



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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www.deq.virginia.gov

Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

July 11, 2018

Mr. Brian Clauto
Senior Environmental Coordinator
EQT Corporation
555 Southpointe Blvd, Suite 200
Canonsburg, PA 15317

Transmitted electronically to: BClauto@eqt.com

Re: Mountain Valley Pipeline LLC
Project Location: MVP LY-029 & MVP LY-049 Plans (Supportive Ancillary Areas)
DEQ SWM #: MVP-18-03
Erosion and Sediment Control (ESC) and Stormwater Management (SWM) Plans

Dear Mr. Clauto:

The Department of Environmental Quality (DEQ) received combined Stormwater Management and Erosion & Sediment Control Plans for supportive ancillary areas identified as MVP LY-029 and MVP LY-049 on June 6, 2018 and revised plans received on June 26, 2018.

The plans received June 26, 2018 are found to be in accordance with the *Virginia Stormwater Management Act and Regulations* and the *Virginia Erosion and Sediment Control Law and Regulations* and are approved. This approval authorizes MVP to begin land disturbing activities consistent with these plans. **No modifications, updates or additions may be made to the approved Plans without obtaining prior approval from DEQ. Additionally, approval of the Erosion and Sediment Control and Stormwater Management Plans does not relieve the owner and/or operator of complying with all other federal, state, or local laws and regulations.**

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have thirty (30) days from the date you received this decision within which to appeal this decision by filing a notice of appeal in accordance with the Rules of the Supreme Court of Virginia with the Director, Virginia Department of Environmental Quality.

Mountain Valley Pipeline, LLC

July 11, 2018

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It is the responsibility of the owner and/or operator to ensure that the project is constructed in accordance with the approved Plans and accompanying specifications. Upon completion of the project, the owner and/or operator will be required to submit construction record drawings for all permanent stormwater management facilities (i.e., post-development best management practices) constructed in accordance with the approved Plans.

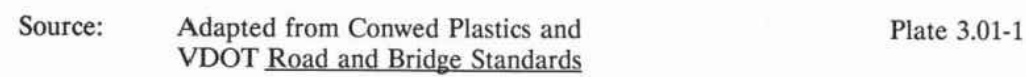
Please contact Mr. Benjamin Leach at 804-698-4037 or Benjamin.leach@deq.virginia.gov if you have any questions about this letter.

Sincerely,



Jaime B. Robb, Manager
Office of Stormwater Management

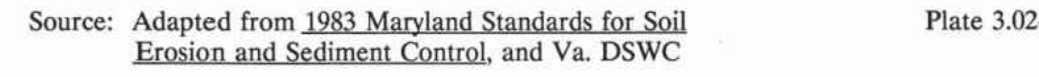
Cc: Benjamin Leach, DEQ-CO
Jerome Brooks, DEQ Water Compliance Manager



III - 5

SAFETY FENCE

TAKEN FROM VADEQ 1992 MANUAL



III - 9

STONE CONSTRUCTION ENTRANCE

TAKEN FROM VADEQ 1992 MANUAL

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

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

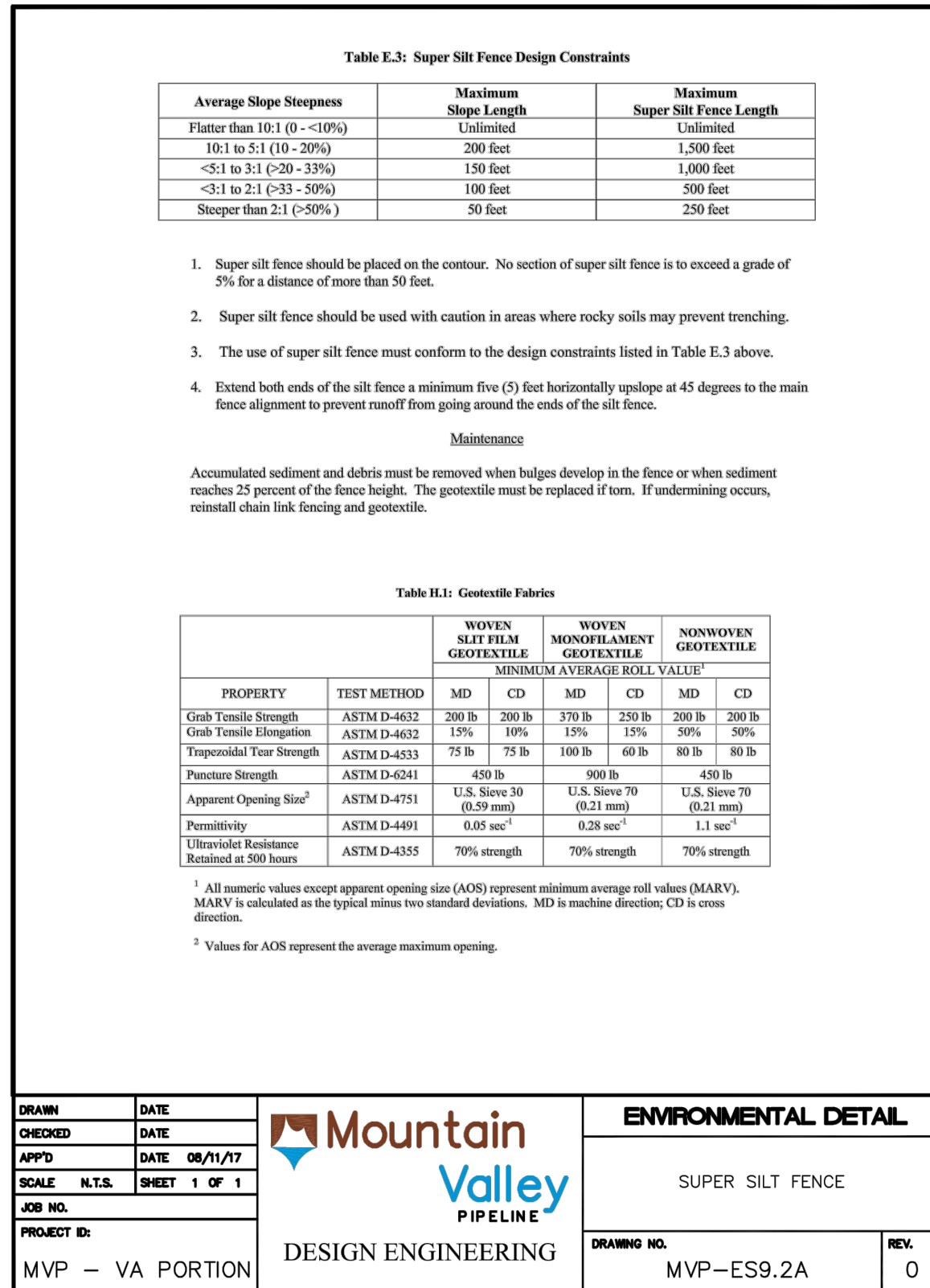
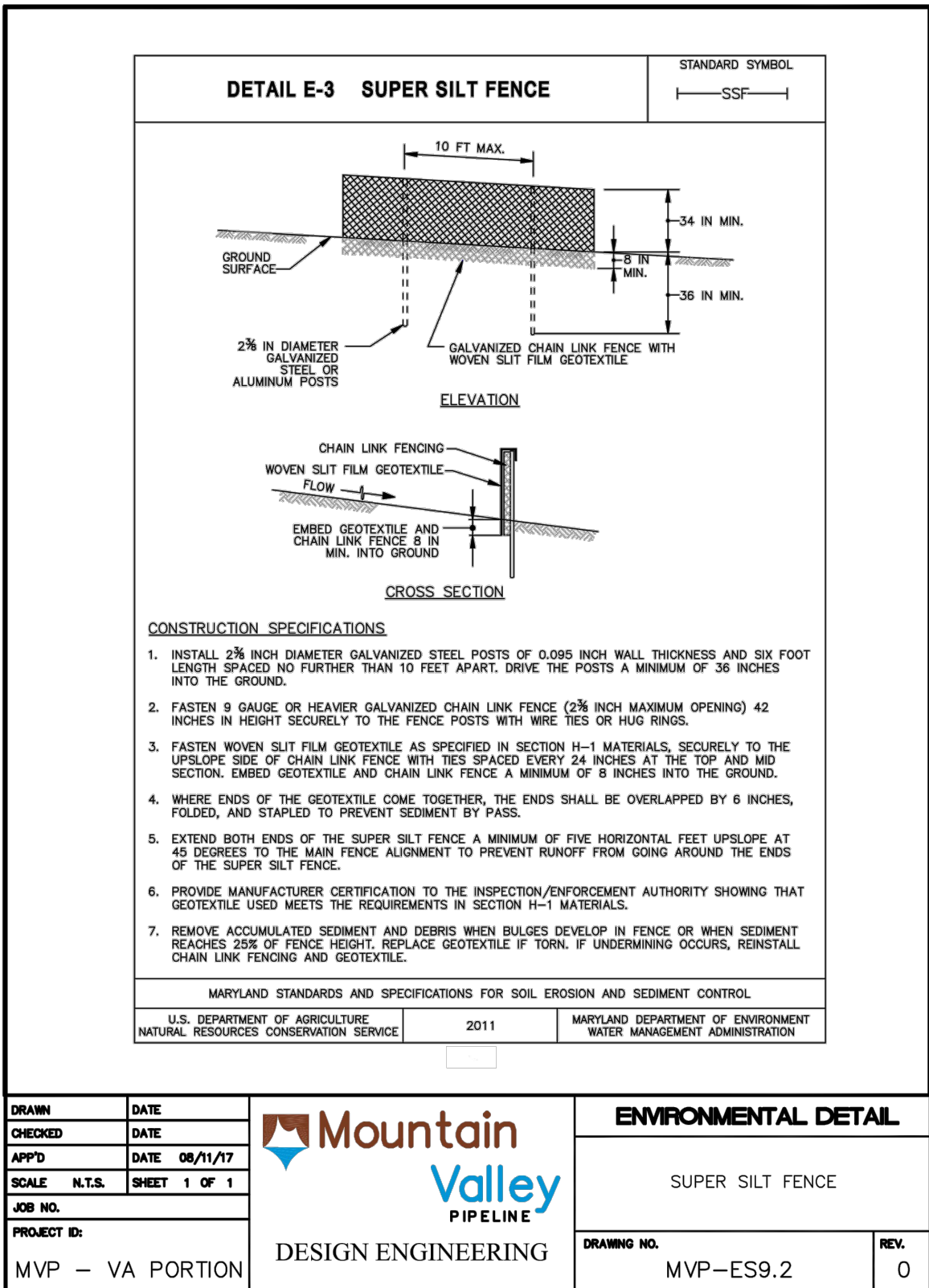
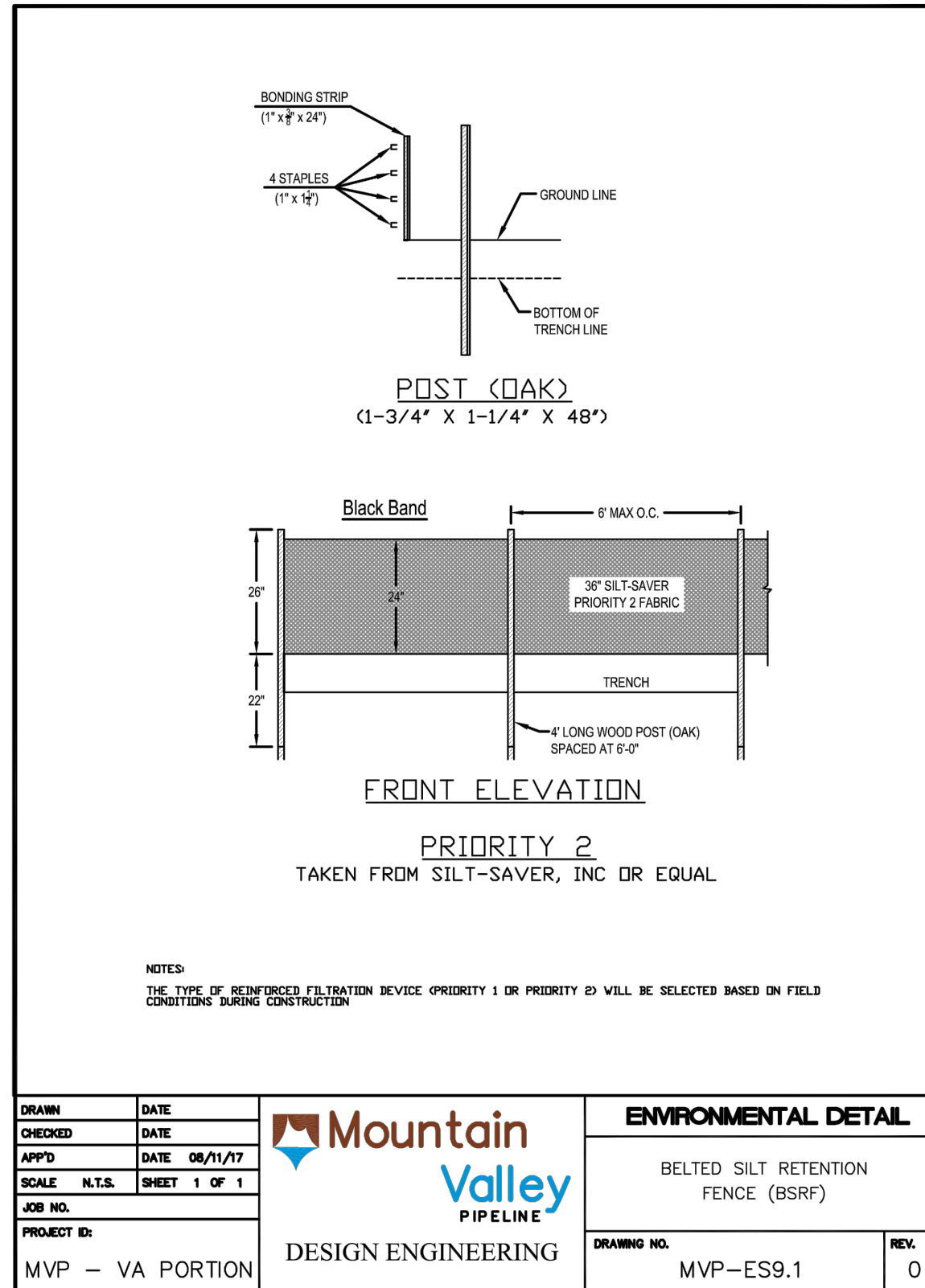
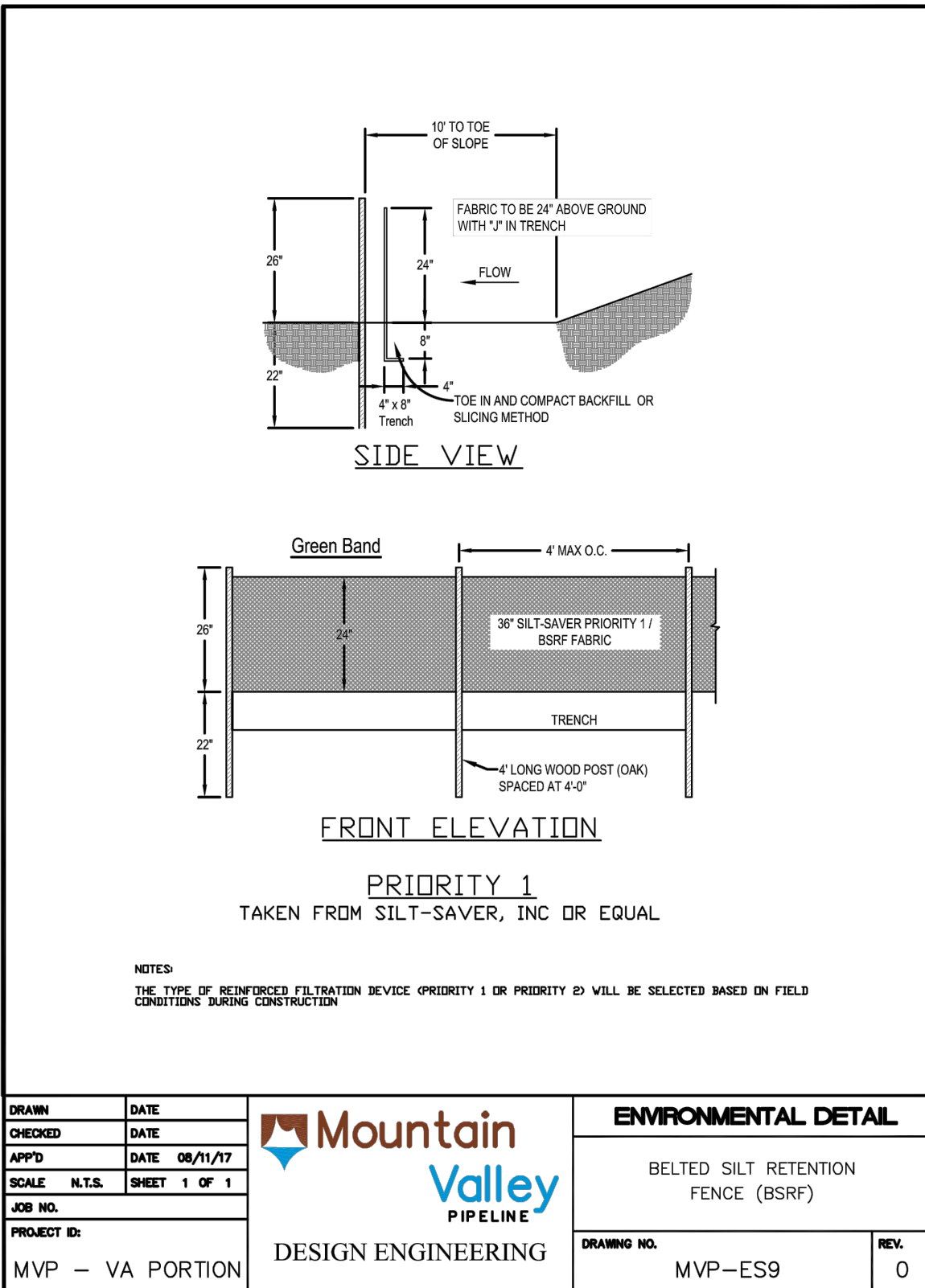
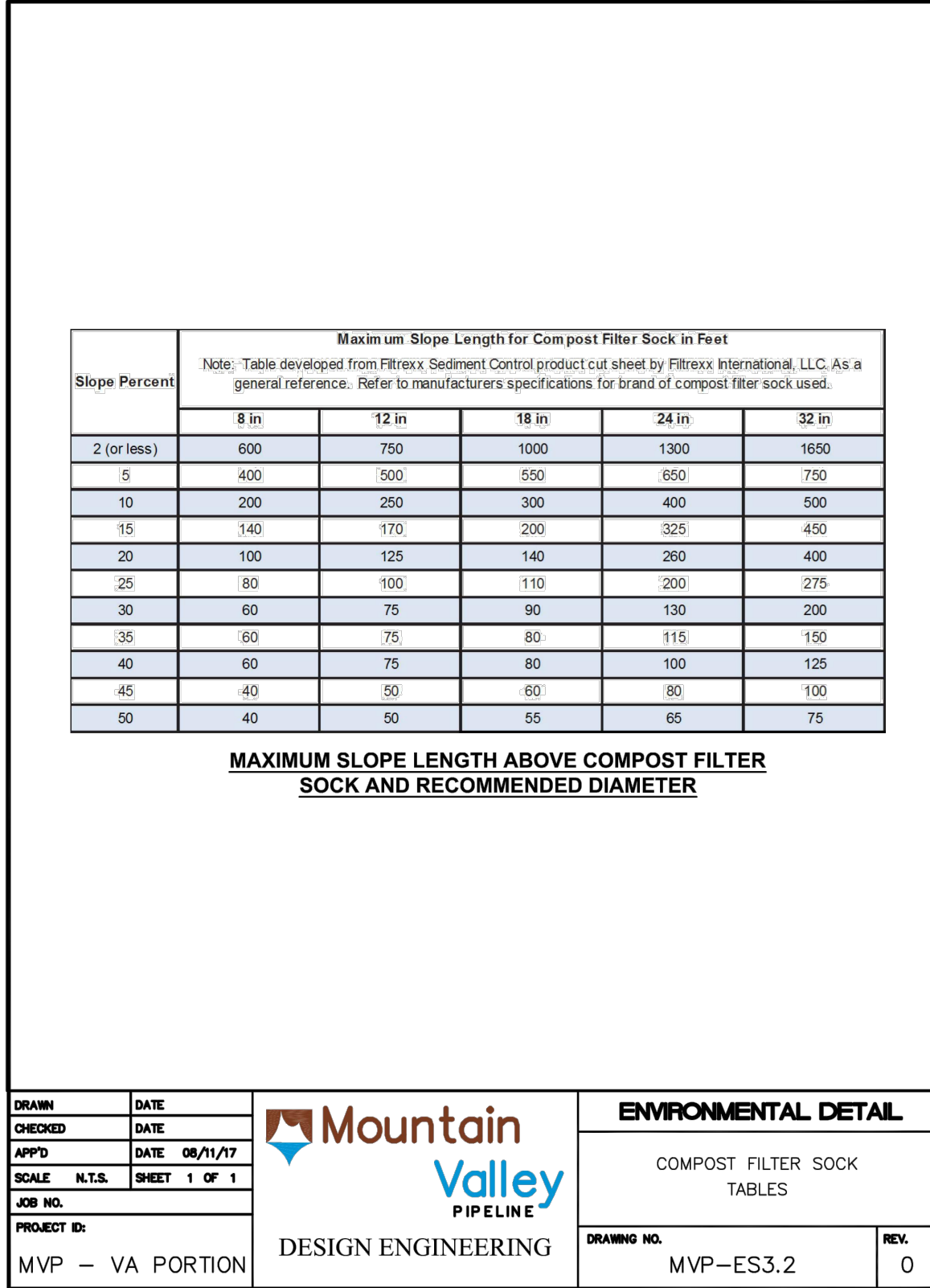
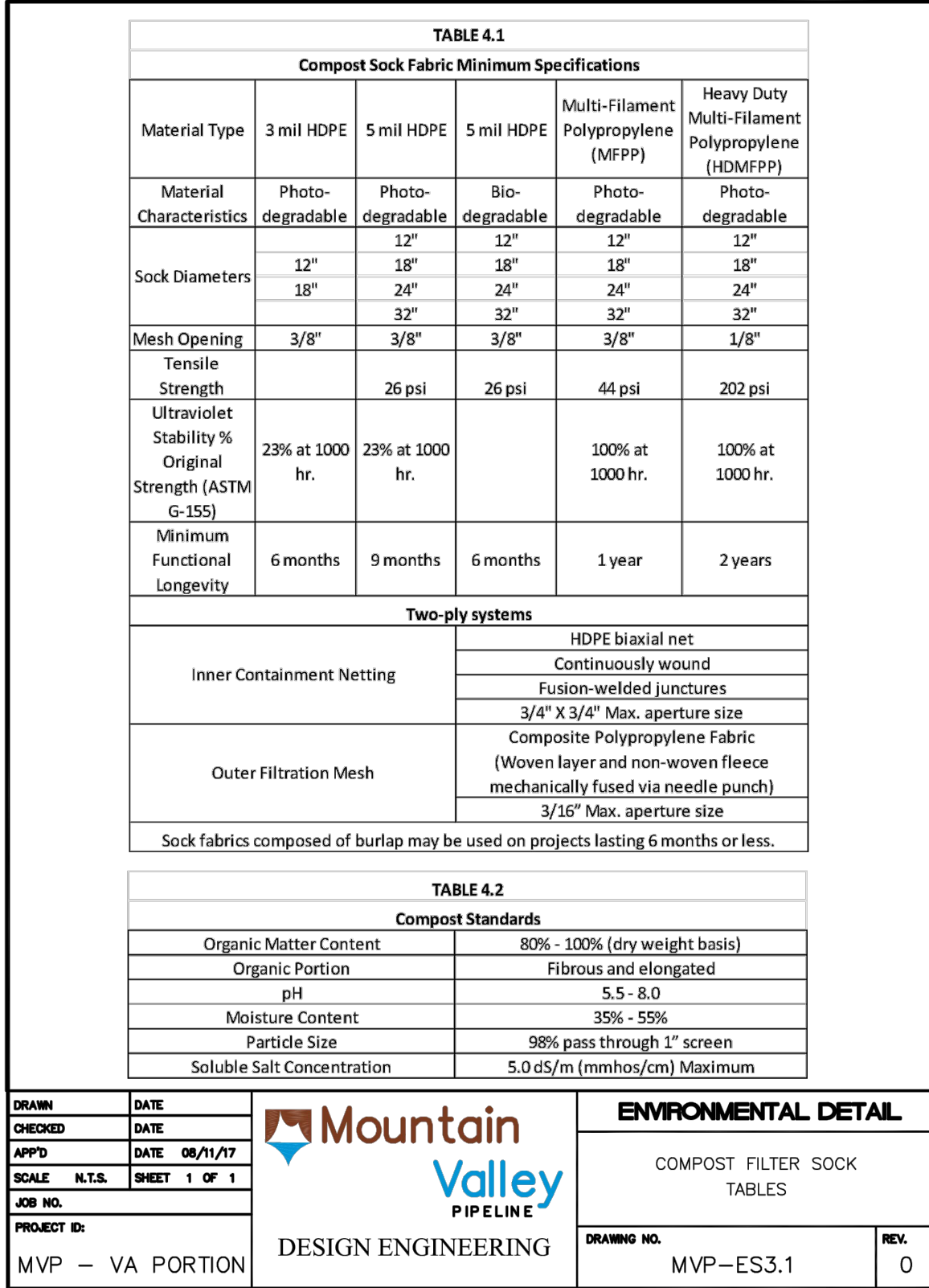
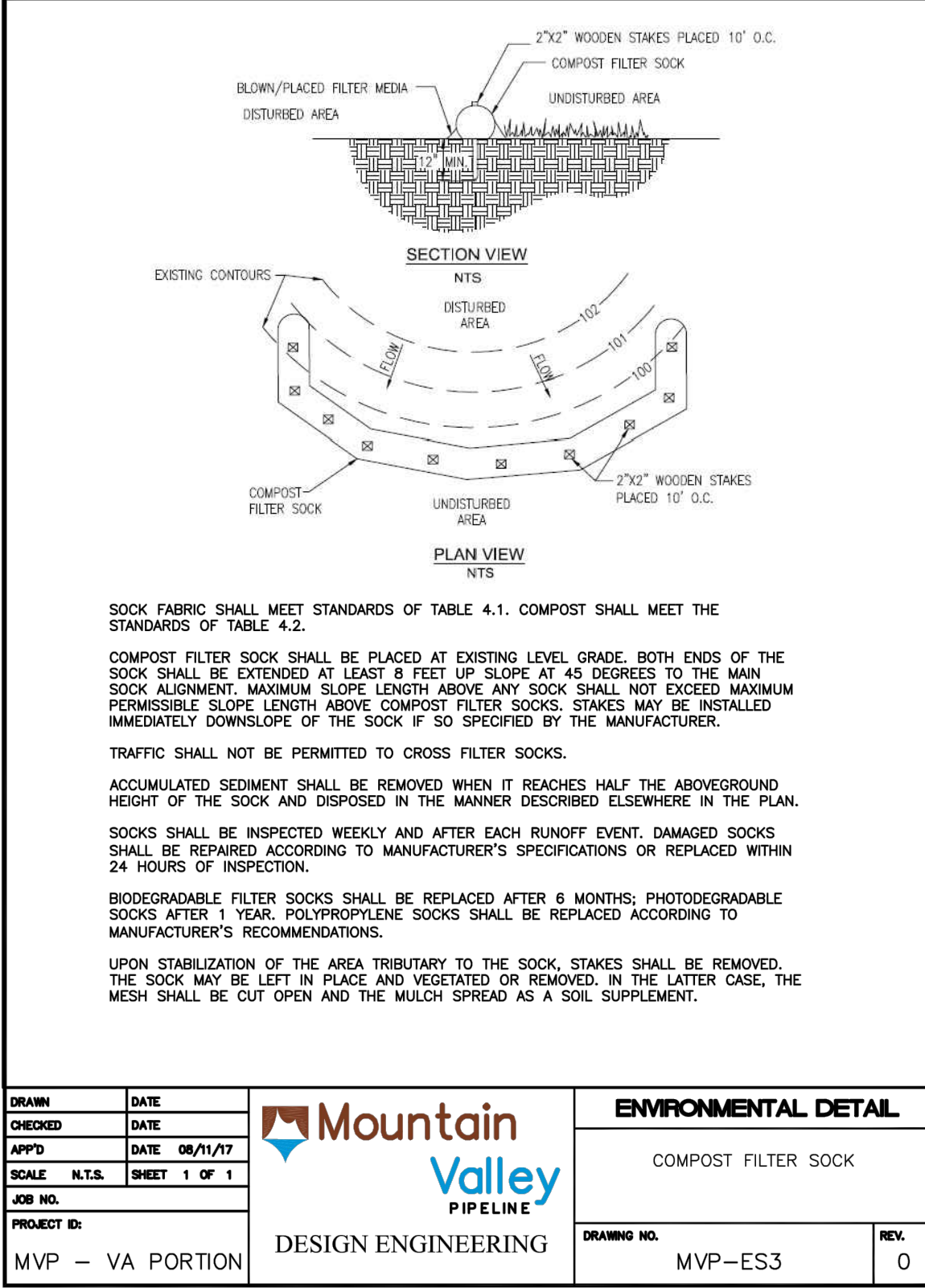
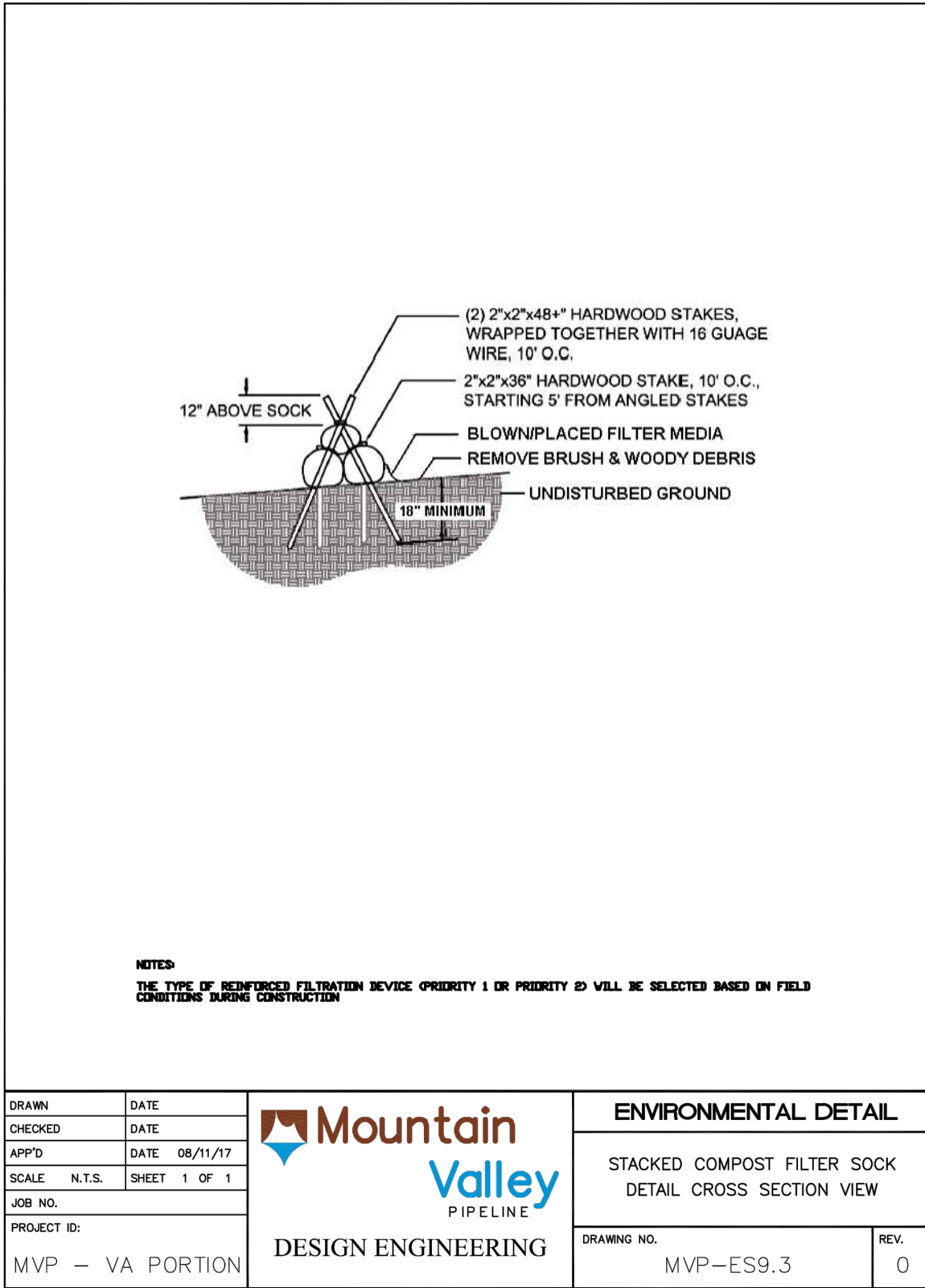
A WATER SUPPLY SHALL BE MADE AVAILABLE TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.

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

AT A MINIMUM, ROCK CONSTRUCTION ENTRANCES WITH WASH RACKS SHOULD BE CONSTRUCTED TO THE LENGTH, WIDTH, AND THICKNESS DIMENSIONS SHOWN ON STANDARD CONSTRUCTION DETAIL #3-2. A METAL WASH RACK OR LIVESTOCK GRATE IS AN ACCEPTABLE ALTERNATIVE TO THE REINFORCED CONCRETE ONE SHOWN IN THE STANDARD DETAIL. APPROACHES TO THE WASH RACK SHOULD BE LINED WITH AASHTO #1 AT A MINIMUM OF 25' ON BOTH SIDES. THE WASH RACK SHOULD DISCHARGE TO A SEDIMENT REMOVAL FACILITY, SUCH AS A CHANNEL LEADING TO A SEDIMENT REMOVAL DEVICE (E.G. A SEDIMENT TRAP OR SEDIMENT BASIN). ROCK CONSTRUCTION ENTRANCES WITH WASH RACKS SHOULD BE MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK WHEN NECESSARY AT THE END OF EACH WORKDAY. A STOCKPILE OF ROCK MATERIAL SHOULD BE MAINTAINED ON SITE FOR THIS PURPOSE. SEDIMENT DEPOSITED ON PAVED ROADWAYS SHOULD BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.

NOTE: WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE. DAMAGED WASH RACKS SHOULD BE REPAIRED AS NECESSARY TO MAINTAIN THEIR EFFECTIVENESS.

NOTE: NOT ALL OF THE FOLLOWING DETAILS APPLY TO THE MVP-LY-049 LAYDOWN YARD.




NOTE: NOT ALL OF THE FOLLOWING DETAILS APPLY TO THE MVP-LY-049 LAYDOWN YARD.

Forest Regeneration Woody Seed Mix and Application Rates.

Species	Common Name	Seeding Rate (lbs/acre)
Oak-Hickory Forest a)		
<i>Fagus grandifolia</i>	American Beech	0.3
<i>Liriodendron tulipifera</i>	Tulip Poplar	0.3
<i>Pinus strobus</i>	White Pine	0.3
<i>Pinus virginiana</i>	Virginia Pine	0.3
<i>Prunus serotina</i>	Black Cherry	0.3
<i>Amelanchier canadensis</i>	Canadian Serviceberry	0.3
<i>Cercis canadensis</i>	Eastern Redbud	0.3
<i>Cornus florida</i>	Flowering Dogwood	0.3
<i>Diospyros virginiana</i>	Persimmon	0.3
<i>Ilex opaca</i>	American Holly	0.3
<i>Nyssa sylvatica</i>	Black Gum	0.3
<i>Sassafras albidum</i>	Sassafras	0.3
<i>Hamamelis virginiana</i>	Witch Hazel	0.3
<i>Lindera benzoin</i>	Spicebush	0.3
<i>Vaccinium angustifolium</i>	Mapleleaf Viburnum	0.3
<i>Viburnum acerifolium</i>	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 Seeding 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		ENVIRONMENTAL DETAIL	
CHECKED	DATE		FOREST REGENERATION WOODY SEED MIX AND APPLICATION RATES	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.1

Upland Meadow Seed Mix and Application Rates in Virginia.

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

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

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

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		UPLAND MEADOW SEED MIX AND APPLICATION RATES	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.2

Upland Steep Slope Seed Mix and Application Rates in Virginia.

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

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		UPLAND STEEP SLOPE SEED MIX AND APPLICATION RATES	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.3

Wetlands Seed Mix and Application Rates in Virginia.

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

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

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

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		WETLAND SEED MIX AND APPLICATION RATES	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.4

Riparian Seed Mix and Application Rates in Virginia.

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

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

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		RIPARIAN SEED MIX AND APPLICATION RATES	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.5

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				
<i>Acer rubrum</i>	Red Maple	FAC	X	X
<i>Acer saccharinum</i>	Silver Maple	FACW	X	X
<i>Betula nigra</i>	River Birch	FACW	X	X
<i>Carpinus caroliniana</i>	American Hornbeam	FAC	X	X
<i>Carya glabra</i>	Pignut Hickory	FACU	X	
<i>Carya ovata</i>	Shagbark Hickory	FACU	X	
<i>Chionanthus virginicus</i>	White Fringe Tree	FAC+	X	
<i>Diospyros virginiana</i>	Common Persimmon	FAC+	X	

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

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

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		NATIVE TREE AND SHRUB SPECIES FOR BARE ROOT PLANTINGS WITHIN RIPARIAN AREAS AND FORESTED WETLANDS	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.6

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

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		NATIVE TREE AND SHRUB SPECIES FOR BARE ROOT PLANTINGS WITHIN RIPARIAN AREAS AND FORESTED WETLANDS	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.7


Mill Creek	245.1	Roanoke	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Green Creek	247.1	Franklin	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Green Creek	247.4	Franklin	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
North Fork Blackwater River	249.7	Franklin	VA	Roanoke logperch suitable habitat, coldwater stream wild trout stream
Waterbody Name	MP	County	State	Valuable Resource
Teels Creek	258.2	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	260.3	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	261.0	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	261.8	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	262.3	Franklin	VA	Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek contributing sediment impacts
Little Creek	262.6	Franklin	VA	Roanoke logperch suitable habitat, numerous crossings upstream contributing sediment impacts
Little Creek	263.3	Franklin	VA	Roanoke logperch suitable habitat, non-listed mussels present, numerous crossings upstream contributing sediment impacts
Magdooe Creek	269.4	Franklin	VA	Roanoke logperch suitable habitat
Blackwater River	269.7	Franklin	VA	Roanoke logperch present, non-listed mussels present
UNT to Jacks Creek	278.8	Franklin	VA	orangefin madtom
Turkey Creek	280.5	Franklin	VA	orangefin madtom
Strawfield Creek	282.3	Franklin	VA	orangefin madtom
Parrot Branch	282.9	Franklin	VA	orangefin madtom
Jonnikin Creek	284.4	Pittsylvania	VA	orangefin madtom
UNT to Rocky Creek	287.1	Pittsylvania	VA	orangefin madtom
Plogg River	289.1	Pittsylvania	VA	Roanoke logperch present, orangefin madtom, mussels present including yellow lampmussel (VA threatened)
Harpen Creek	289.9	Pittsylvania	VA	Roanoke logperch suitable habitat, orangefin madtom
Harpen Creek	292.0	Pittsylvania	VA	orangefin madtom

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE		STREAM CROSSINGS PROPOSED FOR BARE ROOT SEEDING PLANTINGS	
APP'D	DATE 08/11/17			
SCALE N.T.S. SHEET 1 OF 1				
JOB NO.		DESIGN ENGINEERING	DRAWING NO.	REV.
PROJECT ID:			MVP - VA PORTION	MVP-ES11.9

Mountain Valley
ANCILLARY SITE
EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE
ROANOKE COUNTY, VIRGIN

NOTE: NOT ALL OF THE FOLLOWING DETAILS APPLY TO THE MVP-LY-049 LAYDOWN YARD.

Mill Creek	245.1	Roanoke	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Green Creek	247.1	Franklin	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
Green Creek	247.4	Franklin	VA	upstream of Bottom Creek Gorge, orangefin madtom, coldwater stream, wild trout
North Fork Blackwater River	249.7	Franklin	VA	Roanoke logperch suitable habitat, coldwater stream wild trout stream
Waterbody Name	MP	County	State	Valuable Resource
Teels Creek	258.2	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	260.3	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	261.0	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	261.8	Franklin	VA	upstream of Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek
Teels Creek	262.3	Franklin	VA	Roanoke logperch suitable habitat, one of numerous project crossings of Teels Creek contributing sediment impacts
Little Creek	262.6	Franklin	VA	Roanoke logperch suitable habitat, numerous crossings upstream contributing sediment impacts
Little Creek	263.3	Franklin	VA	Roanoke logperch suitable habitat, non-listed mussels present, numerous crossings upstream contributing sediment impacts
Maggodes Creek	269.4	Franklin	VA	Roanoke logperch suitable habitat
Blackwater River	269.7	Franklin	VA	Roanoke logperch present, non-listed mussels present
UNT to Jacks Creek	278.8	Franklin	VA	orangefin madtom
Turkey Creek	280.5	Franklin	VA	orangefin madtom
Strawfield Creek	282.3	Franklin	VA	orangefin madtom
Parrot Branch	282.9	Franklin	VA	orangefin madtom
Jonnikin Creek	284.4	Pittsylvania	VA	orangefin madtom
UNT to Rocky Creek	287.1	Pittsylvania	VA	Roanoke logperch present, orangefin madtom, mussels present including yellow lampmussel (VA threatened)
Pigg River	289.1	Pittsylvania	VA	Roanoke logperch suitable habitat, orangefin madtom
Harpem Creek	289.9	Pittsylvania	VA	Roanoke logperch suitable habitat, orangefin madtom
Harpem Creek	292.0	Pittsylvania	VA	Roanoke logperch suitable habitat, orangefin madtom

DRAWN	DATE		ENVIRONMENTAL DETAIL	
CHECKED	DATE			
APP'D	DATE 06/11/17			
SCALE N.T.S.	SHEET 1 OF 1			
JOB NO.		DESIGN ENGINEERING	STREAM CROSSINGS PROPOSED FOR BARE ROOT SEEDING PLANTINGS	
PROJECT ID:				
MVP - VA PORTION			DRAWING NO.	REV.
			MVP-ES11.9	0



NOTES:

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

BMFs SHOULD ONLY BE USED WHEN NO RAIN IS FORECASTED FOR AT LEAST 48 HOURS FOLLOWING HE APPLICATION. THIS IS TO ALLOW THE TACKIFIER SUFFICIENT TIME TO CURE PROPERLY. ONCE PROPERLY APPLIED, A BMF IS TYPICALLY 80% EFFECTIVE IN PREVENTING ACCELERATED EROSION. BMFs SHOULD NOT BE APPLIED BETWEEN SEPTEMBER 30 AND APRIL 1.

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

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CHECKED	DATE			
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JOB NO.		DESIGN ENGINEERING	BONDED FIBER MATRIX	
PROJECT ID:				
MVP - VA PORTION			DRAWING NO.	REV.
			MVP-ES40	P

Typical Polymer Stabilized Fiber Matrix Application Rates									
Maximum Rainfall of 5.20"									
SLOPE	6:1	5:1	4:1	3:1	2:1	1.5:1	1:1		
Soil Stabilizer (gal/acre)	4	5	6	7	8	9	10		
Fiber (lb/acre)	1,500	1,500	1,500	1,800	2,000	2,500	3,000		


Maximum Rainfall of > 20" and for Site Winterization				
SLOPE	3:1	4:1	5:1	
Soil Stabilizer (gal/acre)	6	8	10	
Fiber (lb/acre)	2,000	2,500	3,000	

NOTES:

UNLIKE ROLLED BLANKETS, THERE IS NO NEED TO SMOOTH THE SLOPE PRIOR TO APPLICATION OF HYDRAULICALLY APPLIED BLANKETS. IN FACT SOME ROUGHENING OF THE SURFACE, EITHER NATURAL OR MECHANICALLY INDUCED, IS PREFERABLE. HOWEVER, LARGE ROCKS, THOSE > 9 INCHES, AND EXISTING RILLS SHOULD BE REMOVED PRIOR TO APPLICATION. TRACKING OR GROOVING OF SLOPES SHOULD BE CONSIDERED TO SLOW WATER FLOWS DURING A STORM EVENT. SLOPE INTERRUPTION DEVICES SUCH AS STAIR STEP GRADING OR SENCINGS SHOULD BE APPLIED PRIOR TO THE APPLICATION. MIXING AND APPLICATION RATES SHOULD FOLLOW MANUFACTURER'S RECOMMENDATIONS.

A POLYMER STABILIZED FIBER MATRIX (PSFM) ARE TYPICALLY APPLIED IN TWO STAGES. UNLESS SPECIFICALLY RECOMMENDED TO BE APPLIED IN ONE APPLICATION BY THE MANUFACTURER, THE SEED MIXTURE AND SOIL AMENDMENTS SHOULD BE APPLIED FIRST. IF THE SEED IS APPLIED AT THE SAME TIME AS THE HYDRAULICALLY APPLIED BLANKET, THE BONDED FIBERS MAY KEEP THE SEED FROM MAKING SUFFICIENT CONTACT WITH THE SOIL TO GERMINATE. AFTER THE SEED MIXTURE IS APPLIED, THE BMF, FGM, OR PSFM SHOULD BE SPRAYED OVER THE AREA AT THE REQUIRED APPLICATION RATE. (SEE ABOVE TABLES)

HYDRAULIC EROSION CONTROL PRODUCTS (HEPC) USED ON JNF LANDS MUST BE SUITABLE FOR WILDLIFE

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MVP - VA PORTION			DRAWING NO.	REV.
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MULCHING

Definition

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

Purposes

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

Conditions Where Practice Applies

- Areas which have been permanently seeded (see Appendix B - Typical Construction Details MVP-ESI 1.1 through ESI2.3) should be mulched immediately following seeding.
- 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 as 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.
- Mulch may be used together with plantings of trees, shrubs, or certain ground covers which do not provide adequate soil stabilization by themselves.
- Mulch shall be used in conjunction with temporary seeding operations as specified in TEMPORARY SEEDING, Std. & Spec. 3.31

Planting 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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PROJECT ID:				
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			MVP-ES45	P

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

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

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

Organic Mulches

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

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

Com 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 hydroseding 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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			MVP-ES45.1	P

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

Blankets and Matting

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

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

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

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

Specifications

Organic Mulches

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

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

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

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

- Where seed is to be applied as part of a hydroseder slurry containing fiber mulch.
- Where seed is to be applied following a straw mulch spread during winter months.



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PROJECT ID:				
MVP - VA PORTION			DRAWING NO.	REV.
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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 1/2 - 2 tons (Minimum 2 tons for winter cover)	70 - 90 lbs.	Free from weeds and coarse matter. Must be anchored. Spread with mulch blower or by hand.
Fiber Mulch	Minimum 1500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods.* Apply as slurry.
Corn Stalks	4 - 6 tons	185 - 275 lbs.	Cut or shredded in 4-6" lengths. Air-dried. Do not use in fine turf areas. Apply with mulch blower or by hand.
Wood Chips	4 - 6 tons	185 - 275 lbs.	Free of coarse matter. Air-dried. Treat with 12 lbs nitrogen per ton. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.
Bark Chips or Shredded Bark	50 - 70 cu. yds.	1-2 cu. yds.	Free of coarse matter. Air-dried. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.
* When fiber mulch is the only available mulch during periods when straw should be used, apply at a minimum rate of 2000 lbs./ac. Or 45 lbs./1000 sq. ft.			

Source: Va. DSWC

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			MVP-ES45.3	P

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

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

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

- Mulch anchoring tool (often referred to as a Krimper or Krimper Tool): This is a tractor-driven 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.
- Fiber Mulch: A very common practice with widespread use today. Apply fiber mulch by means of a hydroseder 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.
- 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:


- Synthetic binders** - Formulated binders or organically formulated products may be used as recommended by the manufacturer to anchor mulch.
- *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 (ES-1, CSS-1, CMS-2, MS-2, RS-1, RS-2, CRS-1, and CRS-2).

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

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

4. **Mulch nettings:** Lightweight plastic, cotton, or paper nets may be stapled over the mulch according to manufacturer's recommendations.

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

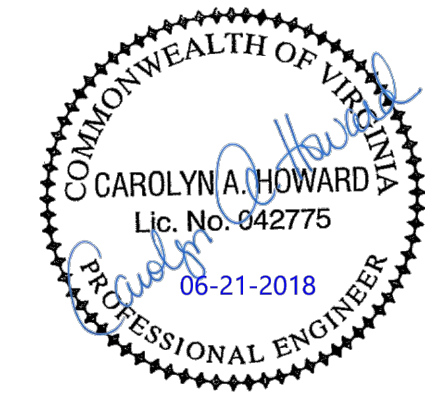
DRAWN	DATE		ENVIRONMENTAL DETAIL	
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JOB NO.		DESIGN ENGINEERING	MULCHING	
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			MVP-ES45.4	P

Mountain Valley
ANCILLARY SITE
EROSION AND SEDIMENT CONTROL PLANS
MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE
ROANOKE COUNTY, VIRGINIA

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


**Draper Aden
Associates**
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 www.daa.com




CONSTRUCTION
PLANS









RESTORATION DETAILS

DRAWN BY:	SWM
CHECKED BY:	CH
APPROVED BY:	CH
DATE:	05/29/2018
SCALE:	AS SHOWN
SHT. NO. LY-049-005	OF 10

NOTE: NOT ALL OF THE FOLLOWING DETAILS APPLY TO THE MVP-LY-049 LAYDOWN YARD.

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 hydrosceded 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.																									
<table><tr><td>DRAWN</td><td>DATE</td></tr><tr><td>CHECKED</td><td>DATE</td></tr><tr><td>APP'D</td><td>DATE</td></tr><tr><td>SCALE</td><td>N.T.S.</td></tr><tr><td>SHEET</td><td>1 OF 1</td></tr><tr><td>JOB NO.</td><td></td></tr><tr><td>PROJECT ID:</td><td>PXXXX</td></tr></table>		DRAWN	DATE	CHECKED	DATE	APP'D	DATE	SCALE	N.T.S.	SHEET	1 OF 1	JOB NO.		PROJECT ID:	PXXXX	<table><tr><td colspan="2"></td></tr><tr><td colspan="2">DESIGN ENGINEERING</td></tr><tr><td>DRAWING NO.</td><td>MVP-ES45.5</td></tr><tr><td>REV.</td><td>P</td></tr></table>				DESIGN ENGINEERING		DRAWING NO.	MVP-ES45.5	REV.	P
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DRAWING NO.	MVP-ES45.5																								
REV.	P																								
ENVIRONMENTAL DETAIL																									
MULCHING																									

TOPSOILING & SOIL HANDLING FOR M.V.P.																									
Definition																									
Methods of preserving and using the surface layer of undisturbed soil, often enriched in organic matter, in order to obtain a more desirable planting and growth medium.																									
Purposes																									
To provide a suitable growth medium for final site stabilization with vegetation and promote successful reforestation.																									
Conditions Where Practice Applies																									
1. Where the preservation or importation of topsoil is determined to be the most effective method of providing a suitable growth medium.																									
2. Where the subsoil or existing soil presents the following problems: <ul style="list-style-type: none">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 resupplying topsoil, may not always be cost-effective. Topsoiling can delay seeding or sodding operations, increasing the exposure time of denuded areas. Most topsoil contains weed seeds, and weeds may compete with desirable species.																									
Advantages of topsoil include its high organic matter content and friable consistence, water-holding capacity, and nutrient content.																									
In site planning, the option of topsoiling should be compared with that of preparing a seedbed in subsoil. The clay content of subsoils does provide high moisture availability and deter leaching of nutrients and, when properly limed and fertilized, subsoils may provide a good growth medium which is generally free																									
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TOPSOILING & SOIL HANDLING FOR M.V.P.																									
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Purposes																									
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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:

- 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).
- Location of the topsoil stockpile so that it meets specifications and does not interfere with work on the site.
- Allow sufficient time in scheduling for topsoil to be spread and bonded prior to seeding or planting.
- 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.
- 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, silty loam, sandy clay loam, clay loam). It shall be free of debris, trash, stumps, rocks, roots, and noxious weeds, and shall give evidence of being able to support healthy vegetation. It shall contain no substance that is potentially toxic to plant growth.




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

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

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

Soluble salts shall not exceed 500 ppm.

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

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Topsoil Importing

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

Stripping

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

Stockpiling

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

Excavated subsoil shall be stockpiled separately from topsoil.

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

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

Site Preparation Prior to and Maintenance During Topsoiling and Excavation

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

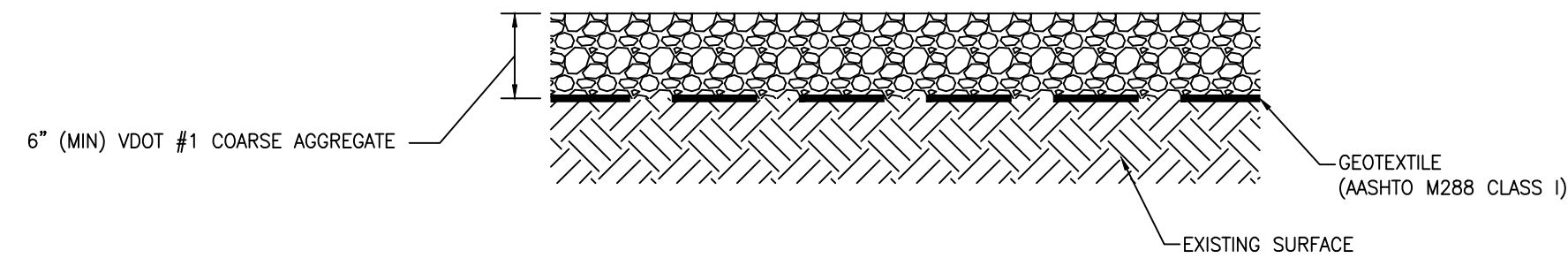
Grading: Previously established grades on the areas to be topsoiled shall be maintained according to the approved plan.

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

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

Applying Topsoil

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



TEMPORARY GRAVEL SURFACE SPECIFICATIONS

- NO LAND DISTURBANCE WILL OCCUR AND THE GRAVEL WILL BE PLACED ON EXISTING GRADE.
- THE EXISTING SURFACE SHALL BE CLEARED OF ALL VEGETATION AND OTHER OBJECTIONABLE MATERIAL.
- A 6-INCH COURSE OF VDOT #1 COARSE AGGREGATE (AS PER SECTION 203 OF VDOT'S ROAD AND BRIDGE SPECIFICATIONS) SHALL BE PROVIDED AS SOON AS VEGETATION REMOVAL IS COMPLETE.
- IN "HEAVY DUTY" TRAFFIC SITUATIONS THE AGGREGATE SHOULD INSTEAD BE PLACED AT AN 8- TO 10-INCH DEPTH TO AVOID EXCESSIVE DISSIPATION OR MAINTENANCE NEEDS.
- IF THE GRAVEL SURFACE BECOMES CLOGGED WITH SEDIMENT AND OTHER DEBRIS, A TOP DRESSING OF NEW GRAVEL SHOULD BE APPLIED.
- GEOTEXTILE SHALL BE NON-WOVEN WITH AASHTO M288 SURVIVABILITY CLASS (1) AND A MIN. PERMITIVITY OF 90 GAL/MIN/FT².

TYPICAL GRAVEL SURFACE DETAIL

N.T.S.

3.10 Sanitary Waste Facilities

Recommended Practices

Portable toilets should be conveniently located conducive to use. Anchor portable toilets to prevent tipping, and provide secondary containment in the form of berms or other containment to prevent pollutants from discharging into streets, gutters, storm drains, or surface waters due to accidental spills or discharges. Inspect portable toilets daily for cleanliness and proper operation, and arrange for regular service by a licensed service provider for proper maintenance and waste collection.

- Provide a convenient and safe location.
- Place on level ground or gravel pad.
- Anchor to prevent tipping.
- Inspect and maintain daily and service regularly.

Locations

- Conveniently locate portable toilets throughout the project site (for large projects).
- Place portable toilets on level ground to prevent accidental tipping or spills.
- Ensure that portable toilets are accessible for regular maintenance and service.
- The locations of the portable toilets should be identified in the SWPPP, preferably on the record Set of Plans or on a site map.

Prohibitions

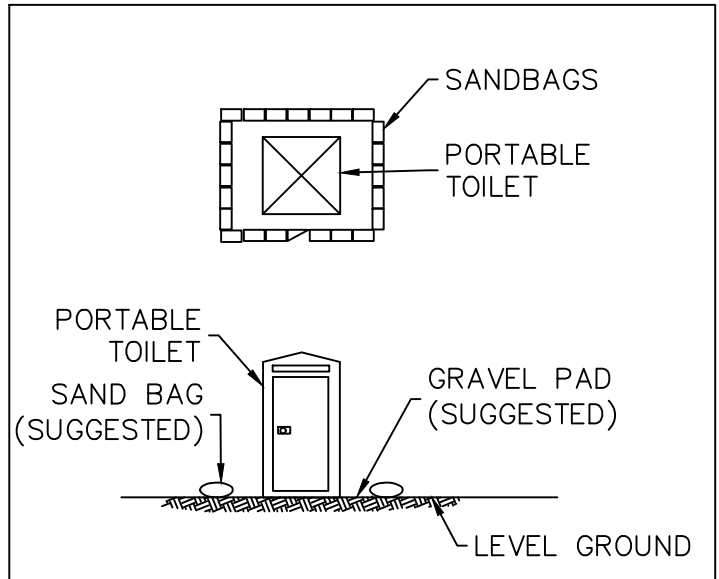
Sanitary discharge from portable toilets is harmful to the environment and should never be discharged to surface waters.

- Never locate portable toilets over storm drains or gutters or near conveyance channels.
- Never allow discharge from portable toilets to leak or spill into streets, gutters, storm drains, or surface waters.

Inspections and Maintenance

- Inspect portable toilets daily to detect leaks.
- Keep facilities safe and clean.
- Provide regular maintenance and waste collection by a licensed service provider to ensure proper disposal of waste into a sanitary sewer system for treatment.

Figure 3-10: Typical Detail for Sanitary Facilities



PORTA-JOHN DETAIL

N.T.S.

3.7 Fueling Areas

Recommended Practices

Onsite storage of fuel should be avoided, whenever possible. If onsite storage and handling of fuel is necessary, a designated, secure fueling area should be established away from heavily trafficked areas. Always keep a functional spill kit available at the fueling area.

- Always leave original labels on fuel containers.
- Always provide secondary containment for all fuel storage containers.
- Always store fuel in accordance with manufacturers' recommendations and Safety Data Sheets (SDS).
- Post emergency phone numbers in the fueling area to aid in a quick response in the event of a spill.
- Provide berms around the fueling area to prevent stormwater runoff from entering.
- Do not leave the fueling area unattended when in use. The area should be secured at all times.
- Do not utilize a mobile fueling operation within 100 feet of any gutter/storm drain, conveyance channel, or surface waters.

Locations

- Locate the fueling area a minimum of 100 feet from gutters, storm drains, conveyance channels, or surface waters.
- Locate the fueling area on level ground.
- Secure the fueling area with fencing or similar perimeter controls to discourage vandalism.
- Place a sign at the location identifying it as the fuel storage and handling area.
- The location of the fuel handling and storage area should be identified in the SWPPP, preferably on the record Set of Plans or on a site map.

Prohibitions

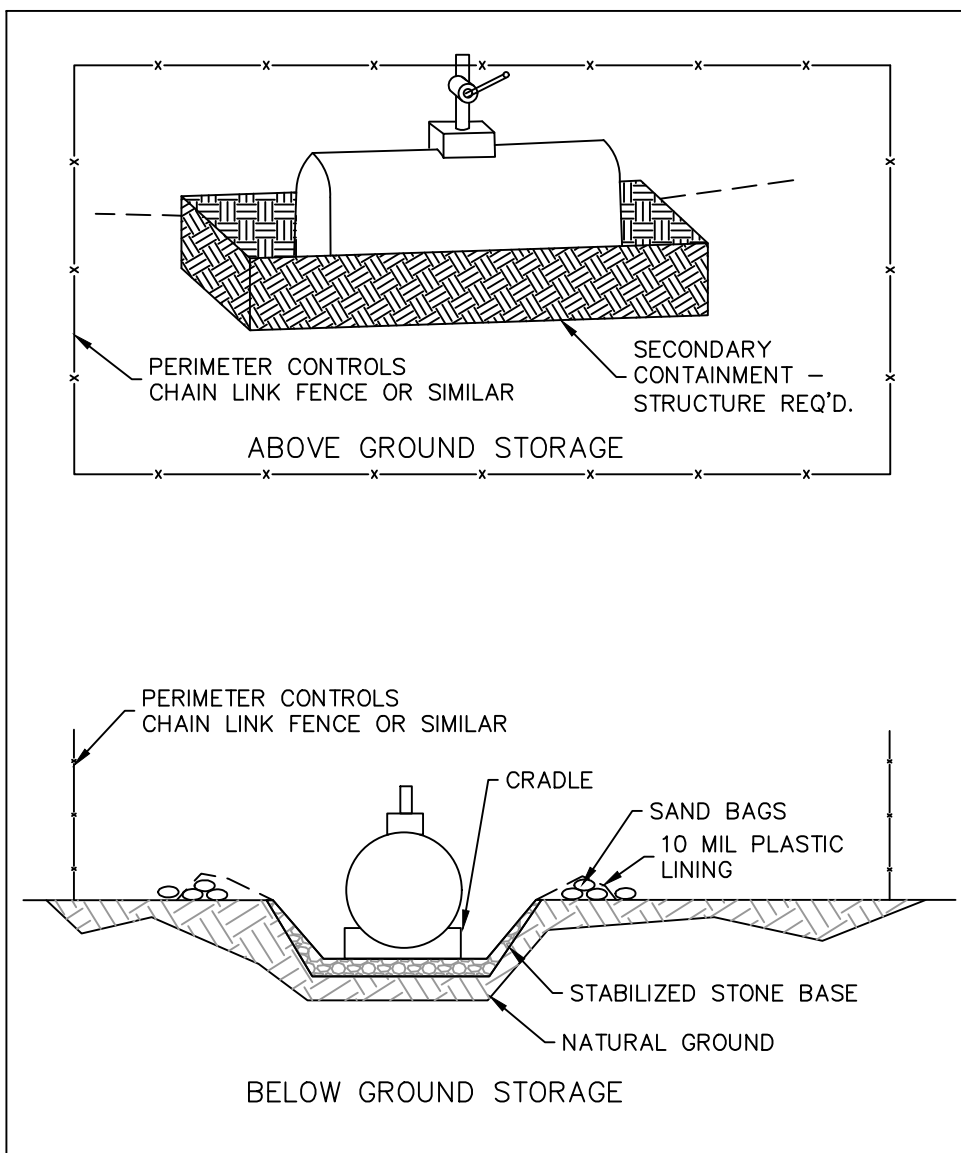
- Do not "top off" fuel tanks when fueling equipment or vehicles.

Inspections and Maintenance

- Inspect the facility daily to detect leaks or spills.
- Use spill kit supplies to immediately clean up any leaks and spills and dispose of used materials properly.
- Inspect spill kit regularly to ensure that all supplies are readily available and functional in the event of a leak or spill.

A Spill Prevention Control and Countermeasure (SPCC) Plan conforming to 40 CFR 112 is required if the aggregated volume of Oil stored within the project limits at any one time is greater than 1320 gallons (see Road and Bridge Specification 107.16(e)3 for additional information).

Figure 3-7: Typical Detail for Fuel Storage Area



FUEL STORAGE DETAIL

N.T.S.

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Mountain Valley ANCILLARY SITE		EROSION AND SEDIMENT CONTROL PLANS		MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		ROANOKE COUNTY, VIRGINIA		MOUNTAIN VALLEY PIPELINE, LLC		555 SOUTHPOINTE BOULEVARD, SUITE 200		CANONSBURG, PA 15317	
Mountain Valley ANCILLARY SITE		EROSION AND SEDIMENT CONTROL PLANS		MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		ROANOKE COUNTY, VIRGINIA		MOUNTAIN VALLEY PIPELINE, LLC		555 SOUTHPOINTE BOULEVARD, SUITE 200		CANONSBURG, PA 15317	
Mountain Valley ANCILLARY SITE		EROSION AND SEDIMENT CONTROL PLANS		MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		ROANOKE COUNTY, VIRGINIA		MOUNTAIN VALLEY PIPELINE, LLC		555 SOUTHPOINTE BOULEVARD, SUITE 200		CANONSBURG, PA 15317	
Mountain Valley ANCILLARY SITE		EROSION AND SEDIMENT CONTROL PLANS		MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		ROANOKE COUNTY, VIRGINIA		MOUNTAIN VALLEY PIPELINE, LLC		555 SOUTHPOINTE BOULEVARD, SUITE 200		CANONSBURG, PA 15317	
Mountain Valley ANCILLARY SITE		EROSION AND SEDIMENT CONTROL PLANS		MOUNTAIN VALLEY PIPELINE PROJECT - H600 LINE		ROANOKE COUNTY, VIRGINIA		MOUNTAIN VALLEY PIPE					

