FAX: (215) 576-7791 PHONE: (215) 887-2165

CHARLES E. SHOEMAKER, INC.
ENGINEERS AND SURVEYORS
SOUTHEAST CORNER OF EASTON & EDGE HILL ROADS
1007 EDGE HILL ROAD
ABINGTON, PENNSYLVANIA 19001

Stormwater Management
&
Erosion and Sediment Control Plan Narrative

for

966 & 968 OLD YORK ROAD

Prepared For

JJLH Associates, LTD

Abington Township
Montgomery County, Pennsylvania

Equitable Owner
JJLH Associates, LTD
4437 East Street Road
Trevose, PA 19053

Engineers & Surveyors
Charles E. Shoemaker, Inc.
1007 Edge Hill Road
Abington, PA 19001

Project No. 25857A
Date: October 25, 2019
Revised: January 31, 2020

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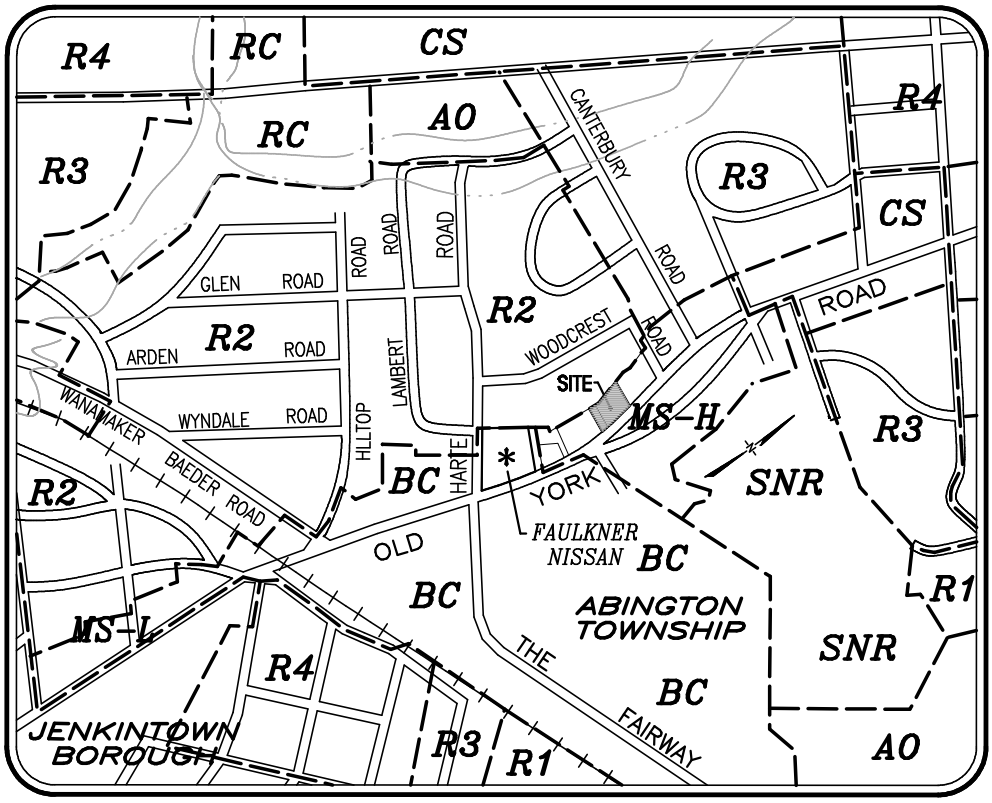
GENERAL INFORMATION

Project Name	966 & 968 Old York Road
Site Address	966 & 968 Old York Road Jenkintown, PA 19046
Zoning Criteria	MS-H – Main Street High Intensity/Density
Tax Map Parcel Number(s)	30-00-49316-00-1, 30-00-49320-00-6
Deed Book – Page(s)	180-079, 180-076
Applicant/Owner of Record	JJLH Associates, LTD 4437 East Street Road Trevose, PA 19053
Land Surveyors & Engineers	Charles E. Shoemaker, Inc. 1007 Edge Hill Road Abington, PA 19001
Construction Schedule	Construction will commence Spring 2020

Plan Designer's Expertise

This project has been designed by Richard A. Stoneback of Charles E. Shoemaker, Inc. Mr. Stoneback is a professional engineer licensed in the Commonwealth of Pennsylvania and specializes in Land Development design. He is a graduate of the Pennsylvania State University and has prepared hundreds of similar erosion control plans since the enactment of the applicable legislation in 1972. He has attended numerous training workshops given by county conservation districts, professional societies, the Soil Conservation Service, and the Department of Environmental Resources.



LOCATION MAP

SCALE: 1" = 800'

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INTRODUCTION

JJLH Assocates, LTD proposes redevelopment of the their property a number of parcels away from their existing Faulkner Nissan development to serve as a storage lot. This project consists of site demolition of the two existing buildings. Historically (50± years), the site was a location of various commercial businesses. The site is currently zoned 'MS-H' – Main Street High Intensity/Density.

SITE TOPOGRAPHY

The existing site consists of an existing two story building (restaurant/apartment) and a one story building (automotive service) with associated parking and utilities. There is no existing stormwater management in this area on site and the existing runoff flows into Old York Road to the existing storm sewer system. All runoff eventually enters the Pennypack Creek via the Abington Township storm sewer system. The PADEP Chapter 93: Receiving Water Classification / Statewide Existing Use Listing for this site is TSF-MF (Pennypack Watershed). Site soils are as mapped on the USDA-NRCS Web Soil Survey, National Cooperative Soil Survey as Urban Land. The site is currently and historically (last 50 years), the location of various commercial businesses. There are no known adverse soil conditions or geological formations that require special consideration or offer potential for pollution of the surface waters.

IMPROVEMENTS

Following the removal of existing structures, a paved lot for 92 vehicle storage for the Faulkner Nissan dealership is proposed with new driveway additions and a decorative pier and fence. The parking lot will be served by a combined stormwater system including a rain garden, grass filter strip, and pervious pavement/underground infiltration bed.

STORMWATER MANAGEMENT

Currently, there is no stormwater management on this site. Existing site runoff flows via sheet flow into the Old York Road, both directly and via a neighboring property, and approximately 350' to the south to stormwater inlets in Old York Road.

A 20% reduction on exiting impervious was applied per DEP CG-1 and Abington Township guidelines. Because this site was a previously developed, highly impervious site, Per Worksheet #4, the change in two year volume ($\triangle 2$) resulted in a net reduction (-124 CF).

The goal of the design was to reduce site runoff to the greatest extent practical and to capture and recharge all storms up to the 100-year event. The underground storage bed was to capture around 2" of runoff per square foot of new proposed impervious area, which was calculated to be 3,122 CF. The majority of the project related runoff will enter the proposed underground seepage bed which will detain the flows. Most of the volume reduction will take place in the void space in the pervious pavement/infiltration bed. Water will back up in the system before out falling into the rain garden. The minimal system bypass flows will flow into the streets as it does in the existing conditions.

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Two 15" drain basins with pedestrian grates connecting a 12" perforated distribution pipe are installed along the curb to capture runoff in the event there is a failure in the pervious pavement. During a typical storm, the drain basins with the grates will collect minimal runoff. In the event the pervious pavement becomes clogged or frozen, etc., the runoff will collect behind the curb and pool before flowing over the depressed curb into the grass filter area or directly to the rain garden. The drain basins will also collect stormwater runoff while during any possible pooling behind the curb.

This site is located in Management District 'B' of the Tookany/Tacony-Frankford Watershed, where the 2-yr proposed event must be reduced to be less than the 1-yr existing event, the 10-yr proposed event must be reduced to be less than the 5-yr existing event, the 25-yr proposed event must be reduced to be less than the 10-yr existing event, the 50-yr proposed event must be reduced to be less than the 25-yr existing event, and the 100-yr proposed event must be reduced to be less than the 100-yr existing event. Runoff coefficients were taken from Table E-2 in assuming 0-2% site slopes and Type 'C' soils. Storm events from the 1 to 100 year storms were analyzed using the Dekalb Rational Method. Tables and exhibits summarizing the results are included within this report.

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PERMANENT BEST MANAGEMENT PRACTICES (BMP's)

There are several Best Management Practices (BMP's) designed and already incorporated into this site. These practices include: (1) a vegetated rain garden proposed along the downslope edge of the parking lot, (2) pervious pavement with an underground infiltration bed is provided in low travel areas and will provide both volume and rate reduction, and (3) restored vegetation in previously stoned areas.

WATER QUALITY CONTROL

The quality of Stormwater runoff is dependent on the type of surfaces the runoff comes in contact with and interval between storm events. Pollutants may include suspended solids, organic carbon matter, bacteria, hydrocarbons, trace metals, thermal impacts, and trash.

Criteria for improved water quality includes limiting the amount of closed storm sewers, increasing the length of grass or naturalized surface drainage, and detaining Stormwater runoff over an extended period of time.

MAINTENANCE AND OPERATION PROCEDURES

Changes in downstream drainages may be too subtle or long in developing to provide adequate warning that the condition of a BMP is deteriorating. Therefore, preventative maintenance is essential. Although general maintenance tasks can be outlined, actual maintenance needs will vary according to specific site conditions. Some of the routine measures of a maintenance program should include visual inspection of the facilities, vegetation management to ensure plant life is flourishing, removal of debris and litter and inspection of mechanical components.

Inspections at a minimum should be conducted annually and after any storm larger than the design storm. Most inspections can be carried out by non-technical staff, however, a professional should be consulted periodically to ensure that the needs of the facility are met. The owner is responsible for the long term "maintenance and operation" of the BMP's.

RECYCLING AND DISPOSAL METHODS

Procedures which ensure that the proper measures for the recycling or disposal of materials associated with or from the project site will be undertaken in accordance with Department of Environmental Protection regulations. Individuals responsible for earth disturbance activities must ensure that proper mechanisms are in place to control waste materials. Construction wastes include, but are not limited to, excess soil materials, building materials, concrete wash water, sanitary wastes, etc. that could adversely impact water quality. Measure should be planned and implemented for housekeeping, materials management, and litter control. Wherever possible, recycling of excess materials is preferred, rather than disposal.

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IMPACT ANALYSIS

Thermal impacts are difficult to quantify, but can be mitigated with design considerations throughout the project. Warm, impervious areas are generally the main contributor to thermal pollution. During the construction phases of the project, thermal impacts will be minimal due to the lack of heat retaining impervious areas. The pervious disturbed area will contribute minimally to this pollution source, and these temporary thermal impacts will be limited by limiting disturbance wherever possible and completing construction in a timely fashion. Any potential for thermal impacts will be mitigated through the use of the stormwater conveyance system as well as the sediment basin riser. The earth surrounding the underground pipes will act as a heat sink (transfers thermal energy from higher temperature to lower temperature) and this component will be a prime contributor to thermal water quality. The sediment basin riser will also agitate the outfall water which will cool it in the process of being discharged towards surface waters.

The site improvements proposed have been analyzed and comply with the Township requirements as well as the PA DEP requirements. These improvements will improve the water quality of the runoff exiting the site, as well as reduce runoff flow rates and volumes, therefore there will be minimal potential for accelerated erosion or detrimental water quality due to the project.

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EROSION CONTROL

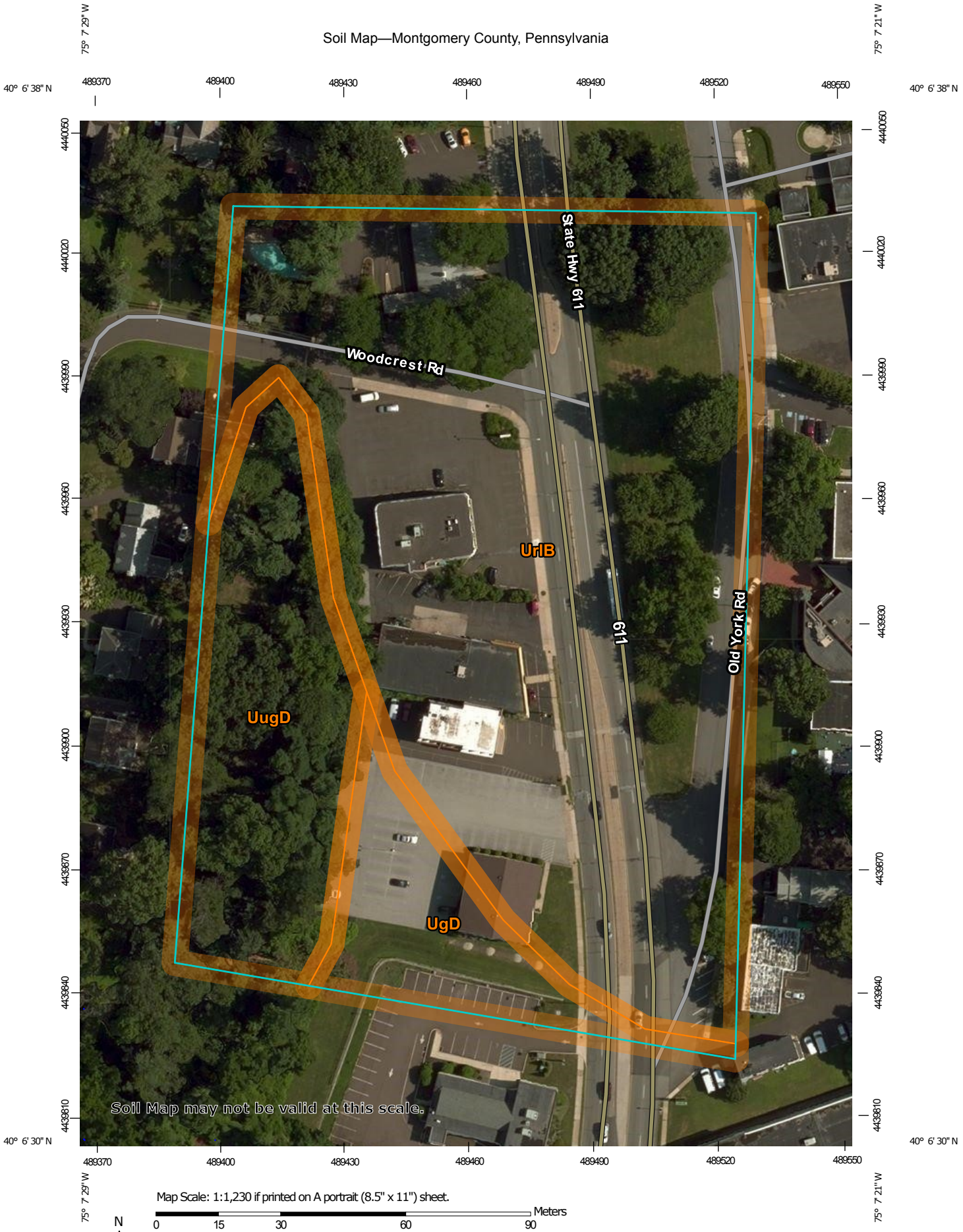
There are several temporary and permanent measures that will be taken to prevent accelerated erosion and sedimentation due to construction activities. These include:

TEMPORARY MEASURES

1. Temporary seeding and mulching of disturbed areas.
2. Silt Sock around the disturbed site area.
3. Inlet filters.
4. Minimize area of disturbance.
5. Maintenance of erosion control facilities on a weekly basis and after each rainfall event.

MAINTENANCE

Erosion control measure in this plan shall be maintained so that they individually and collectively perform the functions for which they were designed. During construction, one individual shall be assigned the responsibility for inspection and maintenance of these facilities. All facilities shall be inspected weekly and after each storm event. All damaged facilities shall be repaired or replaced immediately. Sediment shall be removed from facilities when it reaches sufficient depth to limit their effectiveness.



Map Scale: 1:1,230 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Montgomery County, Pennsylvania
Survey Area Data: Version 11, Oct 4, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 17, 2014—Aug 14, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
UgD	Urban land, 8 to 25 percent slopes	0.6	9.3%
UrlB	Urban land-Gladstone complex, 0 to 8 percent slopes	4.8	72.4%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	1.2	18.3%
Totals for Area of Interest		**6.6**	**100.0%**

SOIL LIST, LIMITATIONS AND RESOLUTIONS:

SOIL NAME*	CUTBANKS CAVE	CORROSIVE TO CONCRETE/STEEL	DROUGHTY	EASILY ERODIBLE	FLOODING	DEPTH TO SATURATED ZONE/ SEASONAL HIGH WATER TABLE	HYDRIC/HYDRIC INCLUSIONS	LOW STRENGTH/ LANDSLIDE PRONE	SLOW PERCOLATION	PIPING	POOR SOURCE OF TOPSOIL	FROST ACTION	SHRINK – SWELL	POTENTIAL SINKHOLE	PONDING	WETNESS
URBAN LAND (UgD)	X	C/S	X	X		X	X	X	X		X	X	X			X
URBAN LAND (UrlB)	X	C		X			X		X			X	X			
URBAN LAND (UugD)	X	C/S	X	X				X	X		X	X				

SOIL LIMITATION RESOLUTIONS:

CUTBANKS CAVE – OSHA STANDARDS AND REGULATIONS MUST BE FOLLOWED AT ALL TIMES TO ENSURE THE SAFETY OF WORKER DURING TRENCHING AND EXCAVATION

CORROSIVE TO CONCRETE/STEEL – SPECIAL SITE EXAMINATION AND DESIGN MAY BE REQUIRED; INSTALL UTILITIES ENTIRELY WITHIN ONE KIND OF SOIL OR SOIL LAYER

DROUGHTY – USE NATIVE VEGETATION WHERE POSSIBLE. SUPPLEMENTAL IRRIGATION MAY BE NECESSARY FOR VEGETATION ESTABLISHMENT.

EASILY ERODIBLE – MECHANICALLY COMPACT AREAS OF FILL PLACEMENT. USE SOD OR EROSION CONTROL NETTING IN AREAS OF STEEP SLOPES OR CONCENTRATED FLOWS.

FLOODING – POSITIVE STORM DRAINAGE, PUMP ALL SEDIMENT LADEN WATER INTO FILTER BAG OR SEDIMENT TRAP/BASIN.

DEPTH TO SATURATED ZONE/SEASONAL HIGH WATER TABLE – STORMWATER MANAGEMENT SYSTEMS AND INFILTRATION AREAS SHOULD BE SITUATED ABOVE THESE LIMITING ZONES. BMPS SHOULD BE DESIGNED WITH A LARGE FOOTPRINT TO INCREASE CONTACT AREA IN SOILS WITH POOR INFILTRATION PROPERTIES.

HYDRIC/HYDRIC INCLUSIONS – STORMWATER MANAGEMENT SYSTEMS AND INFILTRATION AREAS SHOULD BE SITUATED ABOVE LIMITING ZONES. BMPS SHOULD BE DESIGNED WITH A LARGE FOOTPRINT TO INCREASE CONTACT AREA IN SOILS WITH POOR INFILTRATION PROPERTIES.

LOW STRENGTH/LANDSLIDE PRONE – MECHANICALLY COMPACT BERMS AND GRADE WHEN MATERIAL IS NOT SATURATED.

SLOW PERCOLATION – STORMWATER MANAGEMENT SYSTEMS AND INFILTRATION AREAS SHOULD BE SITUATED ABOVE THESE LIMITING ZONES. BMPS SHOULD BE DESIGNED WITH A LARGE FOOTPRINT TO INCREASE CONTACT AREA IN SOILS WITH POOR INFILTRATION PROPERTIES.

PIPING – MECHANICALLY COMPACT AREAS OF FILL PLACEMENT.

POOR SOURCE OF TOPSOIL – SEED, FERTILIZING, AND SOIL PREPARATION FOR ADVERSE CONDITIONS

FROST ACTION – RECOMMENDED TO WORK DURING WARM WINTER MONTHS

SHRINK–SWELL – MECHANICALLY COMPACT AREAS OF FILL PLACEMENT. CONSULT GEOTECHNICAL ENGINEER FOR SUITABILITY AND EXCHANGE SOIL IF DEEMED NECESSARY.

POTENTIAL SINKHOLE – MECHANICALLY COMPACT AREAS OF FILL PLACEMENT. INFILTRATION FACILITIES SHOULD BE MINIMIZED IN AREAS UNDERLAIN BY LIMESTONE. BMPS SHOULD BE DESIGNED WITH A LARGE FOOTPRINT TO INCREASE CONTACT AREA.

PONDING – POSITIVE STORM DRAINAGE, PUMP ALL SEDIMENT LADEN WATER INTO FILTER BAG OR SEDIMENT TRAP/BASIN.

WETNESS – POSITIVE STORM DRAINAGE, PUMP ALL SEDIMENT LADEN WATER INTO FILTER BAG OR SEDIMENT TRAP/BASIN. STORMWATER MANAGEMENT SYSTEMS AND INFILTRATION AREAS SHOULD BE SITUATED ABOVE THESE LIMITING ZONES.

*ON–SITE SOILS IDENTIFIED AND MAPPED FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCE CONSERVATION SERVICE, WEB SOIL SURVEY.

SEQUENCE OF CONSTRUCTION

1. At least 7 days before any earth disturbance activities, the operator is required to invite all contractors involved in those activities, the landowner, all appropriate municipal officials, the erosion and sediment control plan preparer (Licensed Professional), to a preconstruction meeting. Also, at least 3 days before starting any earth disturbance activities, all contractors involved in those activities shall notify the Pennsylvania One Call System, Inc. at 1–800–242–1776 for buried utilities locations.
2. Prior to disturbance, delineate limits of disturbance on the project site with survey stakes/ribbon or orange construction fence.
3. Install rock construction entrance as shown on the erosion control plan.
4. Install silt socks and inlet protection devices as shown on the E&S Plan. Silt socks in areas of existing and proposed driveway may vary slightly (see Erosion Control Plan).
5. After silt socks are in place, if possible, excavate an area approximately 1' deep behind the silt sock. This area is to increase the sediment retention capacity of the "trap" created behind the sock. Apply temporary seeding and mulch to the disturbed area.
6. Upon stabilization of all downslope erosion and sediment perimeter control BMPs and at least 3 days prior to proceeding with the bulk earth disturbance activities, the permittee or co–permittee shall provide notification to the department or authorized conservation district.
7. Once all down gradient erosion control measures are in place and functional and the township has been notified, begin earth moving activities.
8. Demolish existing structures as shown on the Existing Features/Demolition Plan. Strip and stockpile site topsoil. site concrete, paving, utilities, etc. as shown on the plan.
9. Begin underground utility installation (sanitary sewer, manholes, services, etc).
10. Finish rough grading site and install remaining underground utilities including storm sewer, gas line, sewer lateral, water services, etc. Place inlet protection devices on all inlets immediatly upon installation. Inlets should be sealed to prevent sediment laden water from entering the system. The site is to drain to the 18" silt socks via sheet flow. All water pumped from work areas shall be pumped through a properly situated sediment filter bag.
12. Continue with installing the rain gardens. Refer to PSCM details for individual sequence. (CRITICAL STAGES–MUST BE OVERSEEN BY LICENSED PROFESSIONAL)
13. Begin concrete curb and sidewalk construction throughout the site.
14. Stabilize tributary area to the 18" silt socks with stone pavement sub–base wherever final parking lot subgrades have been achieved. Begin placing topsoil on lawn areas that have achieved final grade. No more than 15,000 square feet of disturbed area is to reach final grade before initiating seeding and mulching operations.
15. Once bulk of parking area is stabilized with stone, install remaining curb and river rock level spreaders. Continue grading the lawn in the front of the site.
16. Install remaining curb at proposed entrance drive and stabilize remaining portions of site with stone pavement sub–base wherever final subgrades have been achieved.
17. Remove rock construction entrance and install bituminous base course. Adjust perimeter E&S controls as required to prevent soil and sediment from leaving project site.
18. Construct and stabilize any remaining curbing and sidewalk throughout site.
19. Final grade the remaining site area, install landscaping, including landcaped infiltration beds, and apply permanent seeding and mulch until proper vegetative cover is established. No more than 15,000 square feet of disturbed area is to reach final grade before initiating seeding and mulching operations. Stabilization occurs when disturbed area has 70% uniform vegetation cover. Remove temporary inlet protection within the site and install SNOUTs. After all other areas have achieved uniform stabilization, remove any remaining erosion control devices. Apply permanent seeding and mulch to areas disturbed by removal of perimeter E&S controls (silt socks). Upon stabilization, remove temporary inlet protection. (CRITICAL STAGES–MUST BE OVERSEEN BY LICENSED PROFESSIONAL)
20. Install final wearing course and overlays on all paved areas once heavy constuction phase is completed.
21. Construction activities are expected to commence in the fall/winter of 2019 and be completed within 1 year.

SEQUENCE NOTES:

1. The contractor is to notify the Township and Township Engineer 48 hours prior to start of construction.
2. All other vegetated areas (non–rain garden areas) are to be restored with 9" of amended soils per detail.
3. No more than 15,000 square feet of disturbed area is to reach final grade before initiating seeding and mulching operations.
4. All water pumped from work areas shall be pumped through a properly situated sediment filter bag.
5. Cessation of earthmoving activity for 4 days or longer requires temporary stabilization.

INFILTRATION BED/PERVIOUS PAVEMENT CONSTRUCTION SEQUENCE:

1. EXCAVATE PROPOSED INFILTRATION AREAS AS DELINEATED ON PLAN.
2. INSTALL FILTER FABRIC PER DETAILS.
3. SCARIFY SUBGRADE.
4. INSTALL STONE BASE. PLACEMENT SHOULD BE LIGHTLY COMPACTED.
5. INSTALL CONVEYANCE PIPES AND UNDERDRAIN PIPES AND BACKFILL WITH #57 STONE.
6. PLACE AND COMPACT APPROPRIATED FILL & PAVE TO FINISH GRADES (PERVIOUS PAVEMENT WHERE SPECIFIED).
7. INLET SEDIMENT PROTECTION SHOULD BE IMMEDIATELY PLACED ON ALL INLETS IF NOT ALREAD PRESENT.

RAIN GARDEN CONSTRUCTION SEQUENCE:

1. ROUGH GRADE TO WITHIN ONE (1) FOOT OF THE FINAL ELEVATION OF THE INTERFACE BETWEEN THE PROPOSED SUBGRADE AND THE BIORETENTION PLANTING SOIL. EXCAVATE TO FINISHED BOTTOM ELEVATION PER PLAN. PLANTING SOIL SHOULD BE A LOAM SOIL CAPABLE OF SUPPORTING HEALTHY VEGETATIVE COVER. SOILS SHOULD BE AMENDED WITH A COMPOSTED ORGANIC MATERIAL AS SPECIFIED ON PLAN.
2. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, REMOVE ALL ACCUMULATED SEDIMENT AND GRADE TO FINAL ELEVATION.
3. TILL THE FLOOR WITH ROTARY TILLERS OR DISK HARROWS TO PROVIDE A WELL–AERATED AND HIGHLY POROUS SURFACE AREA.
4. FILL RAIN GARDEN AREA WITH PLANTING SOIL PER PLAN. PLACEMENT SHOULD BE IN LIFTS OF 1 FT OR LESS. INSTALL UNDERDRAIN WHER REQUIRED.
5. PLANT PROPOSED LANDSCAPING AS SHOWN ON LANDSCAPE PLAN.

IMPORT OR EXPORT OF FILL

This site may require exportation of fill. The contractor will be responsible for transporting excess materials to a properly permitted site. The responsibility for performing 'Environmental Due Diligence' and determination of 'Clean Fill' will rest with the contractor.

Clean Fill is defined as: Uncontaminated, non–water soluble, non–decomposable, inert, solid material. The term includes soil, rock, stone, dredged material, used asphalt, and brick, block or concrete from construction and demolition activities that is separate from other waste and is recognizable as such. The term does not include materials placed in or on the 'Waters of the Commonwealth' unless otherwise authorized. (The term "used asphalt" does not include milled asphalt or asphalt that has been processed for re–use). been processed for re–use).

Clean Fill affected by a spill or release of a regulated substance: Fill materials affected by a spill or release of a regulated substance still qualifies as clean fill provided the testing reveals that thefill material contains concentrations of regulated substances that are below the residential limits in Tables FP–1a and FP–1b found in the Department's policy "Management of Fill".

Any person placing clean fill that has been affected by a spill or release of a regulated substance must use form FP–001 to certify the origin of the fill material and the results of the analytical testing to qualify the material as clean fill. Form FP–001 must be retained by the owner of the testing to qualify the material as clean fill. A copy of Form FP–001 can be found at the end of these instructions.

Environmental Due Diligence: The applicant must perform Environmental Due Diligence to determine if the fill materials associated with the project qualify as Clean Fill. Environmental Due Diligence is defined as: Investigative techniques, including, but not limited to, visual property inspections, eletronic data base searches, review of property ownership, review of property use history, Sanborn maps, environmental questionnaires, transaction screens, analytical testing, environmental assessments or audits. Analyticaltesting is not a required part of Due Diligence unless visual inspection and/or review of the past land use of the property indicates that the fill may have been subjected to a spill or release of regulated substance. If the fill may have been affected by a spill or release of a regulated substance, it must be tested to determine if it qualifies as clean fill. Testing should be performed in accordance with Appendix A of the Department's policy "Management of Fill".

Fill material that does not qualify as Clean Fill is Regulated Fill. Regulated Fill is waste and must be managed in accordance with the Department's municipal or residual waste regulations based on 25 Pa. Code Chapters 287 Residual Waste Management or 271 Municipal Waste Management, whichever isapplicable. These regulations are available on–line at www.pacode.com.

MONITORING, INSPECTION, AND REPORTING REQUIREMENTS

Visual Inspections

The permittee and co–permittee(s) must ensure that visual site inspections are conducted weekly, and within 24 hours after each measurable rainfall event throughout the duration of construction and until the receipt and acknowledgement of the NOT by the department or authorized conservation district. The visual site inspections and reports shall be completed in a format provided by the department, and conducted by qualified personnel, trained and experienced in erosion and sediment control, to ascertain that E&S BMPs and PCSM BMPs are properly constructed and maintained to effectively minimize pollution to the waters of this commonwealth. A written report of each inspection shall be kept and include at a minimum:

(1) a summary of site conditions, E&S BMP and PCSM BMP, implementation and maintenance and compliance actions; and

(2) the date, time, name and signature of the person conducting the inspection.

Non Compliance Reporting

Where E&S, PCSM or PPC BMPs are found to be inoperative or ineffective during an inspection, or any other time, the permittee and co–permittee(s) shall, within 24 hours, contact the department or authorized conservation district, by phone or personal contact, followed by the submission of a written report within 5 days of the initial contact. Noncompliance reports shall include the following information:

(1) any condition on the project site which may endanger public health, safety, or the environment, or involve incidents which cause or threaten pollution;

(2) the period of noncompliance, including exact dates and times and/or anticipated time when the activity will return to compliance;

(3) steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance; and

(4) the date or schedule of dates, and identifying remedies for correcting noncompliance conditions.

Reduction, Loss, or Failure of the BMPs

Upon reduction, loss, or failure of the BMPs, the permittee and co–permittee shall take immediate action to restore the BMPs or provide an alternative method of treatment. Such restored BMPs or alternative treatment shall be at least as effective as the original BMPs.

Termination of Coverage

NOT: Upon permanent stabilization of earth disturbance activities associated with construction activity that are authorized by this permit and when BMPs identified in the PCSM Plan have been properly installed, the permittee and/or co–permittee of the facility must submit a NOT form that is signed in accordance with Part B, Section 1.c, Signatory Requirements, of this permit. All letters certifying discharge termination are to be sent to the department or authorized conservation district. The NOT must contain the following information: facility name, address, and location, operator name and address, permit number, identification and proof of acknowledgment from the person(s) who will be responsible for operation and maintenance of the PCSM BMPs in accordance with the approved PCSM Plan, and the reason for permit termination. Until the permittee has received written acknowledgement of the NOT, the permittee will remain responsible for operating and maintaining all E&S BMPs and PCSM BMPs on the project site and will be responsible for violations occurring on the project site.

Completion Certificate and Final Plans

Within 30 days after the completion of earth disturbance activities authorized by this permit, including the permanent stabilization of the site and proper installation of PCSM BMPs in accordance with the approved PCSM Plan, or upon submission of the NOT if sooner, the permittee shall file with the department or authorized conservation district a statement signed by a licensed professional and by the permittee certifying that work has been performed in accordance with the terms and conditions of this permit and the approved E&S and PCSM Plans.

TEMPORARY SEEDING REQUIREMENTS

SPECIES	SEEDING RATE (lb./Ac.)
FOR SPRING SEEDING (UP TO JUNE 15)	
Annual Ryegrass	40
or spring oats,	96 (3 bu)
or spring oats plus ryegrass,	64 oats (2 bu) plus 20 lb annual or perennial ryegrass
or winter wheat,	180 (3 bu)
or winter rye	168 (3 bu)
FOR LATE SPRING AND SUMMER SEEDING (JUNE 16 to AUGUST 15)	
Annual Ryegrass,	40
or Japanese or foxtail millet,	35
or sudangrass,	40
or spring oats,	96 (3 bu)
or winter wheat,	180 (3 bu)
or winter rye	168 (3 bu)
FOR LATE SUMMER AND FALL SEEDING (AUGUST 16 AND LATER)	
Annual Ryegrass,	40
or winter rye,	168 (3 bu)
or winter wheat,	180 (3 bu)
or spring oats (can be used but winter kills)	96 (3 bu)

NOTES:

1. Upon completion of an earth disturbance activity or any stage or phase of an activity, the site shall be immediately seeded, mulched or otherwise protected from accelerated erosion and sedimentation. During the non–growing season, October 15 through March 15, mulch must be applied at the recommended rates.
   Temporary seeding shall be performed after the end of the non–growing season.
   Disturbed areas which are not at finish grade and which will be disturbed within one year shall be seeded and mulched with a quick growing temporary seeding mixture and mulch.
   Disturbed areas which are either at finish grade or will not be redisturbed within one year must be seeded and mulched with permanent seed mixture and mulch.
2. MULCHING: Mulches alone help protect areas from erosion. Mulches also provide initial protection if area is to be seeded later. Use hay or straw at a rate of 3 tons per acre.
3. SITE PREPARATION: Apply 1 ton of agricultural–grade limestone per acre, plus fertilizer at the rate of 50–50–50 (50 pounds of N, 50 pounds of P2O5, and 50 pounds of K2O) per acre, and work in where possible.
4. Topsoil stockpiles must be seeded and mulched immediately.

PERMANENT SEEDING REQUIREMENTS

MIX No.	SPECIES	SEEDING RATE
2	Tall Fescue, or	75 lb./Ac.
	Fine Fescue, or	40 lb./Ac.
	Kentucky Bluegrass,	30 lb./Ac.
	plus Redtop, or	3 lb./Ac.
	Perennial Ryegrass	20 lb./Ac.
3	Birdsfoot Trefoil, plus	10 lb./Ac.
	Tall Fescue	35 lb./Ac.
4	Birdsfoot Trefoil, plus	10 lb./Ac.
	Reed Canarygrass	15 lb./Ac.
10	Tall Fescue, plus	60 lb./Ac.
	Fine Fescue	15 lb./Ac.

NOTES:

1. Seeding rates are for pure live seed, seeding rate shall be adjusted by percent germination.
2. Mixture No. 2 is suitable for frequent mowing. Do not cut shorter than 4 inches.
3. Keep Redtop seeding rate to that indicated. This species has small seeds and is very competitive.
4. Diversion channels, detention basins, and sediment traps or berms shall be seeded and mulched immediately.
5. Due to the absence of soil tests, the site shall be prepared by the application of at least 6 tons of agricultural grade limestone and 100–200–200 (100 pounds of N, 200 pounds of P2O5, and 200 pounds of K2O) per acre. Work lime and fertilizer into the soil deeply where possible.
6. After seeding, mulch with hay or straw at a rate of 3 tons per acre.
7. For best results, grass and legume seedings should be made in spring (March, April, and early May). However, through proper choice of seed mixtures, seed specifications, and establishment techniques, disturbed sites can be seeded almost any time from spring to fall. Legume seedings need a growing period of at least ten to twelve weeks to produce seedlings sufficiently large and hardy to survive the winter. Grasses generally require at least four to six weeks of growth prior to hard frosts. It is suggested that legumes be seeded before August 15 in southeastern Pennsylvania (corn maturity zone 4).

RECOMMENDED SEED MIXTURES FOR VARIOUS AREAS

AREA	MIXTURE
Slopes and banks (unmowed)	3
(mowed)	2 or 10
Drainage swales	2, 3 or 4
Utility Right–of–Way	3
Lawns	2, 3 or 10

MULCHING REQUIREMENTS

All conservation and erosion control areas, whether seeded with a drill, broadcasted, or hydroseeded, should be mulched to reduce soil erosion and to aid seed germination and seedling establishment. Grass hay and cereal straw are preferred mulches and should be applied to produce a loose layer 0.75 to 1 inch deep. Generally, 3 tons of mulch per acre are sufficient. As a guideline, a thickness of five to six overlapping straw or hay stems is acceptable for mulching. Straw or hay should not be chopped or finely broken during application. On steep slopes, hay rather than straw mulch is recommended.

CAUTION: Hay mulch may introduce undesirable weeds; use clean mulch if weeds might be a problem.

Long straws and stems are more readily anchored in place and afford seedling plants more protection than does chopped straw or hay. Mulches of hay or straw may be tied down with commercial netting of various types or with asphalt emulsion or cutback asphalt at a rate of 100 to 150 gallons per acre. Application of cellulose fiber over the straw or hay mulch at a rate of 800 to 1000 pounds per acre also is an excellent way to tack or hold the mulch in place.

TABLE E-2
RATIONAL RUNOFF COEFFICIENTS
By Hydrologic Soils Group and Overland Slope (%)

Land Use	A			B			C			D		
	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Cultivated Land	0.08[a]	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
	0.14[b]	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Pasture	0.12	0.20	0.30	0.18	0.28	0.37	0.24	0.34	0.44	0.30	0.40	0.50
	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Meadow	0.10	0.16	0.25	0.14	0.22	0.30	0.20	0.28	0.36	0.24	0.30	0.40
	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Forest	0.05	0.08	0.11	0.08	0.11	0.14	0.10	0.13	0.16	0.12	0.16	0.20
	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Residential												
Lot Size 1/8 Acre	0.25	0.28	0.31	0.27	0.30	0.25	0.30	0.33	0.38	0.33	0.36	0.42
	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Lot Size 1/4 Acre	0.22	0.26	0.29	0.24	0.29	0.33	0.27	0.31	0.36	0.30	0.34	0.40
	0.30	0.34	0.37	0.33	0.37	0.42	0.36	0.40	0.47	0.38	0.42	0.52
Lot Size 1/3 Acre	0.19	0.23	0.26	0.22	0.26	0.30	0.25	0.29	0.34	0.28	0.32	0.39
	0.28	0.32	0.35	0.30	0.35	0.39	0.33	0.38	0.45	0.36	0.40	0.50
Lot Size 1/2 Acre	0.16	0.20	0.24	0.19	0.23	0.28	0.22	0.27	0.32	0.26	0.30	0.37
	0.25	0.29	0.32	0.28	0.32	0.36	0.31	0.35	0.42	0.34	0.38	0.48
Lot Size 1 Acre	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.29	0.35
	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.46
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.70
	0.85	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.88
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.90
Streets	0.70	0.71	0.71	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
	0.76	0.77	0.79	0.80	0.82	0.84	0.84	0.85	0.89	0.89	0.91	0.95
Open Space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.16	0.21	0.28
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.39
Parking	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

[a] Runoff coefficients for storm recurrence intervals less than 25 years.

[b] Runoff coefficients for storm recurrence intervals of 25 years or more.

Source : Rawls, W.J., S.L. Wong and R.H. McCuen, 1981, "Comparison of Urban Flood Frequency Procedures", Preliminary Draft, U.S. Department of Agriculture, Soil Conservation Service, Baltimore, MD.

966-968 Old York Road
Weighted C

EXISTING TO OLD YORK ROAD		1-yr to 10-yr events					25-yr to 100-yr events				
AREA No.	DRAINAGE AREA (Ac.)	IMPERVIOUS AREA C=0.85	FORREST AREA C=0.10	LAWN AREA C=0.12	WEIGHTED C	INLET CA	IMPERVIOUS AREA C=0.95	FORREST AREA C=0.12	LAWN AREA C=0.18	WEIGHTED C	INLET CA
Ex. to Old York Road	0.46	0.44	0.02	0.00	0.82	0.38	0.44	0.02	0.00	0.91	0.42
Ex. to Old York Road via LC Wellness	0.14	0.13	0.01	0.00	0.80	0.11	0.13	0.01	0.00	0.89	0.12
Ex. to Old York Road (Offsite - LC Wellness)	*0.29*	*0.25*	*0.04*	*0.00*	*0.75*	*0.22*	*0.25*	*0.04*	*0.00*	*0.84*	*0.24*
Total Managed	0.60	0.57	0.03	0.00	0.81	0.49	0.57	0.03	0.00	0.91	0.55
Total Offsite	*0.29*	*0.25*	*0.04*	*0.00*	*0.75*	*0.22*	*0.25*	*0.04*	*0.00*	*0.84*	*0.24*
SITE TOTAL	**0.89**	**0.82**	**0.07**	**0.00**	**0.75**	**0.22**	**0.25**	**0.04**	**0.00**	**0.84**	**0.24**

PROPOSED		1-yr to 10-yr events					25-yr to 100-yr events				
AREA No.	DRAINAGE AREA (Ac.)	IMPERVIOUS AREA C=0.85	FORREST AREA C=0.10	LAWN AREA C=0.12	WEIGHTED C	INLET CA	IMPERVIOUS AREA C=0.95	FORREST AREA C=0.12	LAWN AREA C=0.18	WEIGHTED C	INLET CA
TO RAIN GARDEN											
Infiltration Bed											
Direct to Pervious Pavement	0.27	*0.27*	*0.00*	0.00	0.85	0.23	0.27	0.00	0.00	0.95	0.26
Offsite To Pervious Pavement	*0.11*	*0.00*	*0.11*	*0.00*	*0.10*	*0.01*	0.00	0.11	0.00	0.12	0.01
To Trench Drain #1	0.15	0.10	0.00	0.05	0.61	0.09	0.10	0.00	0.05	0.69	0.10
Offsite to Trench Drain #1	*0.08*	*0.04*	*0.04*	*0.00*	*0.48*	*0.04*	*0.04*	*0.04*	*0.00*	*0.54*	*0.04*
Managed to Infiltration Bed	0.42	0.37	0.00	0.05	0.76	0.32	0.37	0.00	0.05	0.86	0.36
Offsite to Infiltration Bed	*0.19*	*0.04*	*0.15*	*0.00*	*0.26*	*0.05*	*0.04*	*0.15*	*0.00*	*0.29*	*0.06*
Total to Infiltration Bed	0.61	0.41	0.15	0.05	0.61	0.37	0.41	0.15	0.05	0.68	0.42
To Grass Strip	0.03	0.00	0.00	0.03	0.12	0.00	0.00	0.00	0.03	0.18	0.01
Offsite to to Grass Strip	*0.01*	*0.00*	*0.01*	*0.00*	*0.10*	*0.00*	*0.00*	*0.01*	*0.00*	*0.12*	*0.00*
Direct to Rain Garden	0.03	0.00	0.00	0.03	0.12	0.00	0.00	0.00	0.03	0.18	0.01
Total Managed to RG1	0.48	0.37	0.00	0.11	0.68	0.33	0.37	0.00	0.11	0.77	0.37
Offsite to RG1	*0.20*	*0.04*	*0.16*	*0.00*	*0.25*	*0.05*	*0.04*	*0.16*	*0.00*	*0.29*	*0.06*
TOTAL TO RAIN GARDEN 1	**0.68**	**0.41**	**0.16**	**0.11**	**0.56**	**0.38**	**0.41**	**0.16**	**0.11**	**0.63**	**0.43**
Bypass to Old York Road	0.11	0.06	0.00	0.05	0.52	0.06	0.06	0.00	0.05	0.60	0.07
Bypass to Old York Road via LC Wellness	0.01	0.00	0.01	0.00	0.10	0.00	0.00	0.01	0.00	0.12	0.00
Bypass to Old York Road (Offsite - LC Wellness)	*0.29*	*0.25*	*0.04*	*0.00*	*0.75*	*0.22*	*0.25*	*0.04*	*0.00*	*0.84*	*0.24*
Total Managed	**0.60**	**0.43**	**0.01**	**0.16**	**0.64**	**0.39**	**0.43**	**0.01**	**0.16**	**0.73**	**0.44**
Total Offsite	*0.49*	*0.29*	*0.20*	*0.00*	*0.54*	*0.27*	*0.29*	*0.20*	*0.00*	*0.61*	*0.30*
SITE TOTAL	**1.09**	**0.72**	**0.21**	**0.16**	**0.58**	**0.42**	**0.72**	**0.21**	**0.16**	**0.82**	**0.89**

Note:

Runoff coefficients were taken from Table E-2 on the following page assuming 0-2% site slopes and Type ‘C’ soils. Crushed stone/gravel was considered "street".

Scenario: Base

Combined Pipe\Node Report

Pipe	Inlet CA (acres)	Total CA (acres)	Inlet Discharge (cfs)	System Intensity (in/hr)	Total Discharge (cfs)	Capacity (cfs)	Section Size	Man n	Length (ft)	Slope (ft/ft)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
BED TO RG	0.00	0.00	0.00	0.00	0.11	0.52	6 inch	0.010	12.00	0.0050	2.10	295.06	295.00	298.00	295.23	295.00

Scenario: Base

Combined Pipe\Node Report

Pipe	Inlet CA (acres)	Total CA (acres)	Inlet Discharge (cfs)	System Intensity (in/hr)	Total Discharge (cfs)	Capacity (cfs)	Section Size	Man n	Length (ft)	Slope (ft/ft)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Rim Elevation (ft)	Upstream HGL (ft)	Downstream HGL (ft)
I-1 TO BED	0.15	0.15	1.16	7.86	1.16	4.95	15 inch	0.012	28.00	0.0050	3.29	296.14	296.00	297.48	296.56	296.00

FAX: (215) 576-7791 PHONE: (215) 887-2165

CHARLES E. SHOEMAKER, INC.
ENGINEERS AND SURVEYORS
SOUTHEAST CORNER OF EASTON & EDGE HILL ROADS
1007 EDGE HILL ROAD
ABINGTON, PENNSYLVANIA 19001

VOLUME REDUCTION AND WATER QUALITY

Per Worksheet #4, the change in two year volume (△2) resulted in a net reduction (-124 CF). The goal of the design was to reduce site runoff to the greatest extent practical and to capture and recharge all storms up to the 100-year event. The underground storage bed and rain garden were designed to capture around 2" of runoff per square foot of new proposed impervious area, which was calculated to be 3,122 CF.

INFILTRATION BED:

Potential Recharge Volume:	492 CF
100-yr Hydrologic Volume:	393 CF
Volume Permanently Removed:	**393 CF**

RAIN GARDEN:

Potential Recharge Volume:	3,050 CF
100-yr Hydrologic Volume:	2,699 CF
Volume Permanently Removed:	**2,699 CF**

Volume removed permanently:	**3,092 CF**	**(>> -124 required by Worksheet 4)** **(~ 3,122 CF = 2" runoff/SF impervious)** **(= 100 year event)**

966-968 Old York Road
Weighted Curve Numbers

Actual Existing Conditions

AREA No.	TOTAL PROJECT AREA (Ac.)	MANAGED PROJECT AREA (Ac.)	MANAGED IMPERVIOUS AREA[2] PAVED/CONCRETE CN=98 C SOILS	MANAGED WOODS AREA CN=70 C SOILS	MANAGED MEADOW AREA CN=71 C SOILS	WEIGHTED CN
Ex. To Old York Road	0.46	0.46	0.44	0.02	0.00	96.8
Ex. To Old York Road via LC Wellness	0.14	0.14	0.13	0.01	0.00	96.0
SITE TOTAL	***0.60***	***0.60***	***0.57***	***0.03***	***0.00***	***96.6***

Adjusted Existing Conditions (20% Existing Impervious To Be Removed Considered Meadow)

AREA No.	TOTAL DRAINAGE AREA (Ac.)	MANAGED PROJECT AREA (Ac.)	MANAGED IMPERVIOUS AREA[2] PAVED/CONCRETE CN=98 C SOILS	MANAGED WOODS AREA CN=70 C SOILS	MANAGED MEADOW AREA CN=71 C SOILS
Ex. To Old York Road	0.46	0.46	0.35	0.02	0.09
Ex. To Old York Road via LC Wellness	0.14	0.14	0.10	0.01	0.03
SITE TOTAL	***0.60***	***0.60***	***0.46***	***0.03***	***0.11***

1 80% of this value is being credited to DEP Worksheet 4, this impervious area is within our "managed area" and is to be removed. The remaining 20% is considered as Meadow.

Note: Existing and proposed "managed" drainage areas were determined using the project area. Drainage outsside these areas was considered for proper sizing, but not in the Pre- vs. Post- Development design criteria. This summary is to support PA DEP Worksheet #4

966-968 Old York Road
Weighted Curve Numbers

Proposed Conditions

AREA No.	TOTAL PROJECT AREA (Ac.)	IMPERVIOUS AREA CN=98 C SOILS	WOODS AREA CN=70 C SOILS	LAWN AREA CN=74 C SOILS	MEADOW AREA CN=71 C SOILS	WEIGHTED CN
To Old York Road	0.59	0.43	0.00	0.16	0.00	91.5
To Old York Road via LC Wellness	0.01	0.00	0.00	0.01	0.00	74.0
MANAGED TOTAL	***0.60***	***0.43***	***0.00***	***0.17***	***0.00***	***91.2***

Note: Existing and proposed "managed" drainage areas were determined using the project area. Drainage outsside these areas was considered for proper sizing, but not in the Pre- vs. Post- Development design criteria. This summary is to support PA DEP Worksheet #4

Worksheet 4. Change in Runoff Volume for 2-yr Storm Event

Project: 966-968 Old York Road
DA: Managed
2-Year Rainfall 3.3 in

Total Site Area: 0.60 acres
Protected Site Area: -- acres
Managed Area: 0.60 acres

Existing Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
WOODS	C	1,307	0.03	70	4.29	0.857	0.89	97
MEADOW	C	4,792	0.11	71	4.08	0.817	0.94	375
IMPERVIOUS	C	20,038	0.46	98	0.20	0.041	3.07	5,121
TOTAL:		**26,136**	**0.60**	**92**				**5,593**

Developed Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
LAWN	C	7,405	0.17	74	3.51	0.703	1.10	681
MEADOW	C	0	0.00	71	4.08	0.817	0.94	0
IMPERVIOUS	C	18,731	0.43	98	0.20	0.041	3.07	4,787
WOODS	C	0	0.00	70	4.29	0.857	0.89	0
TOTAL:		**26,136**	**0.60**	**91**				**5,469**

2-Year Volume Increase (ft^3): -124 ft^3

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = $(P-0.2S)^2/(P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq.ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

FOR NEW IMPERVIOUS AREAS, HORSHAM TOWNSHIP REQUIRES THAT 2" OF RUNOFF BE TREATED FOR WATER QUALITY WITH THE FIRST 1" BEING REMOVED FROM SURFACE WATERS VIA INFILTRATION THEREFORE:

1" x 18,731 SF 1,561 CF
2" x 18,731 SF 3,122 CF

966 and 968 Old York Road

VOLUME CALCULATIONS FOR STONE AND PLANTING MEDIA								
Basin Invert	**Slope ft/ft**	**Footprint SF**	**Elevation**	**Stage**	**Stage Media Volume**	**% Voids**	**Stage Voids Volume**	**Σ Voids Volume**
293.50	**0.0000**	**2000**	**293.50**	0.00	0	40%	**0.0**	**0**
293.50	0.0000	2000	**293.75**	0.25	500	40%	**200.0**	**200**
293.50	0.0000	2000	**294.00**	0.50	500	40%	**200.0**	**400**
293.50	0.0000	2000	**294.25**	0.75	500	40%	**200.0**	**600**
293.50	0.0000	2000	**294.50**	1.00	500	40%	**200.0**	**800**
293.50	0.0000	2000	**294.75**	1.25	500	40%	**200.0**	**1000**
293.50	0.0000	2000	**295.00**	1.50	500	40%	**200.0**	**1200**
293.50	0.0000	2000	**295.25**	1.75	500	40%	**200.0**	**1400**
293.50	0.0000	2000	**295.50**	2.00	500	40%	**200.0**	**1600**
293.50	0.0000	2000	**295.75**	2.25	500	40%	**200.0**	**1800**
293.50	0.0000	2000	**296.00**	2.50	500	40%	**200.0**	**2000**
293.50	0.0000	2000	**296.25**	2.75	500	40%	**200.0**	**2200**
293.50	0.0000	2000	**296.50**	3.00	500	40%	**200.0**	**2400**
293.50	0.0000	2000	**296.75**	3.25	500	40%	**200.0**	**2600**
293.50	0.0000	2000	**297.00**	3.50	500	40%	**200.0**	**2800**
293.50	0.0000	2000	**297.25**	3.75	500	40%	**200.0**	**3000**
293.50	0.0000	2000	**297.50**	4.00	500	40%	**200.0**	**3200**

100% Infiltration: **2800 CF**

The volume below elevation 297.00 is considered to be 100% volume reduction. In addition to this volume, active infiltation during the rainfall event is to be considered

Active Infiltration:

Surface Area:	2000	SF	
Time Interval:	6	hr	(Time in which water is in contact with subgrade)
Assumed Infiltration Rate:	0.5	in/hr	Based on Soil Test Data
Factor of Safety:	2		
Infiltration Rate w/ FOS:	0.0208	ft/hr	

Active Infiltration = Surface Area x Time Interval x Infiltration Rate w/ FOS

= 250 CF

Rain Garden #1

Total Infiltration =	100% Infiltration + Active Infiltration	<<POTENTIAL RECHARGE VOLUME
=	3050 CF	
Total Infiltration =	**3050 CF**	

966 and 968 Old York Road

TOP OF PLANTING MEDIA								
VOLUME CALCULATIONS FOR STONE AND PLANTING MEDIA								
Basin Invert	**Slope ft/ft**	**Footprint SF**	**Elevation**	**Stage**	**Stage Media Volume**	**% Voids**	**Stage Voids Volume**	**Σ Voids Volume**
295.00	**0.0000**	**239**	**295.00**	0.00	0	100%	**0.0**	**0**
295.00	0.0000	388	**295.50**	0.50	194	100%	**193.8**	**194**
295.00	0.0000	536	**296.00**	1.00	268	100%	**268.0**	**462**
295.00	0.0000	600	**296.50**	1.50	300	100%	**300.0**	**762**

100% Infiltration: **462 CF**

The volume below elevation 295.50 is considered to be 100% volume reduction. In addition to this volume, active infiltation during the rainfall event is to be considered

Active Infiltration:

Surface Area:	239	SF	
Time Interval:	6	hr	(Time in which water is in contact with subgrade)
Assumed Infiltration Rate:	0.5	in/hr	Based on Soil Test Data
Factor of Safety:	2		
Infiltration Rate w/ FOS:	0.0208	ft/hr	

Active Infiltration = Surface Area x Time Interval x Infiltration Rate w/ FOS
= 30 CF

Rain Garden #1

Total Infiltration =	100% Infiltration + Active Infiltration	<<POTENTIAL RECHARGE VOLUME
=	492 CF	
Total Infiltration =	**492 CF**	

SWPPP Cut Sheet:

Filtrexx® Sediment Control

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Sediment control is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for **perimeter control** of sediment and other soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities.

APPLICATION

Filtrexx® Sediment control is to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. Sediment control is effective when installed perpendicular to sheet or low concentrated flow. Acceptable applications include:

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On frozen ground where trenching of silt fence is impossible.
- On paved surfaces where trenching of silt fence is impossible.

INSTALLATION

1. Sediment control used for perimeter control of sediment and soluble pollutants in storm runoff shall meet Filtrexx® Soxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be Filtrexx® Certified™, or use pre-filled Filtrexx® Sediment control products manufactured by a Filtrexx® Certified Manufacturer™ as determined by Filtrexx® International, LLC (440-926-2607 or visit www.filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application. Look for the Filtrexx® Certified™ Seal.
3. Sediment control will be placed at locations indicated on plans as directed by the Engineer.
4. Sediment control should be installed parallel to the base of the slope or other disturbed area. In extreme conditions (i.e., 2:1 slopes), a second Sediment control shall be constructed at the top of the slope.
5. Effective Soxx™ height in the field should be as follows: 8" Diameter Sediment control = 6.5" high, 12" Diameter Sediment control = 9.5" high, 18" Diameter SiltSoxx™ = 14.5" high, 24" Diameter Sediment control = 19" high.
6. Stakes shall be installed through the middle of the Sediment control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) hard wood stakes. In the event staking is not possible, i.e., when Sediment control is used on pavement, heavy concrete blocks shall be used behind the Sediment control to help stabilize during rainfall/runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the Sediment control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the Sediment control is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for

establishment of permanent vegetation. The Engineer will specify seed requirements.

10. Filtrexx® Sediment control is not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct Filtrexx® Sediment control installation (Figure 1.1).

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Sediment control should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Sediment control may be required to reduce effective slope length or sediment removal may be necessary. Sediment control shall be inspected until area above has been permanently stabilized and construction activity has ceased

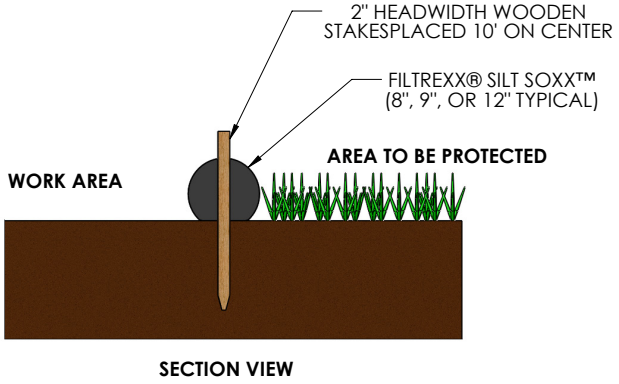
1. The Contractor shall maintain the Sediment control in a functional condition at all times and it shall be routinely inspected.
2. If the Sediment control has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Sediment control when accumulation has reached 1/2 of the effective height of the Sediment control, or as directed by the Engineer. Alternatively, a new Sediment control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Sediment control shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia™ will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, Sediment control can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*				
	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

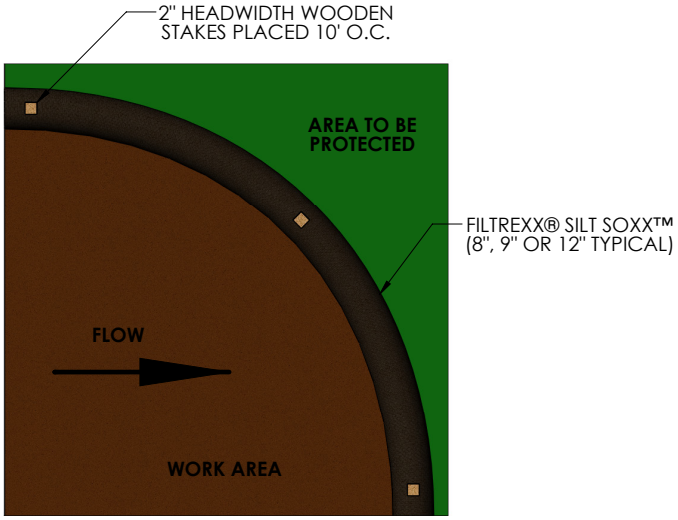
* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.

FILTREXX® SILT SOXX™

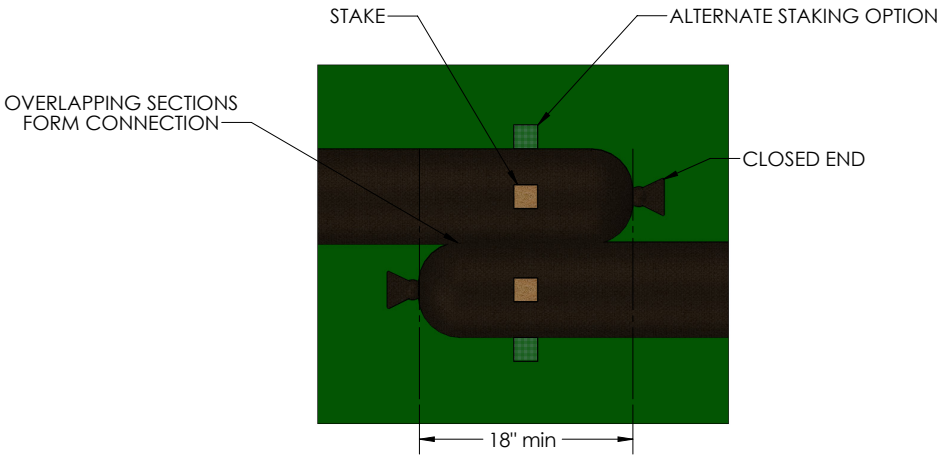


SECTION VIEW

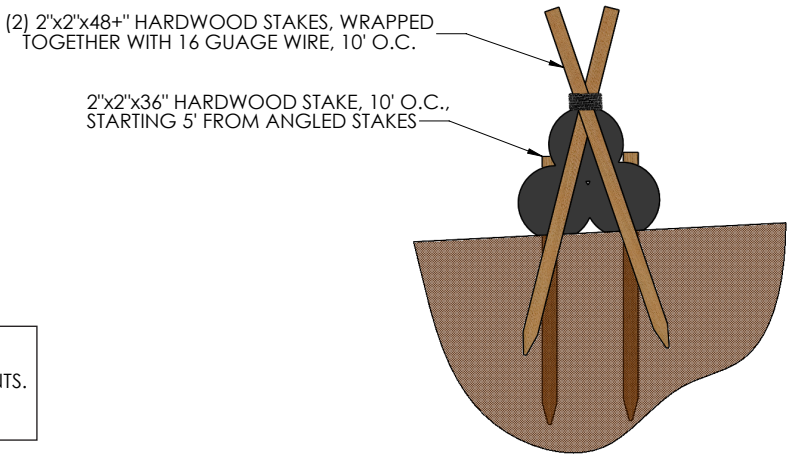


TOP VIEW

COMPOST SOCK CONNECTION/ATTACHMENT DETAIL



FILTREXX® PYRAMID STAKING DETAIL



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILT SOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

The maximum slope length above a compost filter sock should not exceed those shown in Figure 4.2. **NOTE: Slope length is not addressed by use of multiple rows of compost socks.** The anticipated functional life of a biodegradable filter sock should be 6 months; for photodegradable socks it is 1 year. Some other types may last longer. Projects with disturbances anticipated to last longer than the functional life of a sock should plan to replace the socks periodically or use another type of BMP.

Upon stabilization of the tributary area, the filter sock may be left in place and vegetated or removed. In the latter case, the mesh is typically cut open and the mulch spread as a soil supplement. In either case, the stakes should be removed.

Filter socks using other fillers may be approved on a case-by-case basis if sufficient supporting information (including manufacturer's specs and independent test data) is provided. However, they might not qualify as ABACTs. Wherever compost socks are used, Table 4.1 should be placed on a detail sheet.

TABLE 4.1
Compost Sock Fabric Minimum Specifications

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

Filtrexx & JMD

Compost should be a well decomposed, weed-free organic matter derived from agriculture, food, stump grindings, and yard or wood/bark organic matter sources. The compost should be aerobically composted. The compost should possess no objectionable odors and should be reasonably free (<1%

by dry weight) of man-made foreign matter. The compost product should not resemble the raw material from which it was derived. Wood and bark chips, ground construction debris or reprocessed wood products are not acceptable as the organic component of the mix.

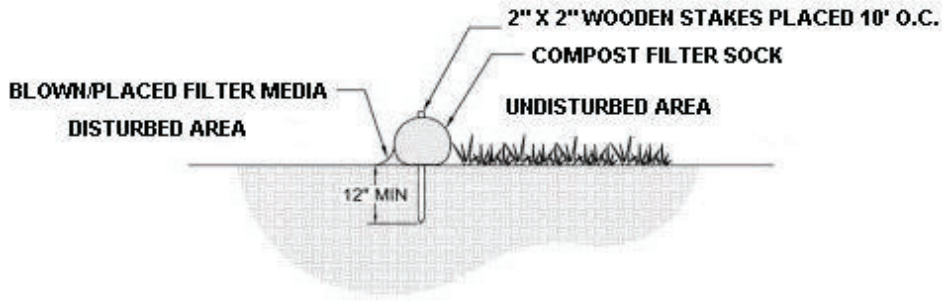
The physical parameters of the compost should comply with the standards in Table 4.2. The standards contained in the PennDOT Publication 408 are an acceptable alternative.

TABLE 4.2
Compost Standards

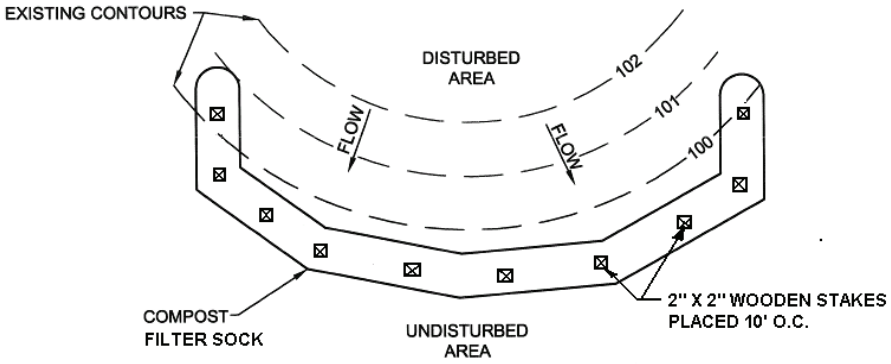
Organic Matter Content	80% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - 8.0
Moisture Content	35% - 55%
Particle Size	98% pass through 1” screen
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

Filtrexx

STANDARD CONSTRUCTION DETAIL #4-1
COMPOST FILTER SOCK



SECTION VIEW
NTS



PLAN VIEW

Filtrexx NTS

Sock fabric shall meet standards of Table 4.1. Compost shall meet the standards of Table 4.2.

Compost filter sock shall be placed at existing level grade. Both ends of the sock shall be extended at least 8 feet up slope at 45 degrees to the main sock alignment (Figure 4.1). Maximum slope length above any sock shall not exceed that shown on Figure 4.2. Stakes may be installed immediately downslope of the sock if so specified by the manufacturer.

Traffic shall not be permitted to cross filter socks.

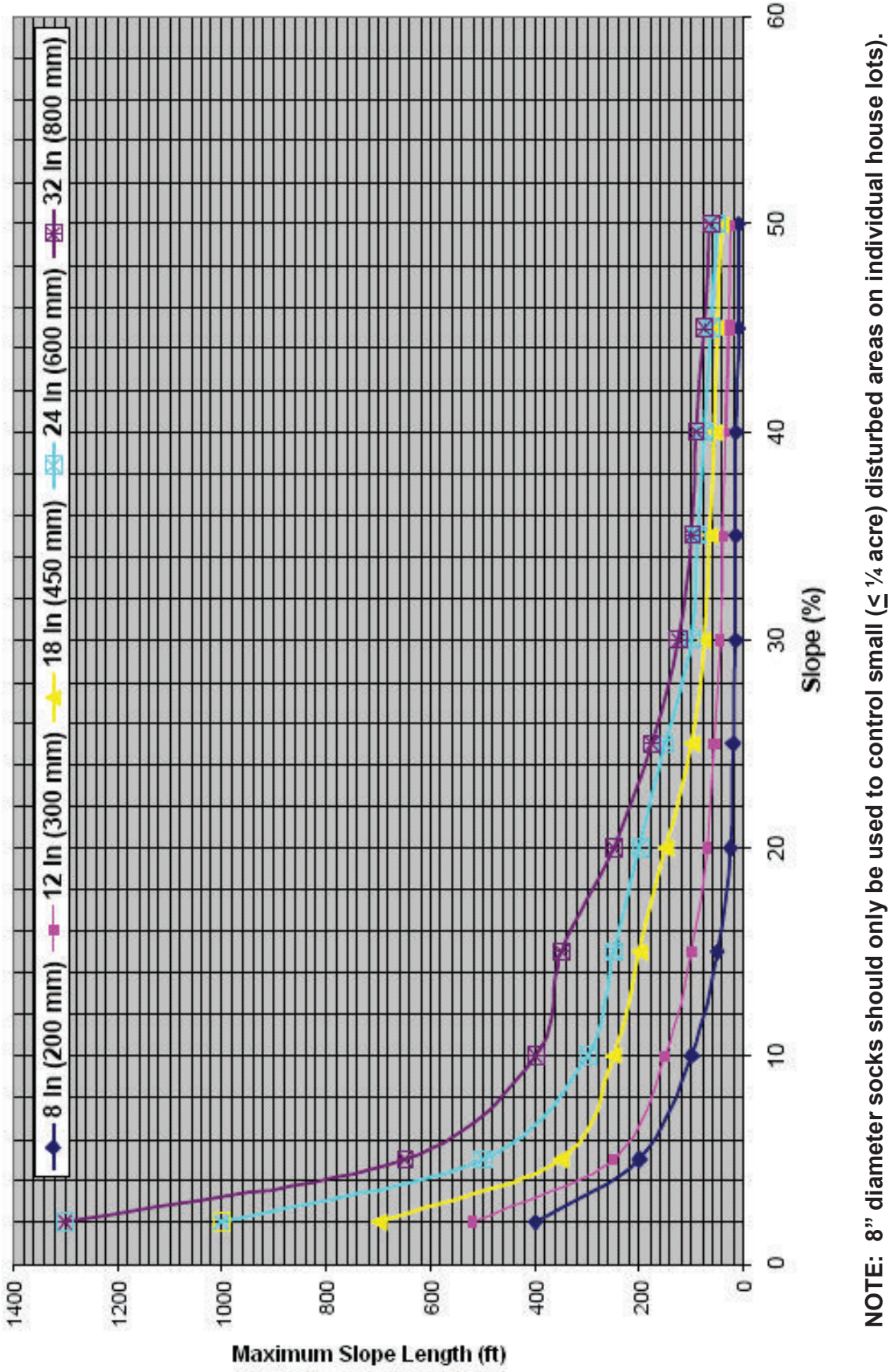
Accumulated sediment shall be removed when it reaches half the aboveground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter socks shall be replaced after 6 months; photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mulch spread as a soil supplement.

FIGURE 4.2
MAXIMUM PERMISSIBLE SLOPE LENGTH ABOVE COMPOST FILTER SOCKS



NOTE: 8" diameter socks should only be used to control small (≤ ¼ acre) disturbed areas on individual house lots).

Adapted from Filtrexx

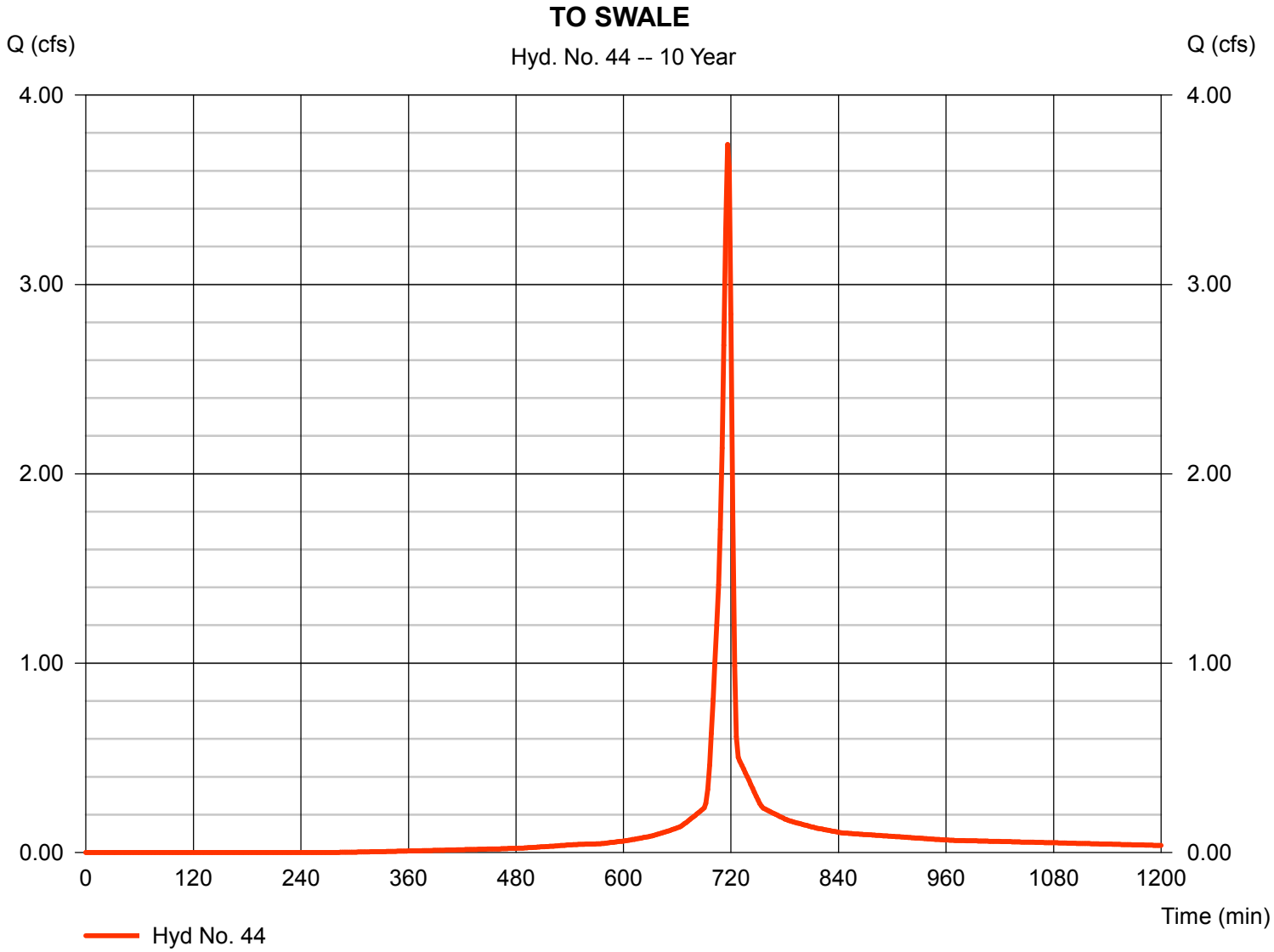
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Friday, Jan 17, 2020

Hyd. No. 44

TO SWALE

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.739 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	7,885 cuft
Drainage area	=	0.650 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.89 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



North American Green
5401 St. Wendel-Cynthiana Rd.
Poseyville, Indiana 47633
Tel. 800.772.2040
>Fax 812.867.0247
www.nagreen.com
ECMDS v7.0

ANALYSIS COMPUTATIONS

> > > > View Computation

Inputs	
Channel Discharge (Q):	3.7 cfs
Peak Flow Period (H):	12 hours
Channel Slope (S0):	0.029 ft/ft
Bottom Width (B):	1.5 ft
Left Side Slope (ZL):	3 (H : V)
Right Side Slope (ZR):	3 (H : V)
Existing Channel Bend:	No
Bend Coefficient (Kb):	1
Channel Bend Radius:	
Retardance Class of Vegetation:	C 6-12 in
Vegetation Type:	Bunch Type
Vegetation Density:	Good 75-95%
Soil Type:	Loam (MH)
Channel Lining Options	

Basic Relationships
A = Cross sectional area, ft2 (m2) = (B * D) + (Z_L / 2 * D2) + (Z_R / 2 * D2)
Where:
B = Base width of channel, ft (m)
D = Flow depth, ft (m)
Z_L = Left side bank slope (H : 1 V)
Z_R = Right side bank slope (H : 1 V)
P = Wetted perimeter, ft (m) = B + Z_L * D + Z_R * D
R = Hydraulic radius, ft (m) = A / P
V = Flow velocity, ft/s (m/s) = Q / A
Where:
Q = Channel discharge, cfs (cms)
Taua Average bed shear stress, psf (Pa) = 62.4 * R * S0
Where:
S0 = Gradient of channel, ft/ft (m/m)
Tau_0 = Maximum bed shear stress, psf (Pa) = 62.4 * D * S_0

Unvegetated Conditions Computations:
n = Manning's n = a * Tauab
and (iteratively solved)
$n = 1.486 / Q * A * R(2/3)S_0^{0.5}$
Where:
n = Manning's n
a = Product specific coefficient from performance testing
b = Product specific coefficient from performance testing

SF_P = Product factor of safety = Tau_T / Tau_0
Where:
TauT = Permissible shear stress from testing, psf (Pa)
Tau_p = In place permissible shear, psf (Pa) = Tau_T / alpha * (Tau_S + alpha / 4.3)
Where:
alpha = unit conversion constant, 0.14 English, 6.5 Metric
Tau_S = Permissible shear stress of soil
SFL = Factor of safety of installed liner = Taup / Taua

Vegetated Computations:
n = Manning's n = alpha * Cn* Taua-0.4
and (iteratively solved)
$n = 1.486 / Q * A * R(2/3)S_0^{0.5}$
Where:
alpha = Unit conversion constant, 0.213 English, 1.0 Metric
Cn = Vegetation retardance coefficient
SF_P = Product factor of safety = Tau_{TV} / Tau_0
Where:
Tau_{TV} = Permissible shear stress from testing, psf (Pa)
Tau_p = In place permissible shear, psf (Pa) = Tau_S / (1 – C_{FTRM}) * (n / n_S)2
Where:
C_{FTRM} = Coefficient of TRM performance derived from testing Tau_S = Permissible shear stress of soil
n_S = Manning's of soil bed if left unprotected
SF_L = Factor of safety of installed liner = Tau_p / Tau_a

Unreinforced Vegetation

Phase	Mannings N	Predicted flow depth (D)	Cross sectional area (A)	Wetted perimeter (P)	Hydraulic radius (R)	Flow velocity (V)	Froude number (FR)	Calculated Shear Stress	SFP/SFL
Unreinforced Vegetation	0.05	0.51 ft	1.54 ft2	4.72 ft	0.33 ft	2.4 ft/s	0.74	0.92 lbs/ft2	4.34 (SFL)
Underlying Substrate	0.05	0.51 ft	1.54 ft2	4.72 ft	0.33 ft	2.4 ft/s	0.74	0.59 lbs/ft2	6.35 (SFL)

North American Green
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Poseyville, Indiana 47633
Tel. 800.772.2040
>Fax 812.867.0247
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ECMDS v7.0

CHANNEL ANALYSIS

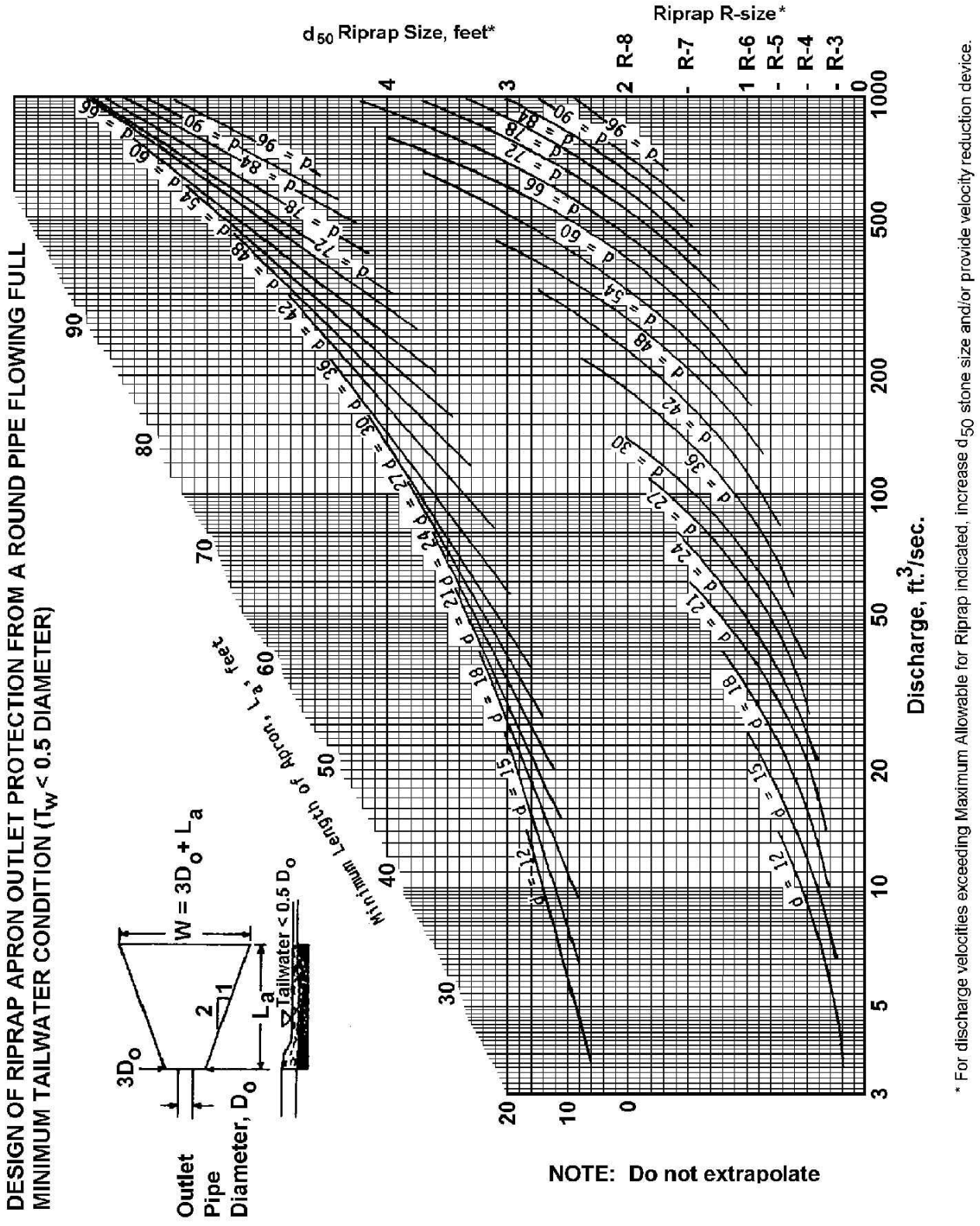
> > > Swale

Name	Swale
Discharge	3.7
Peak Flow Period	12
Channel Slope	0.029
Channel Bottom Width	1.5
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Loam (MH)

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissable Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	3.7 cfs	2.4 ft/s	0.51 ft	0.05	4 lbs/ft2	0.92 lbs/ft2	4.34	STABLE	--
Underlying Substrate	Straight	3.7 cfs	2.4 ft/s	0.51 ft	0.05	3.75 lbs/ft2	0.59 lbs/ft2	6.35	STABLE	--

FIGURE 9.3
Riprap Apron Design, Minimum Tailwater Condition



* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase d_{50} stone size and/or provide velocity reduction device.

Adapted from USDA - NRCS

Not to be used for Box Culverts