

**EROSION & SEDIMENT
CONTROL REPORT
FOR
S.R. 0462 BOX CULVERT REPLACEMENT
OVER TRIBUTARY TO STRICKLER RUN
WEST HEMPFIELD TWP., LANCASTER CO.**

June 2006

Prepared for:

**Pennsylvania Department of Transportation
Engineering District 8-0
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1.0 PROJECT OVERVIEW

1.1 Project Description

The purpose of this study is to develop the Erosion & Sediment Control Plan needed for the replacement of the existing structure that carries S.R. 0462 (Columbia Avenue) over a tributary to Strickler Run in West Hempfield Township, Lancaster County. S.R. 0462 is classified as a rural minor arterial roadway. The project will extend from Station 12+50.00 to Station 15+50.00, a length of 300 feet. The project area is 1.13 acres with a total disturbed area of 0.66 acres.

The existing bridge is a single-span reinforced concrete slab bridge, which carries two lanes and one auxiliary lane of S.R. 0462. The bridge has a clear span of 9'-5" and a clear roadway width of 42'-11 3/4". The bridge has a 6.8-foot underclearance and is skewed at 90 degrees to the centerline of roadway. The bridge shows signs of extensive deterioration.

It is proposed to replace the existing structure with a 22'-0" wide by 7'-6" high precast concrete box culvert. The existing horizontal alignment will be maintained. The proposed roadway cross section will consist of two 11-foot lanes, one 10-foot auxiliary lane, and two 8-foot shoulders.

The project area is located in a rural/agricultural region of Lancaster County. The project is located within the USGS Columbia East Quadrangle at N40° 02' 30" latitude and W76° 28' 00" longitude.

The stream is perennial and the basin of Strickler Run is classified as a Warm Water Fishery (WWF) under Title 25, Environmental Protection, Chapter 93, Water Quality Standards. The bottom of the proposed replacement structure will be depressed a minimum of one (1) foot below the stream invert to establish the natural passage of the fish.

1.2 Project Duration

The project has a proposed let date of September 2006. It is expected construction will be underway in the Spring of 2007 and the project will be completed by the Fall of 2007.

1.3 Plan Preparation

Whitney, Bailey, Cox & Magnani, LLC has prepared erosion and sedimentation control plans for numerous projects from major highway projects to bridge replacement projects and site development plans. Erosion and sedimentation control submissions have been prepared for the following recent projects:

- S.R. 3025-A01 Bridge Replacement, Juniata County
- S.R. 0116-012 Bridge Replacement, Adams County



- S.R. 0097-003 Bridge Replacement, Adams County
- S.R. 3085-40M Bridge Replacement, Chester County
- S.R. 4003-40M Culvert Replacement, Chester County
- S.R. 9900-PED Pedestrian Bridge Project, Blair County
- Salem Church Rd Culvert Replacement, Cumberland County
- Penn State University, York – Library and Classroom Addition, York County
- Penn State University, Altoona – Classroom Addition, Blair County
- West Manchester Municipal Building, York County

The narrative and plan for this project were prepared under the direction of Joseph L. O’Neil, PE. Mr. O’Neil was involved with the preparation of the erosion and sedimentation control plan for seven of the above referenced projects. His formal education consists of a Bachelors Degree in Civil Engineering from George Washington University and a Masters Degree from the University of Maryland.

2.0 SOIL INFORMATION

Soils present in the project area include Ln – Linside silt loam and LdB – Letort silt loam. The Linside silt loam has inclusions that are hydric components. The Letort silt loam has 3-8 percent slopes.

The Linside silt loam and the Letort silt loam are classified as Prime Farmland. The existing land use of this soil within the project area is pasture, farms and single-family homes. Soils information for the project area is located in Appendix C. This information was obtained from the USDA-SCS Soil Survey of Lancaster County, Pennsylvania. The type of soil present within the project area is indicated on the soils map included in Appendix C. The soil is delineated on the Erosion and Sediment Control Plan. Based on the scope of the project, there are no limitations associated with the existing soil type.

3.0 DRAINAGE FACILITIES

The proposed roadway is in a fill condition at all four corners of the bridge. The proposed roadway section is an open section with runoff dissipating down the fill slopes. Drainage improvements will be limited to replacing a section of existing 24” RCP storm drain pipe from Sta. 12+79 RT to Sta. 13+39 RT. The pipe will be redirected to discharge through the box culvert. A standard PENNDOT manhole will be installed at Sta. 12+79 RT to redirect pipe flow. No additional drainage will be discharged to the pipe due to proposed conditions.

4.0 TEMPORARY AND PERMANENT CONTROL MEASURES

Several temporary control measures will be used for this project, which include silt barrier fence (18” high), sediment filter bags, erosion control mulch blanket, rock filter and





temporary sandbag diversion dam with pump to divert the stream while the proposed box culvert is being installed.

Permanent control measures and facilities that will be used for this project include R-6 rip rap for scour protection along the edge of the box culvert end sections and seeding and mulching of all disturbed areas.

Design details and specifications for these control measures are included in Appendix D and were taken from the DEP Erosion and Sediment Pollution Control Program Manual, March 2000.

Any disturbed area on which activity has ceased and which will remain exposed will be stabilized immediately. During non-germination periods, mulch will be applied at the recommended rates.

PENNDOT Formula E will be utilized to stabilize areas temporarily. PENNDOT Formula B will be utilized to permanently seed all disturbed areas except PENNDOT Formula L will be used to stabilize slopes steeper than 3:1. Reference is made to the attached table for seed mix formulations. Seed will be applied at the rates specified in the table.



SEEDING & SOIL SUPPLEMENTS

FORMULA & SPECIES	% BY MASS	MINIMUM %		MAXIMUM % WEED SEED	SEEDING RATE LBS PER 1000 SY	REMARKS
		PURITY	GERMINATION			
FORMULA B					21.0 TOTAL	ALL DISTURBED LAWN AREAS
PERENNIAL RYEGRASS MIXTURE (LOLIUM PERENNE) *	20	98	90	0.15	4.0	
CREEPING RED FESCUE OR CHEWINGS FESCUE	30	98	85	0.15	6.0	
KENTUCKY BLUEGRASS MIXTURE (POA PRATENSIS) **	50	98	80	0.2	11.0	
FORMULA C					9.0 TOTAL	HILLSIDES STEEPER THAN 3:1
CROWN VETCH (CORONILLA VARIA)	45	98	70	0.1	4.0	
ANNUAL RYEGRASS (LOLIUM MULTIFLORUM)	55	98	90	0.15	5.0	
FORMULA D					21.0 TOTAL	SWALES
TALL FESCUE (FESTUCA ARUNDINACEA VAR. K31)	70	98	85	0.15	15.0	
CREEPING RED FESCUE OR CHEWINGS FESCUE	30	98	85	0.15	6.0	
FORMULA E					10.0 TOTAL	TEMPORARY
ANNUAL RYEGRASS (LOLIUM MUTIFLORUM)	100	98	90	0.15	10.0	
FORMULA L					24.0 TOTAL	LOW MAINT. SLOPE AREAS NOT NORMALLY MOWED.
HARD FESCUE MIXTURE (FESTUCA LONGIFOLIA) ***	55	98	85	0.15	13.0	
CREEPING RED FESCUE	35	98	85	0.15	8.5	
ANNUAL RYEGRASS (LOLIUM MULTIFLORUM)	10	98	90	0.15	2.5	

* A COMBINATION OF IMPROVED CERTIFIED VARIETIES WITH NO ONE VARIETY EXCEEDING 50% OF THE TOTAL RYEGRASS COMPONENT

** A COMBINATION OF IMPROVED CERTIFIED VARIETIES WITH NO ONE VARIETY EXCEEDING 25% OF THE TOTAL BLUEGRASS COMPONENT

*** A COMBINATION OF IMPROVED CERTIFIED VARIETIES WITH NO ONE VARIETY EXCEEDING 50% OF THE TOTAL HARD FESCUE COMPONENT.

An area shall be considered to have achieved final stabilization when it has a minimum 70% uniform perennial vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding or other movements.

Soil supplements of the type specified below will be applied at the following application rates:

- Pulverized Agricultural Limestone at a rate of 800 lbs / 1000 SY.
 - 10-20-20 Analysis Commercial Fertilizer at a rate of 140 lbs / 1000 SY.
 - 38-0-0 Ureaform Fertilizer at a rate of 50 lbs / 1000 SY.
- or
- 32-0-0 to 38-0-0 Sulfur Coated Area Fertilizer at a rate of 59 to 50 lbs / 1000 SY as directed.
- or
- 31-0-0 IBDU Fertilizer at a rate of 61 lbs / 1000 SY.

Mulch consisting of straw or hay shall be applied uniformly, in a continuous blanket, at a minimum rate of 1200 lbs / 1000 SY or as otherwise indicated. If indicated, increase the rate of application, depending upon the material used, season, soil conditions, or method of application. An acceptable mechanical blower may be used to apply the mulch.

Erosion control mulch blanket will be installed on all slopes greater than 3:1 and will be furnished and installed in accordance with PENNDOT Publication 408/2003 Specifications – Section 806 – Water Course and Erosion Protection.

5.0 CONSTRUCTION SEQUENCE

All earth disturbance activities shall proceed in accordance with the following sequence. Each stage shall be completed before the following stage is initiated. Clearing and grubbing shall be limited only to those areas described in each stage.

At least 7 days before starting any earth disturbance activities the operator shall invite all contractors involved in those activities, the landowner, all appropriate municipal officials, the erosion and sediment control plan preparer, and the Lancaster County Conservation District to an on site pre-construction meeting. Also, at least three days before starting any earth disturbance activities, all contractors involved in those activities shall notify the PA One Call System Inc. at 1-800-242-1776 for buried utilities locations.

Stage 1

1. Delineate all limits of disturbed area in the field. Install silt fence of the type indicated on the plans.
 2. Construct rock construction entrances (RCE) as indicated on the plans at Sta. 12 + 62 RT and Sta. 14 + 19 RT.
 3. Install traffic control devices associated with Phase 1 of Traffic Control Plan including temporary concrete barrier and traffic signs.
-



4. Install temporary sandbag diversion dam, diversion pump, sediment filter bag and rock filter in downstream channel as indicated on the plans. Diversion pump shall be operated 24 hours a day to divert clean stream water from the disturbed area. Operate and maintain until Step 8 of Stage 2.
5. Remove southern portions of existing bridge superstructure, near and far abutments and wingwalls. Pump water from excavation into the sediment filter bags.
6. Install culvert bedding material, proposed precast box culvert, cast-in-place end section and select borrow excavation rock, Class R-6, at outlet end of box culvert as shown on plans.
7. Install standard PENNDOT manhole at Sta. 12+79 RT and 24" RCP through box culvert. Place R-6 rock at pipe outlet.
8. Remove sediment filter bag.
9. Construct southern portion of east and west approach roadway embankments. Install erosion control mulch blanket on fill slopes from Sta. 13+62 to Sta. 14+50 RT.
10. Seed and mulch disturbed areas.
11. Remove silt fence.
12. Remove rock construction entrances.
13. Construct pavement section and install guide rail along right side of roadway. Shift traffic to south side of roadway and culvert.

Stage 2

1. Delineate all limits of disturbed area in the field. Install silt fence of the type indicated on the plans.
 2. Construct rock construction entrances (RCE) as indicated on the plans at Sta. 12+55 LT and Sta. 14+19 LT.
 3. Install traffic control devices associated with Phase 2 of traffic control plan including temporary concrete barrier and traffic signs.
 4. Install sediment filter bag upstream of bridge.
 5. Remove remaining portions of existing bridge superstructure, near and far abutments and wingwalls. Pump water from excavation into the sediment filter bag.
-



6. Install remaining culvert bedding material, proposed precast box culvert, cast-in-place end section and select borrow excavation rock, Class R-6, at inlet end of box culvert as shown on plans.
7. Construct remaining northern portion of east and west approach roadway embankments.
8. Remove upstream sandbag diversion dam and downstream rock filter. Complete construction of proposed culvert.
9. Remove sediment filter bag.
10. Seed and mulch disturbed areas.
11. Remove silt fence.
12. Remove rock construction entrances.
13. Construct remaining width of roadway pavement section. Construct bituminous concrete wearing surface full width.
14. Install signing and pavement markings.
15. Contractor is to permanently stabilize all of the disturbed areas. Notify Lancaster County Conservation District before removal of temporary erosion and sediment control measures. After final site stabilization has been achieved and released to PADEP, remove temporary erosion and sediment BMPs. Permanently stabilize areas disturbed during removal of erosion and sediment BMPs immediately.

6.0 MAINTENANCE PROGRAM

The Contractor is responsible for installation, maintenance and disposal of erosion and sediment pollution control devices. Perform these activities in accordance with PENNDOT Publication 408/2003 and Special Provisions as applicable until the site is stabilized. All sediment and pollution control devices must be properly maintained including inspection and repair weekly and after storm events. Maintenance includes removal of debris and sediment from dewatering basins, repair and replacement of silt barrier fence disturbed during construction and the regrading and reseeding of washed out areas. If erosion and sediment pollution control devices do not function as intended, replacement or modification of those installed may be required.



1. Silt Barrier Fence

Inspect the silt fence weekly and after storm events. After reviewing the results of the inspection with the Engineer, immediately, clean, repair or replace silt fence found to be in unsatisfactory condition. Remove accumulated sediment when it reaches one-half the above ground height of the silt fence. Repair undercutting or erosion of the toe anchor immediately with compacted backfill.

2. Seeding and Mulching

Maintain seeding and mulching in accordance with PENNDOT Publication 408/2003 Specifications Sections 804 and 805. Reapply soil supplement and reseed in accordance with PENNDOT Publication 408/2003, Section 804. Reapply mulch material and replace in accordance with PENNDOT Publication 408/2003, Section 805.

3. Rock Construction Entrance

Maintain rock construction entrance thickness to the specified dimension by adding rock. Maintain a stockpile of rock material on site for this purpose. Any mud tracked onto the open portion of the roadway must be cleaned up at the end of each day. Washing of the road with water is not permitted.

4. Sediment Filter Bag

Inspect filter bags daily. If any problem is detected, pumping shall cease immediately and not resume until the problem is corrected. Replace the filter bag when they become half full. Keep spare bags on-site for replacement of those that have failed or are filled. Place and connect filter bags as per manufacturer's recommendations for dewatering purposes. Provide bag that will handle 1,700 gpm of water discharged and filter particles down to 125 microns. Place sediment filter bags in undisturbed areas and/or where the construction of the aggregate bed is relatively level.

5. Temporary Sandbag Diversion Dam

Inspect sandbags and plastic sheeting weekly and after storm events. Initiate repairs immediately after inspection. Replace damaged sandbags and plastic sheeting as required.

6. Rock Filter

Inspect rock filter weekly and after each storm event. Remove rock filter when clogged with sediment. Materials must be washed completely free of debris or replaced with new rock when directed to rebuild the barrier. Remove and dispose of sediment so it does not erode the construction areas and/or natural waterways. Accomplish cleanout or replacement within three (3) working days of inspection.

Borrow or waste areas have not been designated. The Contractor will be responsible for acquiring all borrow and waste areas and complying with the following:

- PENNDOT Pub. 408 – Section 105.14 – Borrow Areas and Waste Areas
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- PENNDOT Pub. 408 – Section 845 – Unforeseen Project Water Pollution Control

The Contractor will be responsible for securing approval for the Erosion and Sediment Control Plan for the Borrow and Waste Areas from the Lancaster County Conservation District.

It is expected that the Contractor's staging areas for job trailer, materials storage areas and equipment will be accommodated within the closed portion of the roadway on each approach. Erosion and sediment control plans for areas outside of the Permit Area shown on the plans shall be approved by the Lancaster County Conservation District prior to the initiation of work in this non-Permitted Area.

Permanent Maintenance Operations

Upon completion of the project, the maintenance of permanent erosion and sediment pollution control becomes part of the Township's regular maintenance program. This includes the periodic inspection (at least once a year) and making required repairs to facilities/devices.

7.0 RECYCLING / DISPOSAL OF MATERIALS

It is anticipated that the existing roadway that is removed in conjunction with this project will be used as fill material at the project site in accordance with PENNDOT Publication 408/2003, Section 206.

The existing bridge is to be removed in accordance with the Special Provisions for Item 1018-0050 – Removal of Existing Bridge. The Contractor shall remove and dispose of the existing bridge at an approved disposal site.

8.0 REFERENCES

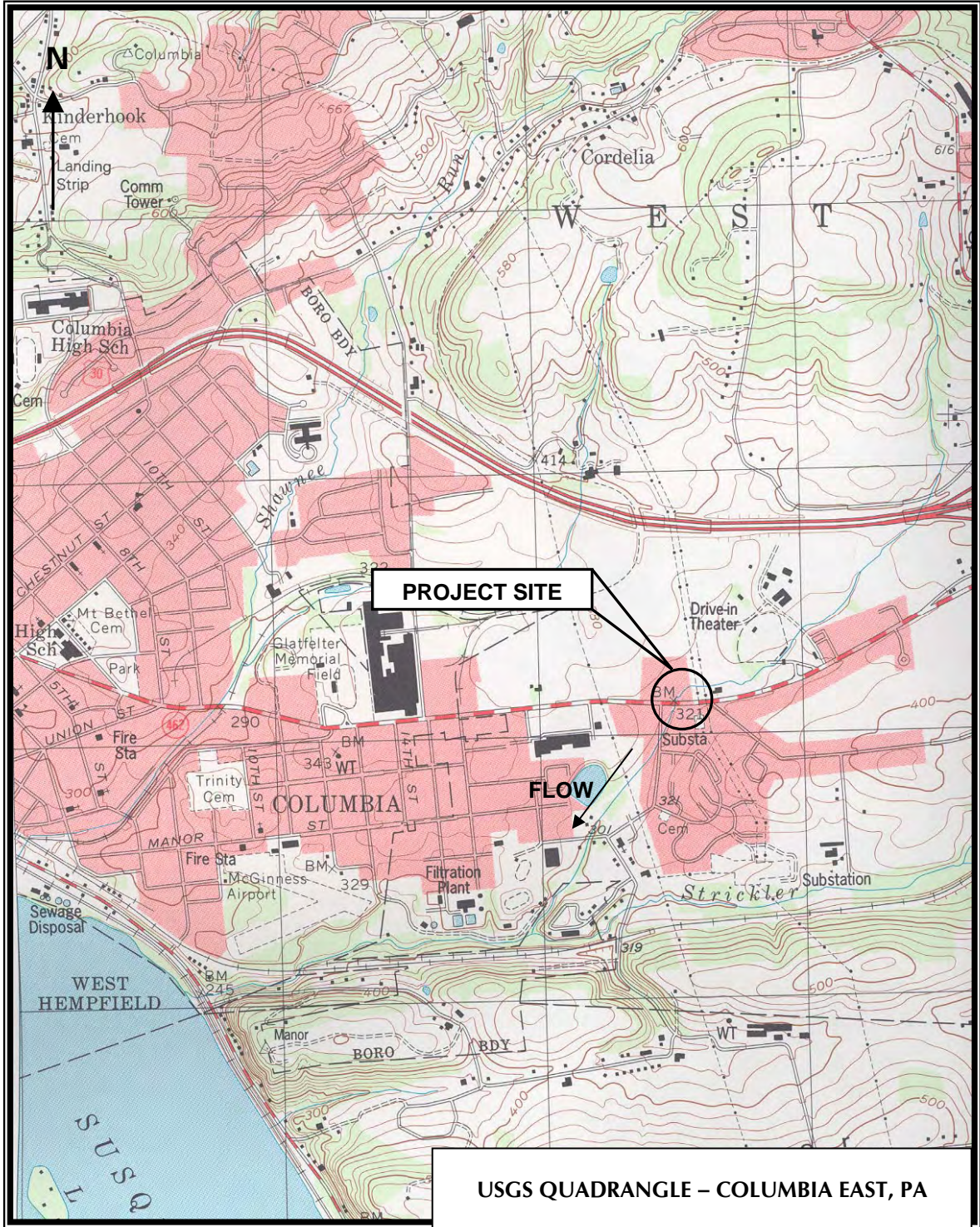
- Pennsylvania Department of Transportation, Design Manual Part 2
- Pennsylvania Department of Transportation, Design Manual Part 3
- Pennsylvania Department of Environmental Protection, Erosion and Sediment Pollution Control Program Manual, March 2000

APPENDIX "A"

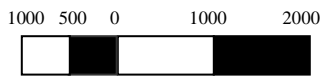


Location and Vicinity Map



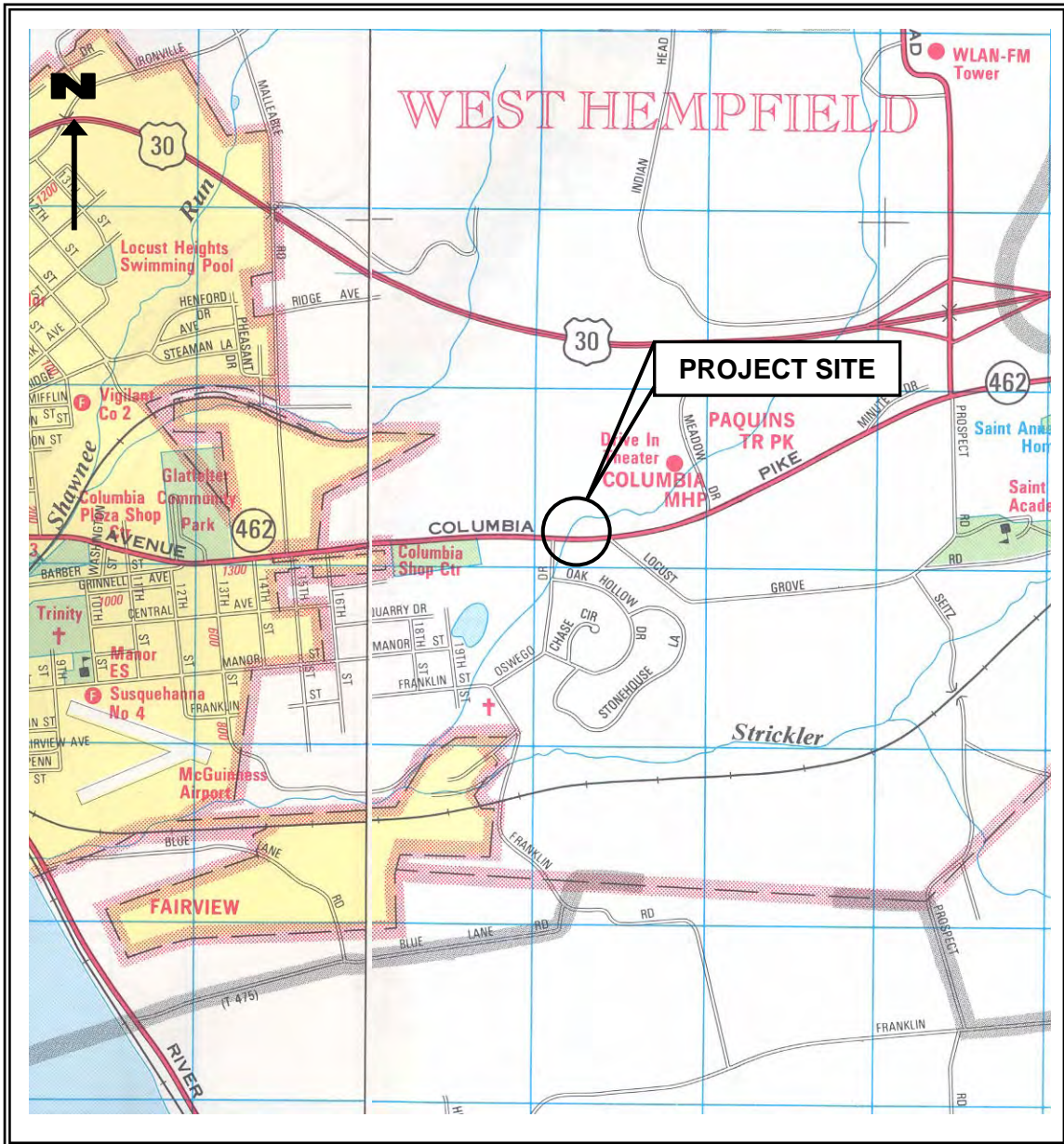


LOCATION MAP



SCALE: 1-in = 2000-ft

**S.R. 0462, Section 019
Over Strickler Run Tributary
West Hempfield Township
Lancaster County**



VICINITY MAP

S.R. 0462, Section 019
 Segment 0100, Offset 0151
 Over Strickler Run Tributary
 West Hempfield Township, Lancaster County



SCALE: 1" = 2000'

APPENDIX "B"

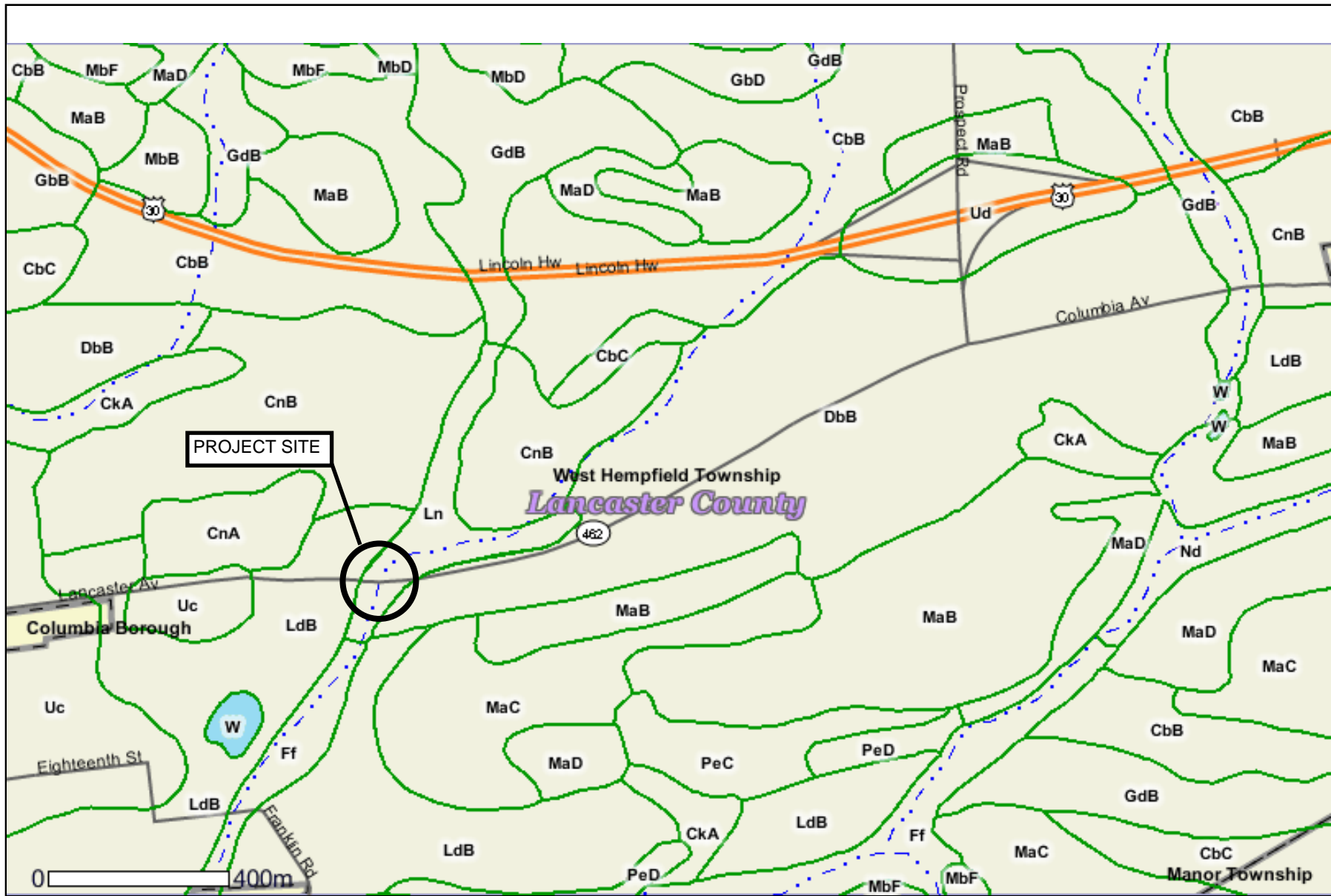


Soils Map and Information



SoilMap

- Soils
- Roads
- Interstate
- US Route
- Pa Route
- Other Route
- Water
- Streams
- Counties
- Townships Text
- Townships
- Boroughs



Map Scale 1:14501, 1 inch = 1208 feet
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Soil maps are subject to change and may be copied without permission. Enlarging the maps may cause misunderstanding of the detail of mapping. Help in using soil surveys is available from the local office of the NRCS.



SOILS MAP

S.R. 0462 over Tributary to Strickler Run
West Hempfield Township, Lancaster County

HYDRIC SOILS - LANCASTER COUNTY, PENNSYLVANIA

Map Symbol	Map Name	Hydric Component	Location Notes
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Map units with major components hydric:

BA	Baile silt loam	Baile (MD0023)	
BO	Bowmansville silt loam	Bowmansville (PA0048)	
HG	Holly silt loam	Holly (OH0032)	

Map units with inclusions of hydric components:

ABB	Abbottstown silt loam, 3 to 8 percent slopes	Poorly drained soil	Low flats, depressions
ASB	Abbottstown extremely stony silt loam, 3 to 8 percent slopes	Poorly drained soil	Low flats, depressions
BM	Blairton silt loam, 3 to 10 percent slopes	Poorly drained soil	Depressions, drainageways
CBA	Chester silt loam, 0 to 3 percent slopes	Baile	Drainageways
CBB	Chester silt loam, 3 to 8 percent slopes	Baile	Drainageways
CKA	Clarksburg silt loam, 0 to 5 percent slopes	Wet spots	Drainageways, depressions
CM	Comus silt loam	Holly	Bottom lands
EU	Elk-Urban land complex	Holly	Bottom lands
FF	Fluvaquents and Udifluvents, loamy	Holly	Bottom lands
GDB	Glenville silt loam, 3 to 8 percent slopes	Baile	Drainageways
LBB	Lehigh silt loam, 3 to 8 percent slopes	Wet spots	Drainageways, seepy areas
LBC	Lehigh silt loam, 8 to 15 percent slopes	Wet spots	Drainageways, seepy areas
LG	Linden silt loam	Holly	Bottom lands
LN	Lindside silt loam	Holly	Bottom lands
MDB	Mount Lucas silt loam, 3 to 8 percent slopes	Poorly drained soil	Swales, depressions
MEB	Mount Lucas very stony silt loam, 3 to 12 percent slopes	Poorly drained soil	Swales, depressions
NC	Newark silt loam	Holly	Bottom lands
ND	Newark silt loam	Holly	Bottom lands
NE	Nolin	Holly	Bottom lands
RAB	Readington silt loam, 3 to 10 percent slopes	Wet spots	Depressions, pot holes
RBB	Readington extremely stony silt loam, 3 to 8 percent slopes	Wet spots	Depressions, pot holes
RD	Rowland silt loam	Bowmansville	Bottom lands
UC	Urban land	Wet spots	Depressions, bottom lands
UD	Udorthents, loamy	Wet spots	Depressions, bottom lands
W	Water	Wet spots	Depressions, bottom lands

TABLE 5.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland]

Map symbol	Soil name
BdA	Bedington silt loam, 0 to 3 percent slopes
BdB	Bedington silt loam, 3 to 8 percent slopes
BrB	Brecknock gravelly silt loam, 3 to 8 percent slopes
BuA	Bucks silt loam, 0 to 3 percent slopes
BuB	Bucks silt loam, 3 to 8 percent slopes
CbA	Chester silt loam, 0 to 3 percent slopes
CbB	Chester silt loam, 3 to 8 percent slopes
CkA	Clarksburg silt loam, 0 to 5 percent slopes
Cm	Comus silt loam
CnA	Conestoga silt loam, 0 to 3 percent slopes
CnB	Conestoga silt loam, 3 to 8 percent slopes
DbA	Duffield silt loam, 0 to 3 percent slopes
DbB	Duffield silt loam, 3 to 8 percent slopes
EcA	Elk silt loam, 0 to 3 percent slopes
EcB	Elk silt loam, 3 to 8 percent slopes
GbB	Glenelg silt loam, 3 to 8 percent slopes
GdB	Glenville silt loam, 3 to 8 percent slopes
HaA	Hagerstown silt loam, 0 to 3 percent slopes
HaB	Hagerstown silt loam, 3 to 8 percent slopes
HfA	Hollinger silt loam, 0 to 3 percent slopes
HfB	Hollinger silt loam, 3 to 8 percent slopes
LaB	Lansdale loam, 3 to 8 percent slopes
LbB	Lehigh silt loam, 3 to 8 percent slopes
LdA	Letort silt loam, 0 to 3 percent slopes
LdB	Letort silt loam, 3 to 8 percent slopes
Lg	Linden silt loam
Ln	Lindsay silt loam
MaB	Manor silt loam, 3 to 8 percent slopes
MdB	Mount Lucas silt loam, 3 to 8 percent slopes
Ne	Nolin silt loam
Rd	Rowland silt loam
UaB	Ungers loam, 3 to 8 percent slopes

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm ³	In/hr	In/in	pH			Pct	
LdA, LdB, LdC Letort	0-9	15-25	1.20-1.40	0.6-2.0	0.16-0.20	5.1-7.8	Low	0.32	4	1-3
	9-32	18-35	1.40-1.60	0.6-2.0	0.12-0.16	5.1-7.8	Low	0.28		
	32-62	18-35	1.40-1.60	0.6-2.0	0.08-0.12	5.6-7.8	Low	0.17		
Lg Linden	0-10	10-18	1.20-1.40	2.0-6.0	0.14-0.18	5.6-7.3	Low	0.37	4	1-4
	10-50	10-18	1.20-1.40	2.0-6.0	0.14-0.18	5.6-7.3	Low	0.37		
	50-60	5-25	1.20-1.40	6.0-20	0.05-0.08	5.6-7.3	Low	0.17		
Ln Lindside	0-10	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.1-7.3	Low	0.32	5	2-4
	10-50	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-7.3	Low	0.37		
	50-60	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-7.3	Low	0.32		
MaB, MaC, MaD Manor	0-10	10-25	1.20-1.40	0.6-2.0	0.17-0.21	4.5-7.3	Low	0.37	3	1-3
	10-23	10-25	1.30-1.50	0.6-2.0	0.14-0.20	4.5-7.3	Low	0.32		
	23-60	5-20	1.25-1.50	0.6-6.0	0.10-0.17	4.5-7.3	Low	0.49		
MbB, MbD, MbF Manor	0-10	10-25	1.20-1.45	0.6-2.0	0.14-0.17	4.5-7.3	Low	0.32	3	---
	10-23	10-25	1.30-1.50	0.6-2.0	0.14-0.20	4.5-7.3	Low	0.32		
	23-60	5-20	1.25-1.50	0.6-6.0	0.10-0.17	4.5-7.3	Low	0.49		
MdB Mount Lucas	0-8	10-20	1.20-1.30	0.6-2.0	0.18-0.22	5.1-7.3	Low	0.37	4	1-2
	8-30	17-32	1.30-1.60	0.06-0.6	0.12-0.16	5.1-7.3	Low	0.28		
	30-60	5-20	1.30-1.70	0.06-6.0	0.04-0.12	5.6-7.3	Low	0.28		
MeB Mount Lucas	0-6	10-20	1.20-1.30	0.6-2.0	0.16-0.22	5.1-7.3	Low	0.28	3	---
	6-30	17-32	1.30-1.60	0.06-0.6	0.12-0.16	5.1-7.3	Low	0.28		
	30-60	5-32	1.30-1.70	0.06-6.0	0.04-0.12	5.6-7.3	Low	0.28		
Nc, Nd Newark	0-16	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low	0.43	5	1-4
	16-32	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43		
	32-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low	0.43		
Ne Nolin	0-10	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43	5	2-4
	10-60	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43		
Pa Penlaw	0-12	15-25	1.20-1.40	0.6-2.0	0.16-0.20	5.6-7.3	Low	0.43	3	2-4
	12-29	20-35	1.40-1.60	0.6-2.0	0.16-0.20	5.6-7.3	Moderate	0.24		
	29-55	20-35	1.60-1.80	0.06-0.2	0.10-0.16	5.6-7.3	Moderate	0.24		
	55-60	15-50	1.40-1.60	0.06-0.6	0.12-0.16	5.6-7.3	Moderate	0.24		
PeC, PeD, PeE Pequea	0-10	10-20	1.10-1.40	0.6-6.0	0.12-0.18	6.1-7.3	Low	0.43	3	1-3
	10-26	10-20	1.20-1.50	0.6-6.0	0.10-0.14	6.1-7.3	Low	0.28		
	26-52	10-20	1.20-1.50	0.6-6.0	0.06-0.12	7.4-8.4	Low	0.28		
	52	---	---	---	---	---	---	---		
Qu [#] Pits										
RaB Readington	0-9	15-20	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.5	Low	0.43	3	1-3
	9-33	18-35	1.40-1.60	0.6-2.0	0.08-0.14	4.5-6.5	Low	0.32		
	33-58	20-30	1.60-1.80	0.2-0.6	0.06-0.10	4.5-6.5	Low	0.32		
	58	---	---	---	---	---	---	---		
RbB Readington	0-9	15-20	1.20-1.40	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	3	1-3
	9-33	18-35	1.40-1.60	0.6-2.0	0.08-0.14	4.5-6.5	Low	0.32		
	33-58	20-30	1.60-1.80	0.2-0.6	0.06-0.10	5.1-6.5	Low	0.32		
	58	---	---	---	---	---	---	---		
Rd Rowland	0-9	10-20	1.10-1.30	0.2-2.0	0.14-0.18	5.1-7.3	Low	0.43	4	2-4
	9-25	15-32	1.20-1.50	0.2-2.0	0.14-0.18	5.1-7.3	Low	0.28		
	25-42	15-32	1.20-1.50	0.2-2.0	0.12-0.16	5.1-7.3	Low	0.28		
	42-60	3-12	1.40-1.70	2.0-6.0	0.03-0.08	5.1-7.3	Low	0.17		
UaB, UaC, UaD Ungers	0-10	10-20	1.20-1.40	0.6-2.0	0.10-0.18	3.6-7.3	Low	0.32	3	1-2
	10-46	17-27	1.30-1.50	0.6-2.0	0.10-0.14	3.6-7.3	Low	0.17		
	46-50	10-20	1.30-1.50	0.6-2.0	0.06-0.12	3.6-7.3	Low	0.17		
	50	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 17. --SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Potential frost action	Uncoated steel	Concrete
Eu*: Urban land.					<u>Ft</u>			<u>In</u>				
Ff*: Fluvaquents. Udfluvents.												
GbB, GbC, GbD Glengel	B	None	---	---	>6.0	---	---	>48	Soft	Moderate	Low	High.
GdB Glenville	C	None	---	---	0.5-3.0	Perched	Nov-Apr	>60	---	High	High	Moderate.
HaA, HaB, HbC, HbD Hagerstown	C	None	---	---	>6.0	---	---	>40	Hard	Moderate	Moderate	Low.
Hc*: Hagerstown Urban land.	C	None	---	---	>6.0	---	---	>40	Hard	Moderate	Moderate	Low.
HfA, HfB, HfC, HfD Hollinger	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
Hg Holly	B/D	Frequent	Long	Nov-May	0-0.5	Apparent	Dec-May	>60	---	High	High	Moderate.
LaB, LaC, LaD Lansdale	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Low	High.
LbB, LbC Lenigh	C	None	---	---	0.5-1.5	Perched	Nov-Mar	40-60	Hard	High	Moderate	Moderate.
LdA, LdB, LdC Levert	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Lg Linden	B	Occasional	Very brief to brief.	Jan-Apr	3.0-6.0	Apparent	Nov-Mar	>60	---	Moderate	Low	High.
Ln Lindsige	C	Occasional	Very brief	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	High	Moderate	Low.
MaB, MaC, MaD, MdB, MdB, MdB, Manor	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
MdB, MeB Mount Lucas	C	None	---	---	0.5-2.0	Perched	Nov-Mar	>60	---	High	High	Moderate.
Nc, Nd Newark	C	Occasional	Brief	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High	High	Low.

See footnote at end of table.

Ln—Lindside silt loam. This soil is nearly level, deep, and moderately well drained. It is on flood plains. Slopes are smooth and are 200 to 300 feet in length. The areas of the soil are long and narrow and range from 4 to 300 acres. They are subject to occasional flooding. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is silty clay loam 40 inches thick. It is yellowish brown in the upper 12 inches; light olive brown and mottled in the next 18 inches; and brown, mottled, and firm in the lower 10 inches. The substratum is dark brown, mottled very gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Nolin, Newark, and Elk soils. Inclusions make up about 20 percent of the unit.

The permeability of this Lindside soil is moderate to moderately slow in the subsoil and moderately slow to rapid in the substratum. The available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 18 to 36 inches. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. A few areas are in nonfarm uses or woodland.

This soil is suited to cultivated crops, but flooding delays tillage and planting in some years. Conservation tillage and the use of cover crops and crop residue will help to maintain tilth.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

Flooding and the seasonal high water table are the main limitations of the soil for community development, especially for septic tank absorption fields and homesites.

Capability subclass: llw; woodland ordination: 1o.

MaB—Manor silt loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and well drained. It is on broad, undulating side slopes and ridgetops. Slopes are slightly convex and are 300 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 200 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish red channery silt loam 13 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Glenville soils; soils that have stones on the surface; soils that have a surface layer of slaty, flaggy, or channery silt loam; and rock outcrop. Also included are areas of soils similar to this Manor soil but that are shallow to bedrock or that are redder and have a subsoil of sandy clay loam or silty clay. Included areas make up about 15 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability subclass: lle; woodland ordination symbol: 2o.

MaC—Manor silt loam, 8 to 15 percent slopes. This soil is sloping, deep, and well drained. It is on side slopes and ridgetops. Slopes are convex and are 300 to 600 feet in length. The areas of the soil are long and narrow or irregular in shape and range from 3 to 250 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish red channery silt loam 13 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Glenville soils; soils that have stones on the surface; soils that have a surface layer of slaty, flaggy, or channery silt loam; and rock outcrop. Also included are areas of soils similar to this Manor soil but that are shallow to bedrock or that are redder and have a subsoil of sandy clay loam or silty clay. Included areas make up about 15 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Capability subclass: IIIe; woodland ordination symbol: 3w.

LdA—Letort silt loam, 0 to 3 percent slopes. This soil is nearly level, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are slightly convex and are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is dark grayish brown silt loam 23 inches thick. The substratum is very dark grayish brown silt loam and channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Hollinger, Conestoga, Clarksburg, and Pequea soils. Included areas make up about 25 percent of the unit.

The permeability of this Letort soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction ranges from strongly acid to neutral in the surface layer and subsoil and from medium acid to mildly alkaline in the substratum.

Most areas of this soil are in cropland. A few areas are in woodland or nonfarm uses.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 2o.

LdB—Letort silt loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and are 100 to 1,000 feet in length. The areas of the soil are irregular in shape and range from 3 to 2,000 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is dark grayish brown silt loam 23 inches thick. The substratum is very dark grayish brown silt loam and channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Hollinger, Conestoga, Clarksburg, and Pequea soils. Included areas make up about 15 percent of the unit.

The permeability of this Letort soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction ranges from strongly

acid to neutral in the surface layer and subsoil and from medium acid to mildly alkaline in the substratum.

Most areas of this soil are farmed. A few areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2o.

LdC—Letort silt loam, 8 to 15 percent slopes. This soil is sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is dark grayish brown silt loam 23 inches thick. The substratum is very dark grayish brown silt loam and channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Hollinger, Conestoga, Clarksburg, and Pequea soils. Included areas make up about 15 percent of the unit.

The permeability of this Letort soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction ranges from strongly acid to neutral in the surface layer and subsoil and from medium acid to mildly alkaline in the substratum.

Most areas of this soil are in cropland. A few areas are in woodland or nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

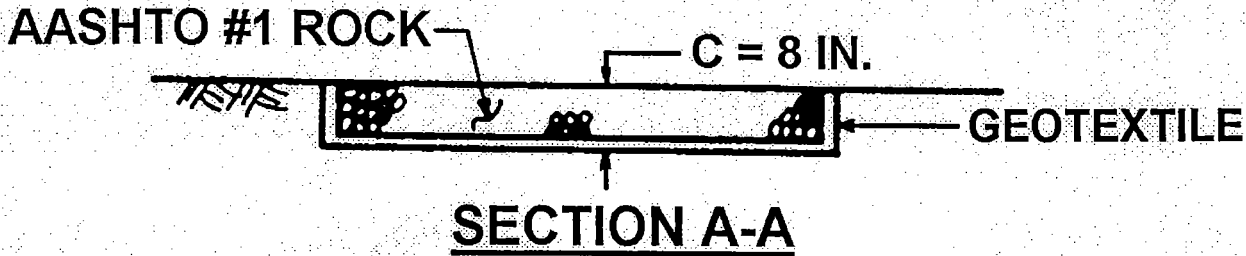
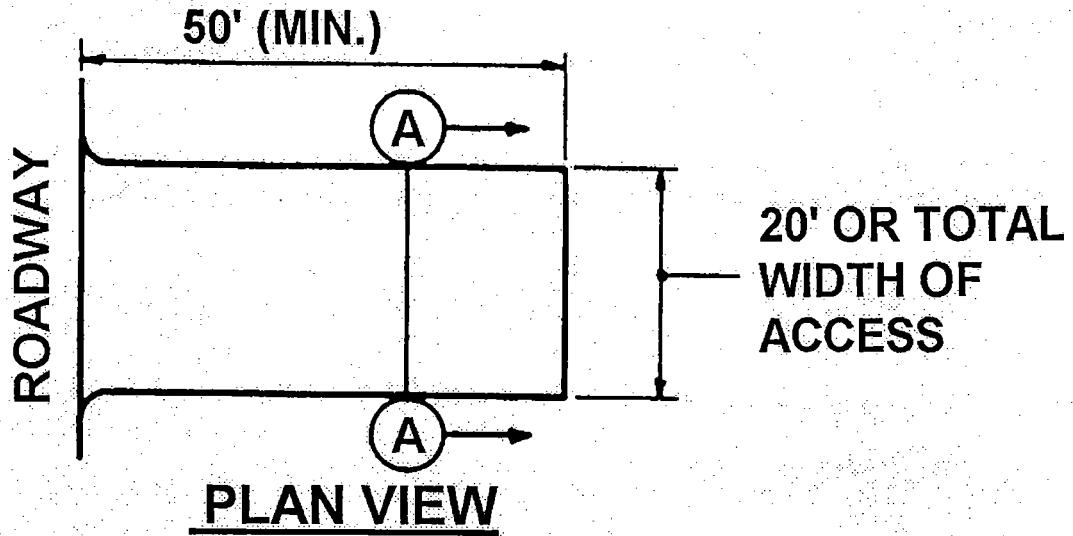
APPENDIX "C"



Details and Specifications

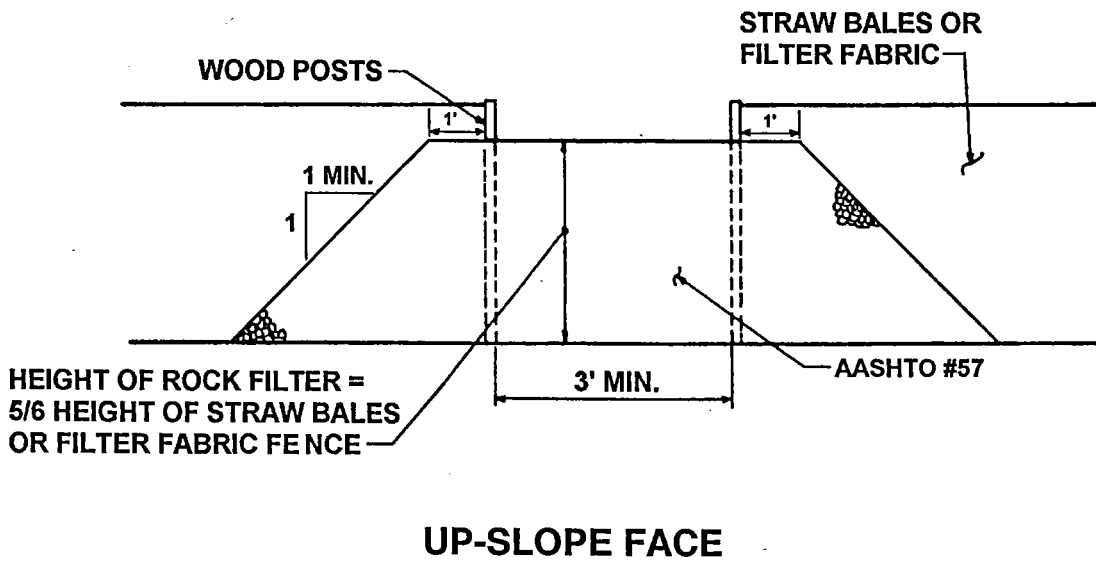
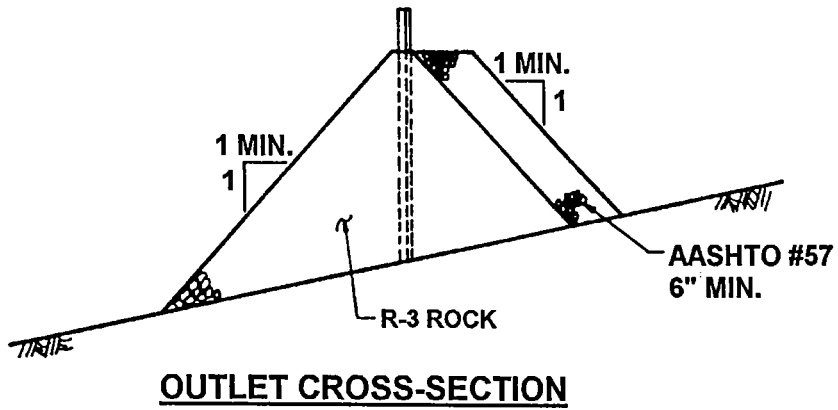


STANDARD CONSTRUCTION DETAIL #16
Rock Construction Entrance



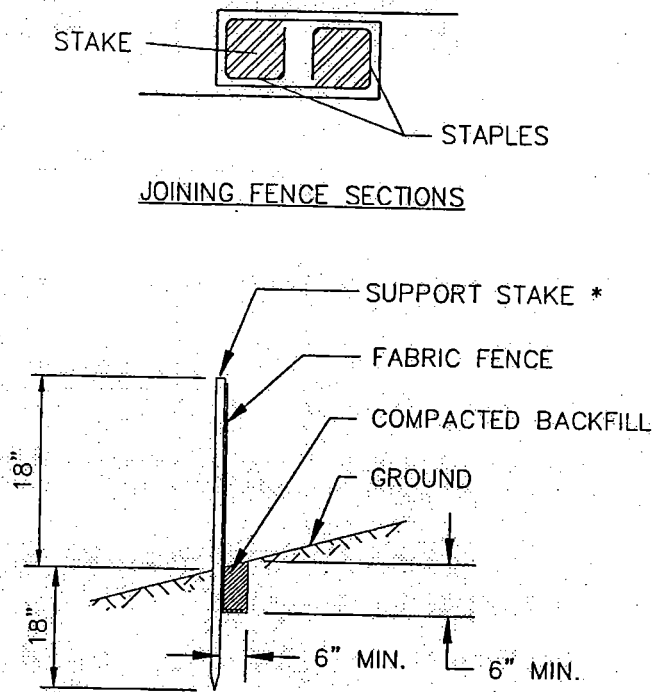
MAINTENANCE: Rock Construction Entrance thickness shall be constantly maintained to the specified dimensions by adding rock. A stockpile shall be maintained on site for this purpose. At the end of each construction day, all sediment deposited on paved roadways shall be removed and returned to the construction site.

STANDARD CONSTRUCTION DETAIL #18
Rock Filter Outlets



Sediment must be removed when accumulations reach 1/3 the height of the outlet.

STANDARD CONSTRUCTION DETAIL #19
Standard Filter Fabric Fence (18" High)



*Stakes spaced @ 8' maximum. Use 2"x 2" wood or equivalent steel stakes.

Filter Fabric Fence must be placed at level existing grade. Both ends of the barrier must be extended at least 8 feet up slope at 45 degrees to the main barrier alignment.

Sediment must be removed when accumulations reach 1/2 the above ground height of the fence.

Any section of Filter fabric fence which has been undermined or topped must be immediately replaced with a Rock Filter Outlet. See Standard Construction Detail # 18.

TABLE 18
Maximum Slope Lengths for Filter Fabric Fence

Slope - Percent	Maximum Slope Length (ft) Above Fence	
	18" High Fence	30" High Fence*
2 (or less)	150	500
5	100	250
10	50	150
15	35	100
20	25	70
25	20	55
30	15	45
35	15	40
40	15	35
45	10	30
50	10	25

*Reinforced 30" high fence. See Standard Construction Details #20 or #21.

Wherever there is a break or change in slope above the silt fence, the Maximum Allowable Slope Length should be determined by the following method:

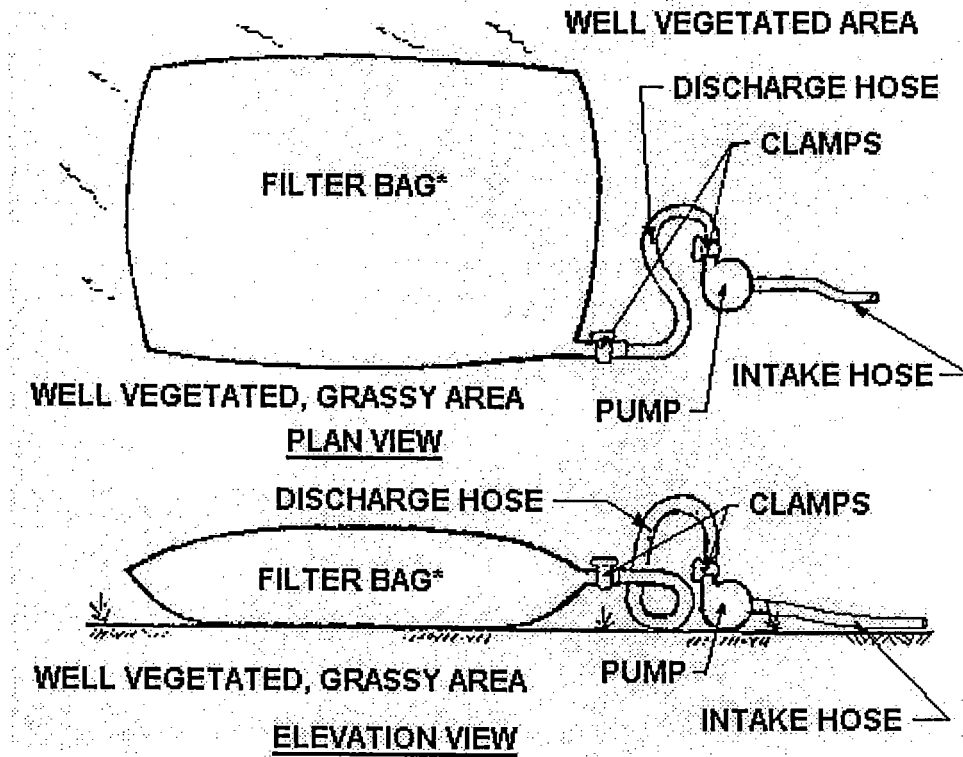
- (a) Determine the length and percent of the slope segment immediately above the fence.
- (b) Subtract the length of this segment from the allowable slope length for that percent slope shown in Table 18. If the result is positive, find the percentage of the allowable slope length that has been used (slope length ÷ allowable slope length).
- (c) Subtract the result from 1.00 to determine the unused percentage of allowable slope length.
- (d) Determine the maximum allowable slope length for the percent slope of the remaining segment from Table 18.
- (e) Multiply this allowable slope length by the remainder from step (c) above.
- (f) Add the result from step (b) to that from step (e). This is the maximum allowable slope length for the entire slope.

PUMPED WATER FILTER BAGS - Filter bags may be used to filter water pumped from disturbed areas prior to discharging to waters of the Commonwealth. They may also be used to filter water pumped from the sediment storage areas of sediment basins.

The pumping rate should be specified on the plan drawings next to the typical detail. Pumping rates will vary depending on the size of the filter bag, and the type and amount of sediment discharged to the bag.

Filter bags should be installed according to the details shown in Standard Construction Detail #26.

STANDARD CONSTRUCTION DETAIL #26
Pumped Water Filter Bag



Filter bags shall be made from non-woven geotextile material sewn with high strength, double stitched "J" type seams. They shall be capable of trapping particles larger than 150 microns.

A suitable means of accessing the bag with machinery required for disposal purposes must be provided. Filter bags shall be replaced when they become $\frac{1}{2}$ full. Spare bags shall be kept available for replacement of those that have failed or are filled.

Bags shall be located in well-vegetated (grassy) area, and discharge onto stable, erosion resistant areas. Where this is not possible, a geotextile flow path shall be provided. Bags shall not be placed on slopes greater than 5%.

The pump discharge hose shall be inserted into the bags in the manner specified by the manufacturer and securely clamped.

The pumping rate shall be no greater than 750 gpm or $\frac{1}{2}$ the maximum specified by the manufacturer, whichever is less. Pump intakes should be floating and screened.

SECTION 212—GEOTEXTILES

212.1 DESCRIPTION—This work is the furnishing and installing of geotextiles, for the class specified.

212.2 MATERIAL—Use geotextiles meeting the requirements of Section 735 for the specified class and type.

For bedding use any open-graded stone meeting the requirements of Type C or better aggregate, as specified in Section 703.2, except that No. 2A or No. 10 coarse aggregate will not be permitted.

Use steel securing pins 460 mm (18 inches) long x 4.75 mm (3/16-inch) in diameter, pointed at one end, and with a 40 mm (1 1/2-inch) washer head at the other end. If permitted, alternate securing devices may be used. Certify as specified in Section 106.03(b)3.

Use cover material, as specified or indicated.

212.3 CONSTRUCTION—As shown on the Standard Drawings, and as follows:

(a) **General.** Remove and replace fabric areas damaged during construction. Lap or sew replaced fabric, as specified for the class of fabric used. No traffic or construction equipment will be permitted on the fabric.

(b) **Class 1—Subsurface Drainage.** Provide smooth side and bottom trench surfaces so the fabric does not bridge depressions in the soil and is not damaged by rock projections. Use fabric of a width to permit a minimum trench-width overlap across the backfill at the trench top. Lay the fabric flat in the prepared trench without stretching. Lay the top of the fabric back on the sides to allow for the placement of the aggregate backfill and pipe. Overlap ends of rolls an amount equal to the trench width prior to fabric placement. Where pockets or cavities occur in the trench bottom or sides, fill them with acceptable granular material to prevent distortion or damage to the fabric.

Backfill aggregate and install pipe in a manner to prevent damage to the fabric. Compact aggregate backfill and overlap the fabric across the trench top. Do not allow the fabric to be exposed for more than 2 weeks without covering with backfill.

(c) **Class 2—Erosion Control.** Use Type A or Type B fabric, as indicated or specified. Remove vegetation, large stones, and other debris from the area to be protected and grade the surface to a relatively smooth condition. Undercut areas of soft material and replace with acceptable compacted material, as directed.

Place the fabric on the prepared area in a loose and unstretched condition to minimize shifting, puncturing, or tearing the fabric. Join adjacent edges and ends with a folded seam and sew using a single lock-type stitch seam or a double chain type stitch seam equivalent in strength to the fabric tensile strength. Sewing may be done on-site or by the manufacturer. Overlap only if permitted and then as directed. Provide a minimum overlap of 300 mm (1 foot). For underwater placement, overlap a minimum of 1 m (3 feet). Offset adjacent roll ends a minimum of 1.5 m (5 feet) when lapped.

Lay and overlap the fabric in the direction shown in Table A for the indicated use.

If permitted, anchor the fabric in place by securing pins or other acceptable methods, along sewn seams or overlaps, at the spacing shown in Table B. Also place securing pins on a maximum 1.8 m (6 foot) grid on the unsewn or unlapped portions of the fabric.

Where slopes are flatter than 1:6 (6:1), if permitted, securing pins may be eliminated, provided that aggregate, rock or other acceptable means are used to secure the fabric.

TABLE A
Fabric Placement

Operation	Slope Stabilization Runoff Protection and Internal Seepage Piping	Stream Slope Protection	Wave Protection
Direction of fabric laying	Up and down (parallel with slope direction)	Parallel to stream flows from upstream to downstream	Up and down (parallel with slope direction)
Overlap direction	Upslope over downslope	Upstream over downstream and upslope over downslope	Upslope over downslope

TABLE B
Securing Pin Spacing *

Slope	Steeper Than 1:3 (3:1)	1:4 (4:1)	Flatter Than 1:4 (4:1)
Pin Spacing along sewn seams or overlaps	0.6 m (2 feet)	1 m (3 feet)	1.5 m (5 feet)

* Place additional pins to secure unlapped portions, as specified.

Cover the fabric with the covering material as soon as possible, so the fabric is not exposed for more than 4 weeks for Type A and 2 weeks for Type B. Prevent slippage of the cover material on the fabric.

Do not drop rocks, 600 mm (2 feet) or larger in dimension, directly on the fabric from a height greater than 300 mm (1 foot). Do not allow the rock placement procedure to puncture or damage the fabric. A minimum 150 mm (6-inch) layer of bedding stone and a greater drop-height combination may be used if the combination produces the placement, thickness, gradation and fabric integrity requirements, and if permitted.

(d) **Class 3—Sedimentation Control.** Use Type A or B fabric, as indicated or specified. Install in accordance with Section 865.3.

(e) **Class 4—Layer Separation (Type A).** Use for the separation of subgrade and other layers. Place the fabric on a normally prepared subgrade area attending the full width of the sub-base layer being protected. Place fabric in a loose and unstretched condition to minimize shifting, puncture, and/or tearing. Overlap fabric roll-ends and edges a minimum of 300 mm (12 inches) with adjacent material. Place subbase material within 2 weeks after placement of fabric to minimize exposure. Place sub-base material in a manner to minimize slippage of the fabric. If excessive slippage occurs, use steel securing pins as specified in Section 212.2 at a maximum spacing of 1.8 m (6 feet).

(f) **Class 4—Stabilization (Type B).** Fine grade the subgrade in accordance with Section 210.3(c) and in compliance with the plans and cross sections. Remove any object that may puncture the geotextile. Roll out the geotextile over the prepared subgrade as indicated. Place the geotextile free of wrinkles. Do not drag the geotextile on the ground during placement or handling. Overlap parallel rolls or intersecting rolls a minimum of 610 mm (2 feet) in the direction of fill. For curves fold and overlap the geotextile in the direction of the turn. Do not allow any equipment directly on the geotextile until it is covered to full plan depth of subbase. Do not back dump the subbase material directly onto the geotextile. Place subbase material by back dumping then spread the subbase ahead of all equipment at full plan depth. Compact the subbase material with a roller in static mode, if directed by the Engineer. Fill any wheel ruts that form during construction with additional subbase to maintain plan profile. Do not remove the wheel ruts by blading the wheel ruts level.

(g) **Class 4—Reinforcement (Type C).** Section 212.3(f) except as follows: For a subgrade with a CBR value of 0.5 or lower, overlaps must be stitched. Use a 401 lock chain stitch seam with a 100 mm (4-inch) lap.

212.4 MEASUREMENT AND PAYMENT—

(a) Geotextiles, Class 1. Meter (Linear Foot)
Measured by the length (linear foot) of trench.

(b) Geotextiles, Class 2. Square Meter (Square Yard)
For the type indicated or specified.

(c) Geotextiles, Class 3. Meter (Linear Foot)
For the type indicated or specified. Measured by the length (linear foot) of sedimentation device.

(d) Geotextiles, Class 4. Square Meter (Square Yard)

SECTION 804—SEEDING AND SOIL SUPPLEMENTS

804.1 DESCRIPTION—This work is the furnishing and placing of seed and soil supplements of the type indicated, the application of herbicides, and mowing.

804.2 MATERIAL—The Department may require pretesting reports from the Pennsylvania Department of Agriculture for verification of analysis and legality of labeling, in addition to control of materials, as specified in Section 106.

(a) Soil Supplements.

1. Pulverized Agricultural Limestone. Conforming to the requirements of the Agricultural Liming Materials Act of 1978, P.L. 15, No. 9, as amended and meeting the following requirements:

• % Total Oxides (Total calcium oxide and magnesium oxide equivalent) (ASTM C 25)	50
• % Calcium Carbonate Equivalent (% by mass (weight)) (ASTM C 25)	89
• % Fineness (Minimum % by mass (weight))	
Material Passing No. 20 sieve	95
Material Passing No. 60 sieve	60
Material Passing No. 100 sieve	50

Furnish material having an effective neutralizing power (E.N.P.) of not less than 64 when calculated utilizing the guaranteed chemical analysis and fineness in accordance with the Agricultural Liming Materials Rules and Regulations (Title 7 PA Code, Part V, Chapter 108).

2. Commercial Fertilizer. Conforming to the requirements of the Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86 (3P.S.68.2), as amended.

Use dry formulations of 10-20-20 analysis for seeded and sodded areas. Use dry formulations of 20-10-5 and 16-8-16 analysis controlled release for tree, shrub, and vine type planting operations. Use dry formulations of 19-6-12 analysis controlled release for herbaceous wetland planting operations. Use other analysis as indicated or specified in the proposal.

3. Slow-Release Nitrogen Fertilizer. Conforming to the requirements of the Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86 (3P.S.68.2) as amended.

Use dry formulations of either 38-0-0 ureaform, 32-0-0 to 38-0-0 sulfur coated urea, 31-0-0 IBDU, or another analysis as indicated; and meeting the following requirements:

• 38-0-0 Ureaform	— 38.0% Minimum
Total Nitrogen (TN) Cold Water Insoluble	— 25.0% Minimum
Nitrogen (WIN) Activity Index (AI)	— 40.0% Minimum
Urea Nitrogen	— 3.5% Minimum
• 32-0-0 to 38-0-0 sulfur coated urea with a 7-day dissolution range of 20% to 30%	
• 31-0-0 IBDU	— Coarse grade (0.7 to 2.5 mm)
• Water Insoluble Nitrogen (WIN)	— 27.0% Minimum
• Other analysis as indicated	

(b) Seed.

1. **General.** Conforming to the Pennsylvania Seed Act of 1965 (Act No. 187) and amendments, and regulations of the Pennsylvania Department of Agriculture, Bureau of Plant Industry.

Have the Pennsylvania Department of Agriculture, Bureau of Plant Industry, conduct purity and germination analysis, following the current Rules for Testing Seeds, of the Association of Official Seed Analysis.

Use certified Crownvetch, Kentucky Bluegrass, Perennial Ryegrass, Creeping Red Fescue, Chewings Fescue, Hard Fescue, and Birdsfoot Trefoil seed.

Use crownvetch seed, pretested by the Pennsylvania Department of Agriculture, in 5.0 kg (10-pound) (net) waterproof containers, with a tag attached to each bag.

Use a premixed seed with an inspection tag, stamped, dated, and signed by the Department of Agriculture inspector sewn or stapled to the outside of each bag. Do not use seed from containers that are not sealed or that have been stored with herbicides.

Do not use seed, unless it has been inspected and sampled, as specified, or sampled by individual species and lot number, and mixed, on the project, under Department supervision.

Do not use seed which has a test date older than nine months.

2. **Seed Formulas.** See Table A.

(c) **Inoculant.** Standard acceptable commercial product, for treating leguminous seed. A product consisting of a suitable carrier, containing a culture of nitrogen-fixing bacteria specific for the seed to be inoculated.

Keep lids on containers when not in use, to avoid contamination. Store at moderate temperature. Do not use inoculant after the expiration date shown on the container.

(d) **Herbicides.** Conforming to all applicable Federal and State pesticide acts and registration requirements, and as specified in Specification No. H-16 issued by the Pennsylvania Department of General Services, Bureau of Purchases, Standards and Specifications Division, for the appropriate type.

Furnish herbicide in manufacturer's labeled container, as follows:

1. **Selective Control in Seeded Areas.** In areas seeded with Formula B or D, use Type I, Class C listed in Specification H-16, for controlling broadleaf weeds.

(e) **Mow-Line Delineator Stakes.** Not used.

(f) **Water.** Section 720.2

TABLE A (METRIC)

Formula and Species	% By Mass	Minimum %		Max. % Weed Seed	Seeding Rate kg Per 1000 m ²
		Purity	Germination		
Formula B					11.5 Total
• Perennial Ryegrass Mixture (<i>Lolium perenne</i>). A combination of improved certified varieties with no one variety exceeding 50% of the total Ryegrass component.	18	98	90	0.15	2.0
• Creeping Red Fescue or Chewings Fescue	30	98	85	0.15	3.5
• Kentucky Bluegrass Mixture (<i>Poa pratensis</i>). A combination of improved certified varieties with no one variety exceeding 25% of the total Bluegrass component.	52	98	80	0.20	6.0
Formula C					5.00 Total
• Crownvetch (<i>Coronilla varia</i>)	45	99	70	0.10	2.25
• Annual Ryegrass (<i>Lolium multiflorum</i>)	55	98	90	0.15	2.75
Formula D					11.5 Total
• Tall Fescue (<i>Festuca arundinacea</i> var. Kentucky 31)	70	98	85	0.15	8.0
• Creeping Red Fescue or Chewings Fescue	30	98	85	0.15	3.5
Formula E					5.5 Total
• Annual Ryegrass (<i>Lolium multiflorum</i>)	100	98	90	0.15	5.5
Formula L					13.00 Total
• Hard Fescue Mixture (<i>Festuca longifolia</i>). A combination of improved certified varieties with no one variety exceeding 50% of the total Hard Fescue component.	54	98	85	0.15	7.00
• Creeping Red Fescue	36	98	85	0.15	4.75
• Annual Ryegrass (<i>Lolium Multiflorum</i>)	10	98	90	0.15	1.25
Formula W					5.5 Total
• Tall Fescue (<i>Festuca arundinacea</i> var. Kentucky 31)	73	98	85	0.15	4.0
• Birdsfoot Trefoil Mixture (<i>Lotus corniculatus</i>). A mixture of 1/2 Viking and 1/2 of either Empire, Norcen, or Leo.	18	98	80*	0.10	1.0
• Redtop (<i>Agrostis alba</i>)	9	92	80	0.15	0.5

* Minimum 20% hardseed and 60% normal sprouts.

TABLE A (ENGLISH)

Formula and Species	% By Weight	Minimum %		Max % Weed Seed	Seeding Rate Lbs. Per 1000 SY
		Purity	Germination		
Formula B					21.0 Total
• Perennial Ryegrass Mixture (<i>Lolium perenne</i>). A combination of improved certified varieties with No one variety exceeding 50% of the total Ryegrass component.	20	98	90	0.15	4.0
• Creeping Red Fescue or Chewings Fescue	30	98	85	0.15	6.0
• Kentucky Bluegrass Mixture (<i>Poa pratensis</i>). A combination of improved certified varieties with no one variety exceeding 25% of the total Bluegrass component.	50	98	80	0.20	11.0
Formula C					9.0 Total
• Crownvetch (<i>Coronilla varia</i>)	45	99	70	0.10	4.0
• Annual Ryegrass (<i>Lolium multiflorum</i>)	55	98	90	0.15	5.0
Formula D					21.0 Total
• Tall Fescue (<i>Festuca arundinacea</i> var. Kentucky 31)	70	98	85	0.15	15.0
• Creeping Red Fescue or Chewings Fescue	30	98	85	0.15	6.0
Formula E					10.0 Total
• Annual Ryegrass (<i>Lolium multiflorum</i>)	100	98	90	0.15	10.0
Formula L					24.0 Total
• Hard Fescue Mixture (<i>Festuca longifolia</i>). A combination of improved certified varieties with no one variety exceeding 50% of the total Hard Fescue component.	55	98	85	0.15	13.0
• Creeping Red Fescue	35	98	85	0.15	8.5
• Annual Ryegrass (<i>Lolium Multiflorum</i>)	10	98	90	0.15	2.5
Formula W					10.5 Total
• Tall Fescue (<i>Festuca arundinacea</i> var. Kentucky 31)	70	98	85	0.15	7.5
• Birdsfoot Trefoil Mixture (<i>Lotus corniculatus</i>). A mixture of 1/2 Viking and 1/2 of either Empire, Norcen, or Leo.	20	98	80*	0.10	2.0
• Redtop (<i>Agrostis alba</i>)	10	92	80	0.15	1.0

* Minimum 20% hardseed and 60% normal sprouts.

804.3 CONSTRUCTION—

(a) **General.** Spread seeds where indicated and at the rates specified in Table A, or as otherwise indicated. Spread seeds within the following dates, or as otherwise indicated or directed.

- | | |
|-----------------------|--|
| • Formula B, D, and L | — March 15 to June 1
August 1 to October 15 |
| • Formula C | — Ryegrass Portion:
March 1 to October 15

Crownvetch Portion:
Anytime except September
and October |
| • Formula E | — March 15 to October 15 |
| • Formula W | — April 1 to June 15
August 16 to September 15 |

Where project conditions warrant, seeding dates may be extended. If extended, either apply full treatment or apply only 50% of the permanent seeding and soil supplements and apply the remaining 50% within the next seeding dates, as directed in writing by the Engineer.

On topsoiled areas, where temporary seeding or mulching has been applied, use tillage and soil supplements prior to permanent seeding.

On untilled areas, where temporary seeding or mulching has been applied, permanent seed and/or soil supplements may be applied without tilling.

(b) **Tillage.** On topsoiled areas, 1:3 (3:1) and flatter, thoroughly loosen the surface, to a depth of at least 50 mm (2 inches), by disking, by harrowing, or by other acceptable methods until the tillage is satisfactory. On untilled areas, 1:3 (3:1) and flatter, till only as directed. Also, till or scarify areas when the surface is glazed or crusted.

Correct surface irregularities by filling any depressions and leveling rough or uneven areas. Remove all metal objects, stones larger than 50 mm (2 inches) in any dimension, and other debris or objects deemed to be detrimental to maintenance operations.

(c) **Soil Supplements.** Uniformly apply supplements to the areas to be seeded, except areas to be seeded with Formula E. Properly document bulk delivery, as specified in Section 804.2(a)2.

On topsoiled areas, blend the initial soil supplements into the soil at least 50 mm (2 inches), by raking, disking, harrowing, or by another acceptable method. The blending of the supplements into the soil may be performed during tillage operations.

Prior to project completion, apply slow-release, nitrogen fertilizer to the surface of Formula B, D, L, and W seeded areas. Do not apply slow-release nitrogen fertilizer supplement to Formula C seeded areas.

Apply soil supplements as follows, unless otherwise indicated:

- | | |
|---|---|
| • Pulverized Agricultural Limestone | — 435 kg per 1000 m ²
(800 pounds per 1,000 S.Y.) |
| • 10-20-20 Analysis Commercial Fertilizer | — 80 kg per 1000 m ²
(140 pounds per 1,000 S.Y.) |

- 38-0-0 Ureaform Fertilizer — 30 kg per 1000 m²
(50 pounds per 1,000 S.Y.)
or
- 32-0-0 to 38-0-0 Sulfur Coated Area Fertilizer — 35 kg to 30 kg per 1000 m²
(59 to 50 pounds per 1,000 S.Y.)
as directed
or
- 31-0-0 IBDU Fertilizer — 35 kg per 1000 m²
(61 pounds per 1,000 S.Y.)

(d) **Inoculating Legumes.** Inoculate leguminous seed with proper cultures, in accordance with the manufacturer's directions. Prior to sowing, protect inoculated seed from prolonged exposure to sunlight. Reinoculate seed not sown within 24 hours. When seed is applied by hydraulic seeders, utilize four times the manufacturer's recommended rate.

If inoculated seed is held in a slurry with fertilizers for more than 1 hour, reinoculate or apply legumes separately.

(e) **Seeding.** At the rates specified in Table A, sow seeds uniformly on the prepared areas by the helicopter, hydraulic placement, broadcasting, drilling, or hand seeding methods. Inspect seeding equipment and adjust the equipment, if required, to assure the specified application rates. Periodically perform a check on the rate and uniformity of application, as directed.

(f) **Rolling.** After seeding, roll topsoiled areas that are to be mowed. Use a roller, having a mass (weight) not more than 100 kg/m (65 pounds per foot). If soil is wet or frozen, roll only when directed.

(g) **Mow-Line Delineation.** Not used.

(h) **Herbicides.** On areas designated for mowing, apply herbicides, as directed, where weed growth is prominent.

Existing plants or groups of plants to be saved within these areas will be designated prior to herbicide application. If directed, more than one application may be required to control undesirable growth.

Apply material with application personnel certified by the Department of Agriculture and with equipment specified in Section 108.05(c).

(i) **Liability.** Final acceptance of seeding and soil supplements will be subject to the results of official sampling and testing. When the purity or germination of any seed species does not meet the requirements of Table A, reseed with the accepted species, not to exceed the original specified rate. When soil supplements do not meet the requirements, reapply not exceeding the original specified rates. Where directed, replace desirable vegetation damaged during mowing or herbicide application.

(j) **Maintenance.** Satisfactorily maintain grass and legume areas within grading limits, until the entire project has been completed. Mow, as indicated and when directed.

Control prohibited and noxious weed growth within the right of way by herbicide spraying or cutting. These plants are defined by law.

After the seeding and soil supplement work on a slope has been satisfactorily completed, if a slope failure occurs, one which requires redressing, excavation, or establishment of a new slope, reapply soil supplements, then reseed, as specified for the original treatment.

804.4 MEASUREMENT AND PAYMENT—

(a) **Seeding and Soil Supplements.** Kilogram (Pound)

Measured by the number of kilograms (pounds) of seed actually incorporated into the work for the formula specified.

Reseeding and reapplying soil supplements on failed slope areas, as specified in Section 804.3(j), will be paid for at the contract unit price, in addition to the original accepted application of seeding and soil supplements.

(b) Seeding. Kilogram (Pound)

(c) Herbicides. 1000 Liters (1,000(M) Gallons)
For the type indicated.

(d) Mowing. Hectare (Acre)

SECTION 805—MULCHING

805.1 DESCRIPTION—This work is the furnishing, placing, anchoring, and maintaining of mulch of the type indicated.

805.2 MATERIAL—

(a) **Mulches.** Free from foreign material, coarse stems, mold, substances toxic to plant growth, and mature seed bearing stalks or roots of prohibited and noxious weeds, as defined by law.

1. **Seeded Areas.** Either one or a combination of the following, as specified:

1.a **Hay.** Timothy hay, mixed clover and timothy hay, or other acceptable native or forage grasses, well-cured to less than 20% moisture content, by mass (weight).

1.b **Straw.** Either wheat or oat straw, reasonably free of viable seed, well cured to less than 20% moisture content, by mass (weight).

1.c **Wood Fiber.** Specially prepared, biodegradable, air-dried wood fibers manufactured from 100% wood chips or bark from lumber mill processing operations, tinted with nontoxic, green dye and containing an organic tackifier approved for use with wood fibers; manufactured to be applied with hydraulic seeding equipment; and meeting the following requirements:

- | | |
|---|--------------|
| • Moisture Content | 15% Maximum |
| • Organic Matter
(Oven-Dried Basis) | 95% Minimum |
| • Water Holding Capacity
(Grams of Water per 100 Grams of Fiber) | 1000 Minimum |
| • Tackifier Content
(By Mass (Weight)) | 2.5% to 3.5% |

Submit a certified physical analysis of the product for approval prior to application.

1.d **Pellet Mulch.** A biodegradable, water-absorbing, paper-based pellet that when wetted loses its pellet shape, breaks down and adheres to other pellets, forming a thin, protective mulch mat, and meeting the following requirements:

- | | |
|------------------------|---|
| • Paper Content | 85% |
| • Fertilizer | 5% |
| • Polyacrylater | 2 to 5% |
| • Moisture Content | 5 to 8% |
| • Dimensions | 3 mm (1/8-inch) diameter,
6 mm (1/4-inch) to 19 mm (3/4-inch) length |
| • Absorption Potential | Minimum, 3 times dry weight |

2. Planting and Other Areas. One of the following:

2.a Tanbark. Suitable fibrous shredded, ground or chunked, aged tanbark derived as a by-product of the tannin extraction process, free from insect life, not decomposed, and between 6 mm (1/4-inch) and 50 mm (2 inches) in any dimension.

2.b Licorice Root or Tan-root. Not used.

2.c Shredded Bark. Suitable shredded, chunked or ground pieces of predominantly aged, but not decomposed, hardwood or pinewood tree bark produced from lumber mill processing operations, free of excessively fine particles and having a general size range of 6 mm (1/4-inch) to 50 mm (2 inches) in any dimension.

2.d Washed Gravel. Uncrushed, washed, No. 57 Coarse Aggregate, Section 703.2

2.e Crushed Aggregate. No. 67 Coarse Aggregate, Section 703.2

2.f Sewage Sludge Compost. A blend of secondary dewatered sewage sludge and wood chips, aerobically composted at a Pennsylvania Department of Environmental Protection, Bureau of Waste Management permitted site for at least 21 days and cured for 30 to 60 days to ensure pathogen destruction. Free of foreign material and substances toxic to plant growth, nonburning, weed free, screened, and meeting the following requirements:

- Minimum of 50% Organic Matter (Oven Dry Basis)
- Minimum of 100% Water Holding Capacity
- Particle Size—10 mm (3/8-inch) to 80 mm (3 inches)
- pH—6.0 minimum
- Heavy Metals and Toxic Compounds (Based on Sewage Sludge Content)

	MAXIMUM PPM
Cadmium	25
Chromium	1,000
Copper	1,000
Lead	1,000
Mercury	10
Nickel	200
Zinc	2,500
PCBs	3

Submit a certified laboratory analysis with each shipment.

2.g Wood Chips. Suitable chipped or ground wood material produced from predominantly live or non-decayed trees, logs, brush including leaves or post-consumer lumber having a general size range of 15 mm (1/2-inch) to 50 mm (2 inches) in any dimension and free of excessively fine or stringy particles. Chips produced and stockpiled during clearing and grubbing operations or aged chips, at least 6 months old, from lumber mill operations of the desired size and free from foreign debris will also be accepted.

(b) Mulch Binders. The following or other acceptable binder materials manufactured for this purpose.

1. **Recycled Cellulose Fiber.** Specifically prepared, biodegradable, shredded paper particles, comprised of recycled newsprint or other recycled wood cellulose fiber, containing a surfactant and nontoxic, green dye; manufactured to be applied with hydraulic seeding equipment; and meeting the following requirements:

- Moisture Content 17% Maximum
- Organic Matter 80% Minimum
(Oven-Dried Basis)
- Water Holding Capacity 900 Minimum
(Grams of Water per 100 Grams of Fiber)

2. **Wood Fiber.** Section 805.2(a)1.c

3. **Nonasphaltic Emulsion.** Either water soluble natural vegetable gum blended with gelling and hardening agents or a water soluble blend of hydrophillic polymers, viscosifiers, sticking aids, and gums.

4. **Polyvinyl Acetate.** Emulsion resin, containing 60% ± 1% total solids by mass (weight).

5. **Recycled Cellulose Fiber/Wood Fiber Mixture.** Specially prepared mixture of biodegradable, air-dried wood fiber, manufactured from wood chips or bark, and shredded paper particles, comprised of recycled newsprint or other recycled cellulose fiber combined with a surfactant and a nontoxic, green dye; manufactured to be applied with hydraulic seeding equipment; and meeting the following requirements:

- Wood Fiber 45% to 55%
- Recycled Cellulose Fiber 45% to 55%
- Moisture Content 21% Maximum
- Organic Matter 97% Minimum
(Oven-Dried Basis)
- Water Holding Capacity 900 Minimum
(Grams of Water per 100 Grams of Fiber)

(c) **Mulch Control Netting.** One of the following:

1. **Plastic.** A uniformly extruded, rectangular, plastic mesh meeting the following requirements:

- Mass (Weight) 7.8 g/m² (0.23 ounce per square yard), minimum
- Mesh Opening Nominal 19 mm (3/4-inch) x 19 mm (3/4-inch)

2. **Coconut Coir.** Undyed, biodegradable coconut coir yarn woven into a mesh meeting the following requirements:

- Mass (Weight) 200 g/m² (6 ounces per square yard), minimum
- Mesh Opening Nominal 50 mm (2-inch) x 50 mm (2-inch), maximum

(d) **Weed Barrier and Weed Control Mats.**

1. **Weed Barrier Mat.** Stable, evenly distributed, permeable, network of polymeric woven, non-woven or a woven/non-woven combination of polypropylene or polyester filaments or yarns manufactured for weed barrier/soil separator use, inert to commonly encountered construction chemicals or substances and meeting the following physical requirements:

Type	MARV*	Property
Woven or Combination Non-Woven Fabric	0.03 sec-1 1.3 sec-1	Permittivity flow rate ASTM D 4491
Woven or Combination Non-Woven Fabric	0.004 cm/sec 488 L/min/m ² (12 gal/min/s.f.)	Permeability Coefficient Permeability Flux ASTM D 4491 Falling head test
All Fabric	175 N (40 lbs.)	Puncture Strength (5/16-inch flat head rod) ASTM D 4833
All Fabric	70% after 150 hours	Ultraviolet Resistance Strength Retention ASTM D 4355

* Minimum Average Roll Value (+95% of the fabric in a lot will meet or exceed the minimum requirements).

Certify as specified in Section 106.03(b).

2. Weed Control Mat. Stable, permeable network of spunbonded, long chain synthetic polyolefins (minimum 95% by mass (weight)) filaments or yarns with nodules of trifluralin, carbon black and polyethylene compounded together utilizing time-release characteristics permanently attached to the fabric on 38 mm (1 1/2-inch) centers and meeting the following requirements.

Physical Property	MARV*
Trifluralin (Nodule)	20%
Puncture Strength (5/16-inch Flat Head Rod) ASTM D 4833	175 N (39 lbs.)
Permittivity ASTM D 4491	0.7 sec-1
Ultraviolet Resistance Strength Retention ASTM D 4355	70% after 500 hours

* Minimum Average Roll Value (+95% of the fabric in a lot will meet or exceed the minimum requirement).

Certify as specified in Section 106.03(b).

(e) Staples. Section 806.2(d)1.

(f) Wood Stakes. Section 806.2(d)3.

(g) **Bonded Fiber Matrix (BFM).** Specially prepared, water soluble, biodegradable, hydraulically applied system of long strand wood fibers held together by a bonding agent which adheres to the soil surface and upon drying forms a continuous, insoluble, three dimensional, non-dispersible protective crust-like soil covering.

1. Polymer or Hydrocolloid Binder Matrix.

1.a Wood Fiber. Specially prepared, long strand (min. 25% 10 mm (3/8-inch) length) air-dried wood fibers (88 to 92% by mass (weight)) manufactured from wood chips, bark or clean wood waste products, and meeting the following requirements:

Moisture Content	15% Maximum
Water Holding Capacity	1000 Minimum (Grams of water per 100 Grams of Fiber)

1.b Bonding Agent. High strength tackifier of powdered polysaccharide guar gum, blended hydrocolloid-based binder, hydrophylic, or co-polymer material 5 to 12% by mass (weight).

1.c Synthetic Fiber. System may contain up to 5% by mass (weight) of crimped, polyester fibers or other synthetic fibers with wetting and dispersion agents manufactured for use in mulching applications.

1.d Dye. System may contain a nontoxic, water soluble, colored dye to aid in the visual application coverage of the matrix.

1.e Activator. System may contain up to 1% by mass (weight) of organic and mineral fertilizers.

2. Gypsum Binder Matrix.

2.a Wood Fiber. Specially prepared, long strand (min. 25% 10 mm (3/8-inch) length) air-dried wood fibers manufactured from wood chips, bark, or clean wood waste products, and meeting the following requirements:

Moisture Content	15% Maximum
Water Holding Capacity	1000 Minimum (Grams of water per 100 Grams of Fiber)

2.b Bonding Agent. Naturally occurring, high purity, processed hemi-hydrate gypsum with manufacturer's system additives which when combined with water will form a cementitious binder that will produce a crust-like soil covering within 4 to 8 hours after application. Material which has become partially air set, lumpy, or caked prior to use is not acceptable for use.

2.c Synthetic Fiber. Synthetic fibers manufactured for use in mulching applications, coated with wetting and dispersion agents.

2.d Dye. System may contain a nontoxic, water soluble, colored dye to aid in the visual application coverage of the matrix.

805.3 CONSTRUCTION—

(a) Mulching Seeded Areas. Place mulch, of the type indicated, immediately after seeding or within 48 hours after seeding is completed. Unless otherwise indicated, place only straw or wood fiber over topsoiled areas. Use hay, straw, or wood fiber in other areas, as indicated or specified.

Place hay or straw uniformly, in a continuous blanket, at a minimum rate of 650 kg/1000 m² (1,200 pounds per 1,000 square yards) or as otherwise indicated. If directed, increase the rate of application, depending upon the material used, season, soil conditions, or method of application. An acceptable mechanical blower may be used to apply mulch. Machines which cut mulch into short pieces will not be permitted. Anchor mulch with specified mulch binders applied at the following rates:

- Recycled Cellulose Fiber. 90 kg/1000 m² (160 pounds per 1,000 square yards)
- Wood Fiber. 90 kg/1000 m² (160 pounds per 1,000 square yards)
- Nonasphaltic Emulsion. At manufacturer's recommended rate

- Polyvinyl Acetate. At manufacturer's recommended rate
- Recycled Cellulose Fiber/Wood Fiber Mixture. 90 kg/1000 m² (160 pounds per 1,000 square yards)

Apply wood fiber mulch hydraulically in accordance with the manufacturer's tank-mixing instructions. It may be incorporated as an integral part of the slurry after the seed and soil supplements have been thoroughly mixed. Apply uniformly at the rate of 175 kg/1000 m² (320 pounds per 1,000 square yards) unless otherwise indicated.

Mulch temporary seeded areas with hay.

1. **Median Areas.** On slopes 1:6 (6:1) or flatter, place pellet mulch either by hand or using a mechanical spreader immediately after seeding. Apply uniformly at application rate of 293 kg/1000 m² (540 pounds per 1,000 square yards). Thoroughly wet pellet mulch with water without dislodging mulch.

(b) Mulch Control Netting.

1. **Plastic.** Install netting over designated mulch surface. Staple upslope ends, edges, bottom, and overlaps at 600 mm (24-inch) intervals. Overlap adjacent fabric to outside edges. Secure remaining fabric areas by putting in approximately 1 staple per 1.0 m² (1 staple per 1 square yard) of area.

2. **Coconut Coir.** Install netting over designated mulch surface. Stretch fabric tightly and anchor with wood stakes along all edges at 2.2 m (7-foot) maximum interval. Overlap adjacent fabric widths by not less than 200 mm (8 inches).

(c) Mulching Planted Areas.

1. **Individual Plant Pits.** Cut weed barrier mat to the size required to cover the plant pit. Secure mat to the soil surface with approved staples. Cut mat around the plant stem to ensure mat will not extend above the mulch. Uniformly apply a designated Section 805.2(a)2 mulch to the entire plant pit to a loose depth of 75 mm (3 inches) and as indicated on the Standard Drawing. Apply mat and mulch within 48 hours after completion of the planting operation. Do not use weed barrier mat when crushed aggregate mulch is required.

2. **Planting Beds.** Cover designated shrub beds with mulch or mulch and weed barrier mat or mulch and weed control mat as indicated. Cut mat at individual plant pit to ensure mat will not extend above the mulch. Secure mat to the soil surface with staples or other approved anchoring devices at a maximum interval spacing of 1.0 m (3 feet) and along all edges and overlaps. Overlap mat edge with 50 mm (2-inch) minimum.

Uniformly apply a designated or specified Section 805.2(a)2 mulch over the entire bed area to a loose depth of 75 mm (3 inches). Redistribute excessive mulch depth. Taper mulch depth at plant pit as indicated on the Standard Drawing. Complete mat and mulch application within 48 hours after completion of the planting operation.

(d) Maintenance. Properly maintain mulched areas until the entire project has been completed. Promptly reapply mulch materials which become dislodged or lost due to wind, rain, or other causes, at initial or modified rates, as directed.

After mulching work on a slope has been satisfactorily completed, if a slope failure occurs, one which requires redressing, excavation, or the establishment of a new slope, replace the mulch, as directed.

(e) Bonded Fiber Matrix.

1. **General.** Prepare surfaces in accordance with Section 804.3(b). Scarify all slopes greater than 1:3 (3:1) to ensure a rough texture for lodging of seed and BFM. Apply seed at twice the rate listed in Section 804.2(b)2 Table A. Apply soil supplements in accordance with Section 804.3(c).

2. **Application.** Apply bonded fiber matrix components hydraulically with hydromulching (hydroseed) equipment manufactured for this purpose. Follow manufacturer's mixing and application instructions.

The bonded fiber matrix components may be incorporated as an integral part of the seeding and soil supplement application if seeding and soil supplements are applied hydraulically.

Apply polymer binder or hydrocolloid binder matrixes at an application rate of 337.5 kg/1000 m² (3,000 lbs/acre) or as indicated to provide a uniform soil surface coverage thickness of 4 mm (0.16 inch) maximum

after drying. Test application procedures to ensure a uniform application rate. Do not apply within 24 hours of anticipated rainfall.

Mix gypsum binder matrix components in a homogenous slurry in the following proportions for each 379 L (100 gallons) of water: gypsum binder-69 kg (150 lbs.); wood fiber-18 kg (40 lbs.); and synthetic fiber-0.3 kg (0.6 lbs). Apply gypsum binder matrix at an application rate of 675 kg/1000 m² (6,000 lbs/acre) or as indicated so that the soil surface is covered uniformly. Do not apply within 12 hours of anticipated rainfall.

Place BFM material at least 450 mm (18 inches) beyond the toe and top of all slopes. Apply material in at least two different directions to provide as much uniform coverage with no gaps or spaces greater than 1 mm (0.04 inch).

805.4 MEASUREMENT AND PAYMENT—

(a) Seeded Areas. Tonne (Ton)

For the type indicated. Measured by the number of tonnes (tons) of mulch actually incorporated into the work, at the specified rates.

(b) Planted Areas. Square Meter (Square Yard)

For the type indicated.

(c) Mulch Replacement. Replacing mulch on failed slope areas, as specified in Section 805.3(c), will be paid for at the contract unit price, in addition to the original accepted mulch application.

(d) Mulching and Weed Barrier Mat. Square Meter (Square Yard)

For the type indicated. Mulch and weed barrier mat applied at individual plant pits is incidental to the cost of the planting operation specified in Section 808.3(g).

(e) Mulching and Weed Control Mat. Square Meter (Square Yard)

For the type indicated.

(f) Mulching - Bonded Fiber Matrix. Square Meter (Square Yard)

(g) Mulch Control Netting. Square Meter (Square Yard)

SECTION 845—UNFORESEEN WATER POLLUTION CONTROL

845.1 DESCRIPTION—This work is construction of temporary or permanent control measures, as ordered during the contract life, to control unforeseen pollution of surface water and groundwater.

845.2 MATERIAL—

- As specified in applicable parts of Sections 804, 805, and 806.
- Erosion and Sediment Pollution Control Devices—As shown on the Standard Drawings.
- Other water pollution control measures and devices as directed by the Engineer.

845.3 CONSTRUCTION—

As directed during construction, provide water pollution control measures to prevent or abate unforeseen pollution of surface water and groundwater resources. These measures are separate from those temporary and permanent water pollution control features designed for the project.

Coordinate control measures with the Erosion and Sediment Control Plan and permanent features to assure economical, effective and continuous pollution control throughout the construction and post-construction periods. Also comply with the requirements of Section 107.28.

If directed, place pollution control measures for authorized construction areas outside the right-of-way. Comply with all applicable Federal, State and local laws, rules or regulations.

845.4 MEASUREMENT AND PAYMENT—The proposal will indicate a predetermined amount (PDA) of money for this item. All items of work, identified and not identified in the contract, performed as water pollution control, will be paid under this item as follows:

(a) **Contract Items.** For performance of work, identified as having similar items listed in the contract, the contract unit price will be paid.

(b) **Non-Contract Items.** Items of work not identified in the contract will be paid as follows:

1. **Negotiated Price.** At an agreed upon price. This price will be agreed upon with the Department, prior to performing the work. When applicable, agreement is also required with the FHWA.

2. **Force Account Basis.** Section 110.03(d)

SECTION 861—CLEANING SEDIMENTATION STRUCTURES

861.1 DESCRIPTION—This work is removal and disposal of sediment deposited in erosion and sedimentation control structures and/or devices.

861.3 CONSTRUCTION—When sediment accumulation has reached a point one-third the depth of the sediment structure or device, remove and dispose of the sediment so it does not erode into the construction areas and/or natural waterways. Do not damage the structure or device.

861.4 MEASUREMENT AND PAYMENT—Cubic Meter (Cubic Yard)

The sediment removed will normally be measured by the number of full loads hauled multiplied by the rated capacity of the hauling equipment, in cubic meters (cubic yards). Cross-sectional measurements will be used for large quantities and when not using hauling equipment.

SECTION 865 — SILT BARRIER FENCE

865.1 DESCRIPTION—This work is construction of silt barrier fences of the height indicated.

865.2 MATERIAL—

- (a) **Geotextiles, Class 3, Type A or B**—Section 735
- (b) **Mesh Support.** Metallic coated steel, 2.0 mm (14.5 gage) wire mesh, arranged in a maximum grid of 150 mm x 150 mm (6 inches x 6 inches), or an acceptable, equivalent plastic mesh.
- (c) **Posts.** Of sufficient length for 460 mm (18-inch) embedment in the ground. Either wood, nominal 51 mm (2.0 inches) square; or steel, 31.8 mm x 25.4 mm (1.25-inch x 1.00-inch) T-section or equivalent; or acceptable plastic, with an equivalent section.
- (d) **Fasteners.** No. 9 Staples, 38 mm (1.5 inches) long, or tie wires, 1.37 mm (17 gage) steel, of appropriate length, acceptably metallic coated.
- (e) **Ground Anchors.** Install for ditch or swale condition, as directed.
- (f) **Guy Wires.** Section 808.2(i)3.c. Install for ditch or swale condition, as directed.
- (g) **Wood Strips.** Of sufficient length and measuring 50 mm x 50 mm (2 inches x 2 inches) in size. Place around the silt barrier fence for inlet protection, as shown on the Standard Drawings.

865.3 CONSTRUCTION—As shown on the Standard Drawings, with or without mesh support fencing, and as follows:

Install posts and excavate the trench. Fasten the geotextile fabric securely to the top of the mesh, at a maximum spacing of 760 mm (30 inches), and to the posts, making sure that sag is kept to a minimum. Extend the geotextile fabric a minimum of 300 mm (12 inches) into the excavated trench, backfill the trench with the excavated soil, and compact.

After installation, satisfactorily maintain the barrier fence. The fence fabric may require periodic cleaning, by tapping the dry fabric from the downstream side. When directed, remove and replace barrier fence not functioning due to clogging, damage, or deterioration.

When the barrier fence is no longer needed, remove the fence and restore the area as specified in Section 105.14.

865.4 MEASUREMENT AND PAYMENT—

- (a) **Silt Barrier Fence. Meter (Linear Foot)**
- (b) **Silt Barrier Fence Replacement.** When silt barrier fence is required to be replaced, it will be paid for at the contract unit price for Silt Barrier Fence.

ITEM 9858-0001 - SEDIMENT FILTER BAG

I. DESCRIPTION - This work is furnishing, installing, maintaining and disposing of a Sediment Filter Bag (bag).

II. MATERIAL -

Sediment Filter Bag. Provide straw as specified in Section 805.2(a)1.b geotextile, Class 4 (Type A), 340 g/m² (10 ounces/yard) as listed in Section 735.1. Construct a 4.6 m (15 feet) x 4.6 m (15 feet) (\pm 80 mm (3 inches)) bag using heat bonded seam or 401 lock chain stitch seam with a 98 kg (216 pounds) minimum breaking strength, tested in accordance with ASTM-D4632. Label each bag indicating maximum flowrate of bag in liters (gallons) per minute.

III. CONSTRUCTION -

Place bag over straw on a stabilized area. Distribute straw at the rate of 1 bale per 3 m² (30 square feet). Filter bags may be used on low volume dewatering operations not to exceed 3785 liters (1000 gallons) per minute. Pump flowrate not to exceed 50% of maximum flow rate indicated on bag label. Double clamp bag firmly to pump discharge hose. Monitor and evaluate entire pumping operation to assure that bag continues to function properly. Replace bag when contained silt reduces flow to approximately 50% of rate of initial bag discharge, or when directed by the Inspector-in-Charge. Dispose of sediment in a manner satisfactory to the Engineer. Restore area as specified in Section 105.14.

IV. MEASUREMENT AND PAYMENT - Lump Sum.

Includes straw, replacement, and disposal of filter bag and contained sediment as required.

ITEM 9866-0001 – TEMPORARY SANDBAG DIVERSION DAM

DESCRIPTION - This work is furnishing, placing, maintaining, and removing a temporary sandbag dike as indicated and as directed.

MATERIAL -

Fine Aggregate - Section 703.1.

Sandbags - Polypropylene or acrylic material that is resistant to ultraviolet radiation, tearing and puncture and woven tightly enough to prevent leakage of fine aggregate.

CONSTRUCTION - Maintain the sandbag dike at a height required to construct the project. Relocate sandbag dike during construction operations as required. Upon notification, remove the sandbag dike, restore the disturbed area to its original condition, and suitably dispose of material removed.

The sandbag dike indicated is not intended to address dewatering requirements because of different soil conditions. Be responsible for investigating the site, and review borings for these requirements.

Present any proposed alternate stream diversion plan at the pre-construction conference for approval by the Department.

MEASUREMENT AND PAYMENT – Linear Feet

APPENDIX "D"



Checklists



COMPLETE PLAN CHECKLIST

Project: SR 0462-019 LANCASTER

- I. Existing topographic features of the project site.
 - A. The existing topographic features of the project site and the immediate surrounding area are shown on maps included in the drawings
 - B. A location map has been provided (8½" x 11" copy of a USGS map with the outline of the project area).....
- II. The Types, depth, slope, locations and limitations of the soils
 - A. A soils map with the project area outlined has been provided
 - B. Physical characteristics of the soil types and their limitations are addressed in the narrative
 - C. Construction techniques or special considerations to address the soil(s) limitations are noted on the drawings.....
- III. Characteristics of the earth disturbance activity
 - A. Limits of the project are shown on the plan map(s)
 - B. Original and final contours are shown on the plan map(s).....
 - C. Past, present and proposed land uses are addressed in the narrative
- IV. The amount of runoff from the project area and its upstream watershed area
 - A. Drainage areas to hydraulic BMPs are shown on plan map(s) N/A
 - B. Calculations are provided which show anticipated peak flows for the design storms... N/A
- V. The location of waters of the Commonwealth which may receive runoff within or from the project site.
 - A. The location(s) of streams or other waterbodies which may receive site runoff are shown on the plan map(s).....
 - B. The Chapter 93 classification of streams or other waterbodies which may receive site runoff is addressed in the narrative

VI. Locations and types of perimeter and on site BMPs

- A. Plan map(s) show locations of proposed temporary BMPs to control runoff and provide sediment removal.....
- B. Plan map(s) show locations of proposed permanent BMPs to control erosion.....
- C. Construction details and specifications for all proposed BMPs are shown on the plan map(s).....

VII. Sequence of BMPs installation & removal

- A. A construction sequence has been provided on the plan map(s).....

VIII. Supporting calculations

- A. Supporting calculations for all proposed BMPs are included in the narrative.....

IX. Plan drawings

- A. Plan drawings are complete and legible.....

X. Maintenance Program

- A. A maintenance program has been provided.....

XI. Measures for the recycling or disposal of materials from the project site.

- A. A program for the recycling or disposal of materials associated with or from the project site has been provided.....

