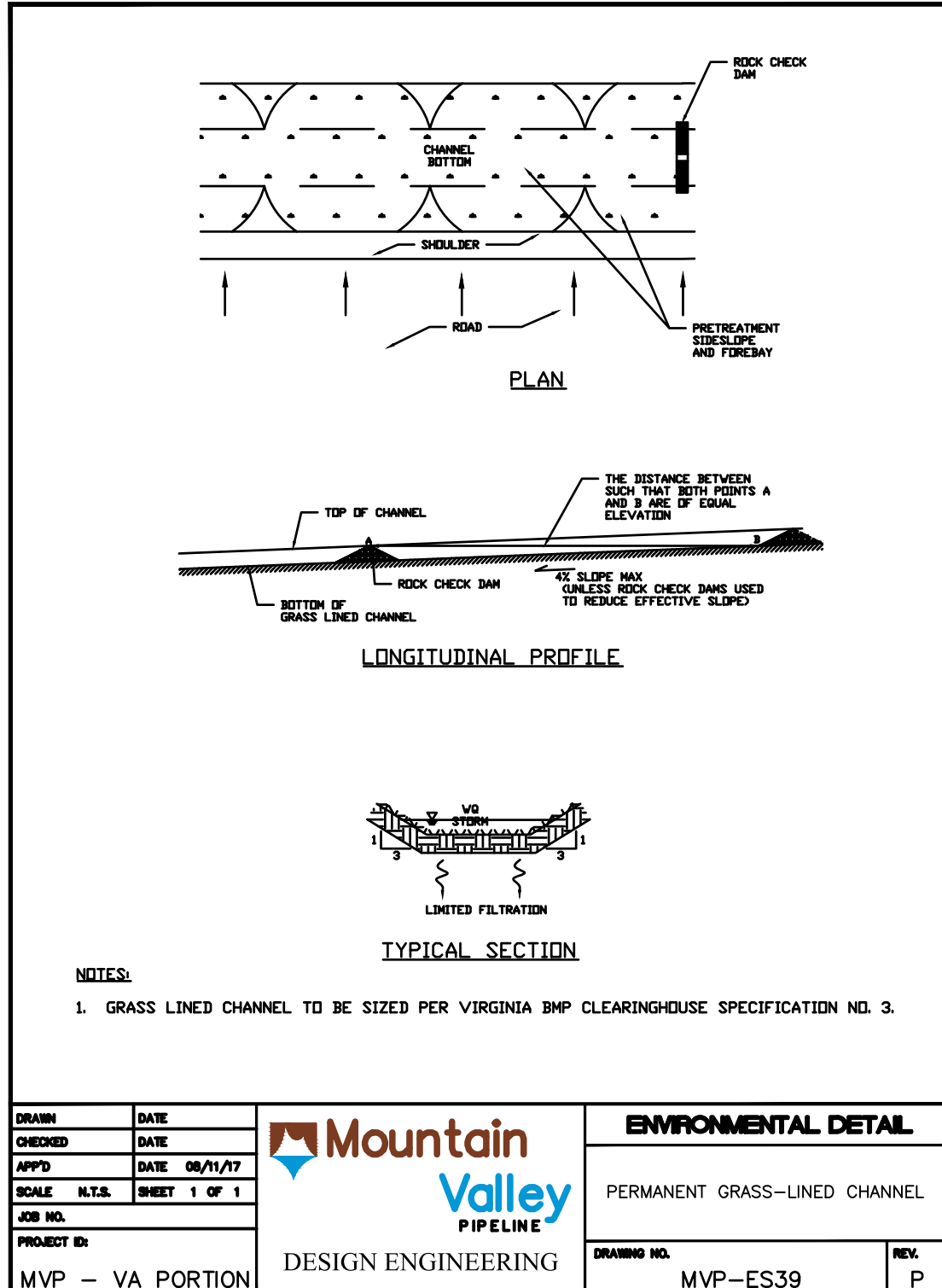
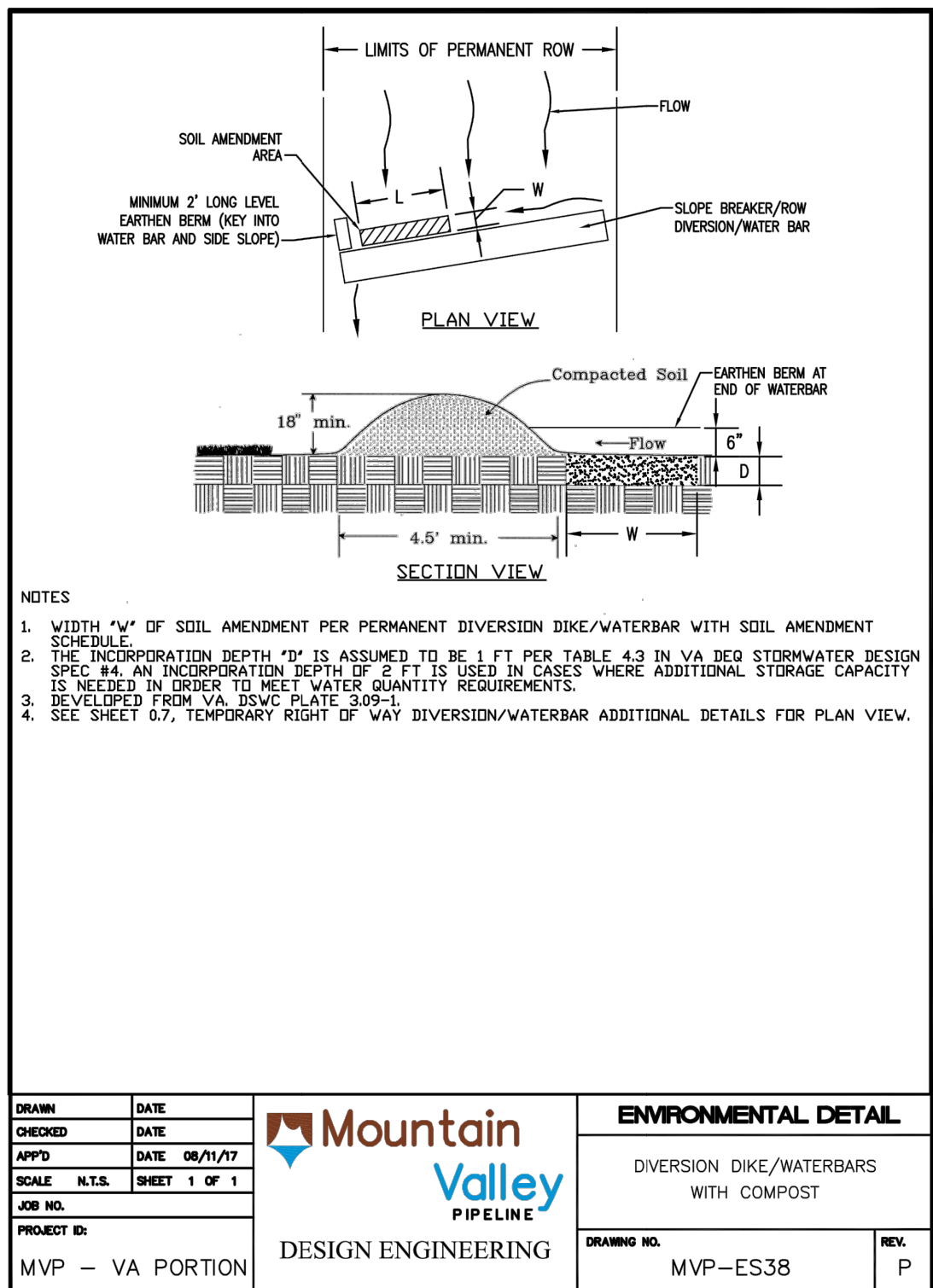
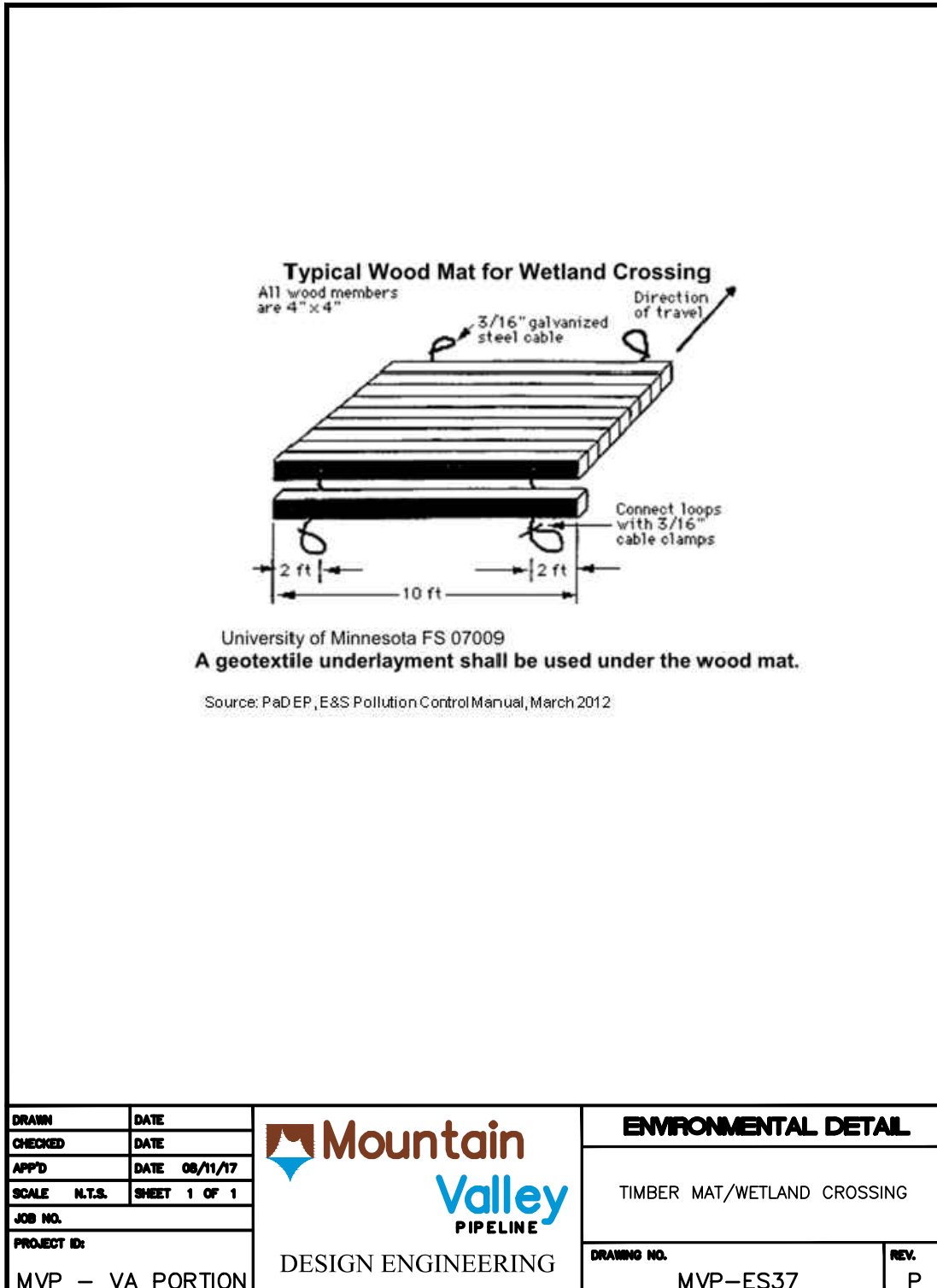
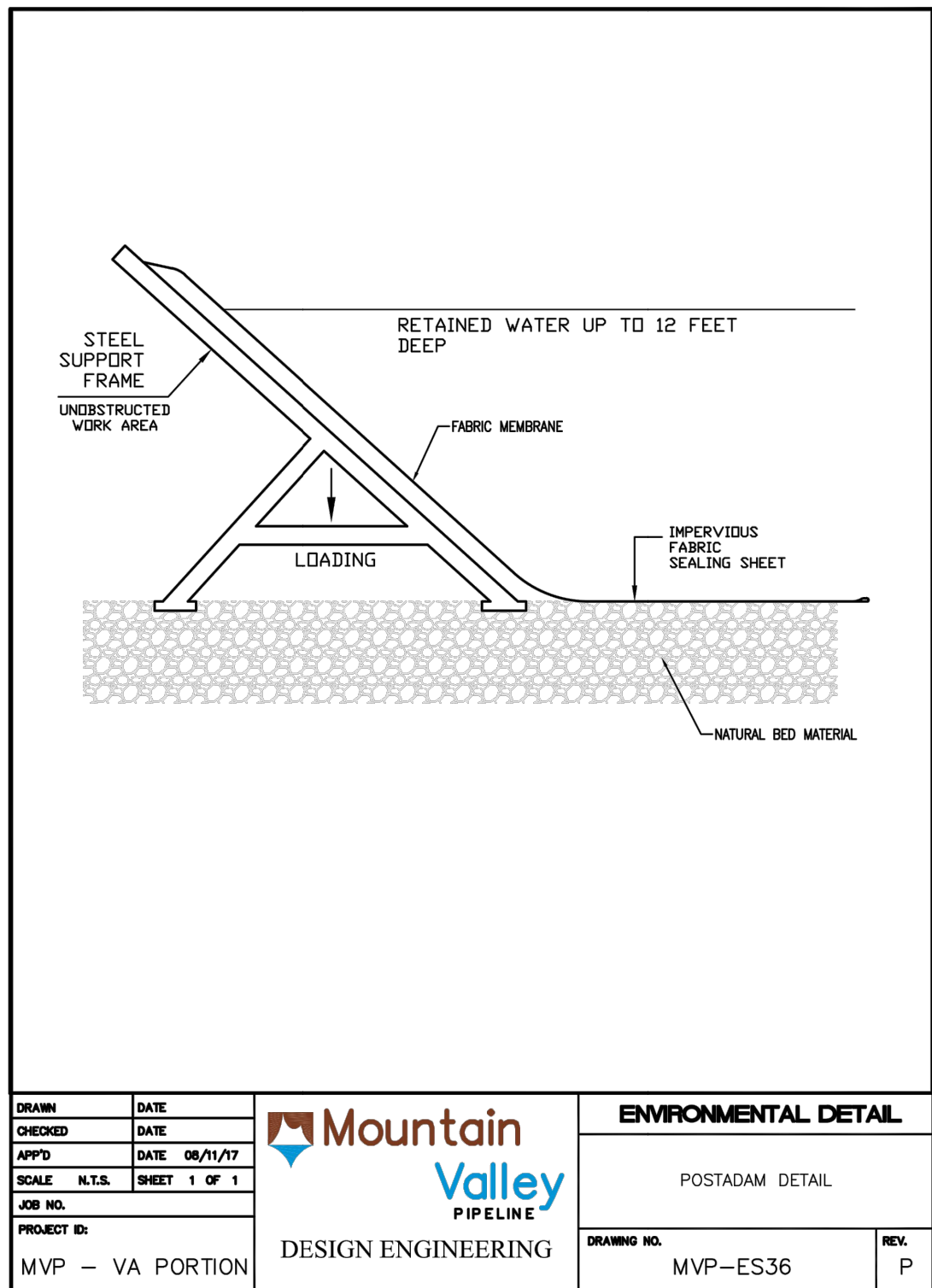
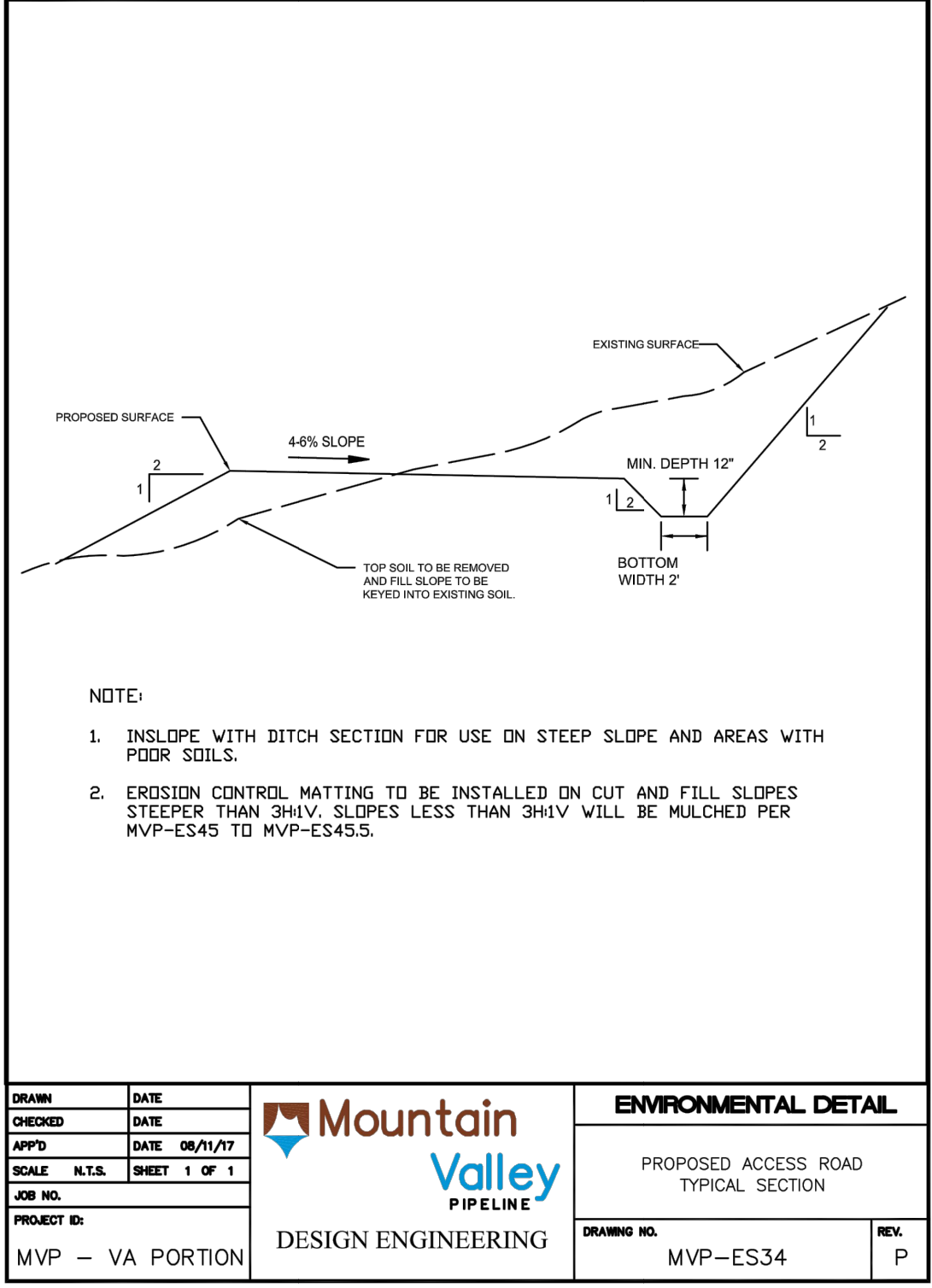
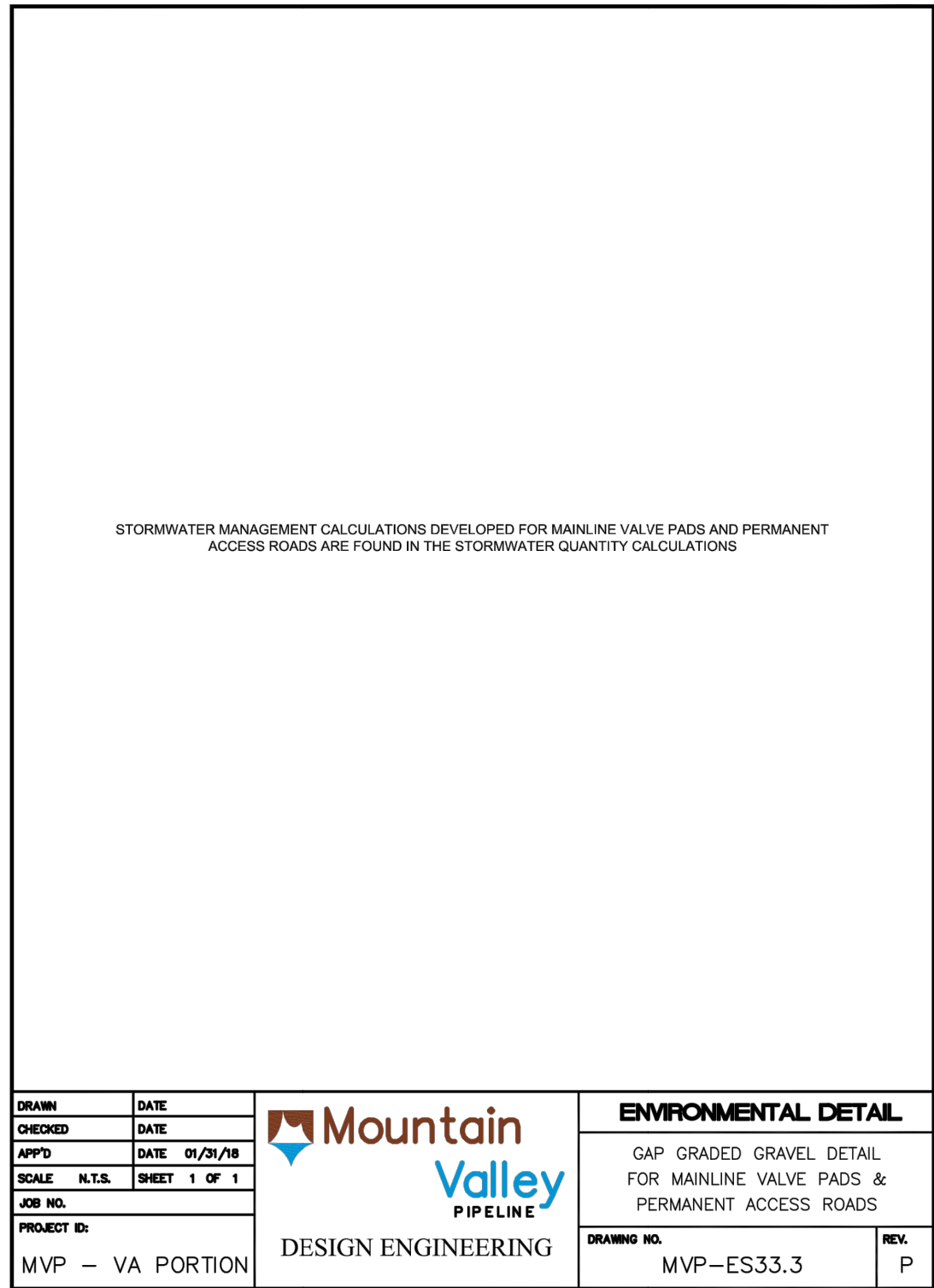
CHECKED BY: HT

APPROVED BY: RE

DATE: 11/28/2017

SCALE: AS SHOWN

SHT. NO. 0.09 OF 0.23



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

Mountain Valley PIPELINE
EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE

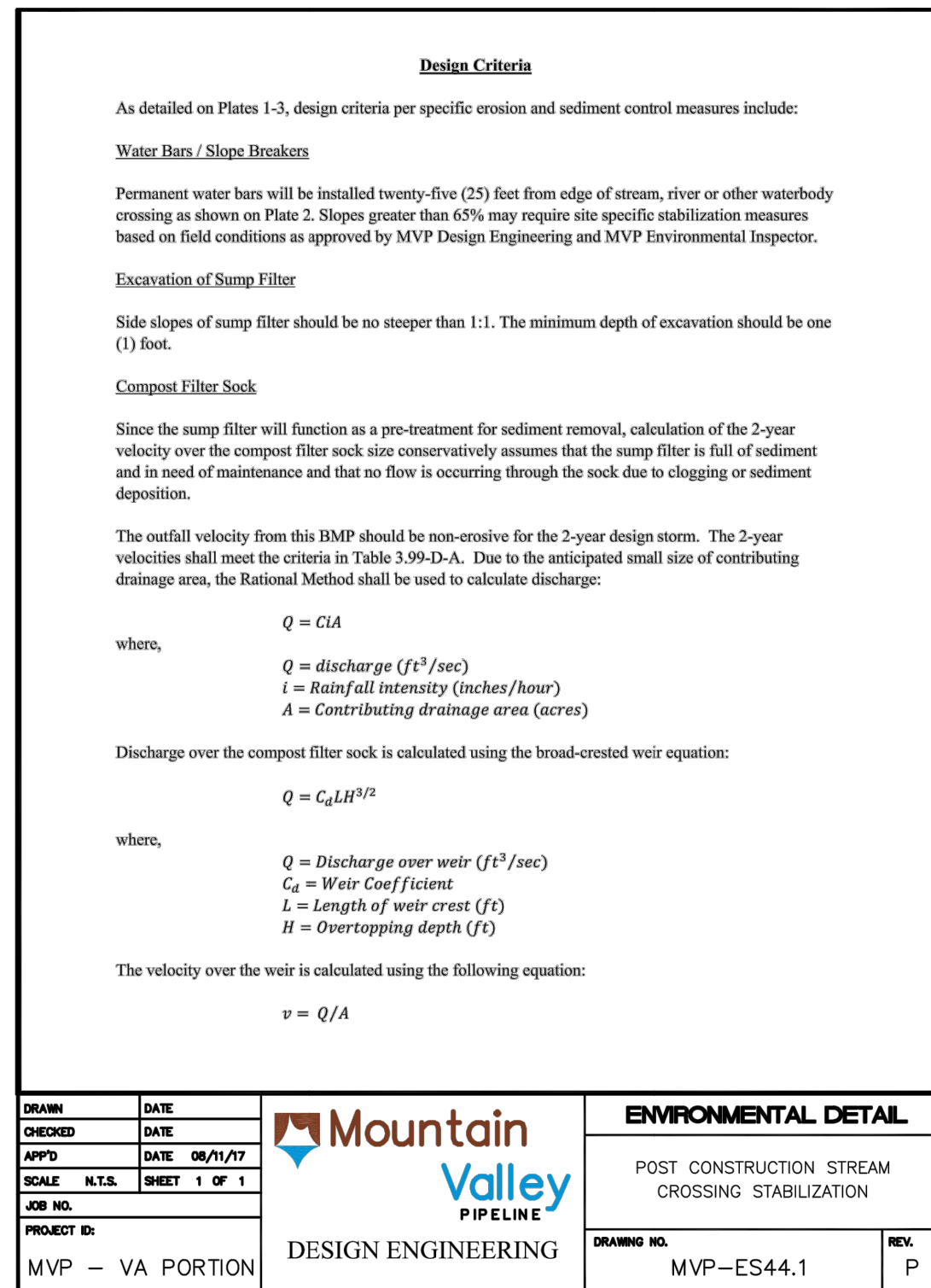
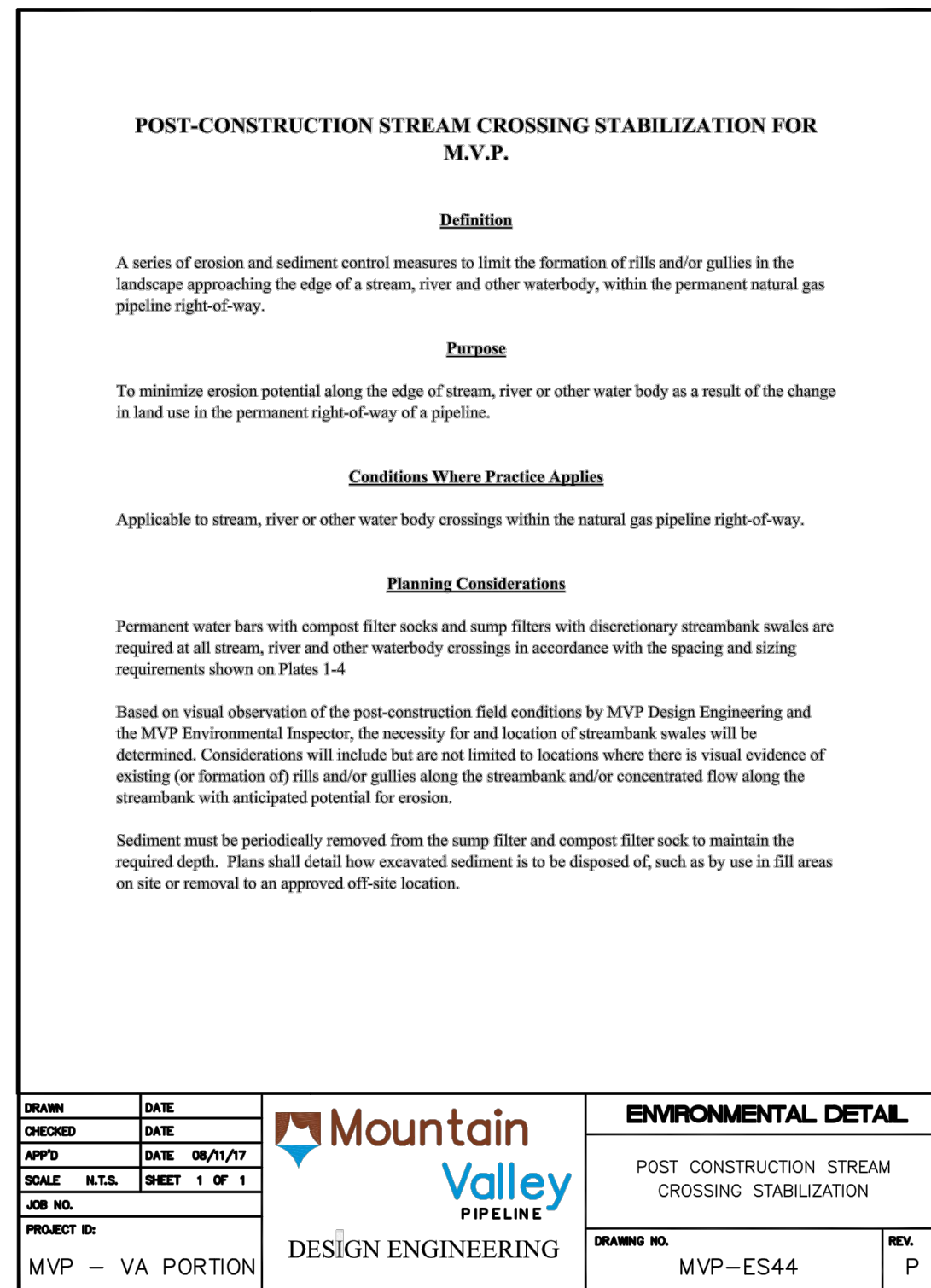
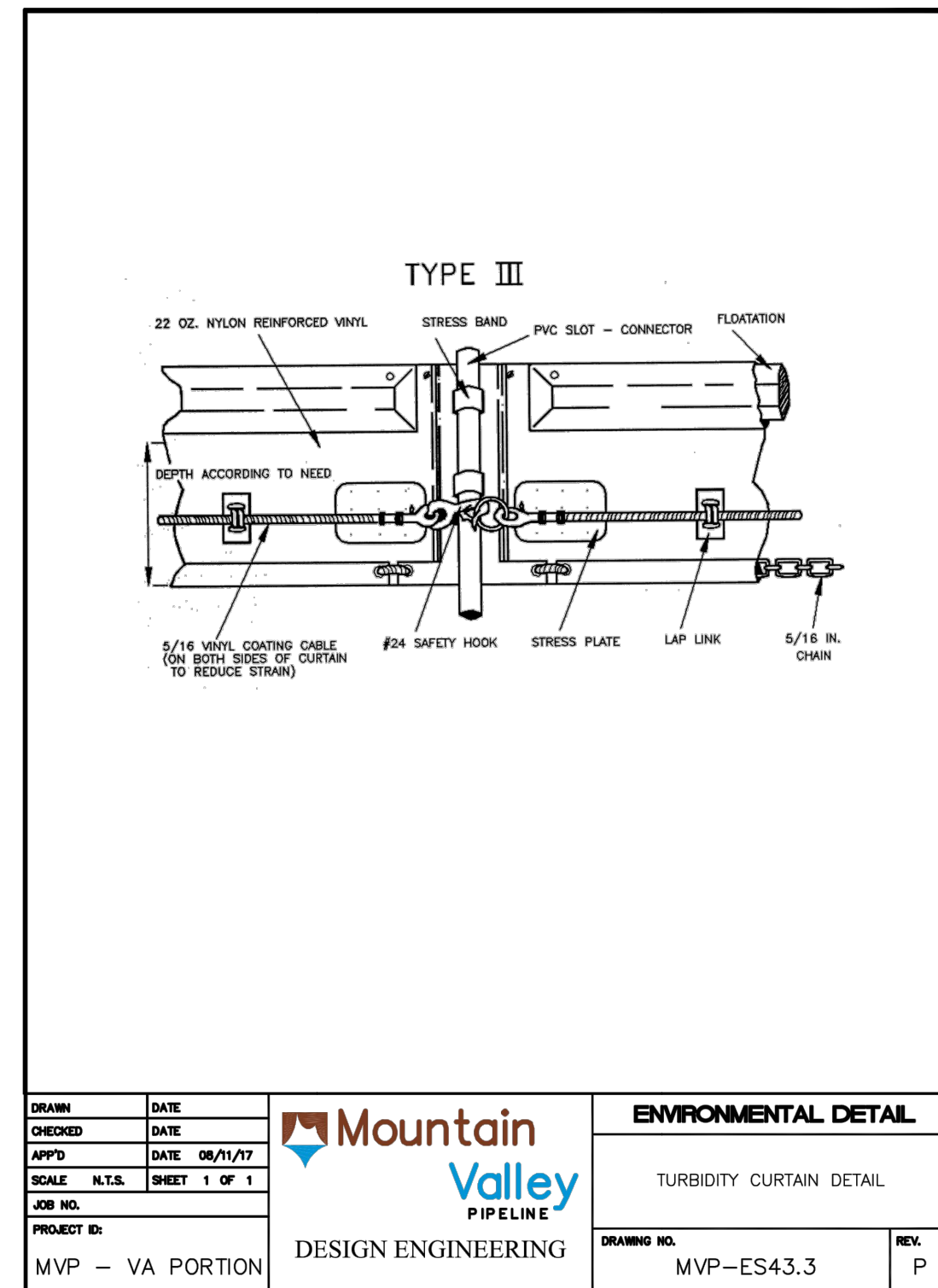
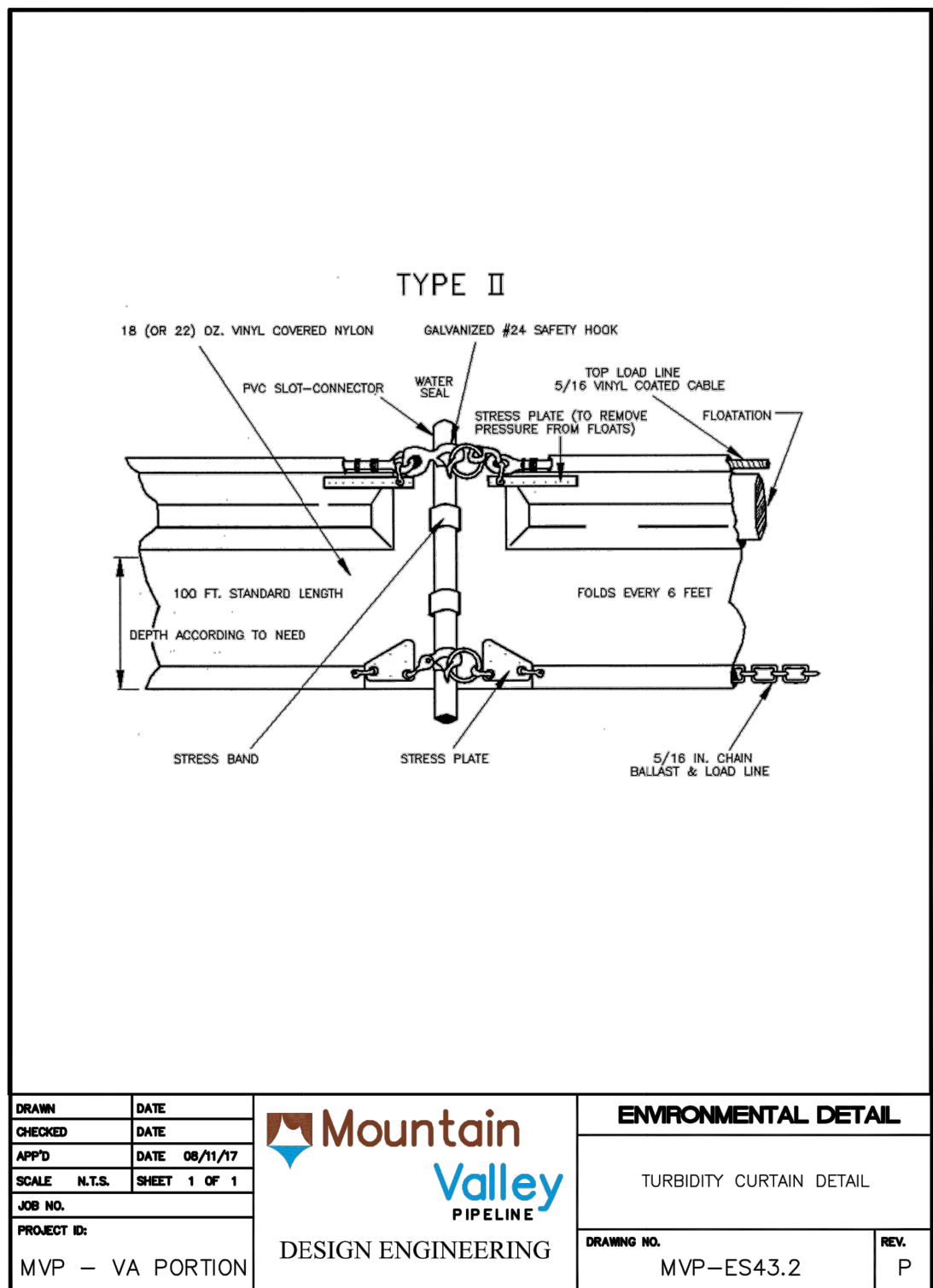
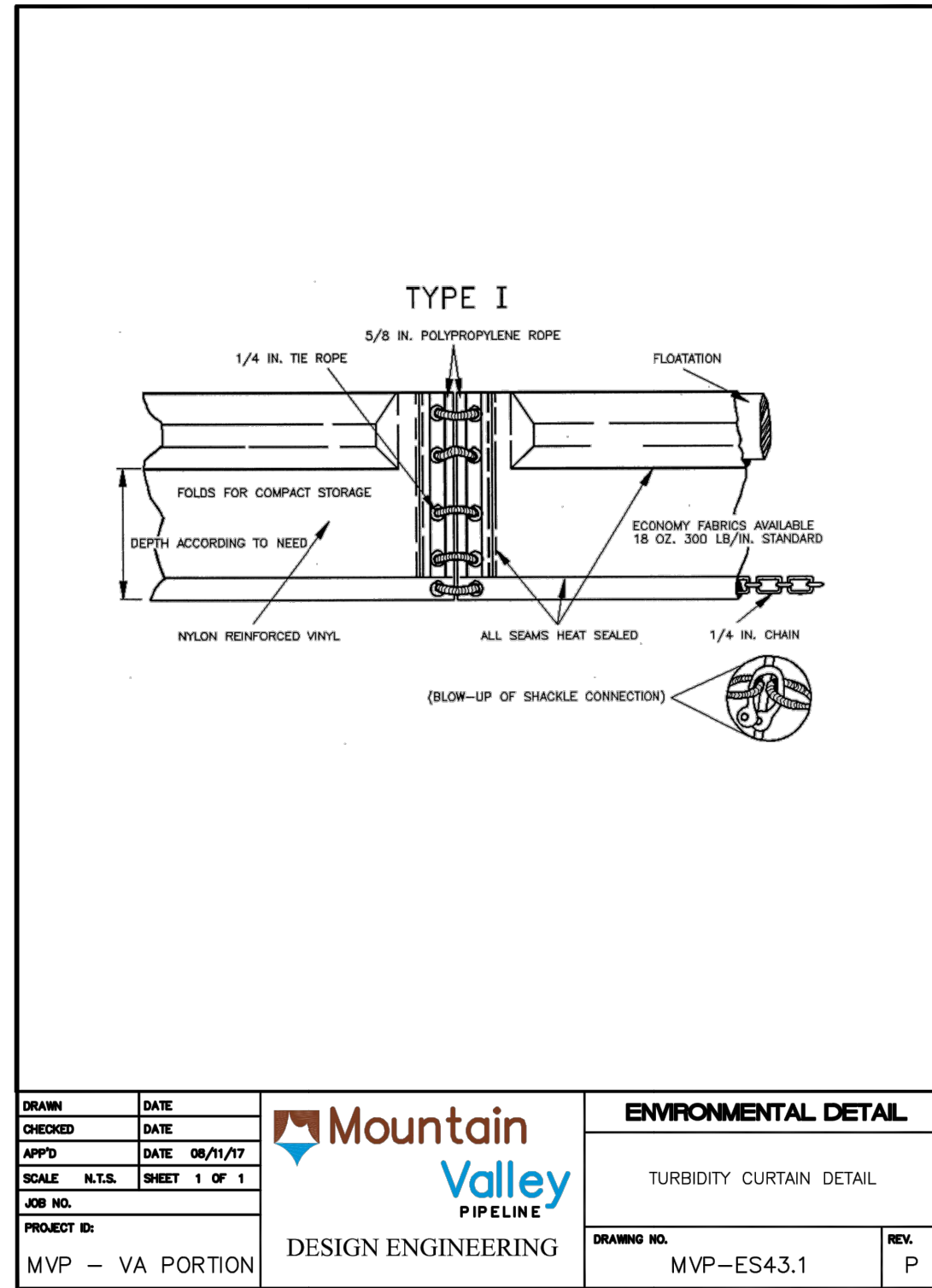
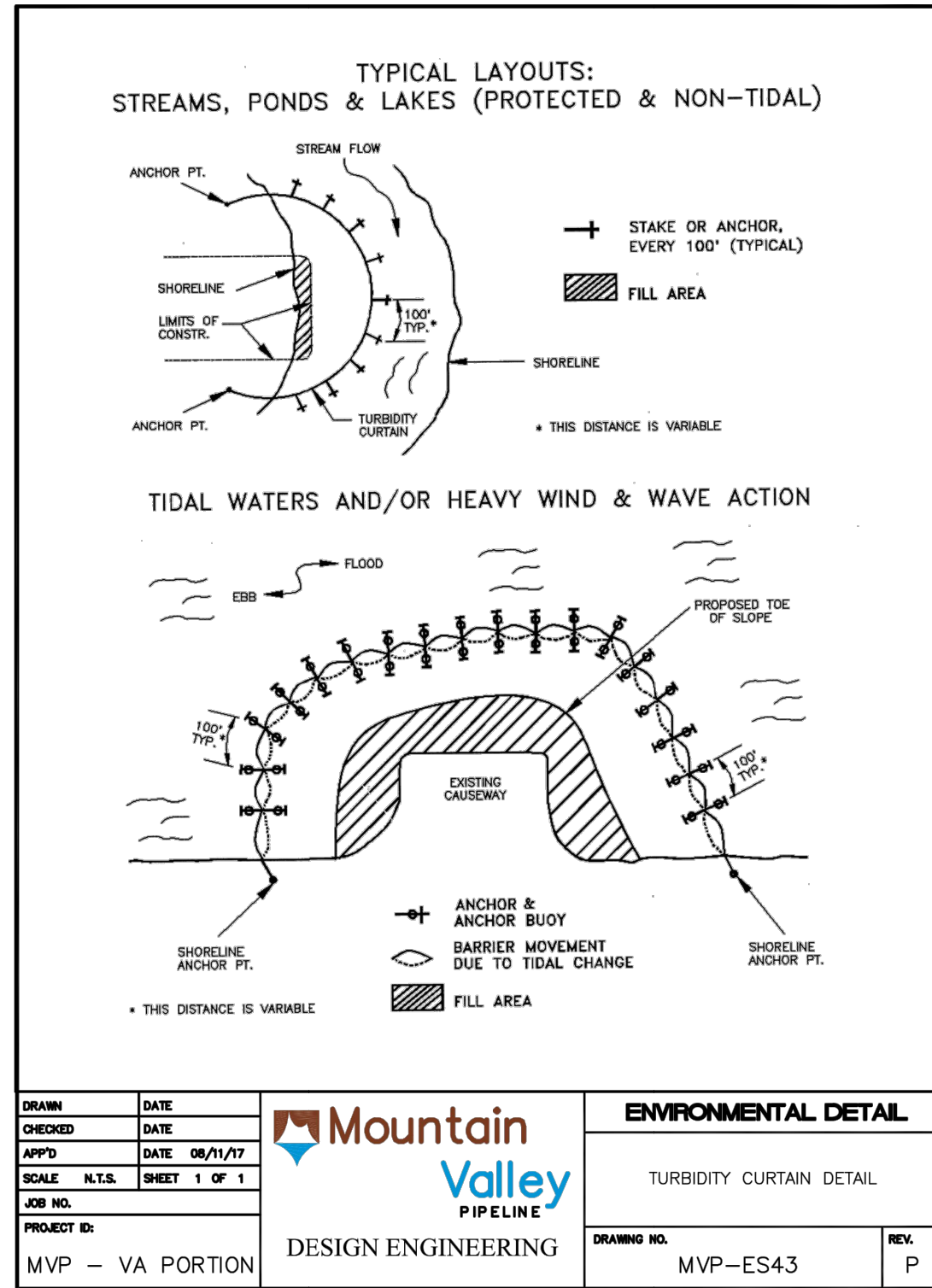
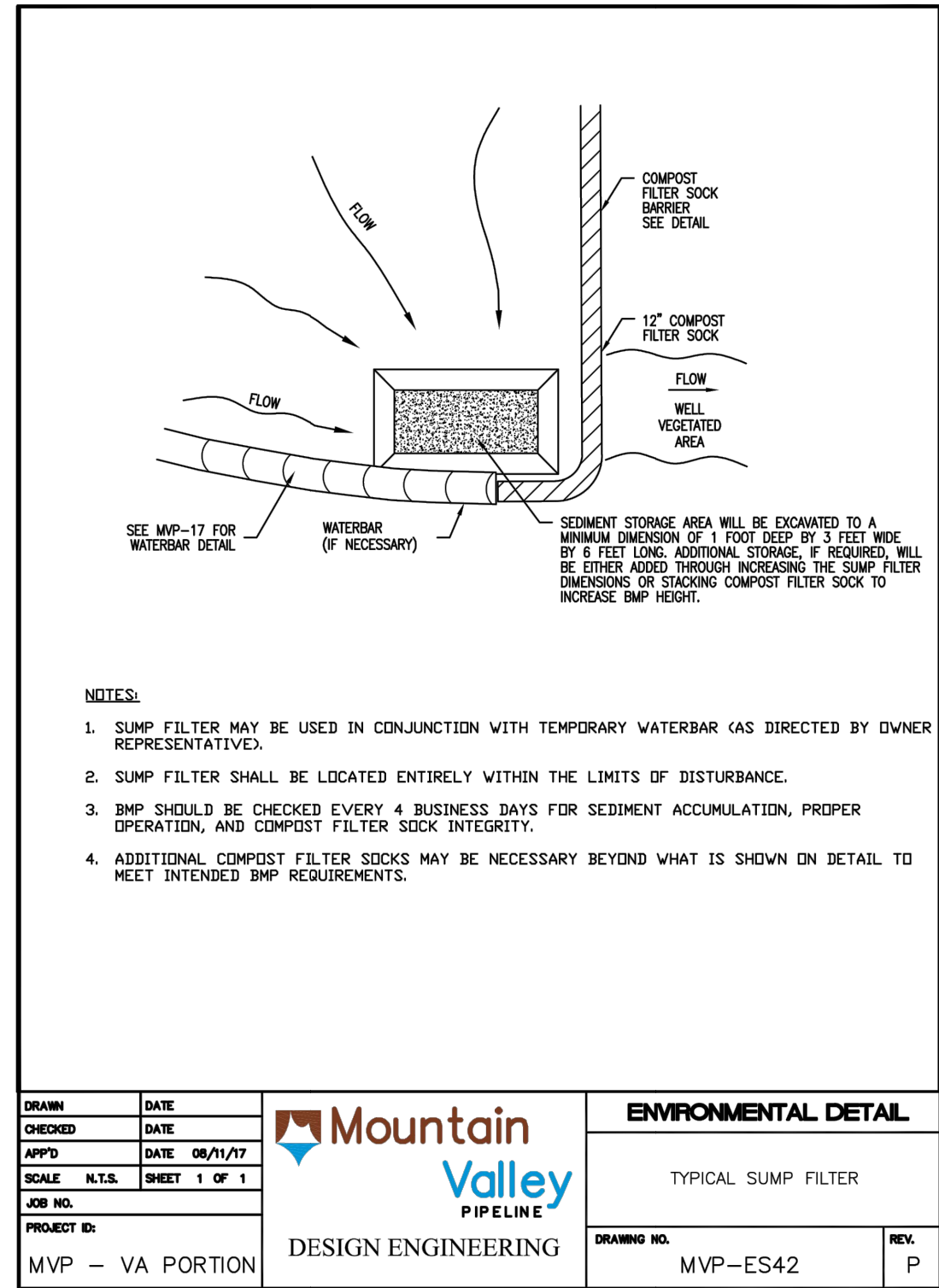
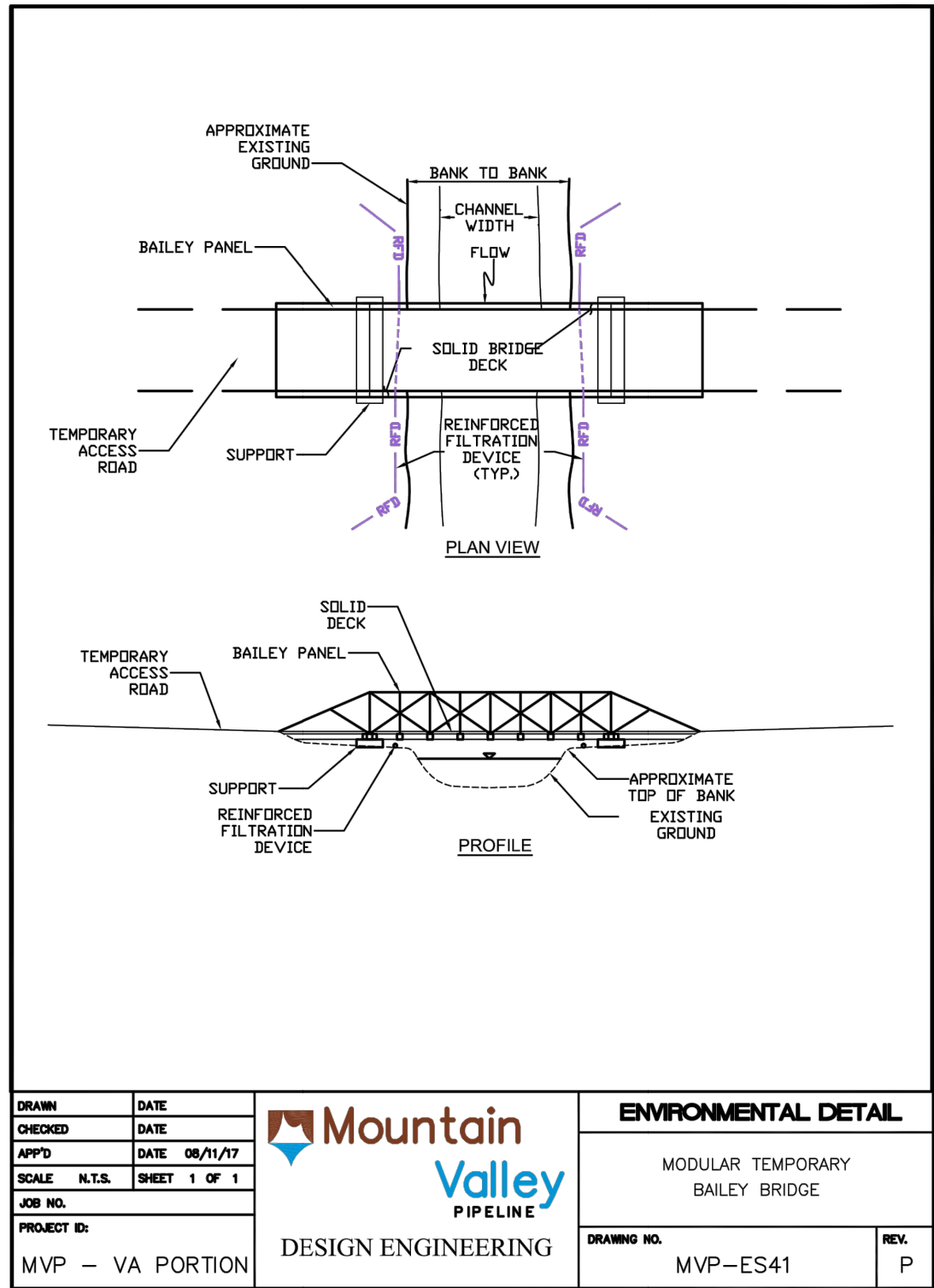
DESIGN ENGINEERING




661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

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



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<div><div></div><div>TETRA TECH</div><div>complex world CLEAR SOLUTIONS™</div></div> <div>661 ANDERSEN DRIVE FOSTER PLAZA 7 PITTSBURGH, PA 15220</div>										<div><div>MOUNTAIN VALLEY PIPELINE, LLC</div><div>555 SOUTHPOINTE BOULEVARD, SUITE 200</div><div>CANONSBURG, PA 15317</div></div>									
<div><div>COMMONWEALTH OF VIRGINIA</div><div>DAVID J. WALLNER</div><div>Lic. No. 0402057593</div><div></div><div>PROFESSIONAL ENGINEER</div></div>																			
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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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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 mulch 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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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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TABLE 3.35-A

ORGANIC MULCH MATERIALS AND APPLICATION RATES

MULCHES:	RATES:		NOTES:
	Per Acre	Per 1000 sq. ft.	
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 or 1500 lbs.	Minimum 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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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. (a 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 "poach" 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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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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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.

Specifications

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 supplying 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 topsoils contain 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 planting, 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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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.

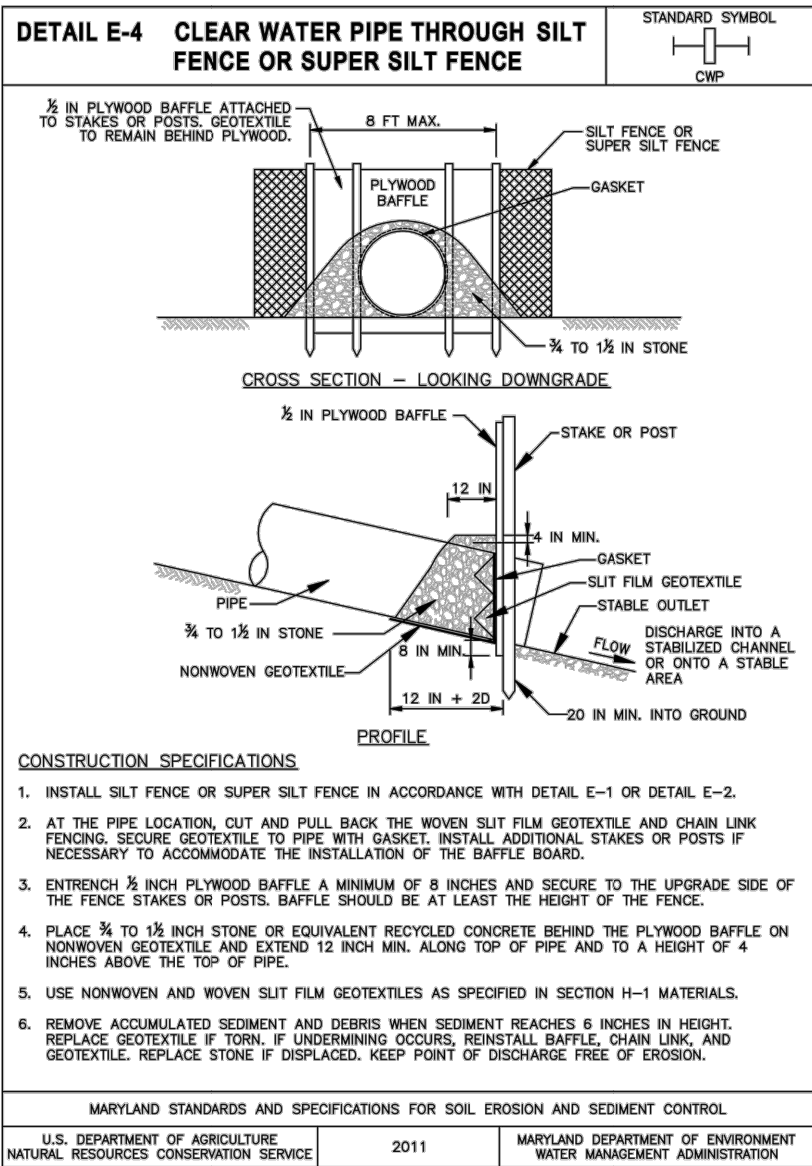
Soluble salts shall not exceed 500 ppm.


Soil samples collected and sent for analysis will be identified by the MVP Construction 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.

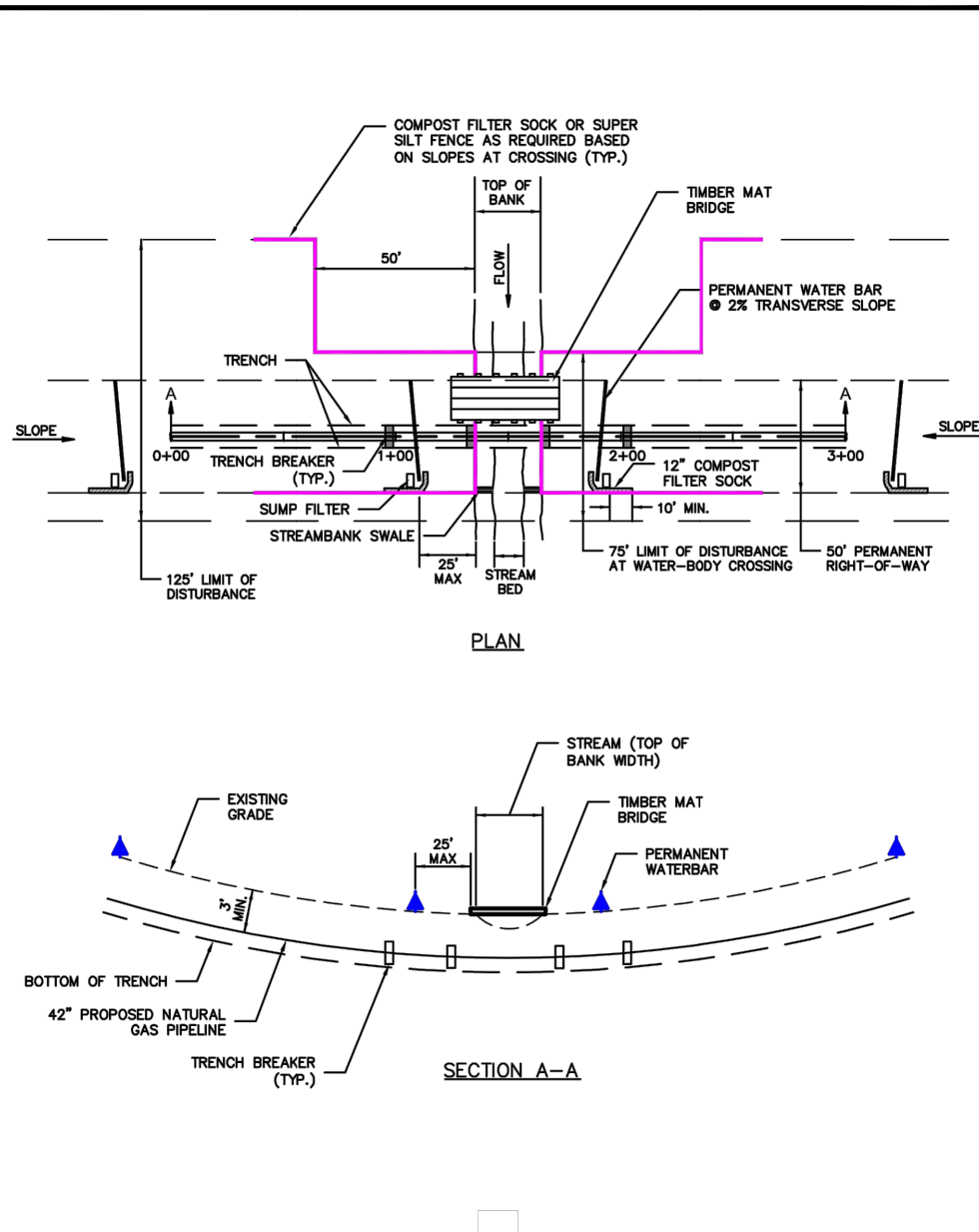
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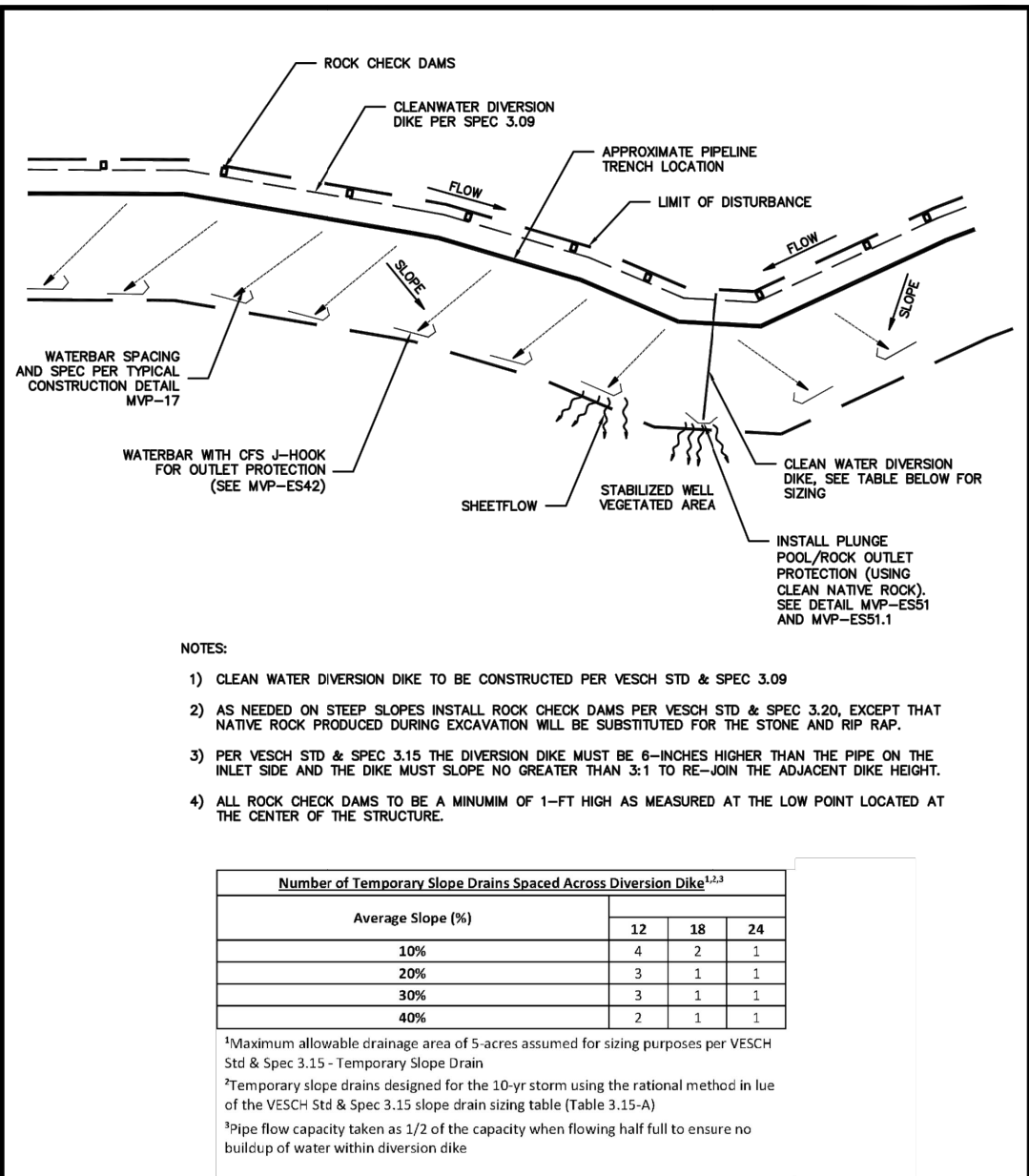


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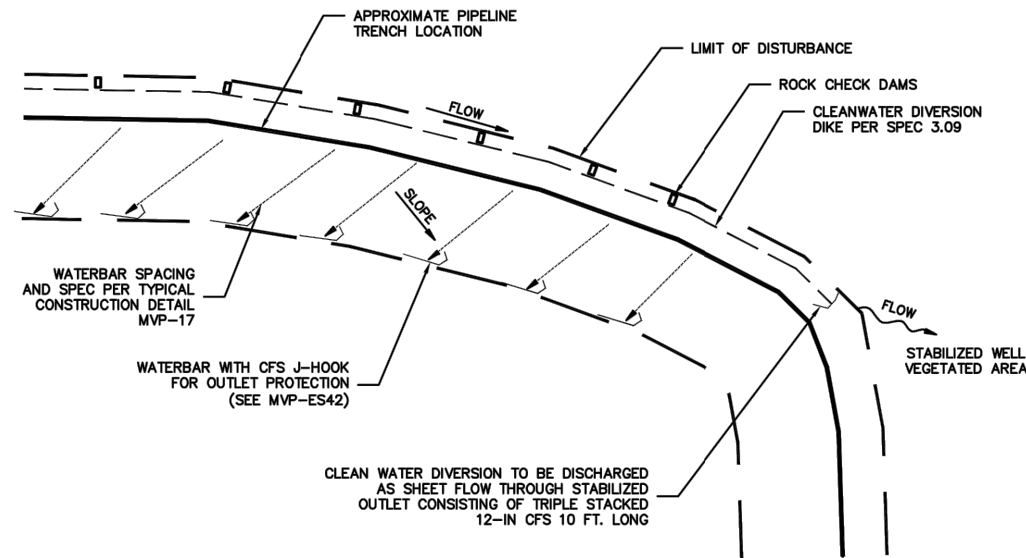


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DESIGN ENGINEERING		


ENVIRONMENTAL DETAIL	
TIMBER MAT BRIDGE STREAM CROSSING	
DRAWING NO. MVP-ES49	REV. P



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	 DESIGN ENGINEERING	ENVIRONMENTAL DETAIL CLEAN WATER DIVERSION WITH CLEAN WATER PIPE	
DRAWING NO. MVP–ES50		REV. P	



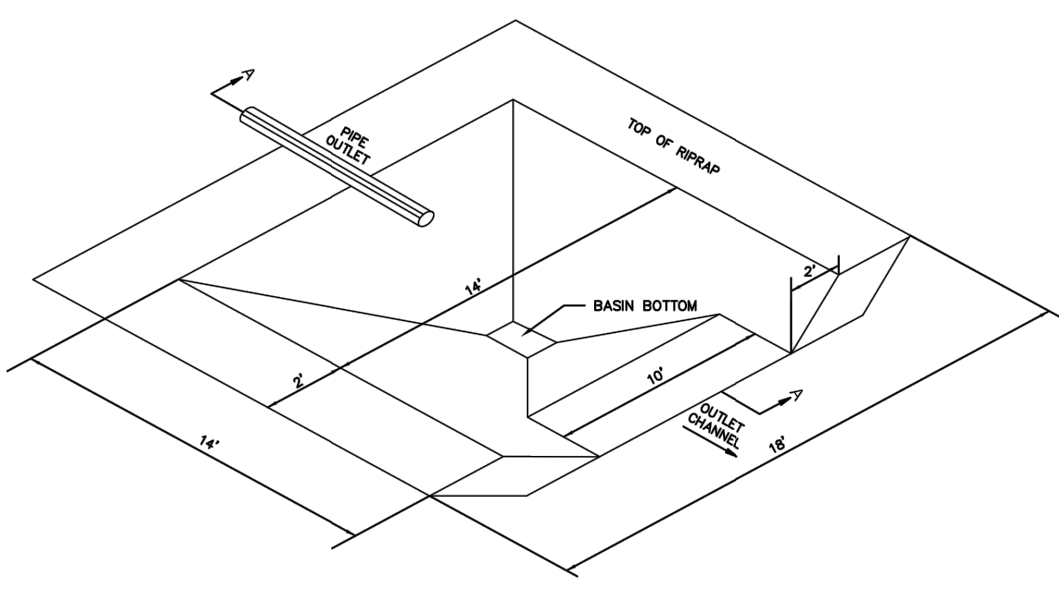
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CHECKED	DATE	10/13/17
APP'D	DATE	10/13/17
SCALE	N.T.S.	SHEET 1 OF 1
JOB NO.		
PROJECT ID:		
MVP - VA PORTION		




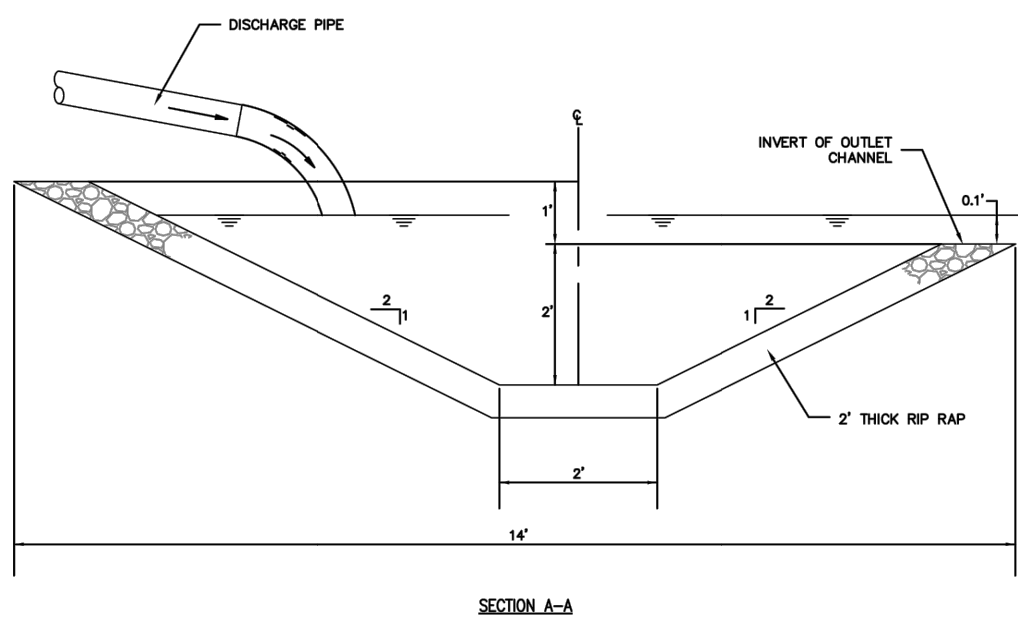
**Mountain
Valley
PIPELINE**

ENVIRONMENTAL DETAIL	
CLEAN WATER DIVERSION WITH END RELEASE	
DRAWING NO.	REV.
MVP-ES50.1	P

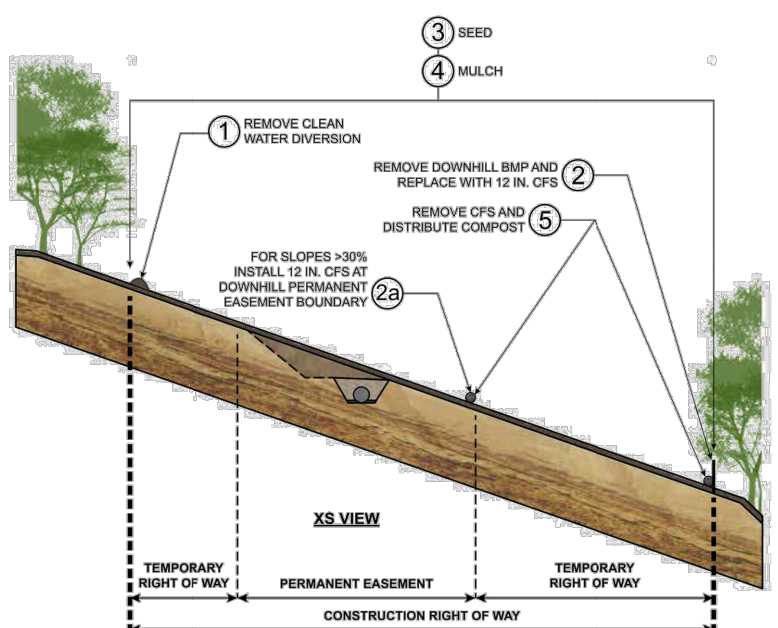
DESIGN ENGINEERING




DESIGN	DATE 10/13/17	 Mountain Valley PIPELINE DESIGN ENGINEERING	ENVIRONMENTAL DETAIL	
CHECKED	DATE 10/13/17		PLUNGE POOL OUTLET ISOMETRIC VIEW	
APP'D	DATE 10/13/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.				
PROJECT ID:			DRAWING NO.	REV.
MVP - VA PORTION			MVP-ES51	P




<table border="1"> <tr> <td>DESIGN</td> <td>DATE</td> <td>10/13/17</td> </tr> <tr> <td>CHECKED</td> <td>DATE</td> <td>10/13/17</td> </tr> <tr> <td>APP'D</td> <td>DATE</td> <td>10/13/17</td> </tr> <tr> <td>SCALE</td> <td>N.T.S.</td> <td>SHEET 1 OF 1</td> </tr> <tr> <td colspan="3">JOB NO.</td> </tr> <tr> <td colspan="3">PROJECT ID:</td> </tr> <tr> <td colspan="3">MVP - VA PORTION</td> </tr> </table>	DESIGN	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			 <p>DESIGN ENGINEERING</p>	<table border="1"> <tr> <th colspan="2">ENVIRONMENTAL DETAIL</th> </tr> <tr> <td colspan="2">PLUNGE POOL OUTLET</td> </tr> <tr> <td>DRAWING NO.</td> <td>REV.</td> </tr> <tr> <td>MVP-ES51.1</td> <td>P</td> </tr> </table>	ENVIRONMENTAL DETAIL		PLUNGE POOL OUTLET		DRAWING NO.	REV.	MVP-ES51.1	P
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CHECKED	DATE	10/13/17																													
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SCALE	N.T.S.	SHEET 1 OF 1																													
JOB NO.																															
PROJECT ID:																															
MVP - VA PORTION																															
ENVIRONMENTAL DETAIL																															
PLUNGE POOL OUTLET																															
DRAWING NO.	REV.																														
MVP-ES51.1	P																														



DESIGN	DATE	10/13/17	 Mountain Valley PIPELINE	ENVIRONMENTAL DETAIL	
CHECKED	DATE	10/13/17		RESTORATION DETAIL	
APP'D	DATE	10/13/17			
SCALE	N.T.S.	SHEET 1 OF 1			
JOB NO.					
PROJECT ID:			DESIGN ENGINEERING	DRAWING NO.	REV.
MVP – VA PORTION				MVP–ES52	P

NO.	DATE	DWNK.	CHKD.	APPD.	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

 Mountain Valley PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

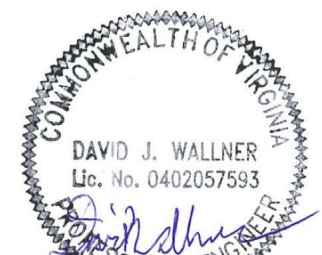
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE


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

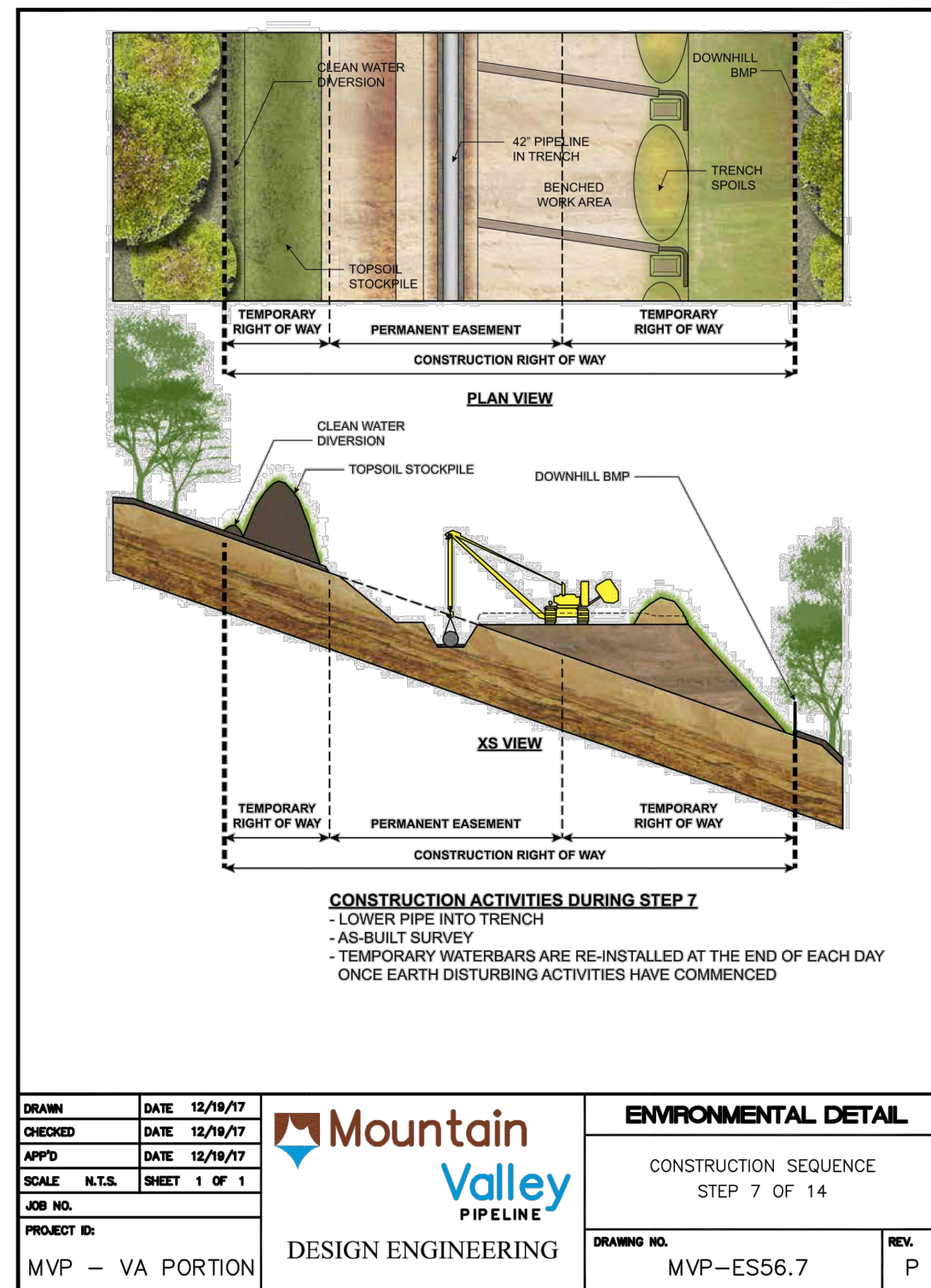
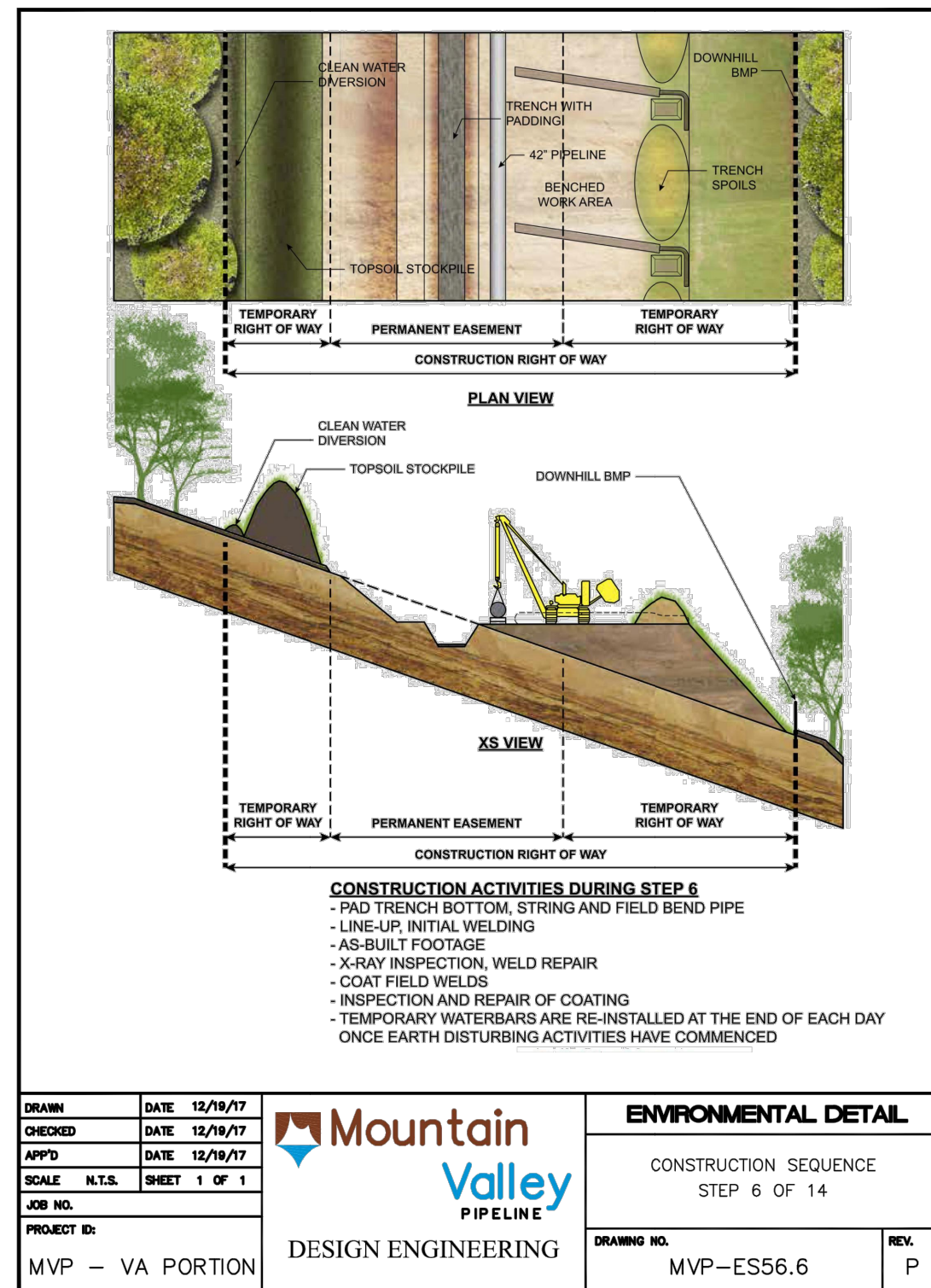
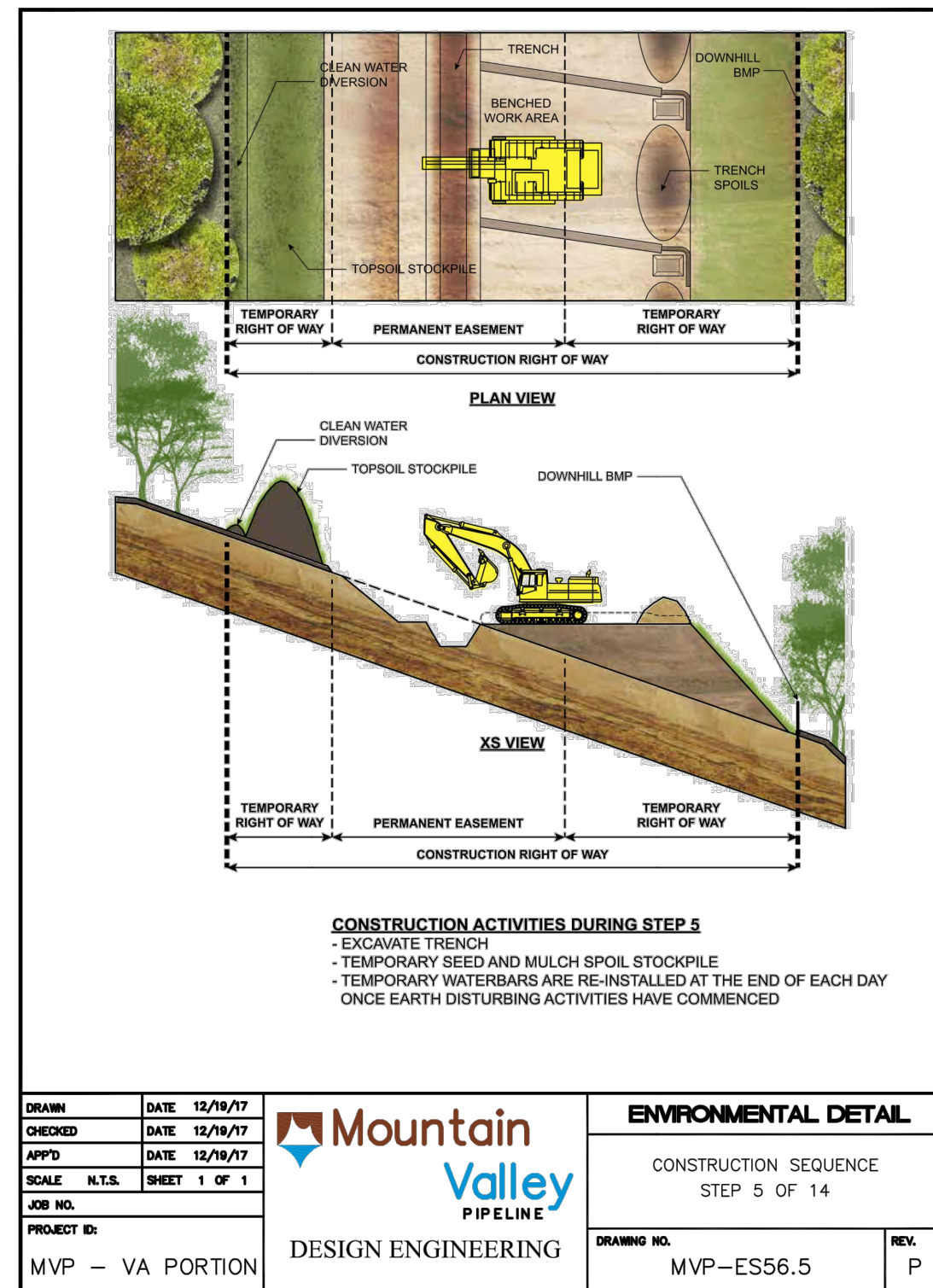
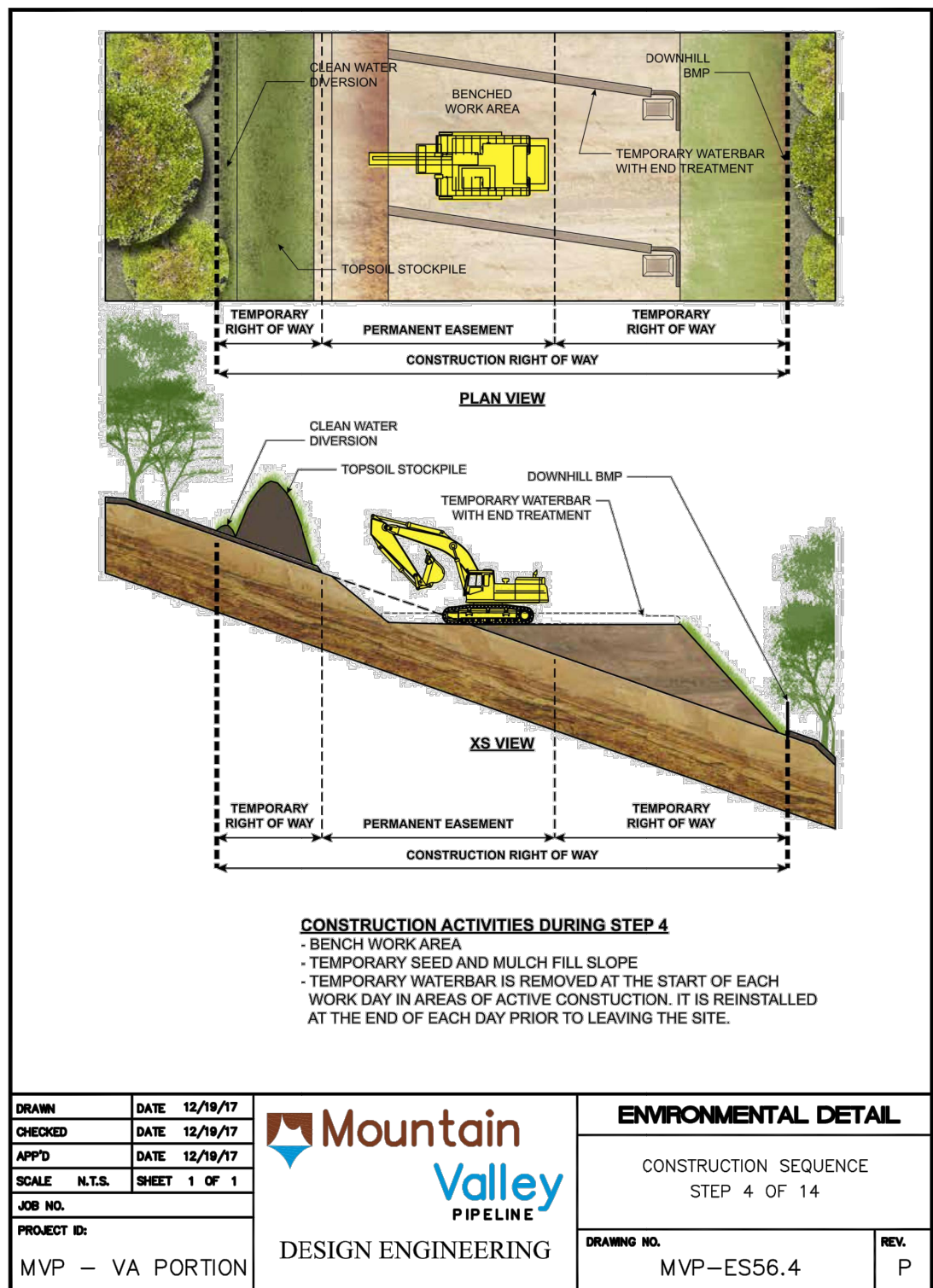
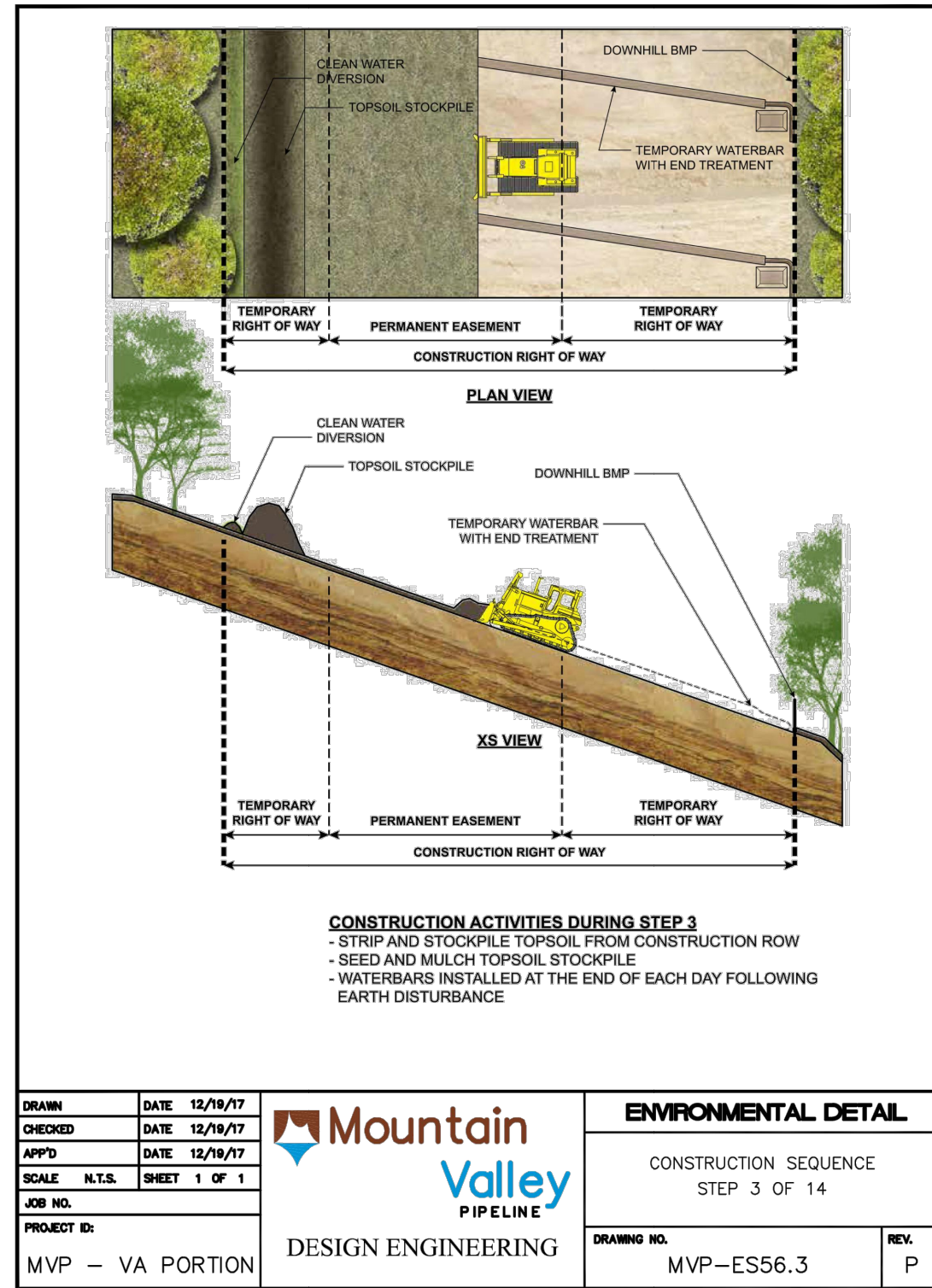
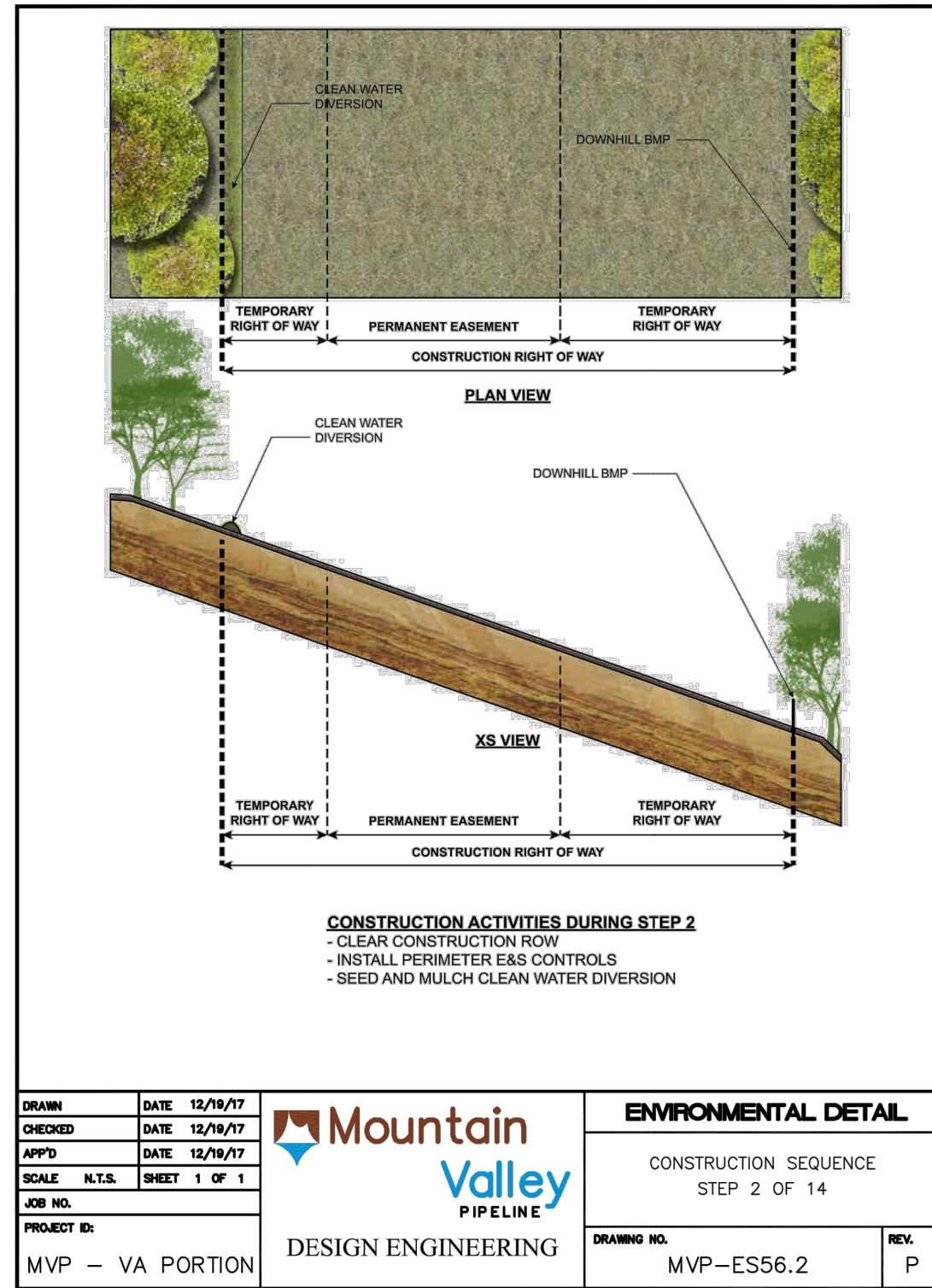
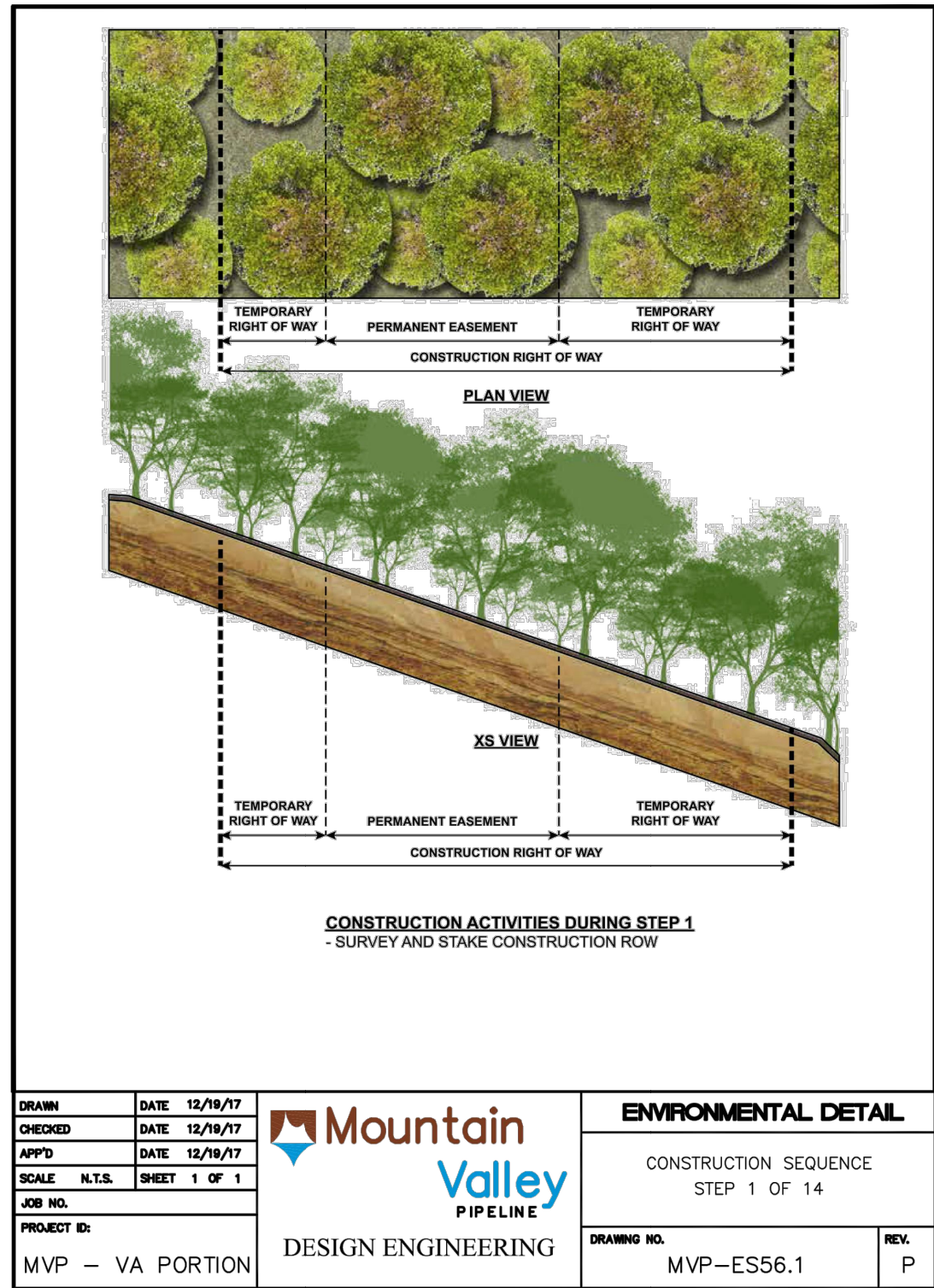
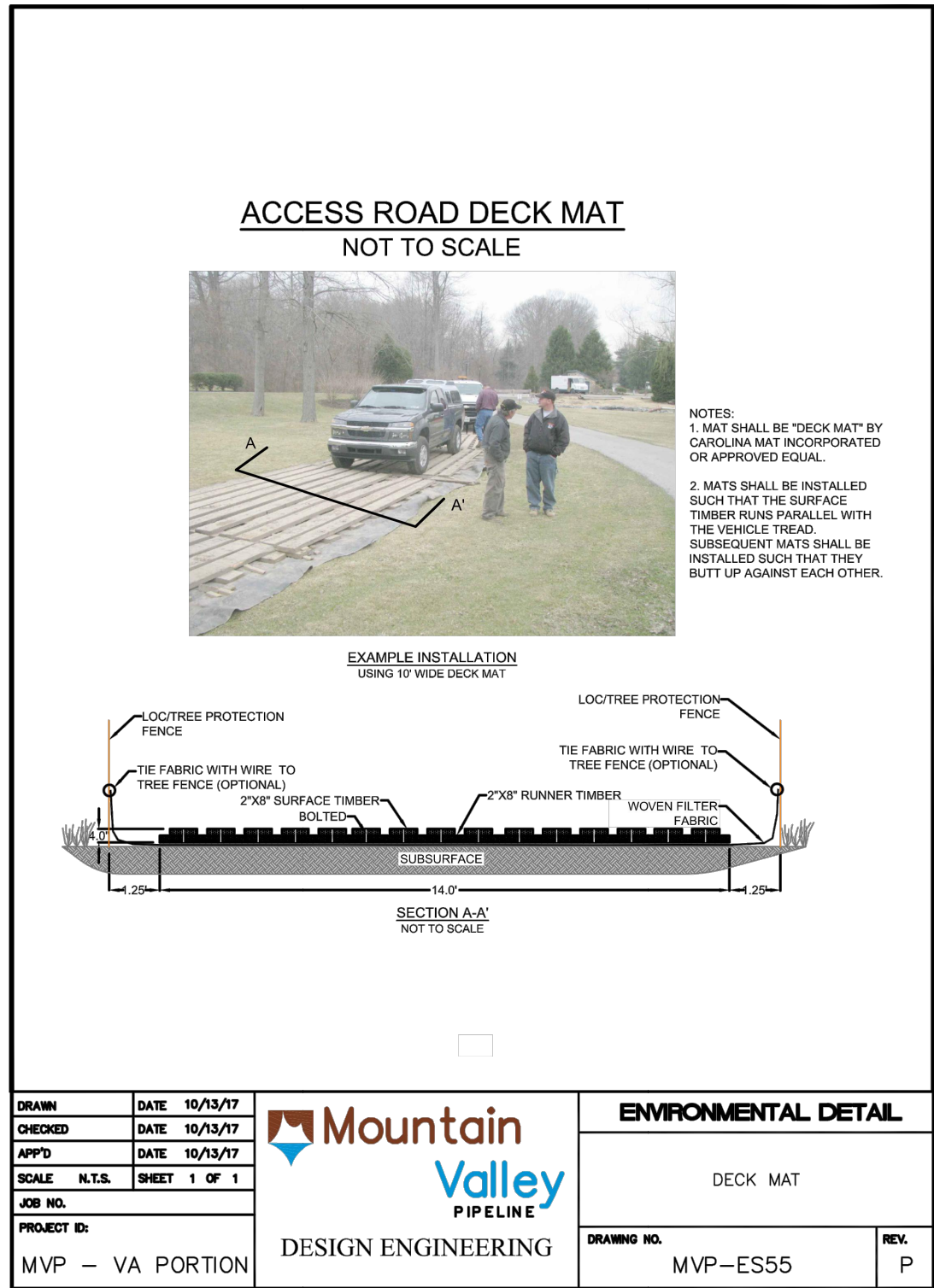


661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET



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



ADDED DETAILS FOR ROADS AND PADS		DW		RE	KAL	01/31/18
ADDRESS VADO COMMENTS		DW		RE	KAL	01/26/18
ADDRESS VADO COMMENTS		DW		RE	KAL	01/08/18
ADDRESS VADO COMMENTS		DW		RE	KAL	11/28/17
ADDRESS VADO COMMENTS		DW		RE	KAL	11/01/17
ADDRESS VADO COMMENTS		DW		RE	KAL	08/18/17
DESCRIPTION:		APPD:		NO.:		
DATE:		DWN:		NO.:		
REVISIONS:						
MOUNTAIN VALLEY PIPELINE, LLC 555 SOUTHPOINTE BOULEVARD, SUITE 200 CANONSBURG, PA 15317						

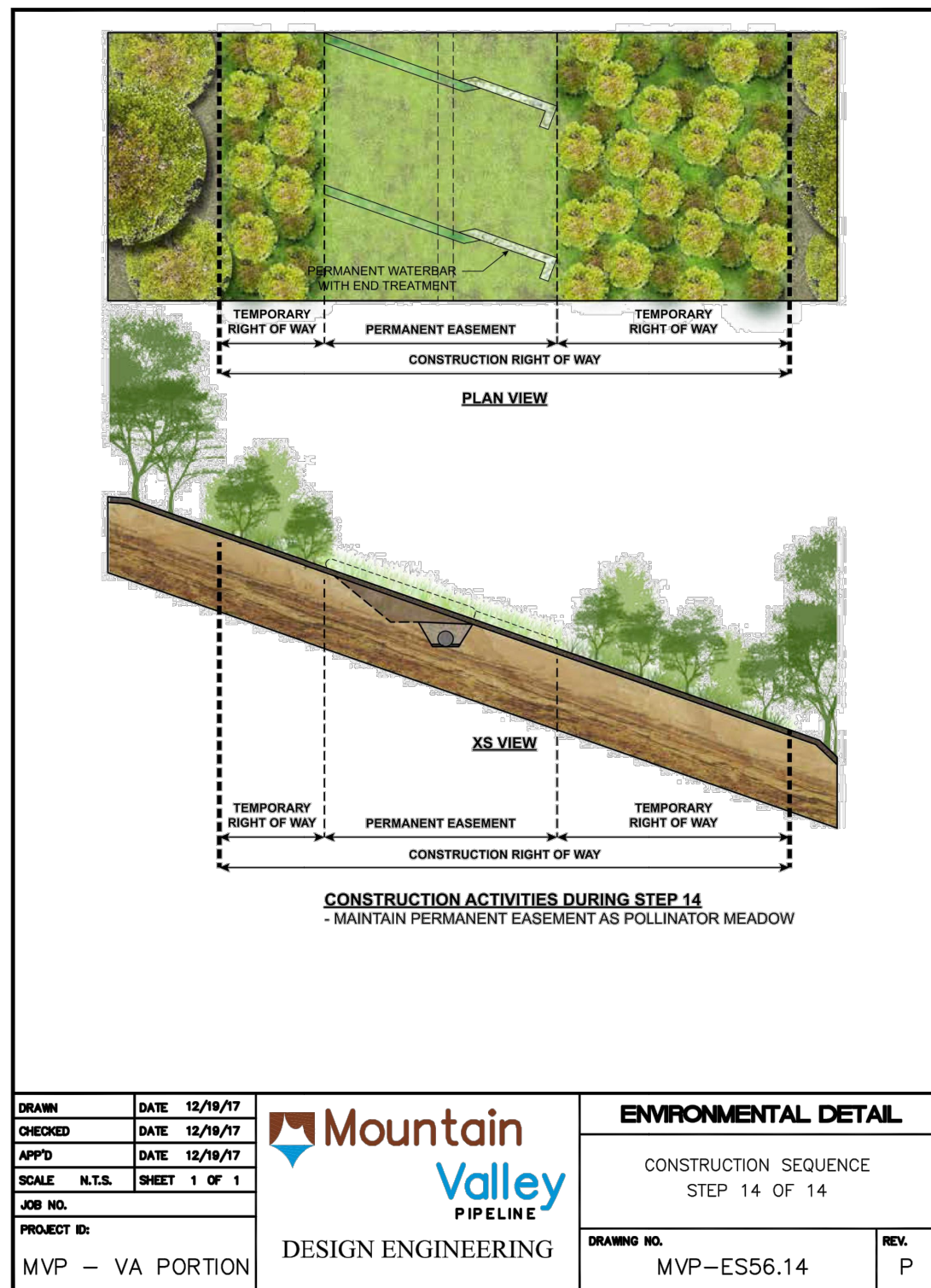
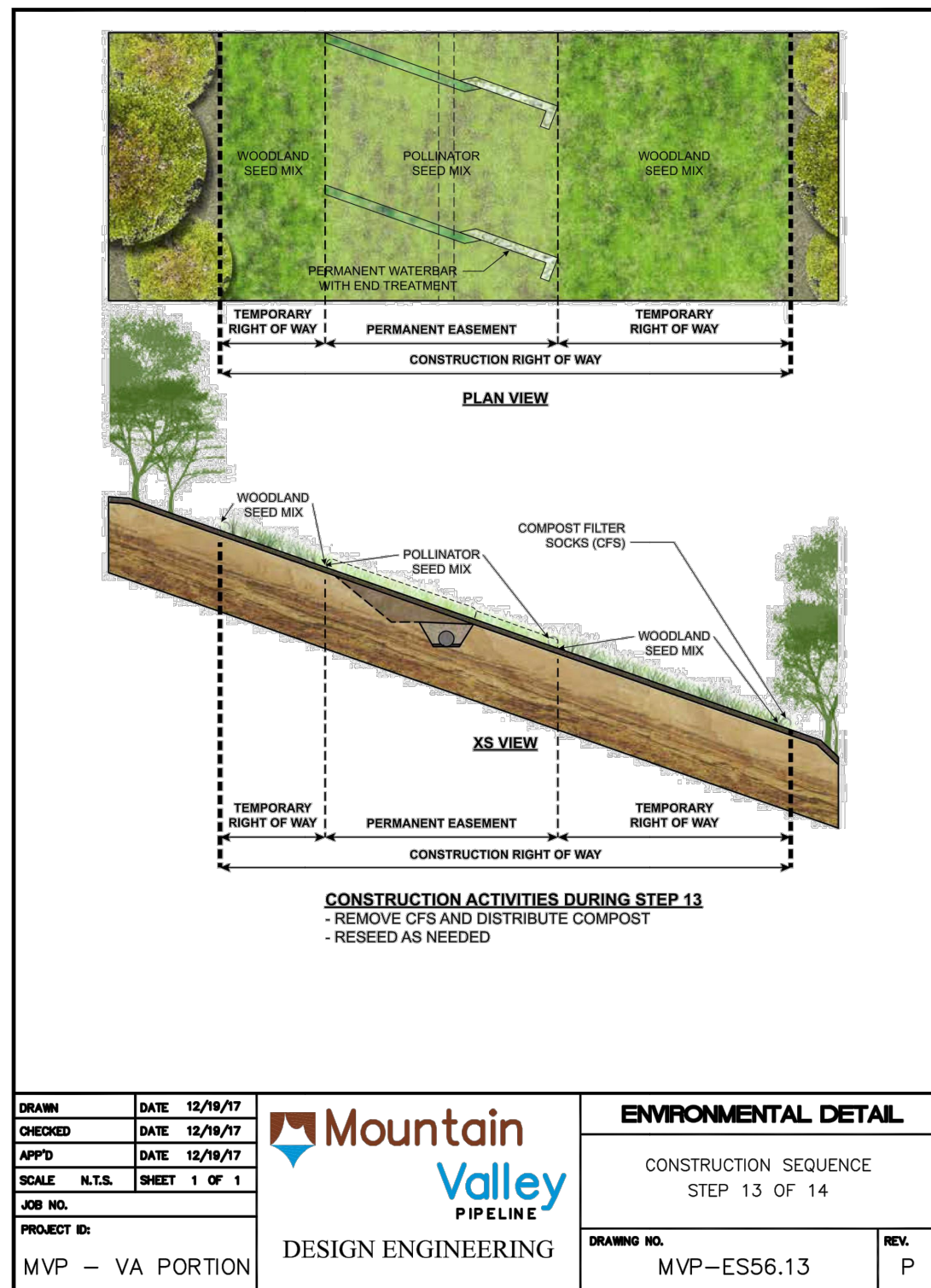
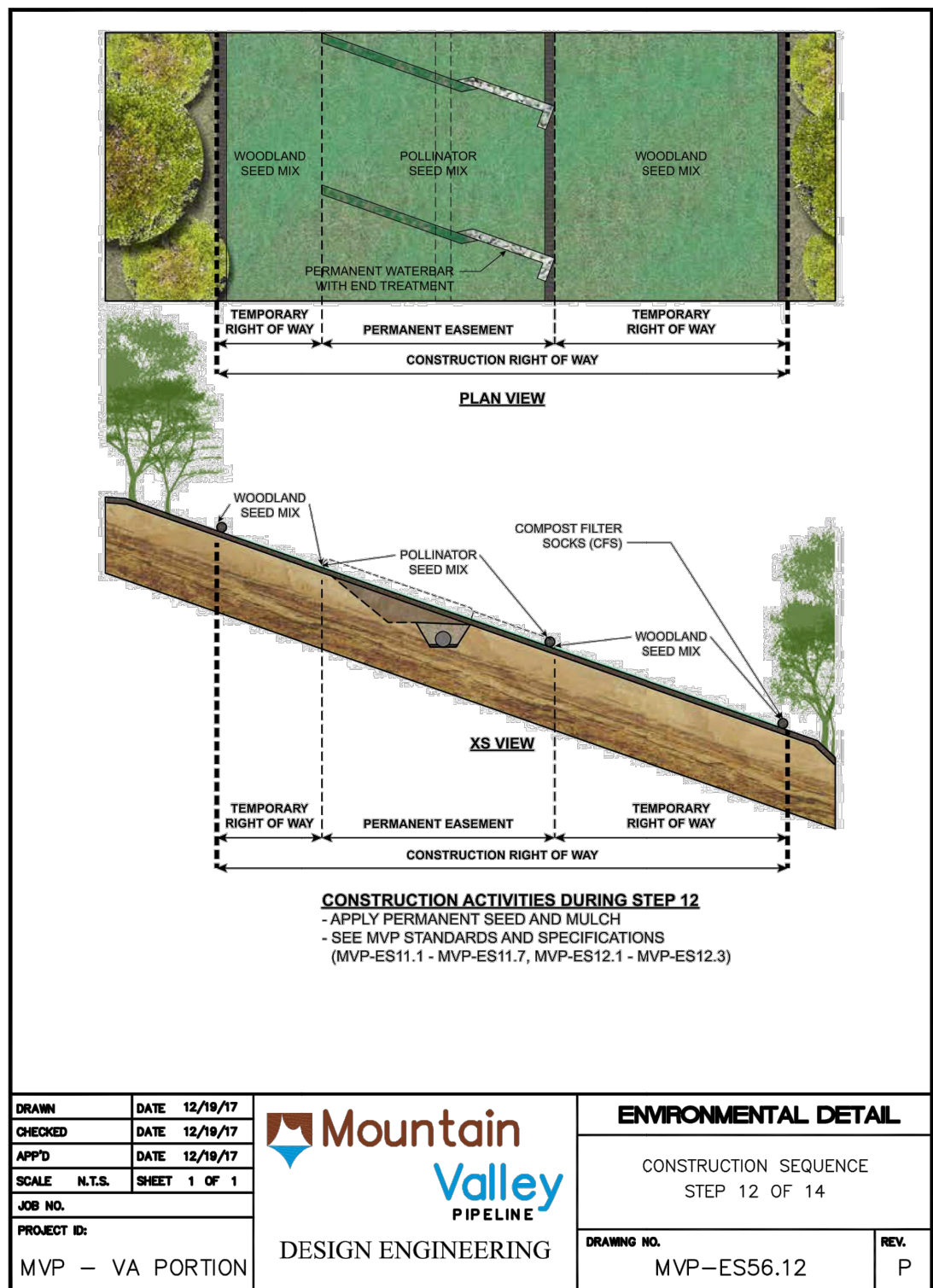
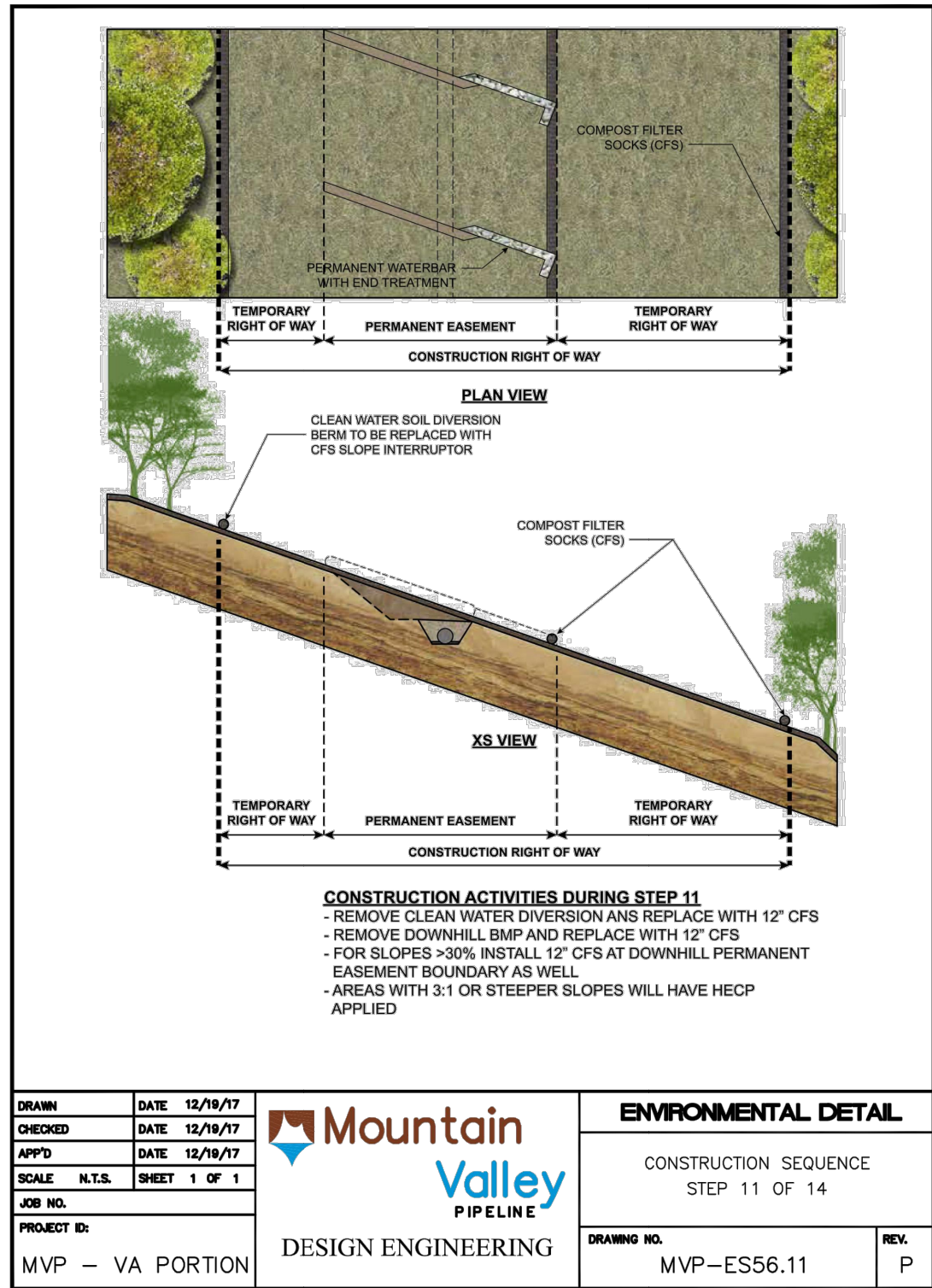
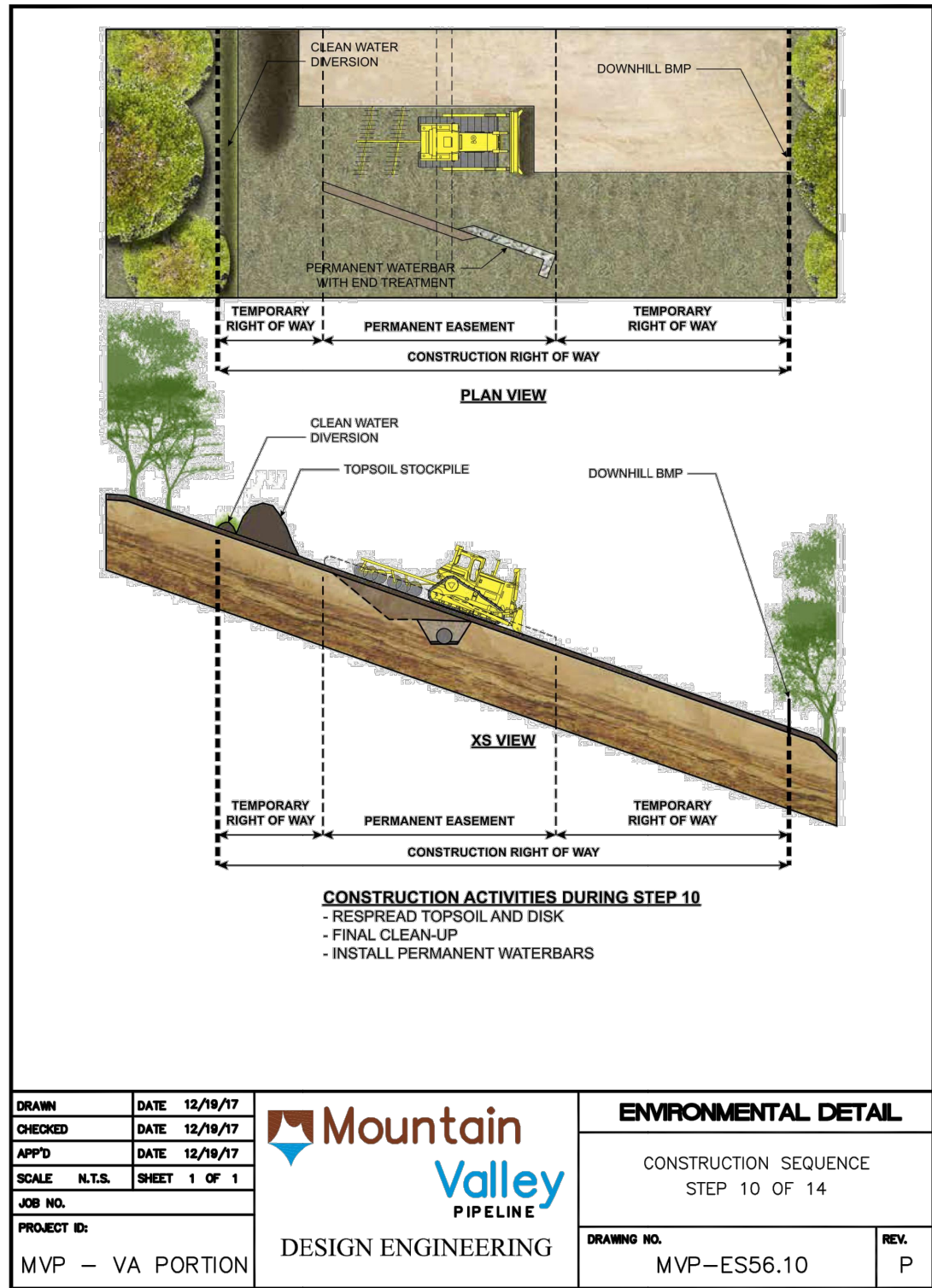
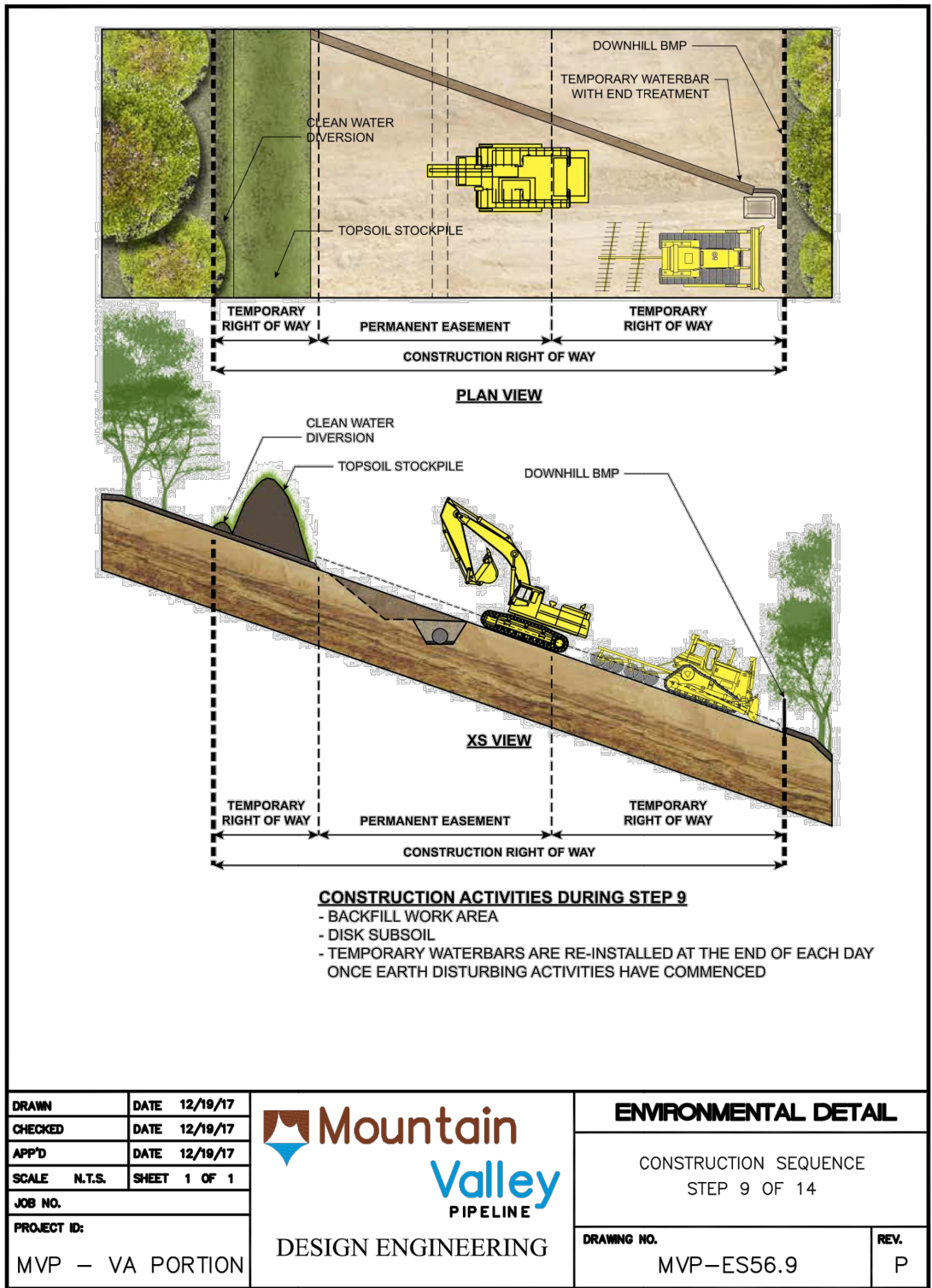
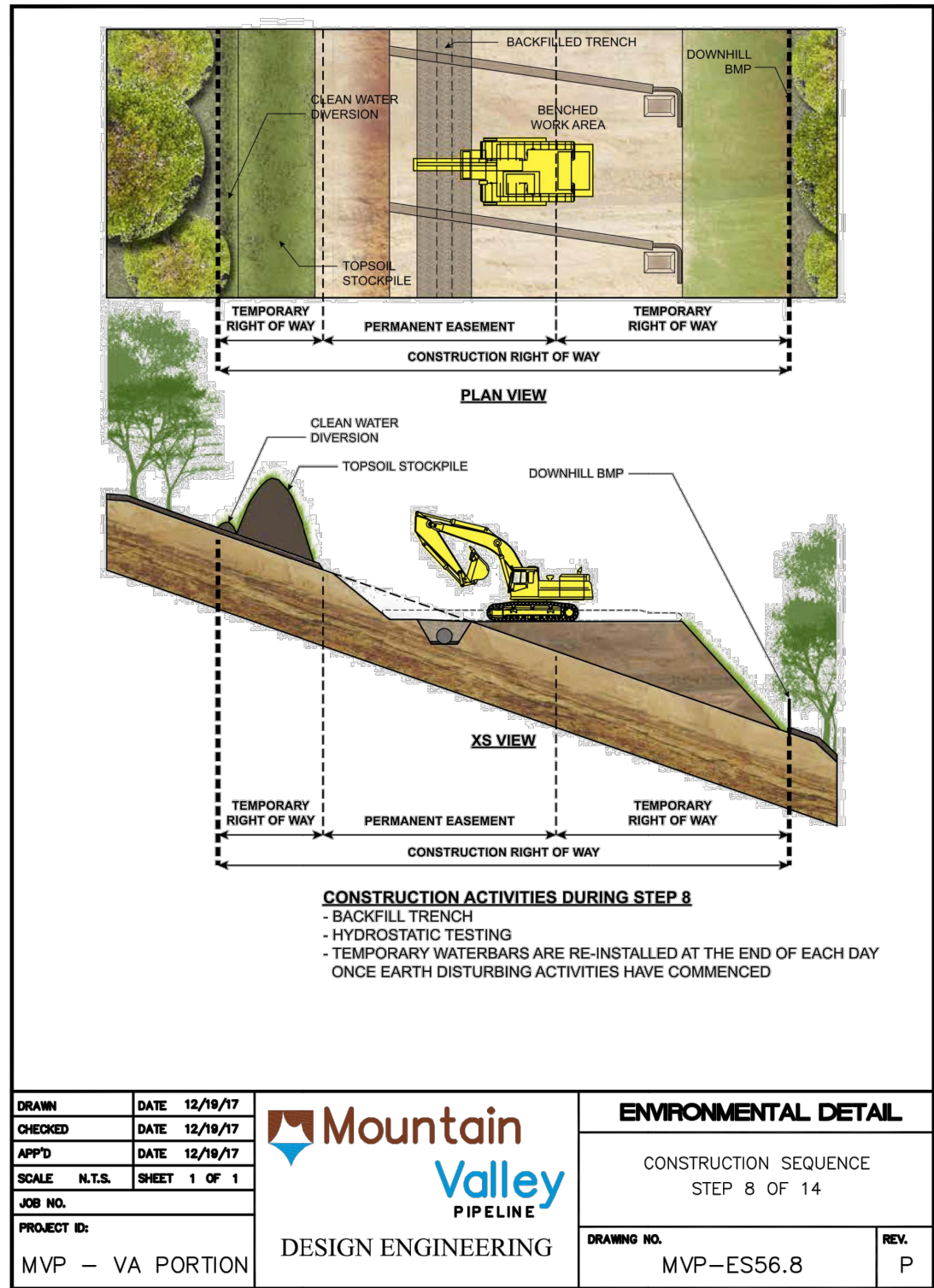
EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE

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661 ANDERSEN DRIVE
FOSTER PLAZA 7
PITTSBURGH, PA 15220

GENERAL DETAILS SET

DAVID J. WALLNER
Lic. No. 0402057593
Professional Engineer
State of Pennsylvania

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



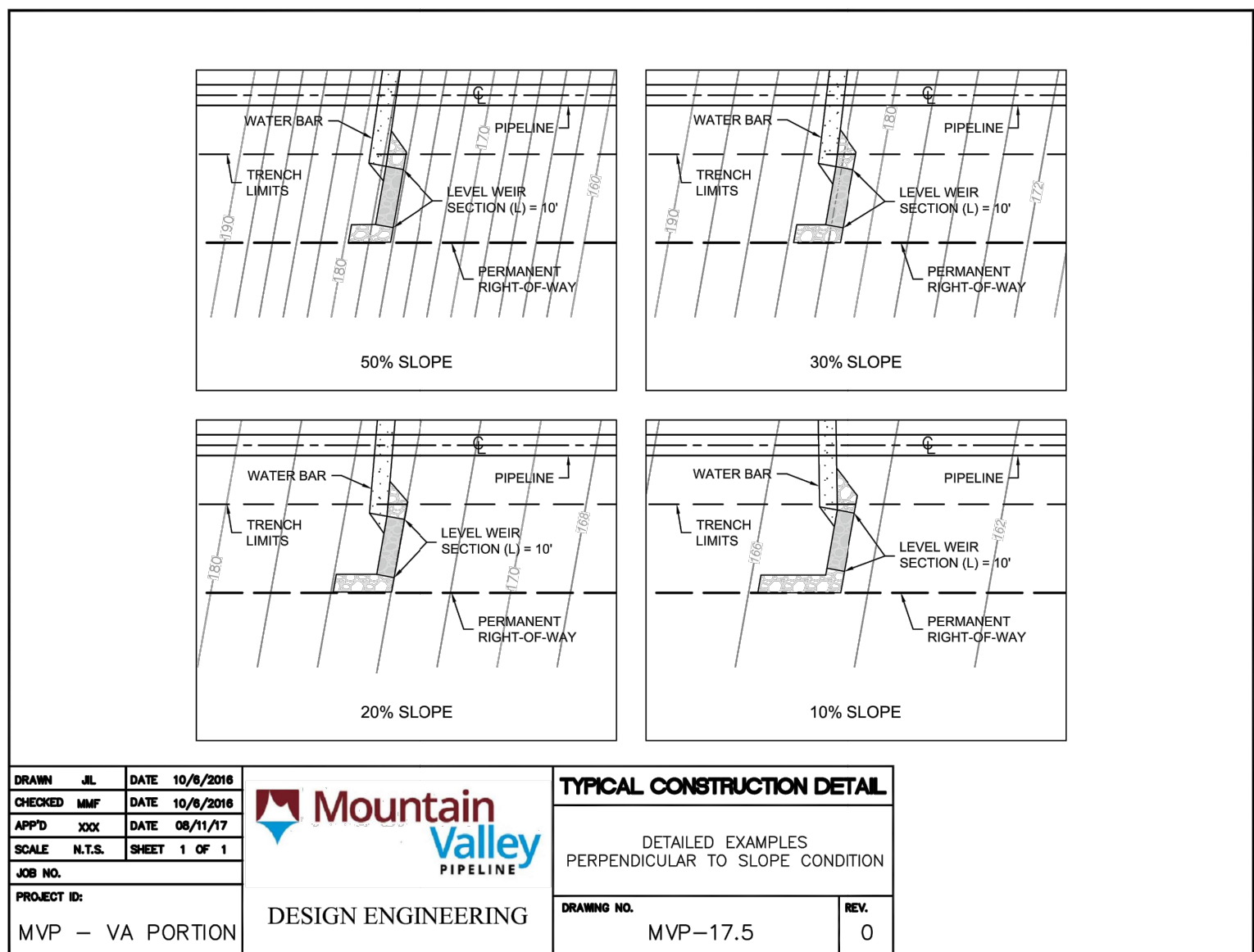
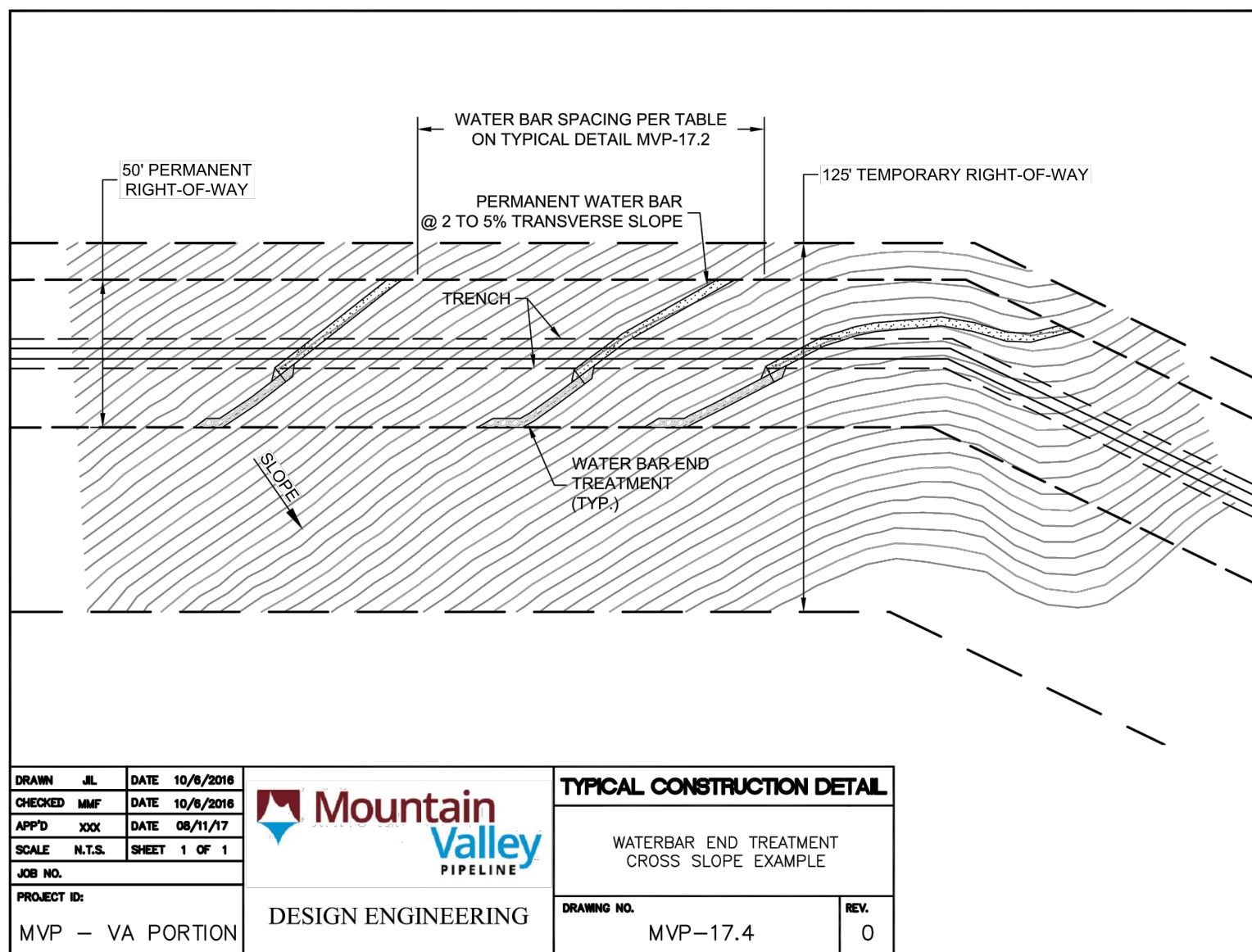
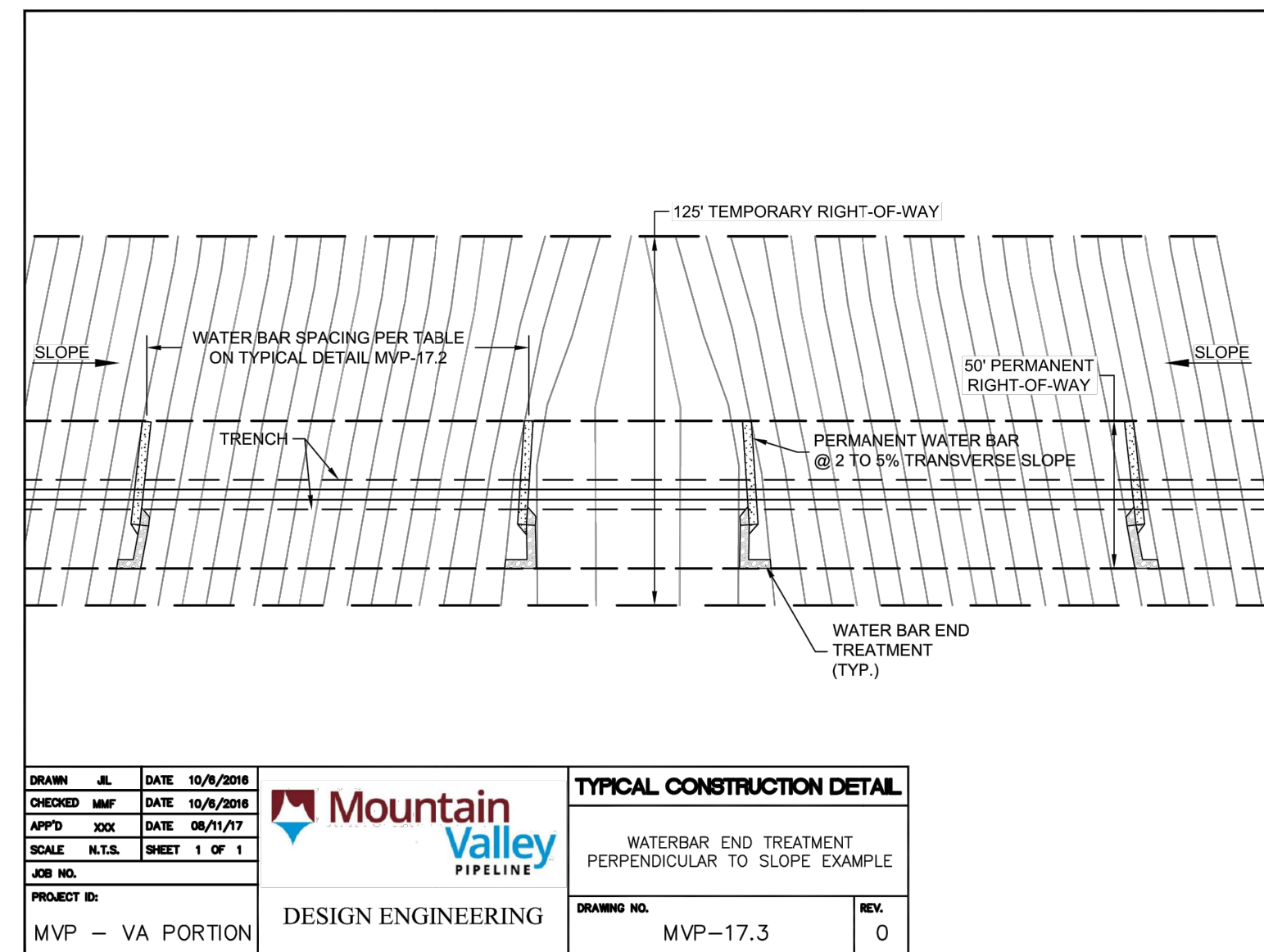
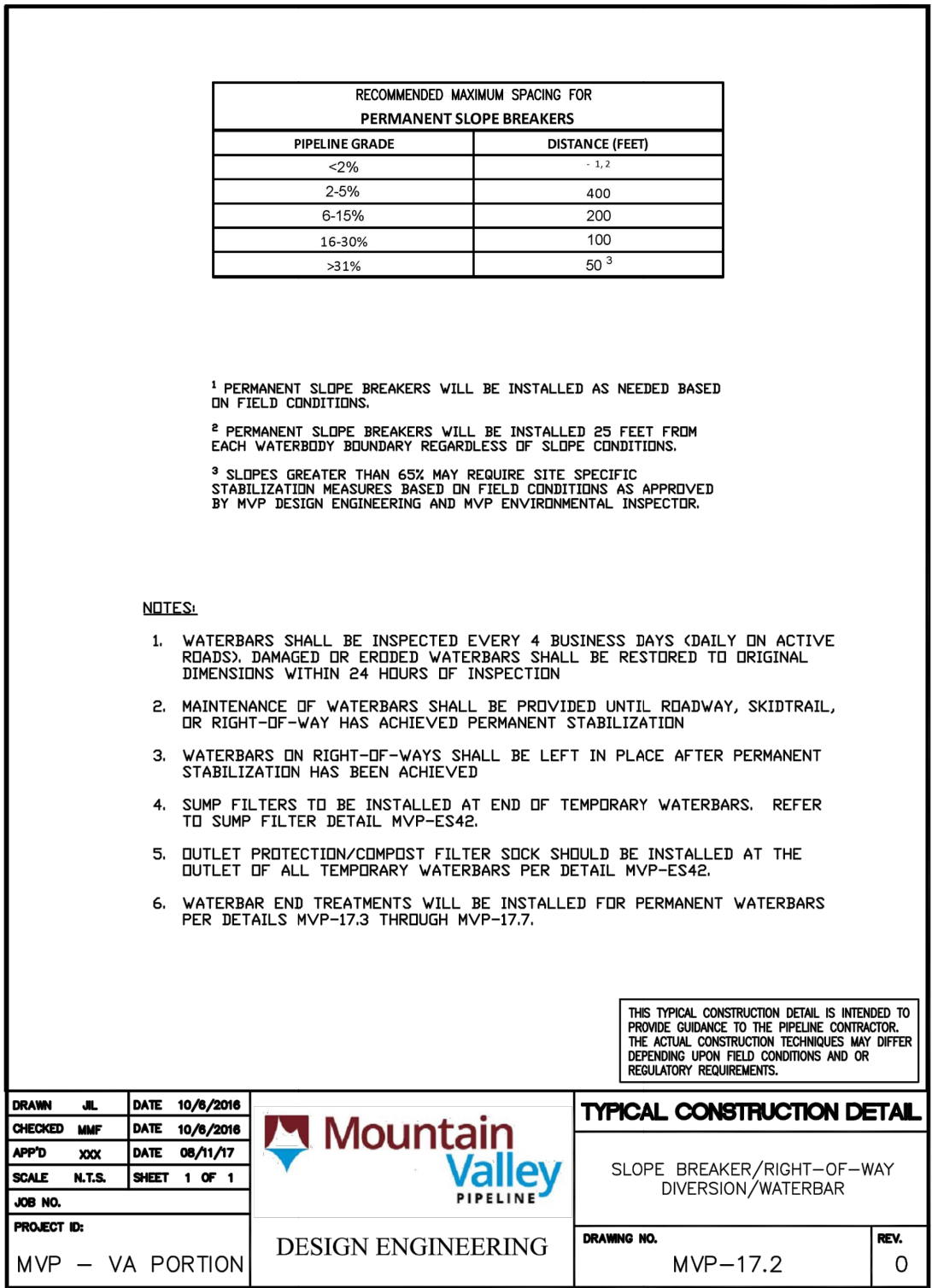
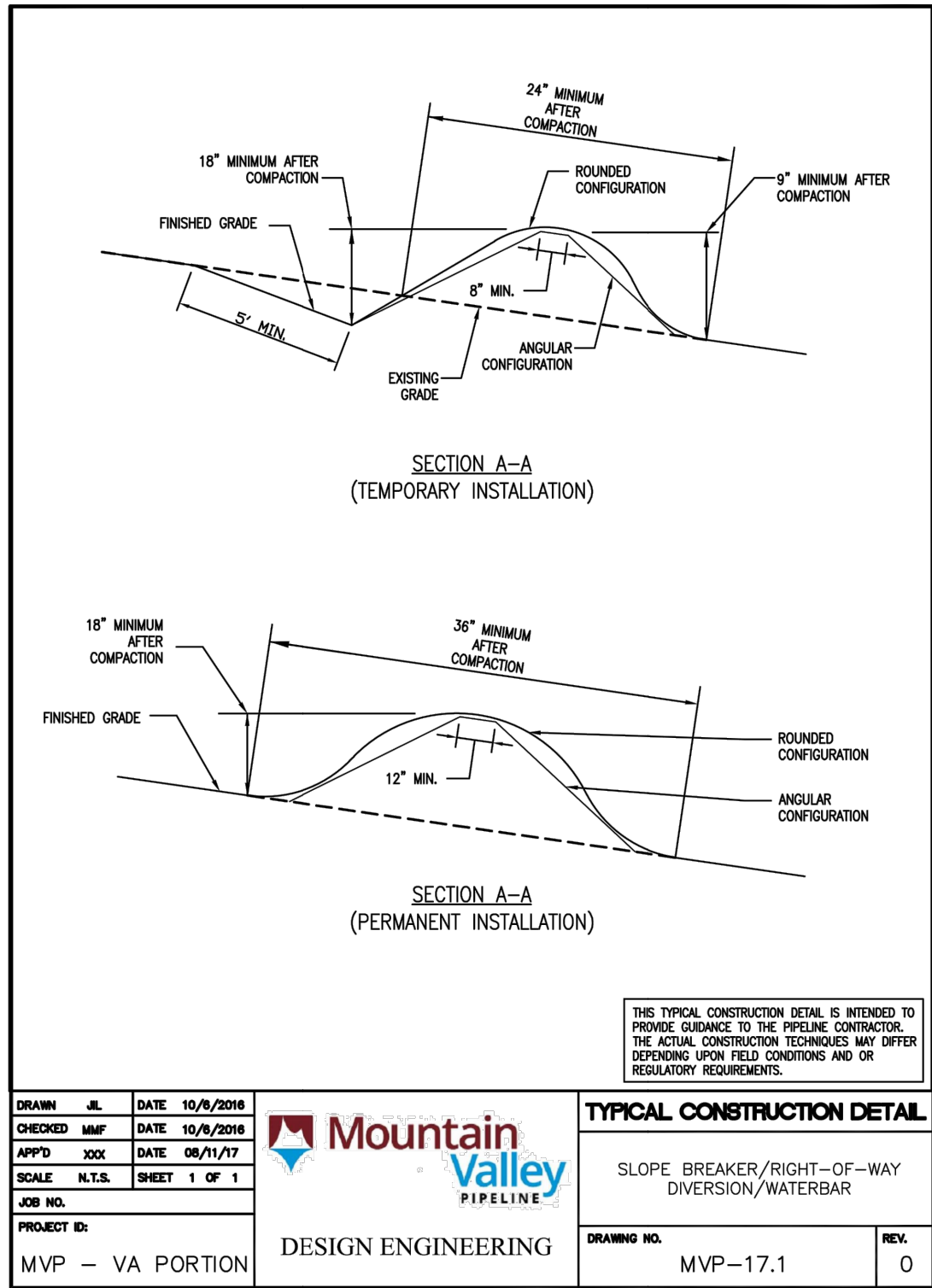
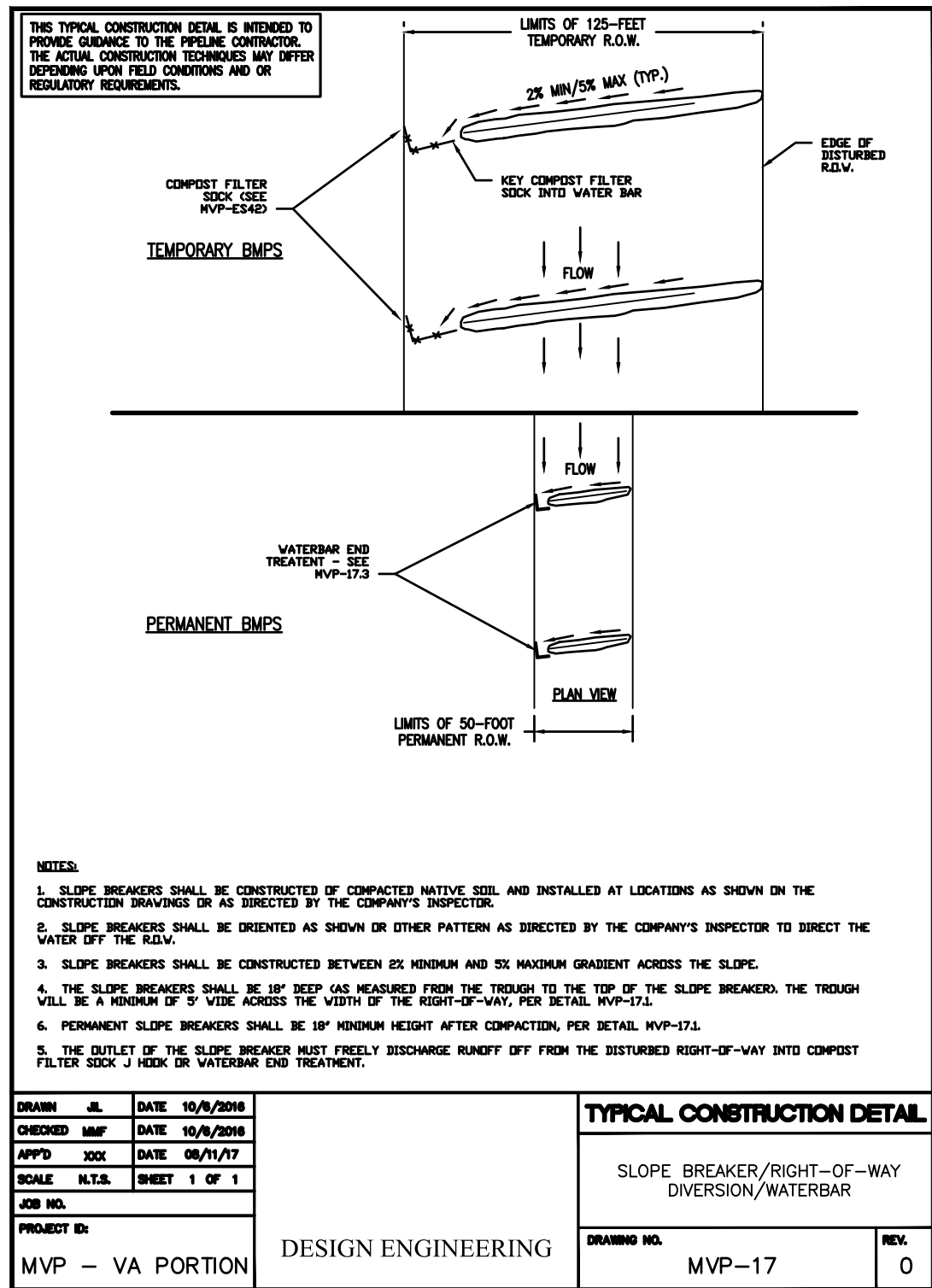
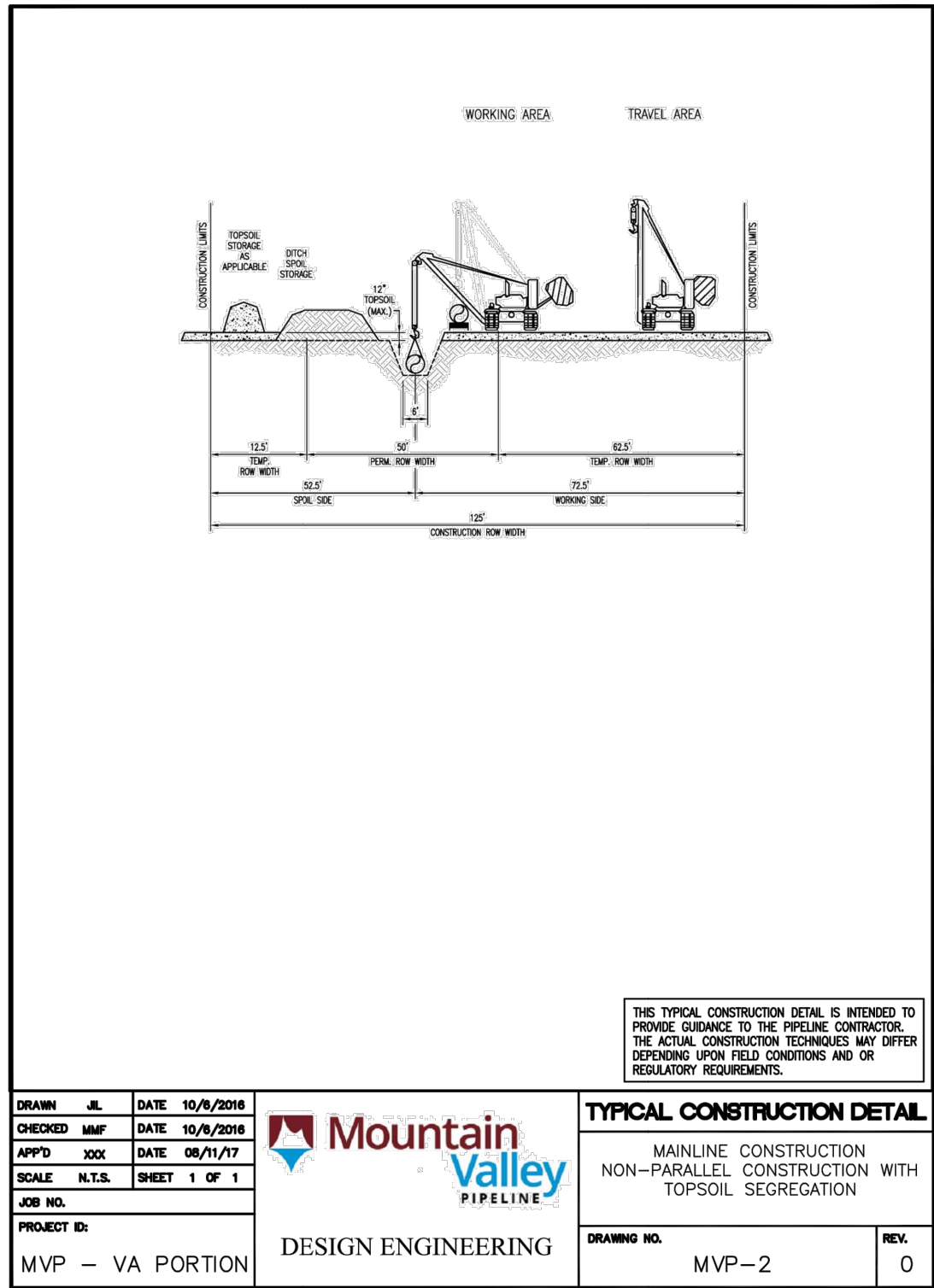
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6	01/26/18	KAL	RE	DW	RE	DW	RE	DW	RE	DW	RE		
5	01/08/18	KAL	RE	DW	RE	DW	RE	DW	RE	DW	RE		
4	11/28/17	KAL	RE	DW	RE	DW	RE	DW	RE	DW	RE		
3	11/01/17	KAL	RE	DW	RE	DW	RE	DW	RE	DW	RE		
2	08/18/17	KAL	RE	DW	RE	DW	RE	DW	RE	DW	RE		
NO.	DATE	DW	RE	DW	RE	DW	RE	DW	RE	DW	RE	CHD.	APPD.
REVISIONS:													

MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		MOUNTAIN VALLEY PIPELINE, LLC	
EROSION AND SEDIMENT CONTROL PLANS		555 SOUTHPOINTE BOULEVARD, SUITE 200	
MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		CANONSBURG, PA 15317	

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

GENERAL DETAILS SET	
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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	



ADDED DETAILS FOR ROADS AND PADS		ADDRESS VADO COMMENTS		ADDRESS VADO COMMENTS		ADDRESS VADO COMMENTS		ADDRESS VADO COMMENTS		ADDRESS VADO COMMENTS		DESCRIPTION											
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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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GENERAL DETAILS SET

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. 0.17 OF 0.23



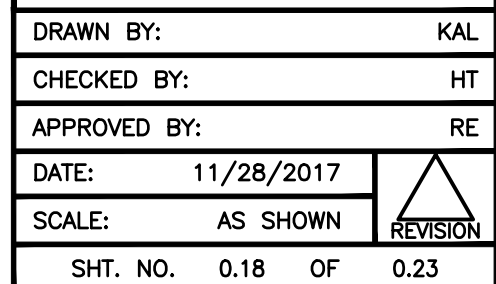
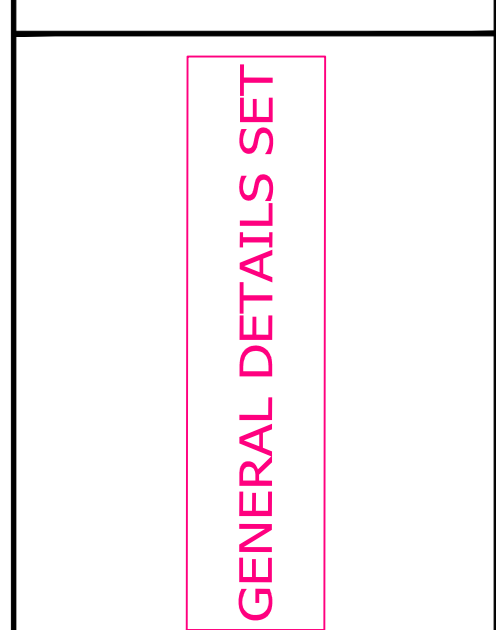


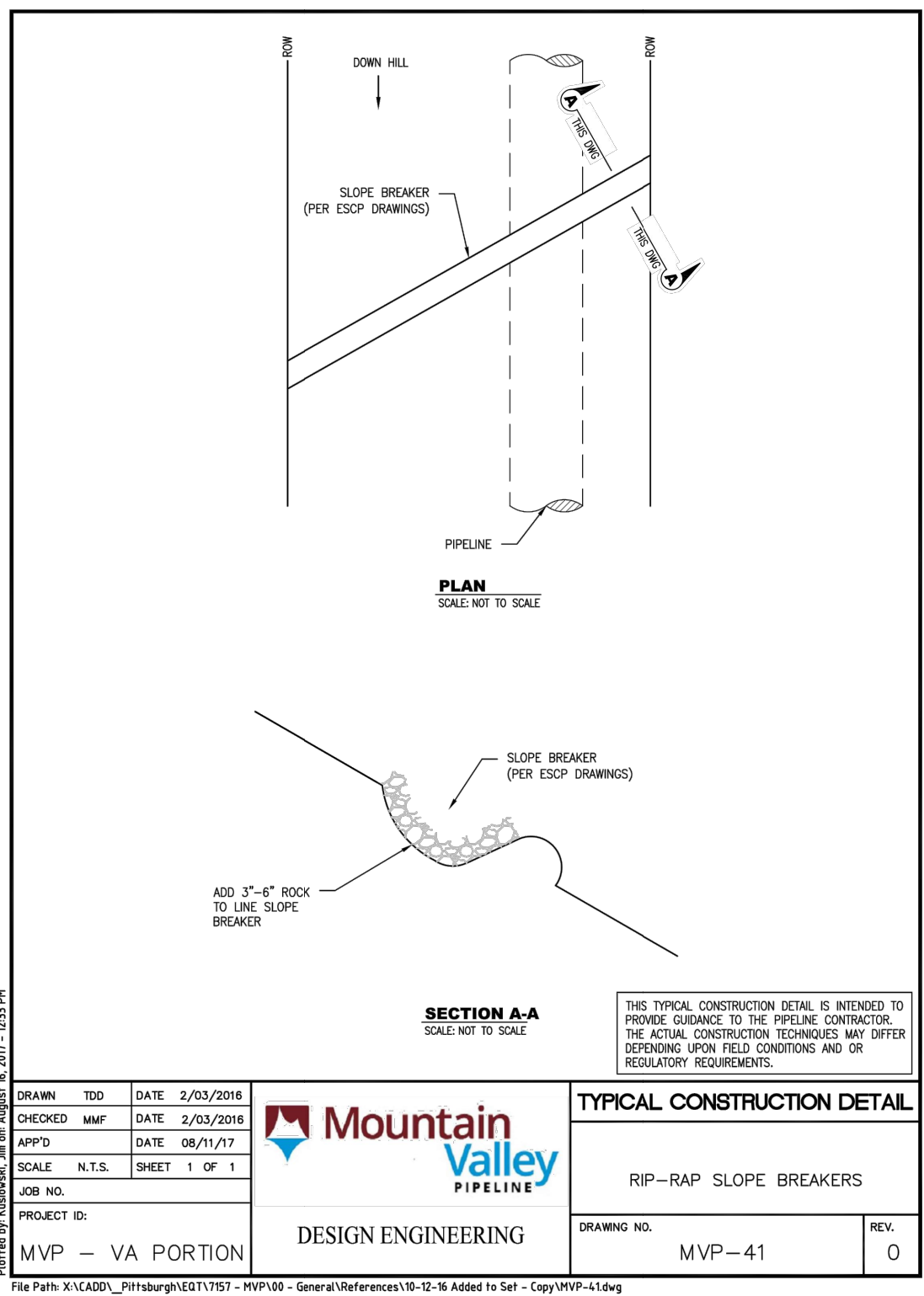
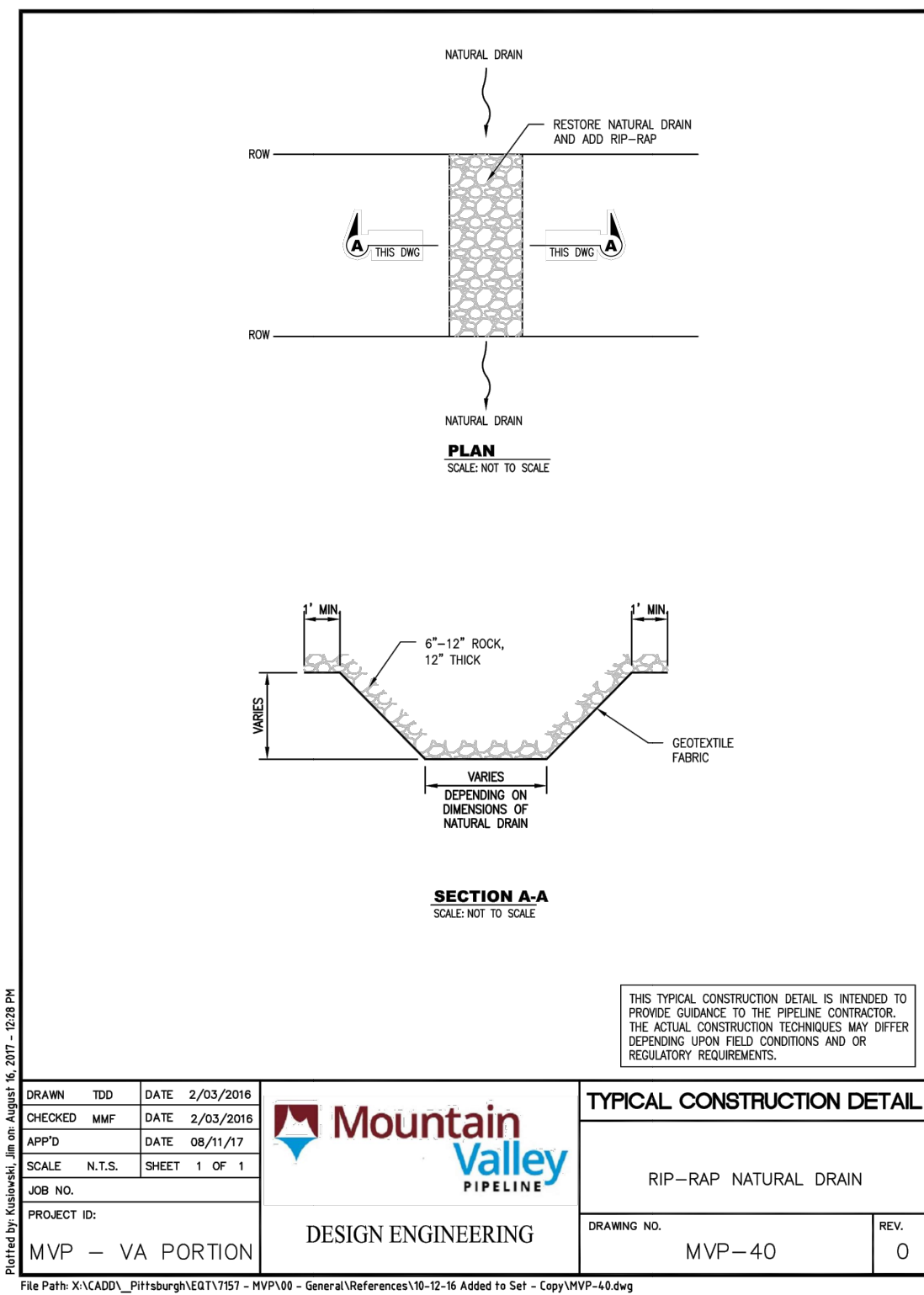
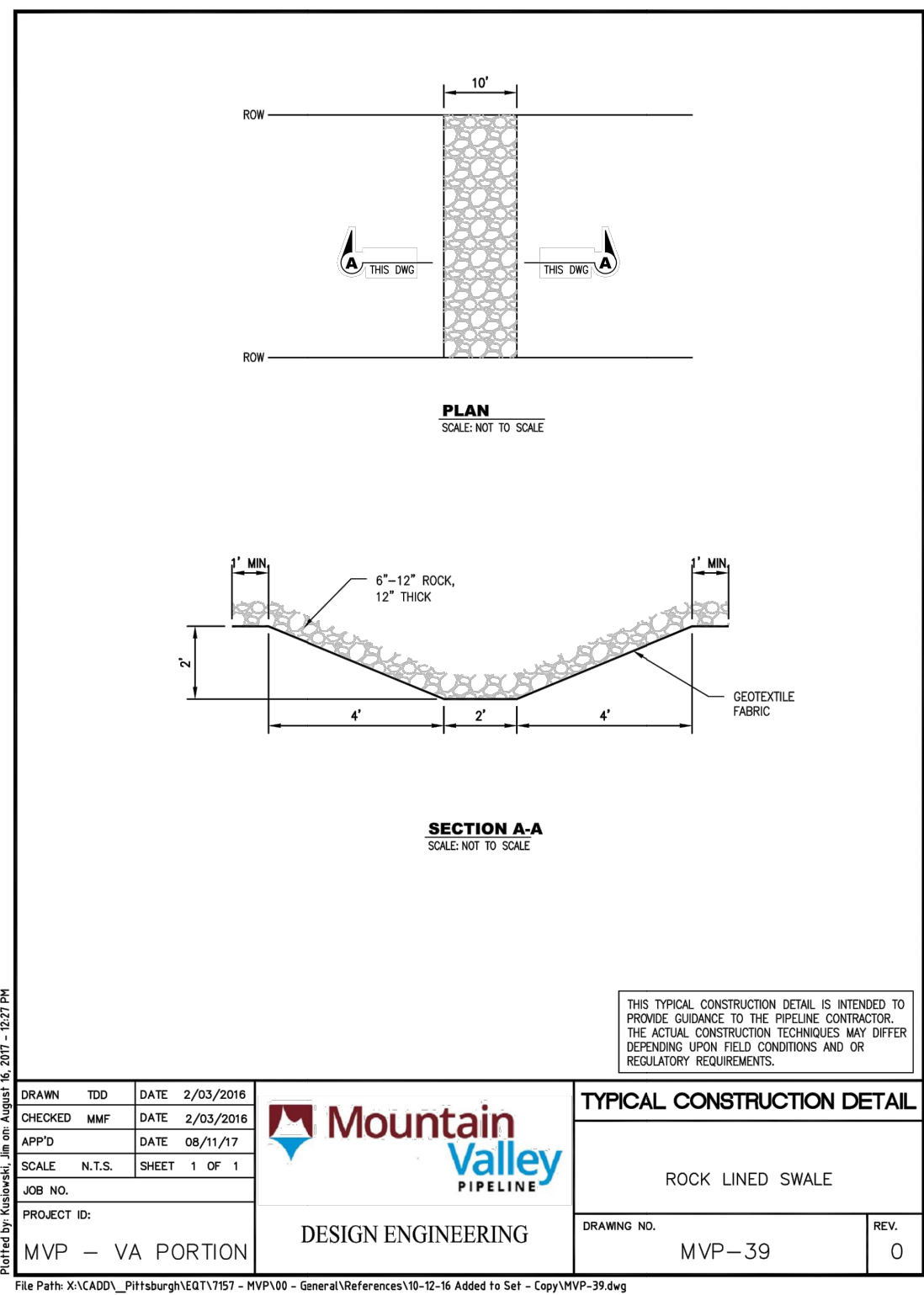
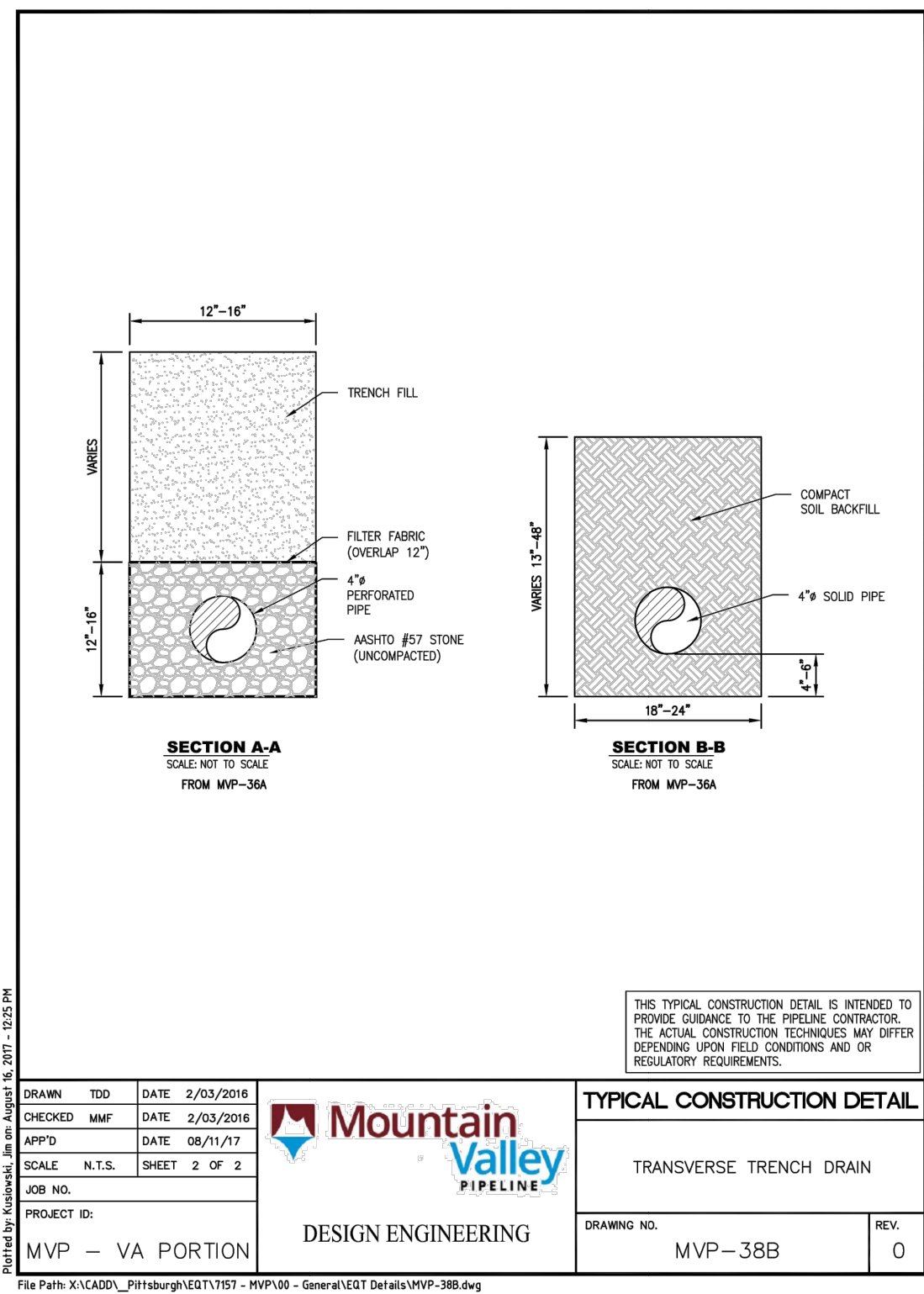
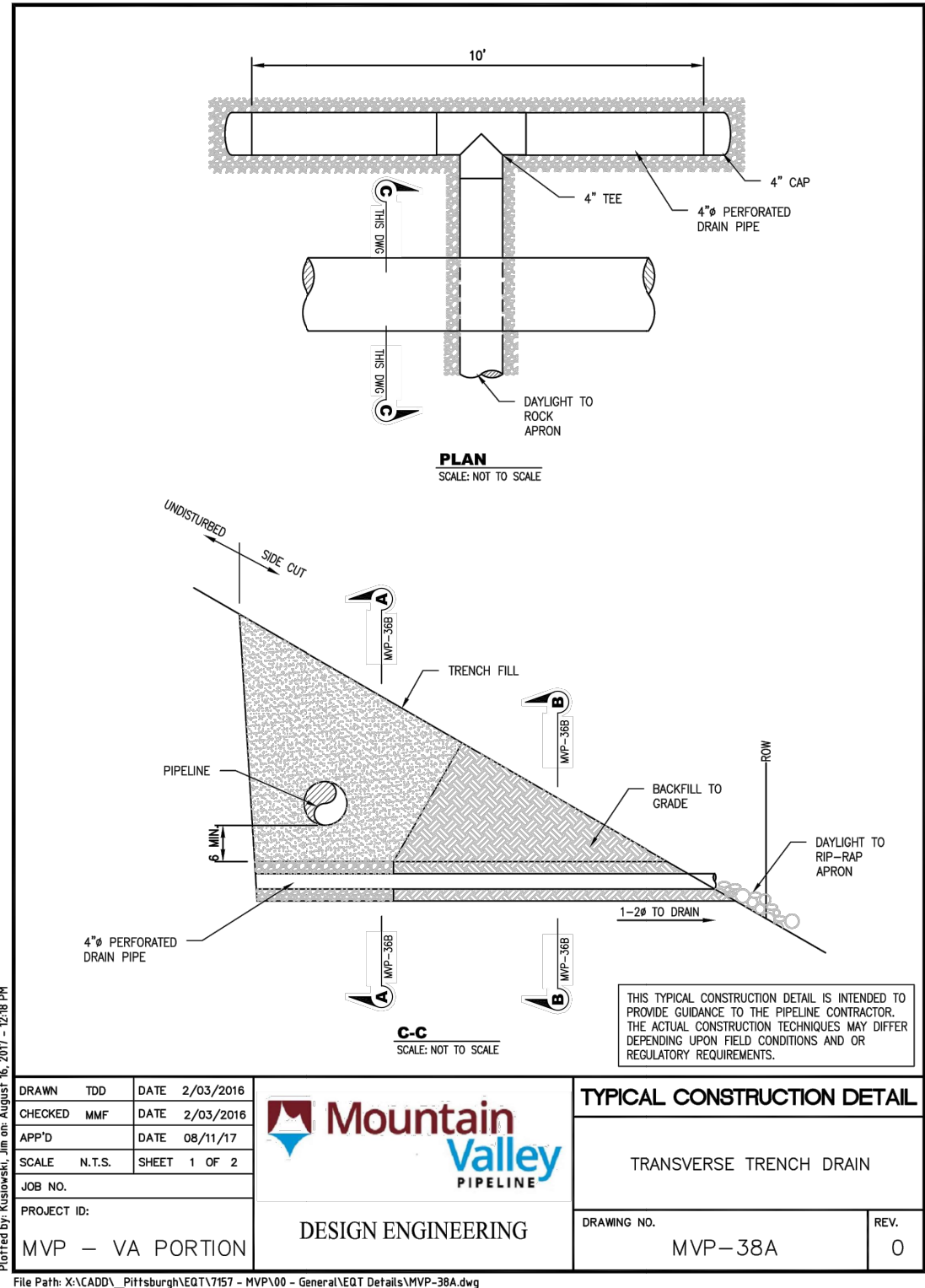
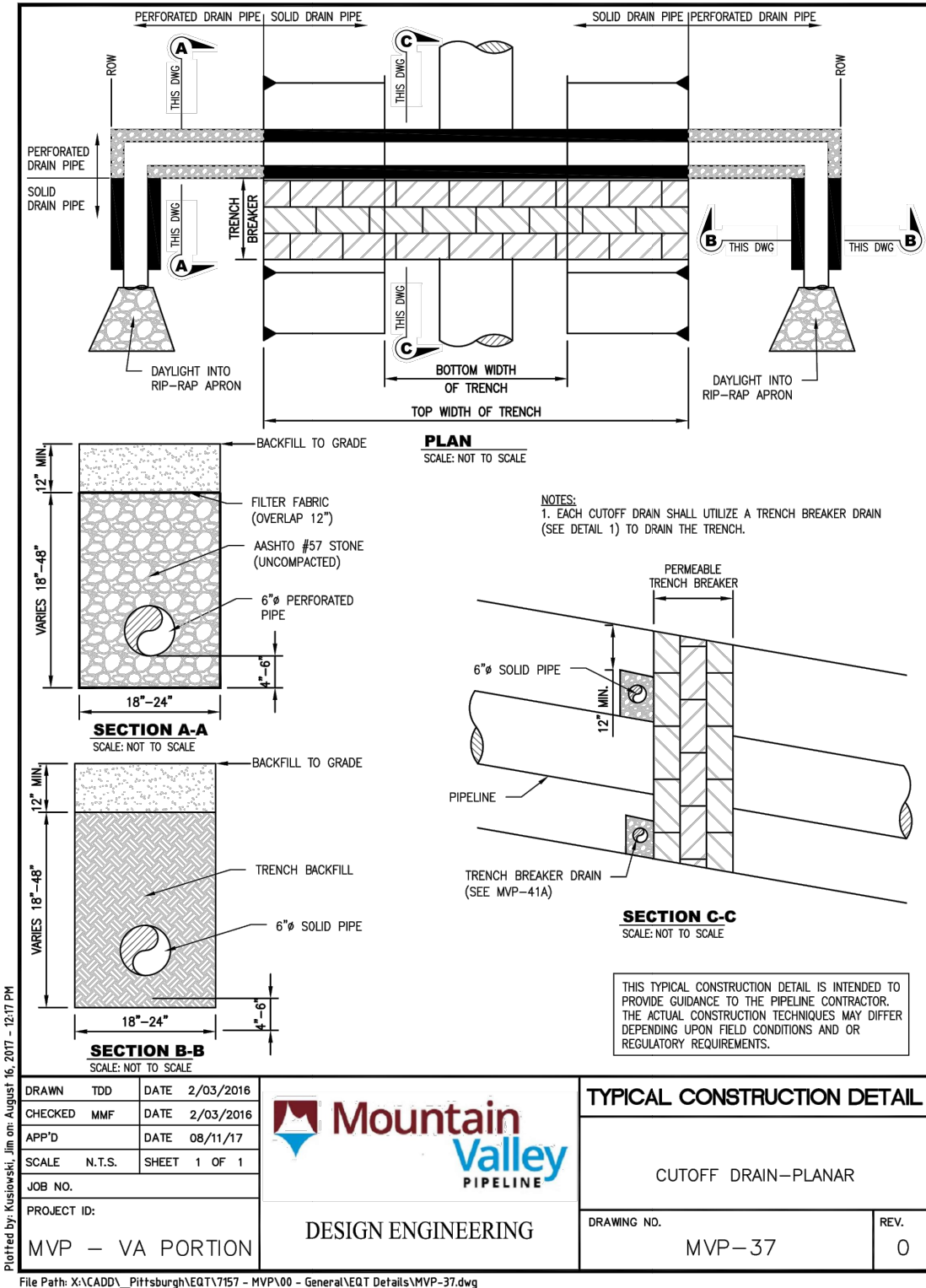
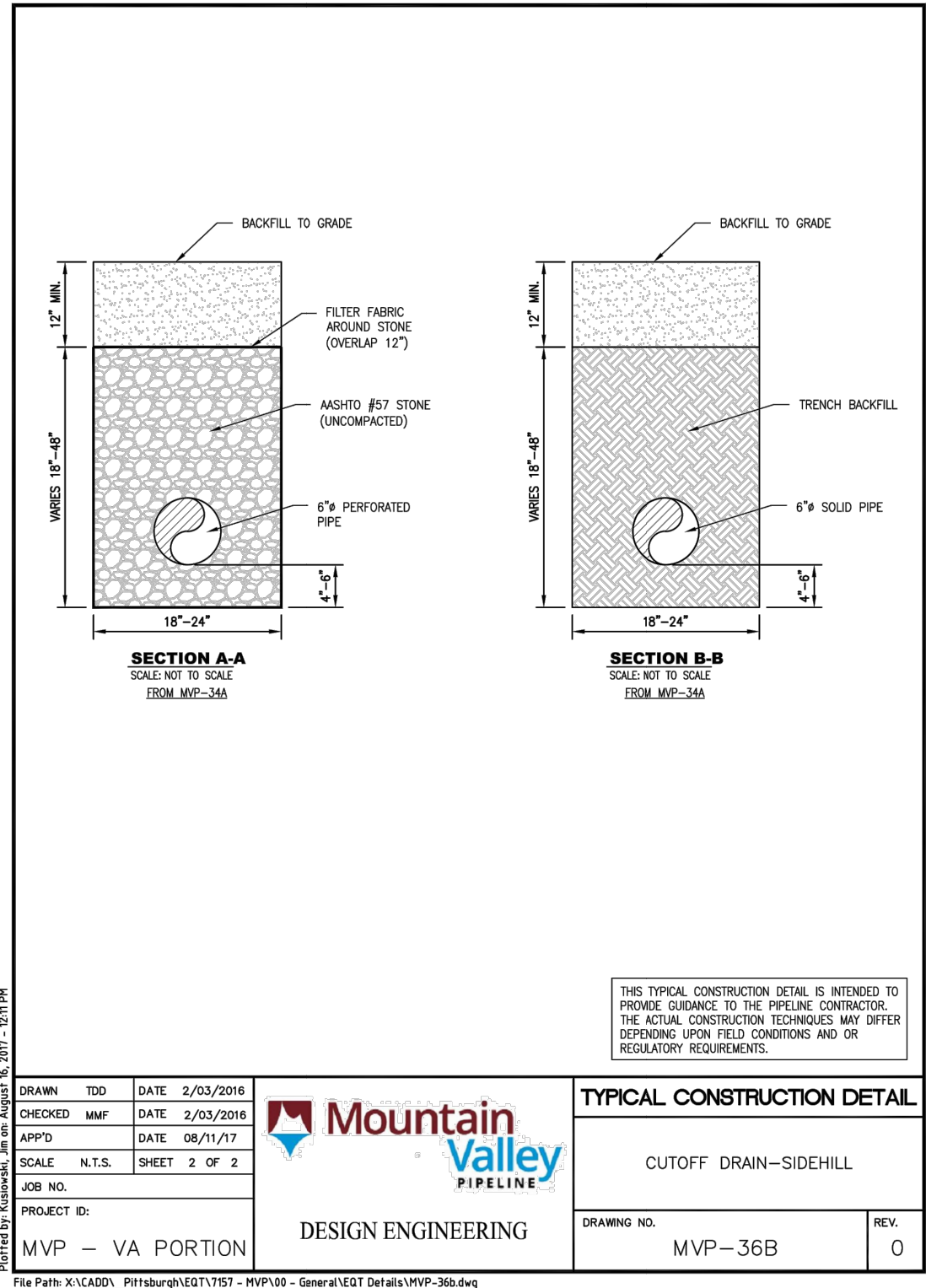
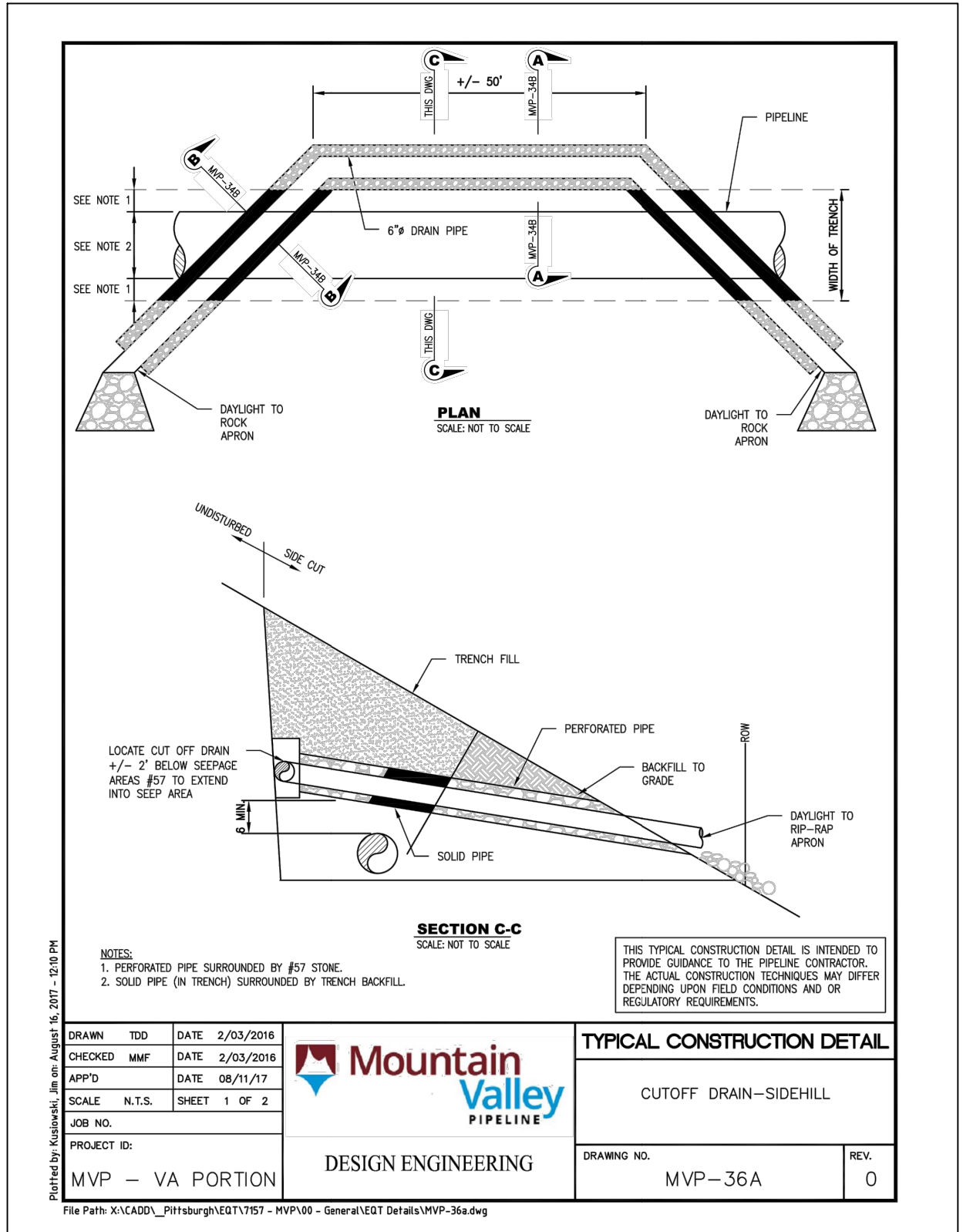
Mountain Valley

PIPELINE

EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE



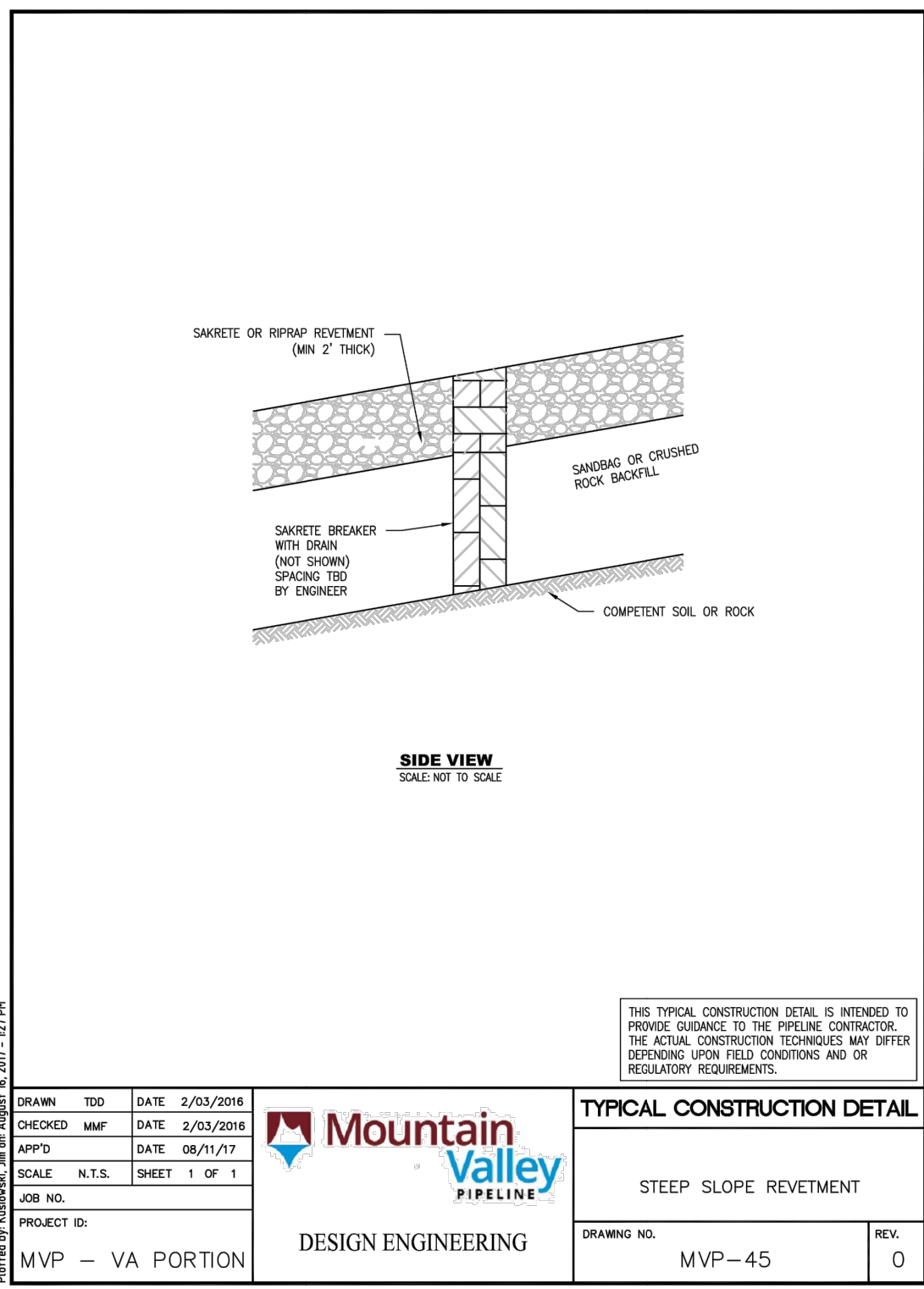
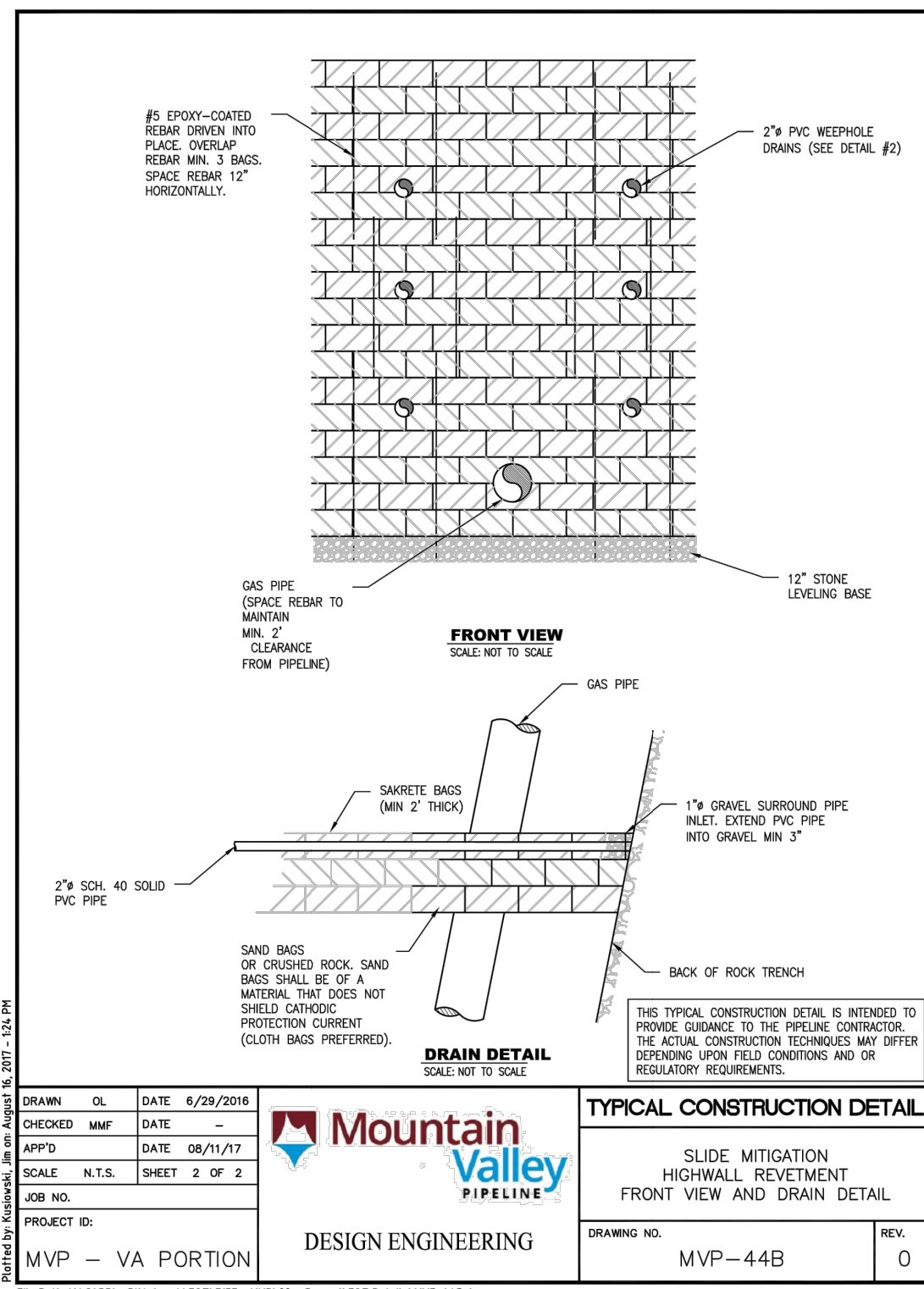
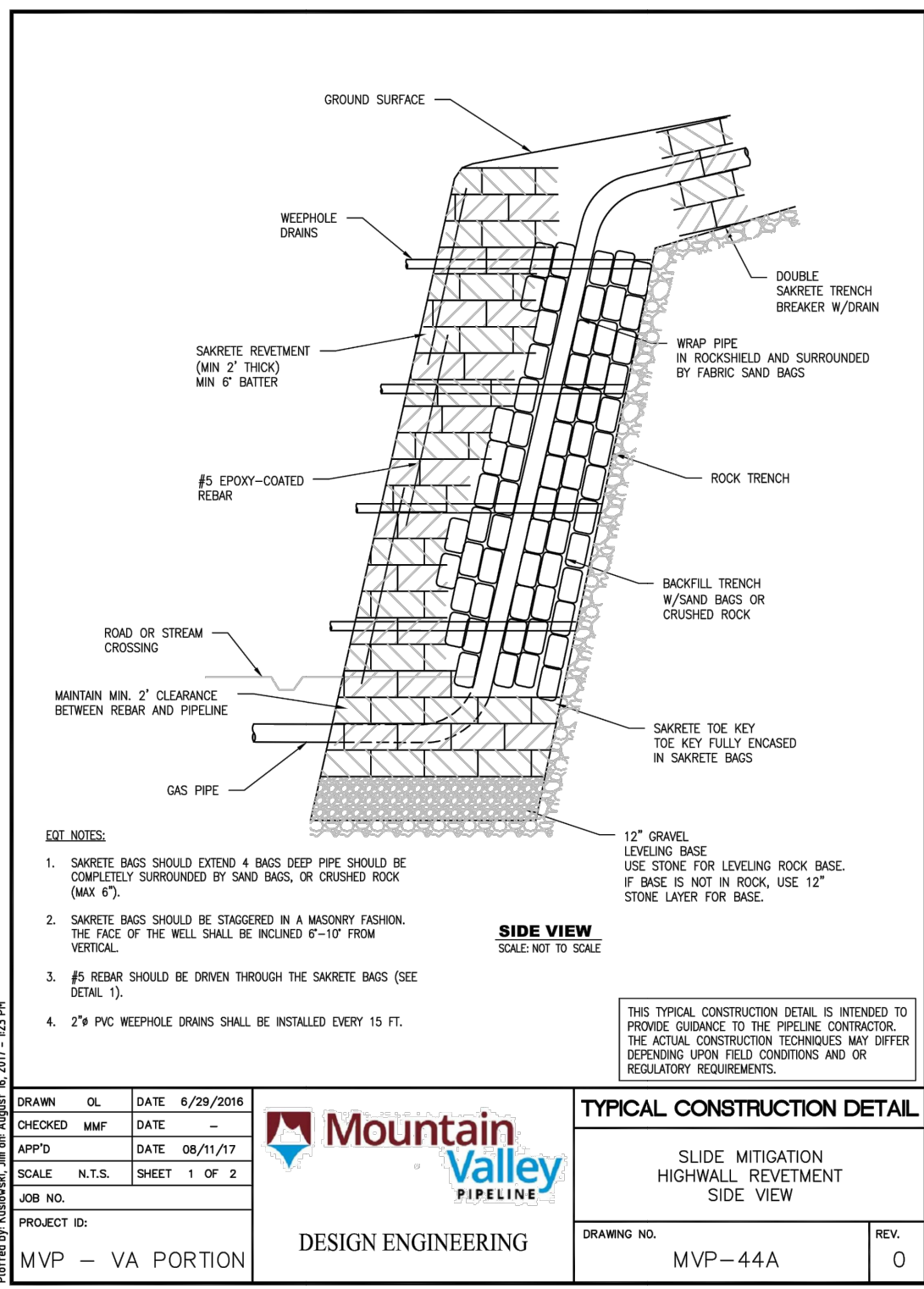
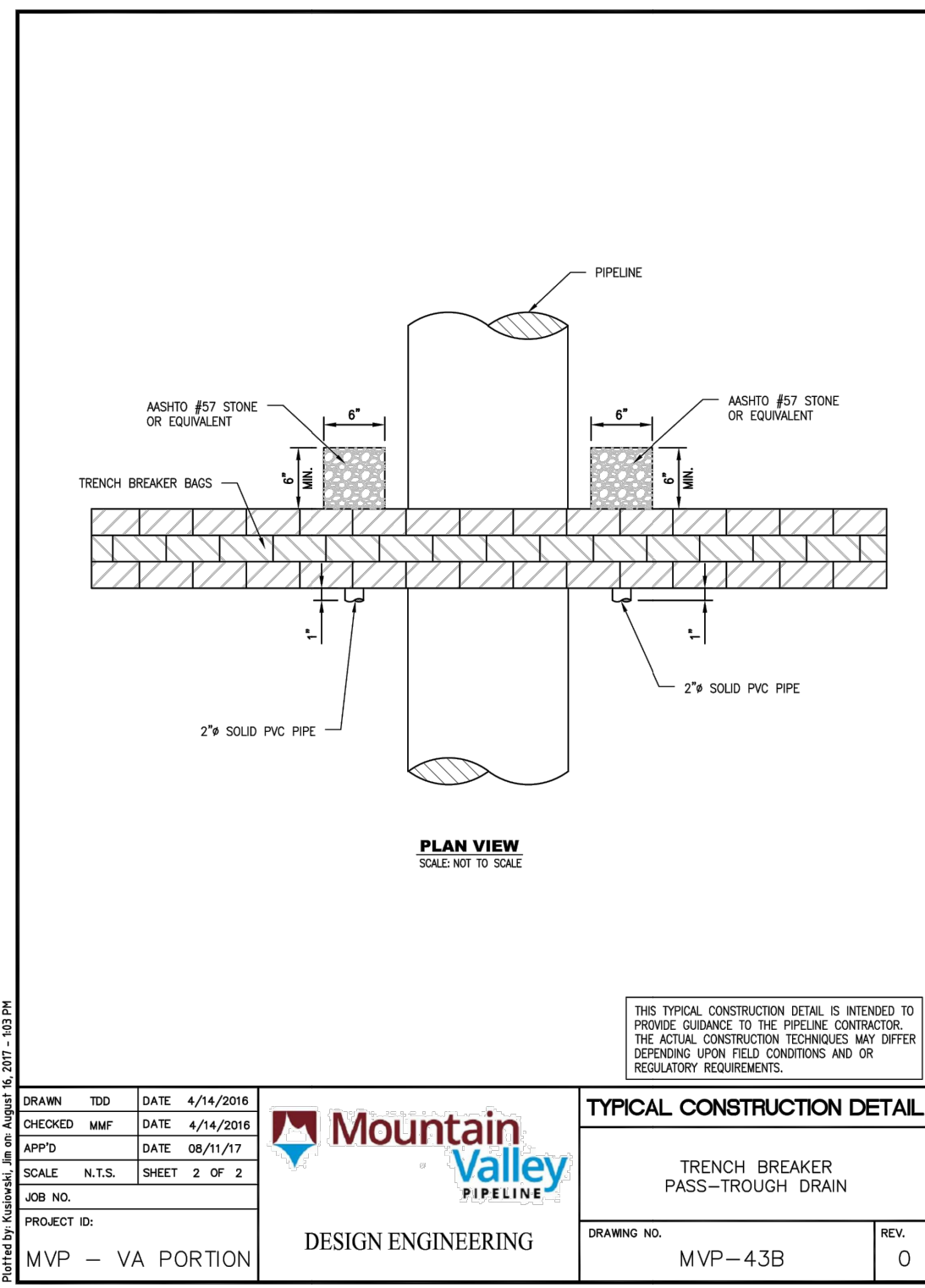
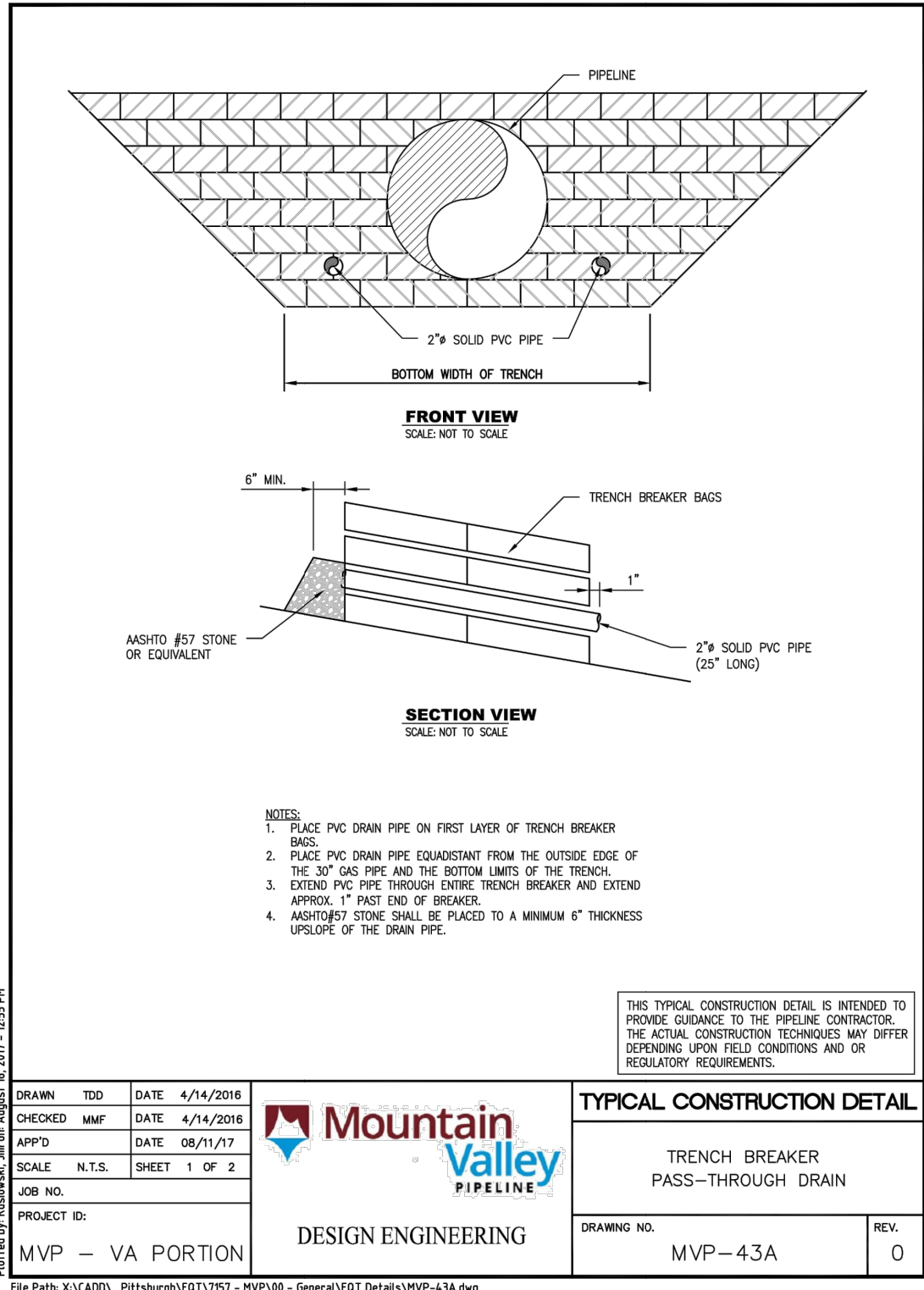
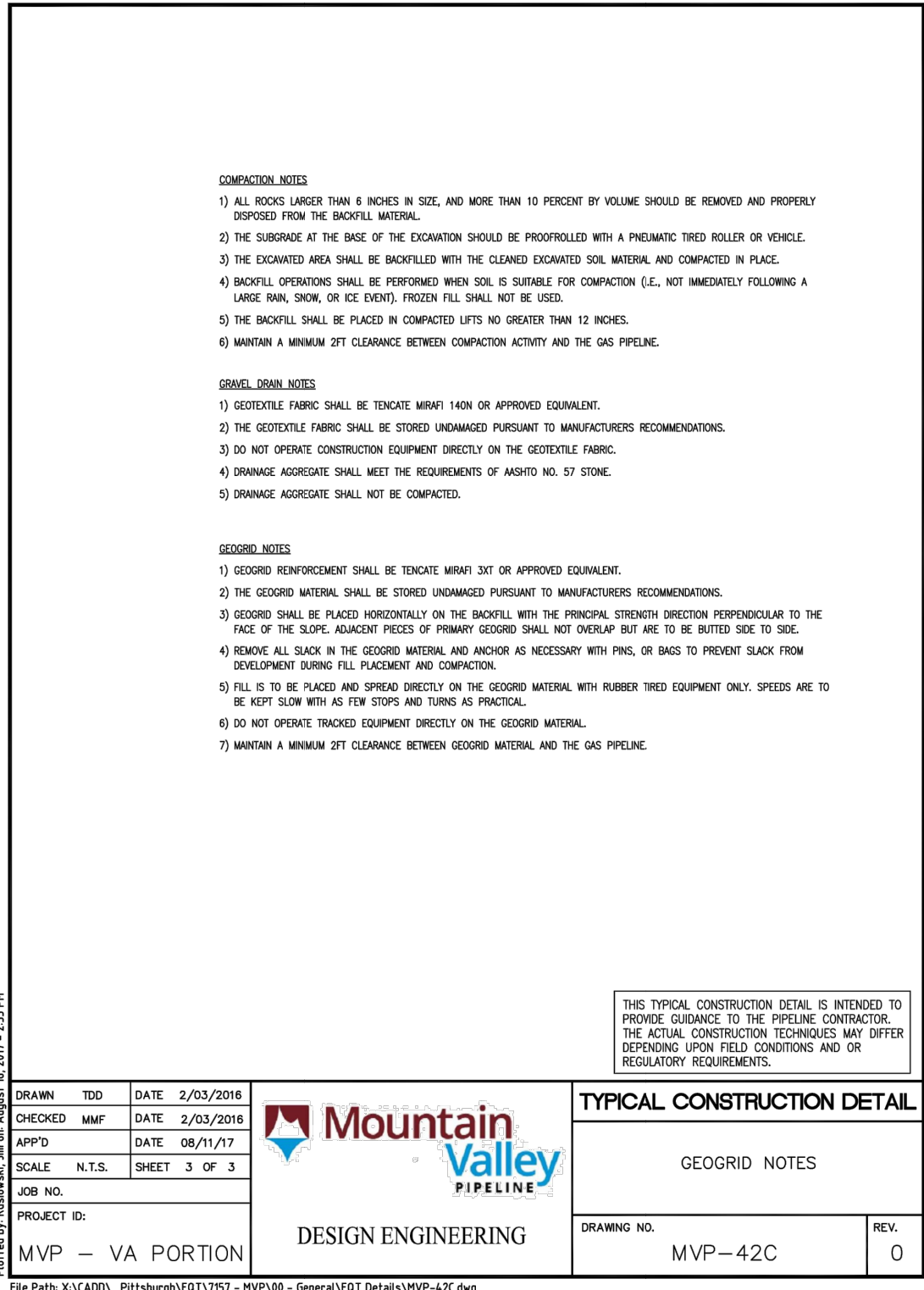
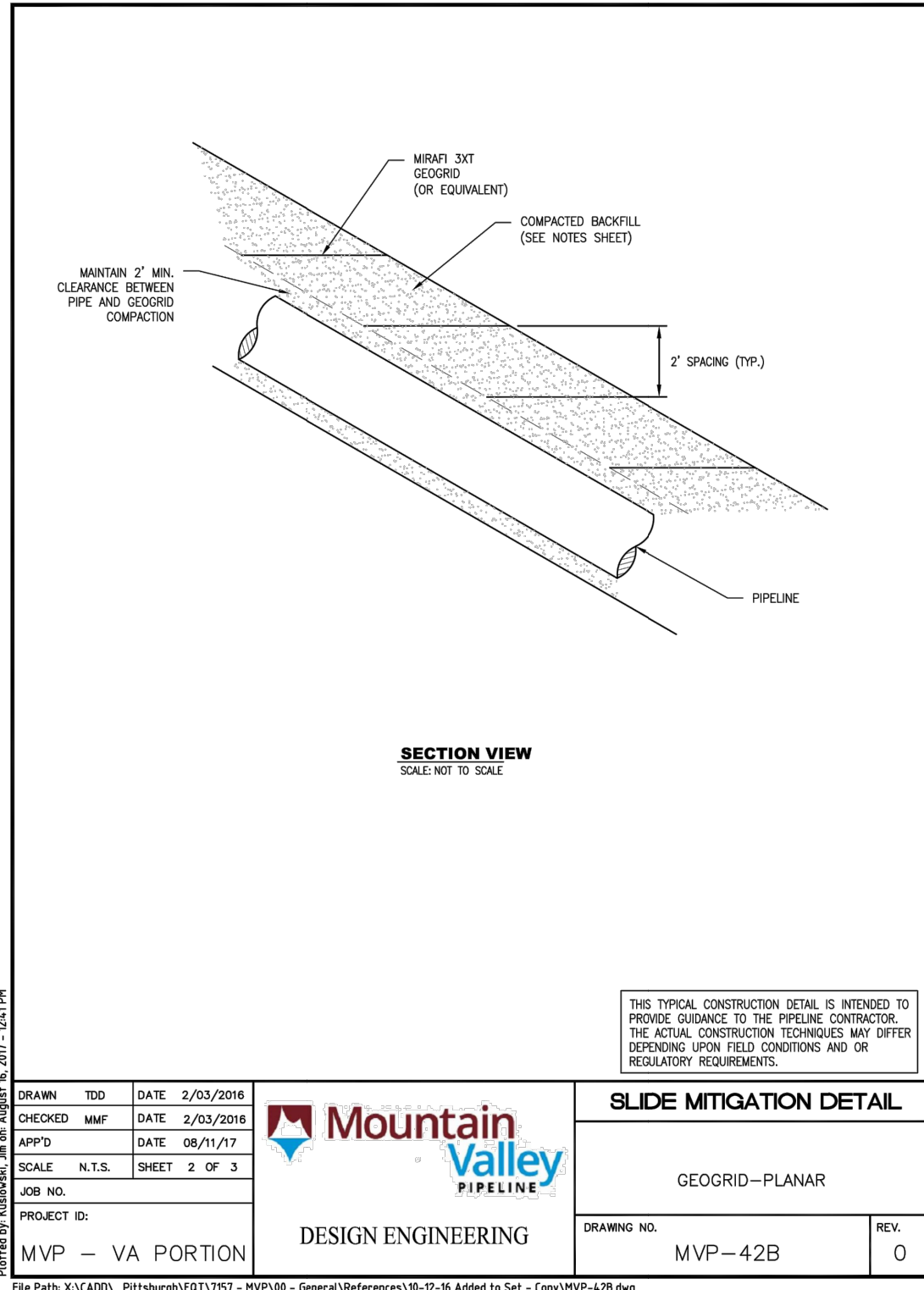
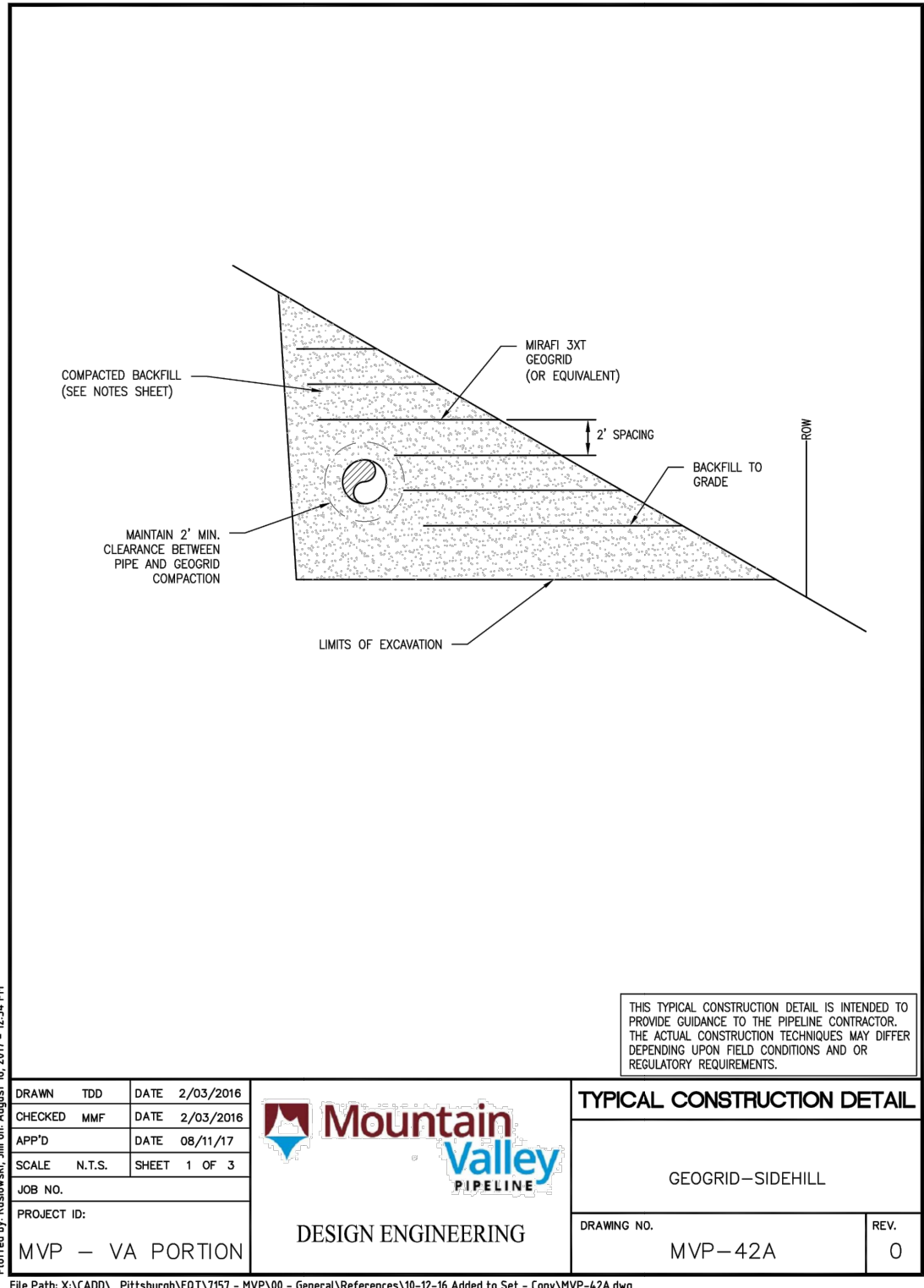


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5	01/08/18	KAL	RE	DW	ADDRESS VADO COMMENTS				
4	11/28/17	KAL	RE	DW	ADDRESS VADO COMMENTS				
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2	08/18/17	KAL	RE	DW	ADDRESS VADO COMMENTS				
NO.:	DATE:	DWN.:	CHD.:	APPD.:	DESCRIPTION:				
						REVISIONS:			

	
EROSION AND SEDIMENT CONTROL PLANS	
MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE	
MOUNTAIN VALLEY PIPELINE, LLC	
555 SOUTHPOINTE BOULEVARD, SUITE 200	
CANONSBURG, PA 15317	

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

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



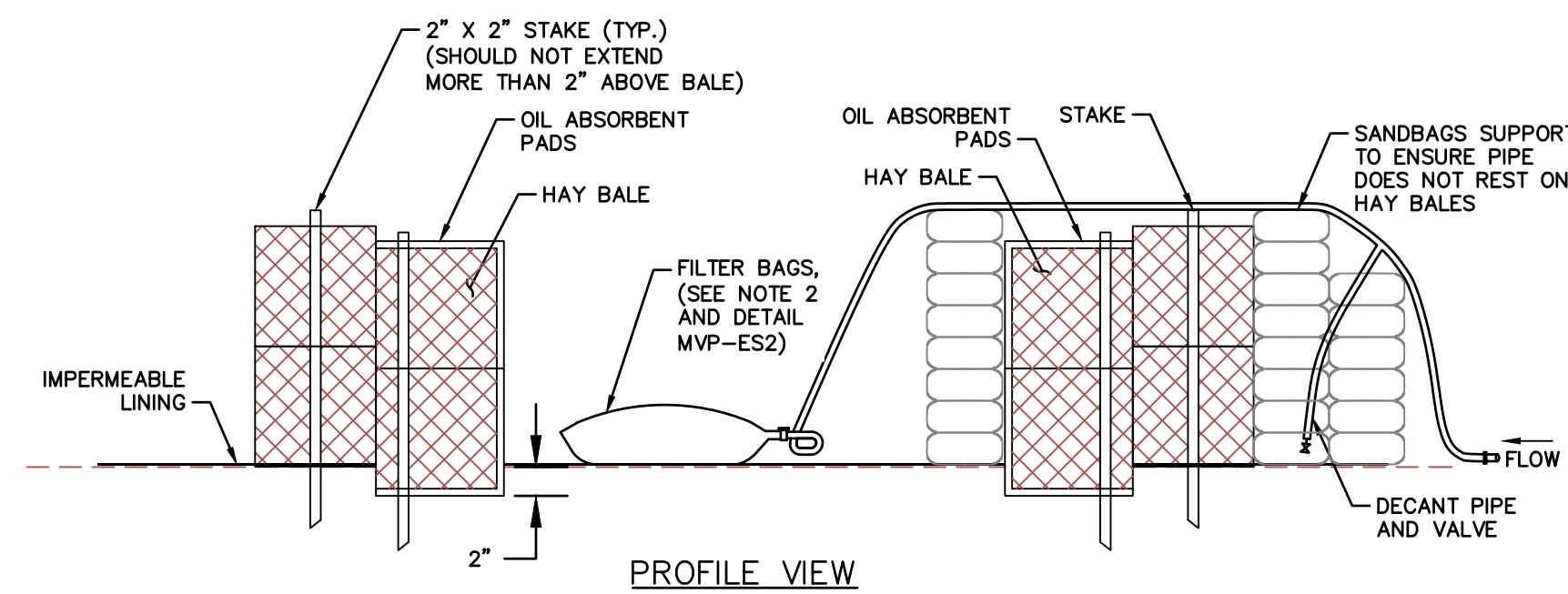
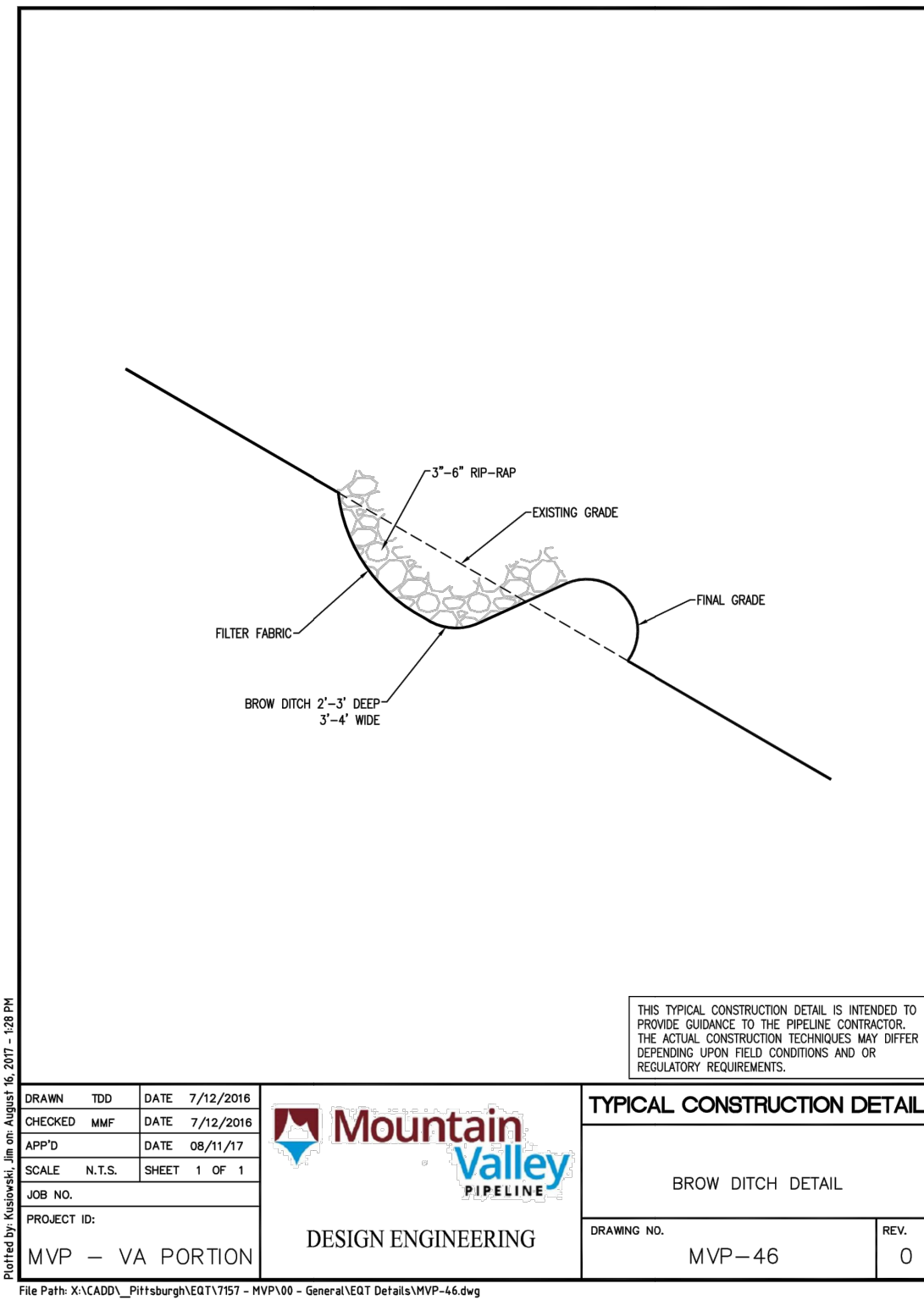
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EROSION AND SEDIMENT CONTROL PLANS		MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		MOUNTAIN VALLEY PIPELINE, LLC	
MOUNTAIN VALLEY PIPELINE		555 SOUTHPOINTE BOULEVARD, SUITE 200		CANONSBURG, PA 15317	

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

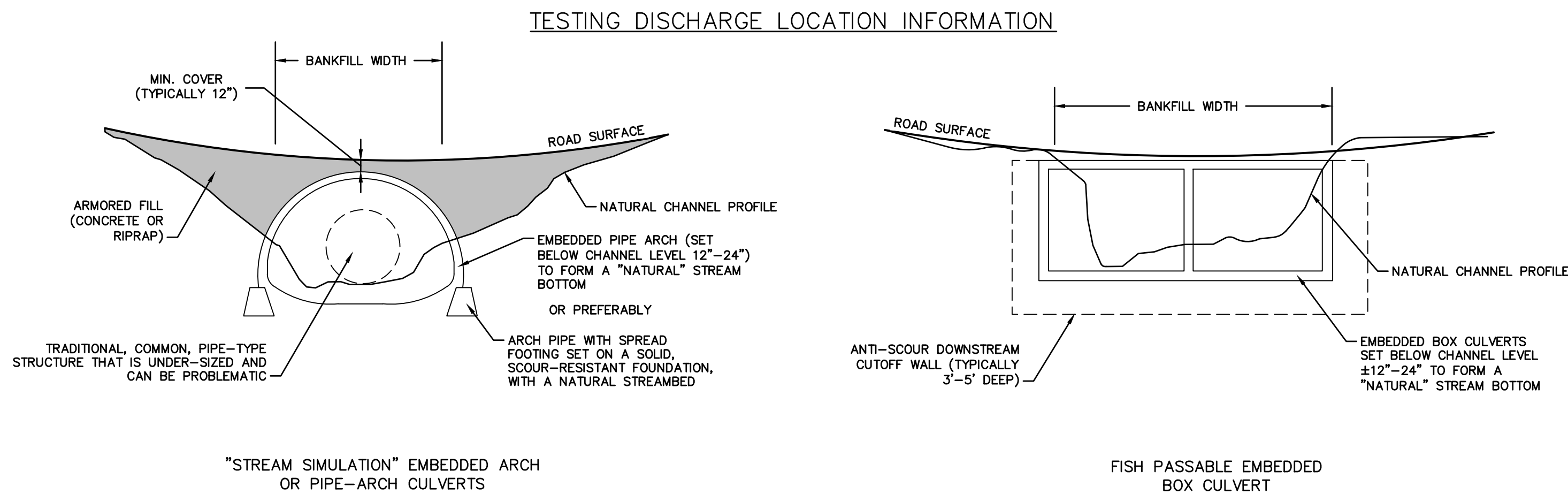
GENERAL DETAILS SET

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. 0.20 OF 0.23
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- 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					
9A	37° 20' 30.66"	-80° 37' 9.84"	37° 20' 32.42"	-80° 37' 9.64"	3,620,000	600 to 1200	4 to 2	2 to 4	Little Stony Creek
9B	37° 16' 7.85"	-80° 18' 52.91"	37° 16' 6.010"	-80° 18' 55.920"	1,580,000	300 to 600	4 to 2	1 to 2	North Fork Roanoke River
9C	37° 13' 50.92"	-80° 11' 53.89"	37° 13' 50.290"	-80° 11' 52.360"	3,040,000	600 to 1200	4 to 2	2 to 4	UNT to Roanoke River




NOTE:
LOW-WATER CROSSINGS THAT PROVIDE PASSAGE FOR FISH AND OTHER AQUATIC SPECIES. THE EMBEDDED CULVERTS WOULD HAVE A LAYER OF STREAMBED MATERIAL AT LEAST 1- TO 2-FOOT THICK COVERING THE CULVERT FLOOR.

Stream ID	Access Road Station	Drainage Area (ac)	10-Year	Culvert	Existing	Existing	Proposed	Proposed	Lidar	Lidar	Invert	Invert	Culvert	Replacement Culvert Type	Replacement Culvert	Culvert	Embedment	
			Design Flow (cfs)		Inlet Cover (ft) ³	Outlet Cover (ft) ³	Inlet Cover (ft) ⁴	Outlet Cover (ft) ⁴	Elevation at Inlet (ft) ¹	Elevation at Outlet (ft)	Inlet (ft) ²	Outlet(ft) ²				Dimensions (Span/Rise)		
				Length (ft)	(ft) ³	(ft) ³	(ft) ⁴	(ft) ⁴	Elevation at Inlet (ft) ¹	Elevation at Outlet (ft)	Inlet (ft) ²	Outlet(ft) ²	Slope		Material			
S-MN32	33 + 35.49	426.08	524.55	12	3	3	7.667	7.667	1317.895	1317.827	1313.562	1313.494	0.6%	Box Culvert	Concrete	12' / 8'	16	AASHTO Riprap Class A
S-MN33	25 + 83.30	14.23	40.40	12	2	2	2.75	2.75	1321.995	1321.737	1318.828	1315.570	2.2%	Box Culvert	Concrete	4' / 3'	14	AASHTO Riprap Class A
S-MN34	20 + 88.96	87.49	278.12	12	1	1	5.313	5.313	1338.584	1337.743	1335.917	1335.076	7.0%	Box Culvert	Concrete	9' / 6'	20	Grouted Riprap

- ¹ Roadway crest elevation based on Lidar elevation at inlet + required fill.
- ² Calculated culvert invert based on Lidar elevations adjusted for stream depth from wetland data sheets.
- ³ Based on wetland data sheet maximum top of bank height (assumed measurement from bottom of stream to top of road).
- ⁴ Fill required to accommodate box culvert.

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



Mountain Valley

PIPELINE


EROSION AND SEDIMENT CONTROL PLANS

MOUNTAIN VALLEY PIPELINE PROJECT – H600 LINE

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

GENERAL DETAILS SET



DRAWN BY:		KAL	
CHECKED BY:		HT	
APPROVED BY:		RE	
DATE:	11/28/2017		
SCALE:	AS SHOWN		
SHT. NO.	0.21	OF	0.23

GENERAL CONSTRUCTION SEQUENCE

THE FOLLOWING IS A GENERAL SEQUENCE FOR EARTHMOWING 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-ESS0.1. IN ADDITION, INSTALL OUTLET STRUCTURES FOR CLEAN WATER PIPES IN ACCORDANCE WITH MVP-ES51 AND MVP-ESS1.1. 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 OR 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 EROSIIVE 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.

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 RESEEDD 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.

TETRA TECH CAD FILE PATH: X:\CADD\Pittsburgh\EQT\7157 - MVP\00 - General\E&S\Spread 9\7157ES022.dwg PLOTTED ON: 3/12/2018 11:14 AM PLOTTED BY: Rickabough, Greg PLOT FILE: ENVIRONMENTAL_COLOR.ctb

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
- ANST APPALACHIAN NATIONAL SCENIC TRAIL
- EXISTING ROAD/TRAIL
- EXISTING PROPERTY LINE
- EXISTING STATE LINE
- EXISTING COUNTY LINE
- POND
- WETLAND
- AFM ACID FORMING MATERIAL
- AGRI AGRICULTURAL LAND USE BOUNDARY
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED ACCESS ROAD CENTERLINE
- PROPOSED PIPELINE
- PROPOSED SILT FENCE
- PROPOSED SUPER SILT FENCE (SEE DETAIL MVP-ES9.2)
- RFD PROPOSED REINFORCED FILTRATION DEVICE (SEE DETAILS MVP-ES9, 9.1, 9.2, 9.3)
- EGT ORANGE CONSTRUCTION SAFETY FENCE
- 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:

- TOPSOIL SEGREGATION WILL BE PERFORMED IN ALL-CONSTRUCTION AREAS OF THE PROJECT IN ACCORDANCE WITH DETAIL MVP-ES46.1 THROUGH MVP-ES46.3.
- FLEX TERRA, EARTHGUARD OR EQUIVALENT MAY BE USED AS A SUBSTITUTE TO EROSION CONTROL BLANKET AS DIRECTED BY MVP.
- 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.
- 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 PIPELINE PROJECT.
- WHERE CONSTRUCTION CONDITIONS PRECLUDE THE USE OF DIVERSION DITCHES DUE TO SITE CONDITIONS THE CONTRACTOR WILL INSTALL SILT FENCE AT THE DIRECTION OF MVP.
- IMPROVEMENTS TO PERMANENT AND TEMPORARY ACCESS ROADS WILL BE PERFORMED PER THE SITE SPECIFIC ACCESS ROAD DETAILS.
- TEMPORARY ACCESS ROAD CROSSING OF STREAMS AND WETLANDS WILL UTILIZE TIMBERMATS. ANY PERMANENT ROAD CROSSINGS WILL BE CONDUCTED VIA CULVERTS.
- ALL NON VMRC STREAM CROSSINGS WILL BE PERFORMED AS DESCRIBED IN THE STREAM CROSSING TABLE INCLUDED IN THIS PACKAGE.

ADDED DETAILS FOR ROADS AND PADS		ADDRESS VADEQ COMMENTS		ADDRESS VADEQ COMMENTS		ADDRESS VADEQ COMMENTS		ADDRESS VADEQ COMMENTS		ADDRESS VADEQ COMMENTS		DESCRIPTION:		REVISIONS:		
DW	RE	KAL	DW	RE	KAL	DW	RE	KAL	DW	RE	KAL	DW	RE	CHD:	APPD:	
7	01/31/18	6	01/26/18	5	01/08/18	4	01/28/17	3	11/01/17	2	08/18/17	NO:	DATE:	DWN:		
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 PENNSYLVANIA DAVID J. WALLNER Lic. No. 0402057595 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	