EROSION & SEDIMENTATION CONTROL REPORT

for

283 Commerce Center – Building #1

Mount Joy Township, Lancaster County, Pennsylvania

January 4, 2023

Prepared for:

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EROSION & SEDIMENTATION CONTROL REPORT
283 Commerce Center – Building #1
Mount Joy Township, Lancaster County, Pennsylvania

INTRODUCTION & PROJECT DESCRIPTION

The project site is located on the northeast side of Mount Pleasant Road (S.R. 4010) and west of Stauffer Road in Mount Joy Township, Lancaster County, Pennsylvania. See Appendix A for the Site Location Map (USGS Elizabethtown, PA Quadrangle) for the exact site location.

Land development entails the construction of one (1) warehouse / distribution center with an approximate building footprint of 1,006,880 square feet of gross floor area. Access to the site is proposed via two (2) driveways on Mount Pleasant Road. The northwest driveway is proposed for trucks and the southeast driveway is proposed for passenger vehicles. Development of the site will also include construction of truck courts, employee parking areas, trailer storage areas, site utilities, landscaping amenities, a stormwater collection, conveyance, and management system, and other related site improvements.

To provide appropriate vehicular access to the site from the nearby highway, Steel Way, which is an existing road with a dead-end cul-de-sac to the west of the site, will be modified to connect to Mount Pleasant Road across from the project's proposed northwest driveway. Additionally, the side of Mount Pleasant Road nearest to the site will be widened and reconstructed to current township standards.

Approximately 94 acres of the site and surrounding areas will be disturbed as part of this project. Pending receipt of all required project permits and approvals, it is expected that initial site construction will commence in 2023.

EXISTING SITE CONDITIONS

Over the past fifty years and up to the present, the subject property has been used for farming purposes with some wooded areas near steep slopes where farming isn't practical. The north side of the property is approximately defined by the headwaters of an Unnamed Tributary (UNT) to Little Chiques Creek, flowing from west to east. This UNT is identified as two separate streams (Stream 1 & Stream 3). Four (4) wetlands have also been delineated within the project area. These features are identified in the Water of the U.S. Delineation report prepared by ECS Mid-Atlantic, LLC. No disturbance will occur to any regulated areas (streams, wetlands, floodways) of the site.

Approximately 60% of the site is tributary to Streams 1 & 3. The remainder of the site flows to the south or east and leaves the site via overland flow. A more detailed description of the project's drainage areas is contained later within this project's Post-Construction Stormwater Management (PCSM) Report.

Ultimately, all stormwater is tributary to an UNT to Little Chiques Creek. All of the UNT to Little Chiques Creek have a Chapter 93 classification of Trout Stock Fishery, Migratory Fishes (TSF, MF) for designated use and none for existing use, are impaired for Aquatic Life from Agriculture – Siltation, have attained uses of Fish Consumption and Recreational, and have a Total Maximum Daily Load caused by Siltation, Total Suspended Solids, and Turbidity.

PREPARATION OF THE PLAN

The plan has been prepared in accordance with the requirements and recommendations of the Pennsylvania Department of Environmental Protection Erosion and Sediment Pollution Control Program Manual, Title 25, Chapter 102 – Erosion Control; Mount Joy Township Ordinances, and other acceptable engineering standards and practices. The report has been prepared with the attempt to provide effective erosion and sedimentation controls during the construction phase of the project in order to control the amount of sediment leaving the project site. Implementation of the measures contained herein should provide effective erosion and sedimentation control during and after the construction of the project.

The plan has been prepared by Landworks Civil Design, LLC, a professional engineering firm experienced in the preparation of soil erosion and sedimentation control plans for a variety of development projects throughout Pennsylvania. It shall remain the responsibility of the permittee and any co-permitee to implement and monitor the plan in accordance with the approved plan and any permits and permit conditions issued and related thereto.

SOIL TYPE CLASSIFICATIONS & DESCRIPTIONS

Based upon a review of United States Department of Agriculture, Soil Conservation Service Soil Survey for Lancaster County, Pennsylvania, the site is composed of the following soil types. Reference is made to Appendix B for a copy of the soils map of this area and their characteristics.

- AbB: Abbottstown Silt Loam, 3% to 8% Slopes, HSG D
- BdA: Bedington Silt Loam, 0% to 3% Slopes, HSG B
- BdB: Bedington Silt Loam, 3% to 8% Slopes, HSG B
- BdC: Bedington Silt Loam, 8% to 15% Slopes, HSG B
- BeD: Bedington Channery Silt Loam, 15% to 25% Slopes, HSG B
- Bm: Blairton Silt Loam, 3% to 10% Slopes, HSG C
- BuB: Bucks Silt Loam, 3% to 8% Slopes, HSG B
- BuC: Bucks Silt Loam, 8% to 15% Slopes, HSG B
- BuD: Bucks Silt Loam, 15% to 25% Slopes, HSG B
- LaD: Lansdale Loam, 15% to 25% Slopes, HSG B
- RaB: Readington Silt Loam, 3% to 8% Slopes, HSG C
- W: Water

EARTH DISTURBANCE

The amount of earth disturbance during construction is expected to be approximately 94 acres in size including the proposed road and utility connections. For purposes of clarity, the limits of disturbance has been depicted on the plan as estimating the anticipated amount of disturbed acreage required for various construction related activities. In certain areas of the site, grading/utility work is proposed to extend outside of the property boundary. Approximately six (16) acres across the site, such as areas around wetlands, streams, and floodplains will be part of the reduced grading / minimized disturbance area as part of the project's NPDES Permit. The overall NPDES Permit boundary will be 110 acres.

GENERAL EROSION & SEDIMENTATION CONTROL DESIGN

Temporary Sediment Basin Design:

Temporary Sediment Basins have been designed utilizing Standard Worksheets #12-17. Tributary areas are the maximum theoretical area to an individual basin at any time during construction. Further, any part of the tributary area within the limits of disturbance is considered "bare construction site" with a curve number (CN) of 98, equivalent to impervious area.

For Temporary Facility #1 and Temporary Sediment Basin #2, the worksheets used the maximum total drainage area to both BMPs at any given point during construction to verify that Temporary Sediment Basin #2 meets all relevant sediment basin design criteria on its own. As Temporary Facility #1 (as permanent MRC #1) is integral to the overall site design and drainage, it must be built early in the construction sequence. Temporary Facility #1 is provided with a temporary spillway at the bottom of its temporary elevation to enable construction stormwater to flow through and into Temporary Sediment Basin #2. Routings for the two BMPs assume the combined maximum drainage area at any time during construction to either BMP.

Dynamic Channel / Top of Slope Berm / Runoff Diversion Filter Sock:

These BMPs have been designed to constantly move throughout the site as large cut and fill operations occur. They have been designed to provide freeboard consistent with channel calculations based upon an assumed runoff rate per acre of tributary area. They were analyzed assuming a longitudinal slope of 1% and 2:1 side slopes. This combination of slopes represents the worst case scenario for available cross-sectional flow, which will generate the most conservative freeboard calculation.

OFFSITE DISCAHRGE ANALYSIS

The summaries included throughout this report demonstrate how peak discharge rate, runoff volume, and water quality compliance is achieved for the project's Discharge Points 001-009. The following table briefly summarizes how a stable flowpath is provided from each discharge point to the receiving waters.

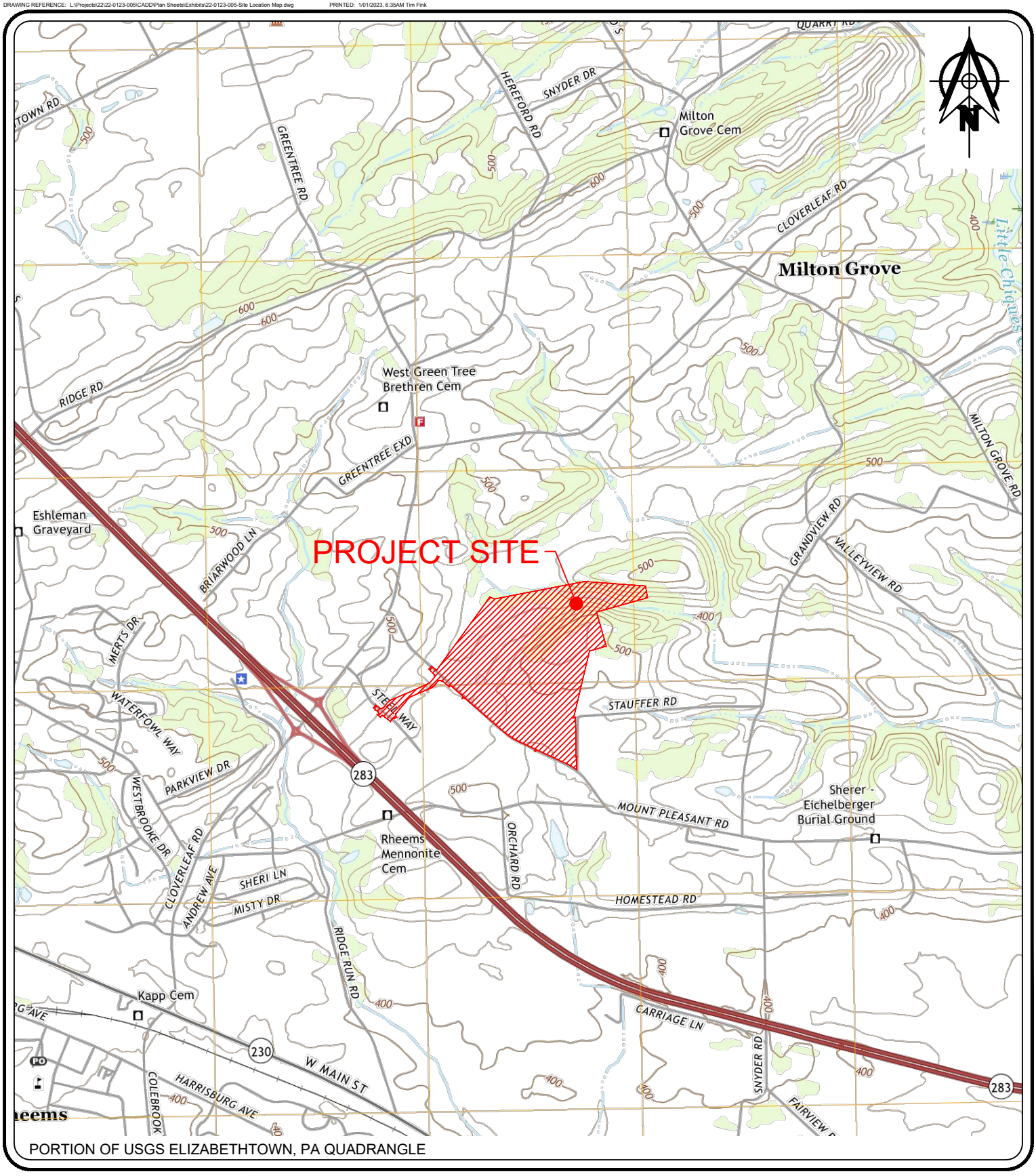
Discharge Point	Notes
001	MRC #1 & SWM/BMP Facility #2 discharge immediately outside of the floodway for Stream 3 at rates less than or equal to pre-development rates. Therefore, as no evidence of existing erosion was found, no erosion will occur post-development.
002	The post-development area is reduced from the pre-development area and no concentrated stormwater discharge is proposed to this discharge point.
003	MRC #3 discharges above Wetland 1 at a discharge rate less than or equal to pre-development rates. Therefore, as no evidence of existing erosion was found, no erosion will occur post-development.
004	The post-development area is reduced from the pre-development area and no concentrated stormwater discharge is proposed to this discharge point.
005	An existing culvert is being replaced as part of this project and no evidence of existing erosion was found downstream of this culvert. The post-development discharge rates are less than the pre-development discharge rates and therefore, no erosion will occur.
006	The post-development area is reduced from the pre-development area and no concentrated stormwater discharge is proposed to this discharge point.
007	The post-development area is reduced from the pre-development area and no concentrated stormwater discharge is proposed to this discharge point.
008	The post-development area is reduced from the pre-development area and no concentrated stormwater discharge is proposed to this discharge point.
009	MRC #4 discharges into an area upstream of an existing culvert. The proposed rip-rap apron will provide a stable flowpath from the facility discharge to the existing culvert.

An Offsite Discharge Map is included in Appendix E of the PCSM Report which graphically depicts the discharge points and their downstream flowpaths to the receiving waters.

APPENDIX A

SITE LOCATION MAP

DRAWING REFERENCE: L:\Projects\22\22-0123-005\CADD\Plan Sheets\Exhibits\22-0123-005-Site Location Map.dwg PRINTED: 1/01/2023, 6:35AM Tim Fink



PORTION OF USGS ELIZABETHTOWN, PA QUADRANGLE

LANDWORKS
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SITE LOCATION MAP

FOR

283 COMMERCE CENTER - BUILDING #1

FOR

PDC NORTHEAST LPIV, LLC

MOUNT JOY TOWNSHIP LANCASTER COUNTY, PENNSYLVANIA

PROJECT NO.	22-0123-005
DATE:	01/03/23
SCALE:	1" = 2000'
SHEET	1 of 1

APPENDIX B

SOIL INFORMATION

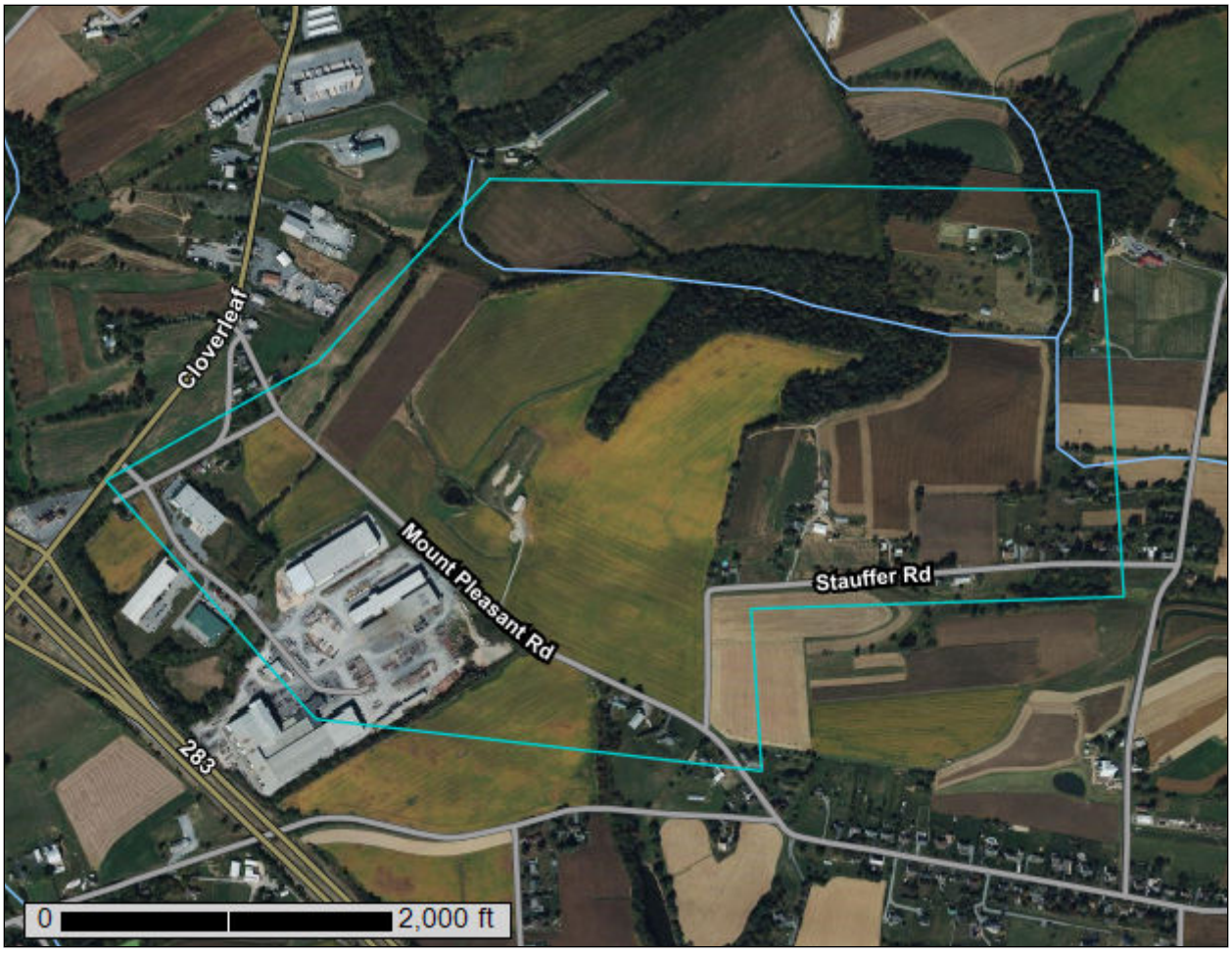
United States Department of Agriculture

NRCS

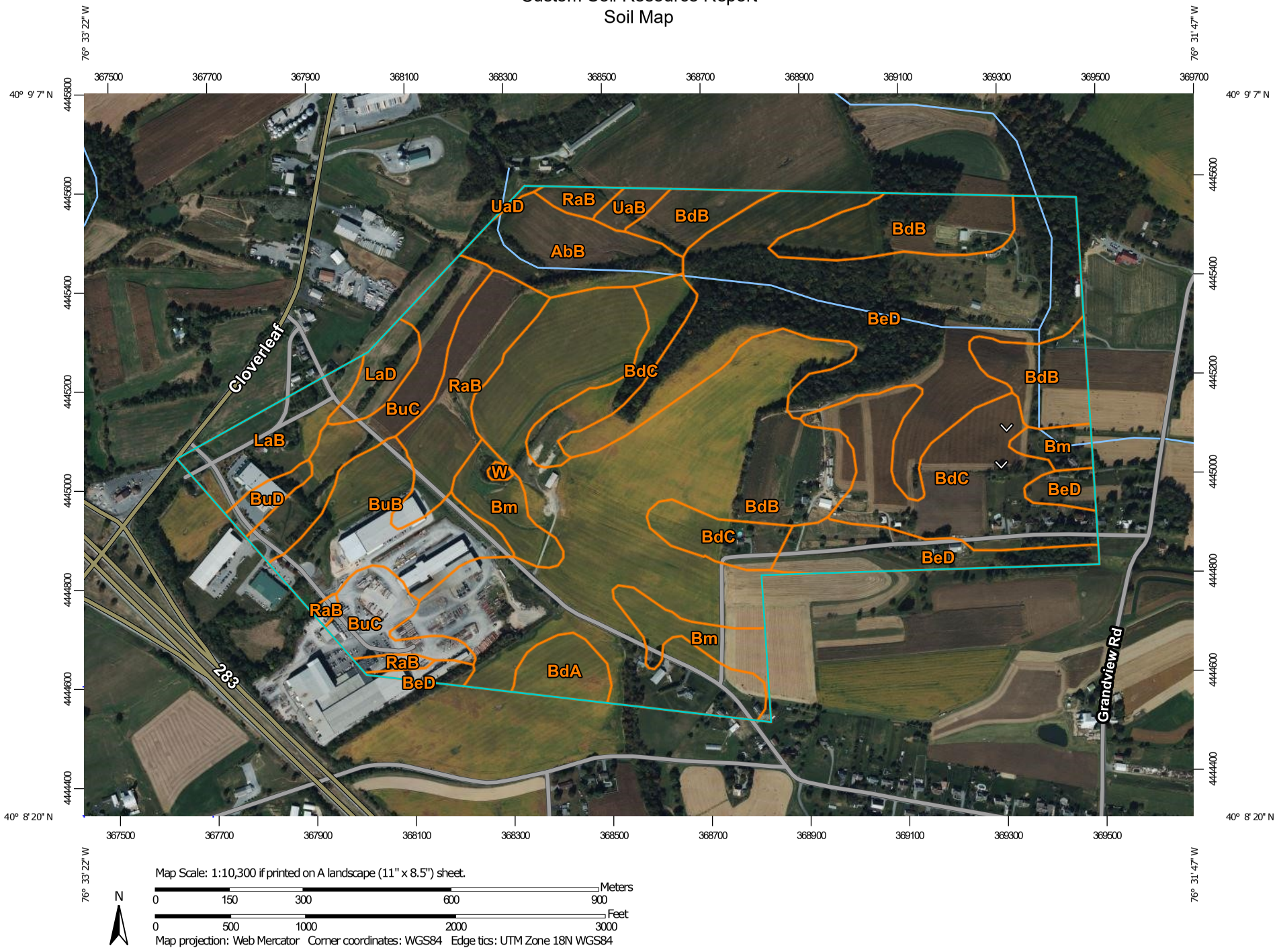
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lancaster County, Pennsylvania



Custom Soil Resource Report
Soil Map



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AbB	Abbottstown silt loam, 3 to 8 percent slopes	13.2	3.8%
BdA	Bedington silt loam, 0 to 3 percent slopes	5.0	1.4%
BdB	Bedington silt loam, 3 to 8 percent slopes	119.7	34.5%
BdC	Bedington silt loam, 8 to 15 percent slopes	39.6	11.4%
BeD	Bedington channery silt loam, 15 to 25 percent slopes	78.1	22.5%
Bm	Blairton silt loam, 3 to 10 percent slopes	14.7	4.2%
BuB	Bucks silt loam, 3 to 8 percent slopes	18.9	5.4%
BuC	Bucks silt loam, 8 to 15 percent slopes	21.0	6.0%
BuD	Bucks silt loam, 15 to 25 percent slopes	2.4	0.7%
LaB	Lansdale loam, 3 to 8 percent slopes	10.7	3.1%
LaD	Lansdale loam, 15 to 25 percent slopes	4.4	1.3%
RaB	Readington silt loam, 3 to 8 percent slopes	17.3	5.0%
UaB	Ungers loam, 3 to 8 percent slopes	1.8	0.5%
UaD	Ungers loam, 15 to 25 percent slopes	0.2	0.1%
W	Water	0.3	0.1%
Totals for Area of Interest		**347.6**	**100.0%**

Lancaster County, Pennsylvania

AbB—Abbottstown silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v7gd
Elevation: 130 to 660 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 190 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Abbottstown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Abbottstown

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Acid reddish brown residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 10 inches: silt loam
Bt - 10 to 20 inches: silt loam
Bx - 20 to 39 inches: channery silt loam
BCg - 39 to 48 inches: channery silt loam
R - 48 to 58 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 22 inches to fragipan; 40 to 60 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F148XY025PA - Moist, Triassic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Penn

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Croton

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Klinesville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

BdA—Bedington silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: l6r1
Elevation: 300 to 2,900 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 45 to 59 degrees F
Frost-free period: 110 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bedington and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bedington

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 9 inches: silt loam
BE - 9 to 12 inches: channery silt loam
Bt - 12 to 60 inches: very channery loam
C - 60 to 77 inches: extremely channery silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 120 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F148XY026PA - Moist, High Base-Saturation, Upland, Mixed Oak - Hickory - Conifer Forest
Hydric soil rating: No

Minor Components

Blairton

Percent of map unit: 5 percent
Hydric soil rating: No

Clymer

Percent of map unit: 2 percent
Hydric soil rating: No

Duffield

Percent of map unit: 2 percent
Hydric soil rating: No

Hagerstown

Percent of map unit: 1 percent
Hydric soil rating: No

BdB—Bedington silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l6r2

Elevation: 300 to 1,500 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 140 to 217 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bedington and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bedington

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 47 inches: channery silty clay loam
H3 - 47 to 63 inches: very channery clay loam
R - 63 to 67 inches: weathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 48 to 99 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F147XY002PA - Mixed Sedimentary Upland, F148XY026PA - Moist, High Base-Saturation, Upland, Mixed Oak - Hickory - Conifer Forest
Hydric soil rating: No

Minor Components

Berks

Percent of map unit: 10 percent
Hydric soil rating: No

Edom

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Hartleton

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Watson

Percent of map unit: 5 percent
Landform: Valley sides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BdC—Bedington silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: l6r3
Elevation: 300 to 1,500 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 140 to 217 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bedington and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bedington

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 47 inches: channery silty clay loam

H3 - 47 to 63 inches: very channery clay loam
R - 63 to 67 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 48 to 99 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F147XY002PA - Mixed Sedimentary Upland, F148XY026PA - Moist, High Base-Saturation, Upland, Mixed Oak - Hickory - Conifer Forest
Hydric soil rating: No

Minor Components

Berks

Percent of map unit: 10 percent
Hydric soil rating: No

Edom

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Watson

Percent of map unit: 5 percent
Landform: Valley sides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hartleton

Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

BeD—Bedington channery silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: l6r4
Elevation: 300 to 1,600 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 120 to 214 days
Farmland classification: Not prime farmland

Map Unit Composition

Bedington and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bedington

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Acid residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 9 inches: channery silt loam
H2 - 9 to 29 inches: channery silty clay loam
H3 - 29 to 72 inches: very channery silt loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F147XY002PA - Mixed Sedimentary Upland, F148XY026PA - Moist, High Base-Saturation, Upland, Mixed Oak - Hickory - Conifer Forest
Hydric soil rating: No

Minor Components

Comly
Percent of map unit: 7 percent
Hydric soil rating: No

Berks
Percent of map unit: 5 percent
Hydric soil rating: No

Weikert
Percent of map unit: 3 percent
Hydric soil rating: No

Bm—Blairton silt loam, 3 to 10 percent slopes

Map Unit Setting
National map unit symbol: l6r5
Elevation: 300 to 1,500 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Blairton and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blairton

Setting
Landform: Depressions
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Local silty colluvium derived from shale and siltstone over acid silty residuum weathered from shale and siltstone

Typical profile
Ap - 0 to 10 inches: silt loam
Bt - 10 to 35 inches: channery silty clay loam
Cg - 35 to 39 inches: very channery loam
R - 39 to 43 inches: bedrock

Properties and qualities
Slope: 3 to 10 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F148XY024PA - Moist, Piedmont - felsic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Poorly drained areas

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Ungers

Percent of map unit: 2 percent
Hydric soil rating: No

Bucks

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Bedington

Percent of map unit: 1 percent
Hydric soil rating: No

BuB—Bucks silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l6rd
Elevation: 300 to 1,500 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 150 to 200 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Bucks and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bucks

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Silt mantle over residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 30 inches: silty clay loam
C - 30 to 52 inches: very gravelly silty clay loam
R - 52 to 56 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F148XY022PA - Dry, Triassic, Upland, Mixed Oak Heath / Oak-Pine Woodland
Hydric soil rating: No

Minor Components

Readington

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Lehigh

Percent of map unit: 2 percent

Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Ungers

Percent of map unit: 2 percent
Hydric soil rating: No

Lansdale

Percent of map unit: 1 percent
Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

BuC—Bucks silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: l6rf
Elevation: 300 to 1,500 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bucks and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bucks

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Silt mantle over residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 30 inches: silty clay loam
C - 30 to 52 inches: very gravelly silty clay loam
R - 52 to 56 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F148XY022PA - Dry, Triassic, Upland, Mixed Oak Heath / Oak-Pine Woodland
Hydric soil rating: No

Minor Components

Readington

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Ungers

Percent of map unit: 2 percent
Hydric soil rating: No

Lehigh

Percent of map unit: 2 percent
Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Lansdale

Percent of map unit: 1 percent
Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

BuD—Bucks silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: l6rg
Elevation: 300 to 1,500 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Bucks and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bucks

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Silt mantle over residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 30 inches: silty clay loam
C - 30 to 52 inches: very gravelly silty clay loam
R - 52 to 56 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F148XY022PA - Dry, Triassic, Upland, Mixed Oak Heath / Oak-Pine Woodland

Hydric soil rating: No

Minor Components

Readington

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Lehigh

Percent of map unit: 2 percent
Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Ungers

Percent of map unit: 2 percent
Hydric soil rating: No

Lansdale

Percent of map unit: 1 percent
Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

LaB—Lansdale loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l6sk
Elevation: 70 to 1,000 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lansdale and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lansdale

Setting

Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and/or residuum weathered from conglomerate

Typical profile

Ap - 0 to 8 inches: loam
Bt - 8 to 34 inches: channery sandy loam
C - 34 to 46 inches: channery sandy loam
R - 46 to 50 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 42 to 60 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F148XY025PA - Moist, Triassic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Reaville

Percent of map unit: 8 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

LaD—Lansdale loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: l6sm
Elevation: 70 to 1,000 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Lansdale and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lansdale

Setting

Landform: Hillsides
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and/or residuum weathered from conglomerate

Typical profile

Ap - 0 to 8 inches: loam
Bt - 8 to 34 inches: channery sandy loam
C - 34 to 46 inches: channery sandy loam
R - 46 to 50 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 42 to 60 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F148XY025PA - Moist, Triassic, Upland, Mixed Oak - Hardwood - Conifer Forest

Hydric soil rating: No

Minor Components

Reaville

Percent of map unit: 8 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

RaB—Readington silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w05x
Elevation: 70 to 950 feet
Mean annual precipitation: 38 to 55 inches
Mean annual air temperature: 43 to 57 degrees F
Frost-free period: 170 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Readington and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Readington

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Triassic colluvium derived from shale and siltstone and/or triassic residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 10 inches: silt loam
Bt1 - 10 to 17 inches: silt loam
Bt2 - 17 to 34 inches: silty clay loam
Btx - 34 to 48 inches: clay loam
C - 48 to 58 inches: channery silt loam
R - 58 to 68 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent

Depth to restrictive feature: 20 to 36 inches to fragipan; 40 to 60 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F148XY025PA - Moist, Triassic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Abbottstown

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Reaville

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Penn

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

UaB—Ungers loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l6th

Elevation: 250 to 1,500 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 160 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ungers and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ungers

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and siltstone

Typical profile

H1 - 0 to 11 inches: loam
H2 - 11 to 40 inches: gravelly sandy clay loam
H3 - 40 to 60 inches: very channery sandy loam
H4 - 60 to 64 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F148XY025PA - Moist, Triassic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Penn

Percent of map unit: 7 percent
Hydric soil rating: No

Readington

Percent of map unit: 5 percent
Hydric soil rating: No

Bucks

Percent of map unit: 3 percent
Hydric soil rating: No

UaD—Ungers loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: l6tk
Elevation: 250 to 1,500 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Ungers and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ungers

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and siltstone

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 40 inches: gravelly sandy clay loam
H3 - 40 to 60 inches: very channery sandy loam
H4 - 60 to 64 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B
Ecological site: F148XY025PA - Moist, Triassic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Penn
Percent of map unit: 7 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Readington
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Bucks
Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

W—Water

Map Unit Setting
National map unit symbol: l6tr
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 120 to 214 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting
Parent material: Rivers streams ponds

Properties and qualities

Runoff class: Negligible
Frequency of ponding: Frequent

APPENDIX C

EROSION & SEDIMENTATION CONTROL CALCULATIONS

TEMPORARY SEDIMENT BASIN #2 DESIGN

STANDARD E&S WORKSHEET # 12
Sediment Basin Capacity Requirements

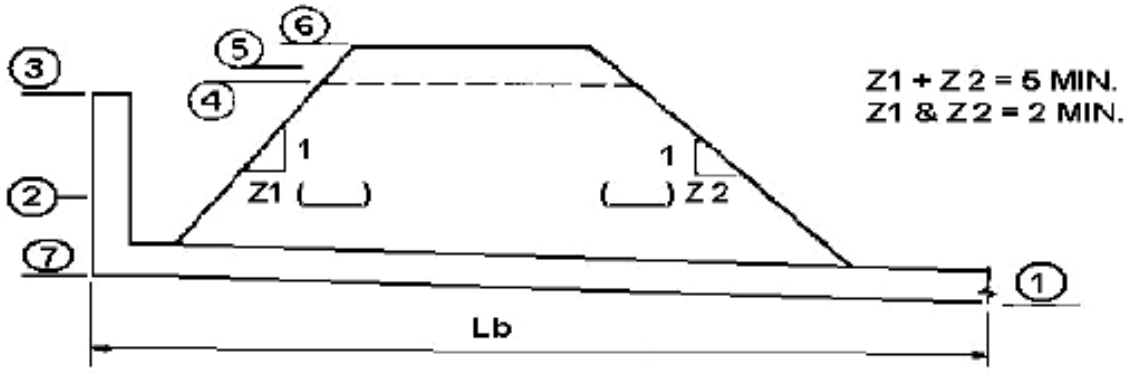
PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

BASIN NUMBER		Temp #2
PERMANENT OR TEMPORARY BASIN?	(P or T)	P
SPECIAL PROTECTION WATERSHED?	(YES OR NO)	No
Karst Soils?	(YES OR NO)	No
(A) MAXIMUM TOTAL DRAINAGE AREA	(AC)	59.05
IS DRAINAGE AREA (A) MORE THAN 10% LARGER THAN THE PRECONSTRUCTION CONDITION?	(YES OR NO)	Yes
(A_1) DISTURBED ACRES IN DRAINAGE AREA (AC)		59.05
(I) INITIAL REQ'D DEWATERING ZONE (5,000 X A)	(CF)	295,250
(T) REDUCTION FOR TOP DEWATERING (-700 X A)	(CF)	0
(P) REDUCTION FOR PERMANENT POOL (-700 X A)	(CF)	0
(L) REDUCTION FOR 4:1 FLOW LENGTH:WIDTH (-350 X A)	(CF)	0
(D) REDUCTION FOR 4 TO 7 DAY DEWATERING (-350 X A)	(CF)	0
(Sv) REQUIRED DEWATERING ZONE [I - (T+P+L)][1]	(CF)	295,250
(Sd) REQUIRED SEDIMENT STORAGE VOLUME (1000 X A_1)	(CF)	59,050
(St) TOTAL REQUIRED STORAGE VOLUME (Sv + Sd)	(CF)	354,300
TOTAL STORAGE VOLUME PROVIDED (@ ELEV 3)[2]	(CF)	539,400
DEWATERING TIME FOR DEWATERING ZONE	(DAYS)	5.7
REQUIRED DISCHARGE CAPACITY (2 X A)	(CFS)[3]	118.10
PRINCIPAL SPILLWAY TYPE (PERFORATED RISER, SKIMMER, etc.)		SKIMMER
PEAK FLOW FROM 10 YR/24R HR STORM FOR DRAINAGE AREA (A)	(CFS)[4]	283.18
PRINCIPAL SPILLWAY CAPACITY (@ ELEV 5)	(CFS)[4]	41.51
EMERGENCY SPILLWAY CAPACITY (@ ELEV 5)	(CFS)	76.59
TOTAL BASIN DISCHARGE CAPACITY (@ ELEV 5)		118.10
EMERGENCY SPILLWAY PROTECTIVE LINER[5]		SC250
OUTLET TO A SURFACE WATER?	(YES OR NO)[6]	No
PEAK FLOW FROM A 100 YR/24 HR STORM FOR DRG AREA (A)		480.09

1 The minimum dewatering zone capacity for sediment basins is (3,600 X A). No reduction is permitted in Special Protection (HQ and EV) Watersheds
2 Total Storage Volume provided at riser crest.
3 Or Provide calculations to show peak flow from 25 yr./24 hour storm for area (A) is routed through the basin
4 Provide supporting calculations.
5 If grass lining is proposed, spillway should be constructed in original ground unless a suitable TRM lining is use. Wherever a TRM is used, riprap should be placed at the bottom of the embankment to prevent scour.
6 If no, and basin is permanent or drainage area is more than 10% larger than pre-construction, provide supporting calculations to show accelerated erosion will not result from the proposed discharge. For discharges increasing volume or rate of flow onto a neighboring property prior to entering a surface water, an easement should be obtained prior to plan submittal.

STANDARD E&S WORKSHEET # 13
Sediment Basin Dimensions and Elevations

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03



BASIN NUMBER		Temp #2	
1. DISCHARGE PIPE ELEVATION	(FT)	429.22	
2. ELEVATION AT TOP OF SEDIMENT STORAGE ZONE (@Sd) (MIN. 1.0' ABOVE ELEVATION 7)	(FT)	433.00	
3. ELEVATION AT TOP OF DEWATERING ZONE (St) (CREST OF PRINCIPAL SPILLWAY)	(FT)	436.00	
4. EMERGENCY SPILLWAY CREST ELEVATION (MIN. 0.5' ABOVE ELEVATION 3)	(FT)	437.60	
5. 2 CFS/ACRE OR 100-YR/24 HOUR FLOW ELEVATION	(FT)	438.17	(100-Yr)
6. TOP OF EMBANKMENT ELEVATION (MIN 24" ABOVE ELEVATION 5 OR 12" WITH ROUTED 100-YR/24-HR STORM)	(FT)	440.00	
7. BASIN BOTTOM ELEVATION	(FT)	432.00	
AVERAGE BOTTOM WIDTH	(FT)	100	
AVERAGE BOTTOM LENGTH	(FT)	169	
(SA_{min}) REQUIRED SURFACE AREA AT ELEVATION 2	(SQ. FT)	60,000	
SURFACE AREA PROVIDED AT ELEVATION 2	(SQ. FT)	82,044	
AVERAGE BASIN WIDTH (W) AT ELEVATION 3	(FT)	210	
FLOW LENGTH (L) AT ELEVATION 3	(FT)	850	
FLOW LENGTH:WIDTH RATIO AT ELEVATION 3	(FT)	4:1	
SILT CURTAIN OR FOREBAY? (IF YES, INDICATE WHICH)		Forebay	
EMBANKMENT TOP WIDTH	(FT, 8' MIN.)	10	
EMBANKMENT SOIL TYPE(S)		CL, ML	
KEY TRENCH DEPTH	(FT, 2' MIN.)	2.0	
KEY TRENCH WIDTH	(FT. 4' MIN)	4.0	
RISER DIAMETER/TYPE	(15" MIN)	N/A	
BARREL DIAMETER/TYPE	(12" MIN)	24	
Lb (BARREL LENGTH)	(FT)	55.60	
EMERGENCY SPILLWAY WIDTH	(FT)	70	
EMERGENCY SPILLWAY SIDE SLOPES	(H:V)	3:1	
EMERGENCY SPILLWAY DEPTH	(FT)	2.40	

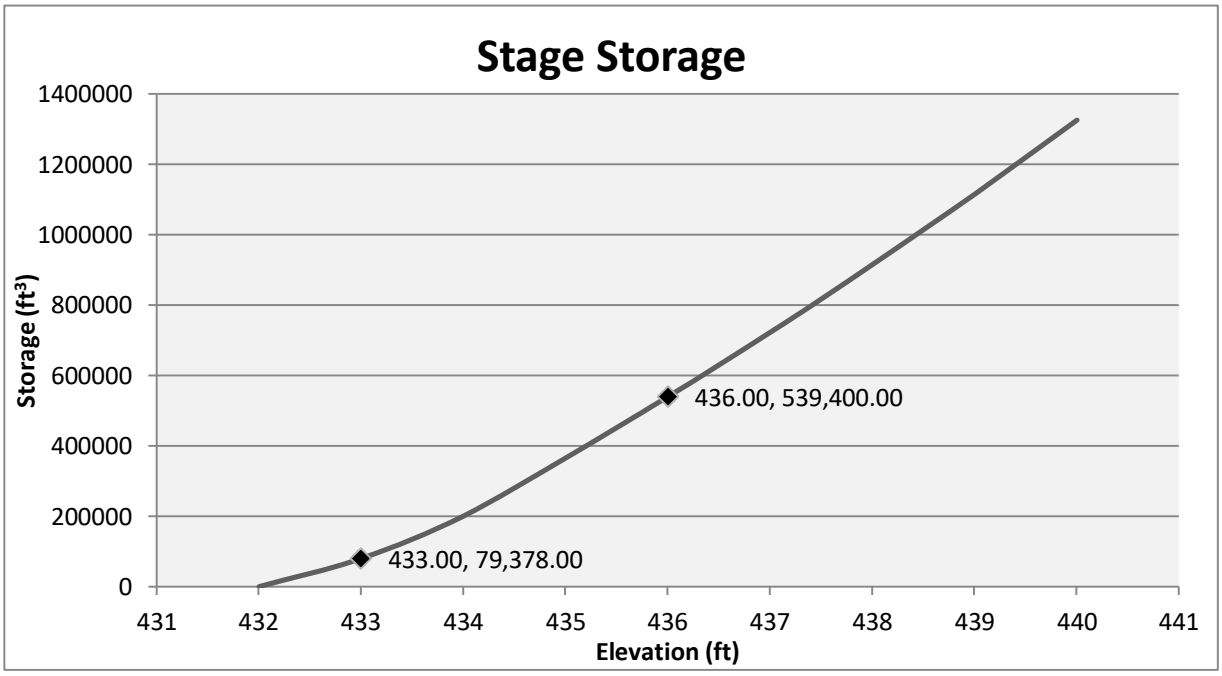
For irregular shaped traps, provide stage storage data

STANDARD E&S WORKSHEET # 14
Sediment Basin/Sediment Trap Storage Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

WATER SURFACE ELEVATION (FEET)	AREA (SQ. FT)	AVERAGE AREA (SQ. FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
432.00	76,712				0
433.00	82,044	79,378	1.00	79,378	79,378
434.00	160,416	121,230	1.00	121,230	200,608
435.00	169,382	164,899	1.00	164,899	365,507
436.00	178,404	173,893	1.00	173,893	539,400
437.00	187,483	182,944	1.00	182,944	722,344
438.00	196,618	192,051	1.00	192,051	914,394
439.00	205,810	201,214	1.00	201,214	1,115,608
440.00	215,058	210,434	1.00	210,434	1,326,042

ELEV. 2:	W.S.E.	433.00	ELEV. 3:	W.S.E.	436.00
	SURF. AREA:	82,044		SURF. AREA:	178,404
TOTAL STORAGE (CF):		79,378	TOTAL STORAGE (CF):		539,400



Determining the Skimmer Size and the Required Orifice for the *Faircloth Skimmer®* Surface Drain

November 2007

Important note: *The orifice sizing chart in the Pennsylvania Erosion Control Manual and reproduced in the North Carolina Design Manual* ***DOES NOT APPLY*** *to our skimmers. It will give the wrong size orifice and not specify which size skimmer is required. Please use the information below to choose the size skimmer required for the basin volume provided and determine the orifice size required for the drawdown time, typically 4-7 days in Pennsylvania and 3 days in North Carolina.*

The **size** of a Faircloth Skimmer®, for example a 4" skimmer, refers to the maximum diameter of the skimmer inlet. The inlet on each of the 8 sizes offered can be reduced to adjust the flow rate by cutting a hole or ***orifice*** in a plug using an adjustable cutter (both supplied).

Determining the skimmer size needed and the orifice for that skimmer required to drain the sediment basin's volume in the required time involves two steps: **First**, determining the size skimmer required based on the volume to be drained and the number of days to drain it; and **Second,** calculate the orifice size to adjust the flow rate and "customize" the skimmer for the basin's volume. *The second step is not always necessary* if the flow rate for the skimmer with the inlet wide open equals or is close to the flow rate required for the basin volume and the drawdown time.

Both the skimmer size and the required orifice radius for the skimmer should be shown for each basin on the erosion and sediment control plan. Make it clear that the dimension is either the radius or the diameter. It is also helpful to give the basin volume in case there are questions. During the skimmer installation the required orifice can be cut in the plastic plug using the supplied adjustable cutter and installed in the skimmer using the instructions provided.

The plan review and enforcement authority may require the calculations showing that the skimmer used can drain the basin in the required time.

Determining the Skimmer Size

Step 1. Below are approximate **skimmer maximum flow capacities** based on typical draw down requirements, which can vary between States and jurisdictions and watersheds. If one 6" skimmer does not provide enough capacity, multiple skimmers can be used to drain the basin. For drawdown times not shown, multiply the 24-hour figure by the number of days required.

Example: A basin's volume is 29,600 cubic feet and it must be drained in 3 days. A 3" skimmer with the inlet wide open will work perfectly. (Actually, the chart below gives 29,322 cubic feet but this is well within the accuracy of the calculations and the basin's constructed volume.)
Example: A basin's volume is 39,000 cubic feet and it must be drained in 3 days. The 3" skimmer is too small; a 4" skimmer has enough capacity but it is too large, so the inlet will need

November 6, 2007 1

Step 1:

Dewatering Volume Required:	295,250 CF
Number of Skimmers Required:	1
Skimmer Size Required:	6"

to be reduced using step 2 to adjust the flow rate for the basin's volume. (It needs a 3.2" diameter orifice.)

1½" skimmer:	1,728 cubic feet in **24 hours**	6,912 cubic feet in **4 days**
with a 1½" head	3,456 cubic feet in **2 days**	12,096 cubic feet in **7 days**
	5,184 cubic feet in **3 days**	
2" skimmer:	3,283 cubic feet in **24 hours**	13,132 cubic feet in **4 days**
with a 2" head	6,566 cubic feet in **2 days**	22,982 cubic feet in **7 days**
	9,849 cubic feet in **3 days**	
2½" skimmer:	6,234 cubic feet in **24 hours**	24,936 cubic feet in **4 days**
with a 2.5" head	12,468 cubic feet in **2 days**	43,638 cubic feet in **7 days**
Revised 11-6-07	18,702 cubic feet in **3 days**	
3" skimmer:	9,774 cubic feet in **24 hours**	39,096 cubic feet in **4 days**
with a 3" head	19,547 cubic feet in **2 days**	68,415 cubic feet in **7 days**
	29,322 cubic feet in **3 days**	
4" skimmer:	20,109 cubic feet in **24 hours**	80,436 cubic feet in **4 days**
with a 4" head	40,218 cubic feet in **2 days**	140,763 cubic feet in **7 days**
Revised 11-6-07	60,327 cubic feet in **3 days**	
5" skimmer:	32,832 cubic feet in **24 hours**	131,328 cubic feet in **4 days**
with a 4" head	65,664 cubic feet in **2 days**	229,824 cubic feet in **7 days**
	98,496 cubic feet in **3 days**	
6" skimmer:	51,840 cubic feet in **24 hours**	207,360 cubic feet in **4 days**
with a 5" head	103,680 cubic feet in **2 days**	362,880 cubic feet in **7 days**
	155,520 cubic feet in **3 days**	
8" skimmer:	97,978 cubic feet in **24 hours**	391,912 cubic feet in **4 days**
with a 6" head	195,956 cubic feet in **2 days**	685,846 cubic feet in **7 days**
CUSTOM	293,934 cubic feet in **3 days**	
MADE BY ORDER	**CALL!**	

Determining the Orifice

Step 2. To determine the orifice required to reduce the flow rate for the basin's volume and the number of days to drain the basin, simply use the formula volume ÷ **factor** (from the chart below) for the same size skimmer chosen in the first step and the same number of days. This calculation will give the **area** of the required orifice. Then calculate the orifice radius using Area = πr^2 and solving for r, $r = \sqrt{(Area / 3.14)}$ .The supplied cutter can be adjusted to this radius to cut the orifice in the plug. The instructions with the plug and cutter has a ruler divided into tenths of inches. Again, this step is not always necessary as explained above.

An alternative method is to use the orifice equation with the head for a particular skimmer shown on the previous page and determine the orifice needed to give the required flow for the volume and draw down time. C = 0.59 is used in this chart.

Example: A 4" skimmer is the smallest skimmer that will drain 39,000 cubic feet in 3 days but a 4" inlet will drain the basin too fast (in 1.9 days) To determine the orifice required use the factor of 4,803 from the chart below for a 4" skimmer and a drawdown time of 3 days. 39,000 cubic

Step 2: No Custom Orifice Required

feet ÷ 4,803 = 8.12 square inches of orifice required. Calculate the orifice radius using Area = $\pi \cdot r^2$ and solving for r, $r = \sqrt{(8.12/3.14)}$ and r = 1.61". As a practical matter 1.6" is about as close as the cutter can be adjusted and the orifice cut..

Factors (in cubic feet of flow per square inch of opening through a **round** orifice with the head for that skimmer and for the drawdown times shown) for determining the **orifice radius** for a basin's volume to be drained. This quick method works because the orifice is centered and has a constant head (given above in Step 1).

1½" skimmer:	960 to drain in **24 hours**	3,840 to drain in **4 days**
	1,920 to drain in **2 days**	6,720 to drain in **7 days**
	2,880 to drain in **3 days**	
2" skimmer:	1,123 to drain in **24 hours**	4,492 to drain in **4 days**
	2,246 to drain in **2 days**	7,861 to drain in **7 days**
	3,369 to drain in **3 days**	
2½" skimmer: Revised 11-6-07	1,270 to drain in **24 hours**	5,080 to drain in **4 days**
	2,540 to drain in **2 days**	8,890 to drain in **7 days**
	3,810 to drain in **3 days**	
3" skimmer:	1,382 to drain in **24 hours**	5,528 to drain in **4 days**
	2,765 to drain in **2 days**	9,677 to drain in **7 days**
	4,146 to drain in **3 days**	
4" skimmer: Revised 11-6-07	1,601 to drain in **24 hours**	6,404 to drain in **4 days**
	3,202 to drain in **2 days**	11,207 to drain in **7 days**
	4,803 to drain in **3 days**	
5" skimmer:	1,642 to drain in **24 hours**	6,568 to drain in **4 days**
	3,283 to drain in **2 days**	11,491 to drain in **7 days**
	4,926 to drain in **3 days**	
6" skimmer:	1,814 to drain in **24 hours**	7,256 to drain in **4 days**
	3,628 to drain in **2 days**	12,701 to drain in **7 days**
	5,442 to drain in **3 days**	
8" skimmer:	1,987 to drain in **24 hours**	7,948 to drain in **4 days**
	3,974 to drain in **2 days**	13,909 to drain in **7 days**
	5,961 to drain in **3 days**	

J. W. Faircloth & Son, Inc.
Post Office Box 757
412-A Buttonwood Drive
Hillsborough, North Carolina 27278
Telephone (919) 732-1244 FAX (919) 732-1266
FairclothSkimmer.com jwfaircloth@embarqmail.com

Dewatering Time:	Discharge Rate per Skimmer=	0.600 CFS
	x 1 Skimmer=	0.600 CFS
	Total Dewatering Time=	5.7 Days

STANDARD E&S WORKSHEET # 17
Sediment Basin Discharge Capacity

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

PRINCIPAL SPILLWAY DISCHARGE CAPACITY

BASIN NO:

WATER SURFACE ELEVATION[4] (FT)	Flow into Top of TEMPORARY RISER			Flow into Top of PERMANENT RISER			BARREL PIPE FLOW		PRINCIPAL SPILLWAY CAPACITY[3] (CFS)
	HEAD (FT)	ORIFICE FLOW[1] Q (CFS)	WEIR FLOW Q (CFS)	HEAD (FT)	ORIFICE FLOW[1] Q (CFS)	WEIR FLOW Q (CFS)	HEAD[2] (FT)	Q (CFS)	
438.13	-	-	-	2.13	56.28	96.67	7.91	41.51	41.51

EMERGENCY SPILLWAY DISCHARGE CAPACITY

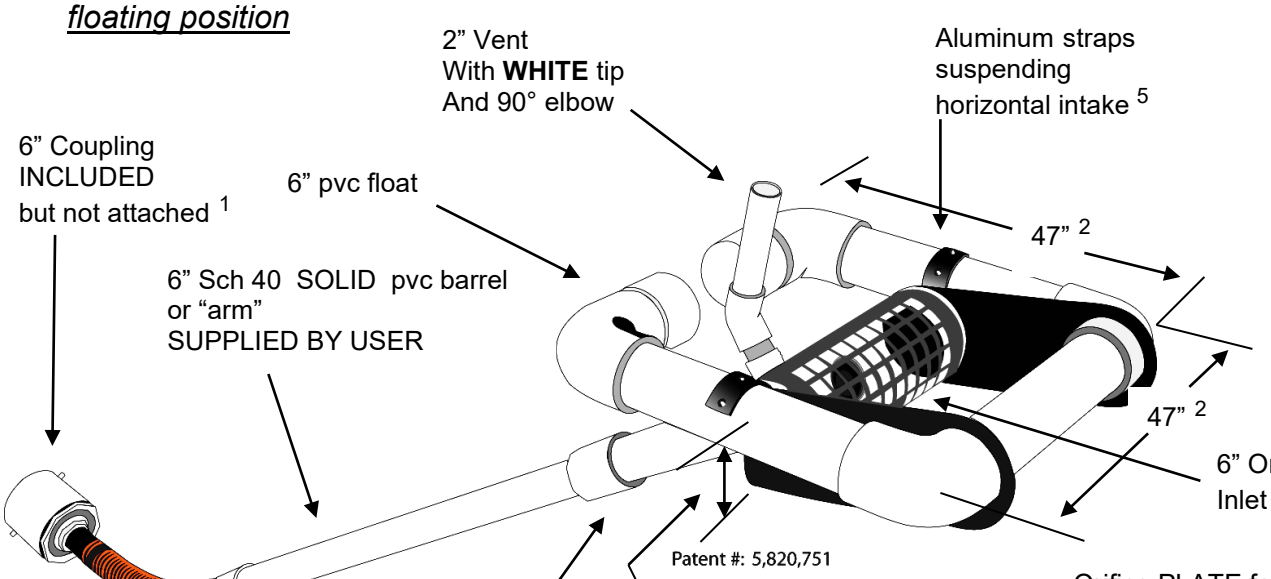
WATER SURFACE ELEVATION[4] (FT)	EMERGENCY SPILLWAY BOTTOM WIDTH[5] (FT)	TABLE OR C VALUE USED[6]	EMERGENCY SPILLWAY CAPACITY (CFS)	REQUIRED DISCHARGE CAPACITY (CFS)	TOTAL DISCHARGE CAPACITY PROVIDED[7]
438.13	70.00	2.80	76.59	118.10	118.10

1. Flow into top of riser only (Flow through perforations not included)
2. Water surface elevation minus elevation at centerline of pipe outlet
3. Least of orifice, weir, or pipe flow (Peak flow from 10yr/24 hr storm Min.)
4. 24" below top of embankment (12" if 100-year storm routed through basin)
5. 8 Ft. minimum
6. Use Tables 7.5 through 7.8 or equation for broad crested weir [$Q=CLH^{1.5}$ where C <= 2.8 (MAX)]; for Riprap larger than R-3 or flows less than 1.5' deep, adjust C downward]
7. Principal Spillway Capacity + Emergency Spillway Capacity

6” *Faircloth Skimmer®* Cut Sheet

J. W. Faircloth & Son, Inc.
www.FairclothSkimmer.com

Skimmer shown in floating position



Orifice PLATE for inlet

1. Hose can be attached to outlet using the threaded 5” nipple. Typical methods used: a) a metal structure with a steel stub out welded on the side at the bottom with a 5” threaded coupling or reducer(s); b) a concrete structure with a hole or orifice at the bottom - use a steel plate with a hole and coupling welded to it that will fit over the hole in the concrete and bolted to the structure with sealant.

2. Dimensions are approximate, not intended as plans for construction.

3. Barrel (solid, not foam core pipe) should be 1.4 times the depth of water with a minimum length of 8’ so the inlet can be pulled to the side for maintenance. If more than 12’ long, weight may have to be added to inlet to counter the increased buoyancy.

4. Orifice/Inlet tapers down from 6” maximum inlet to a 5” flex hose. The orifice/inlet can be reduced using the plate and cutter provided to control the outflow rate – see # 6.

5. Horizontal intake is 10” pipe between the straps with slots cut in the inlet and aluminum screen door (smaller than shown in illustration) for access to the 6” inlet and orifice inside.

6. **Capacity**: 51,840 cubic feet per day maximum with 6” inlet and 5” head. Inlet can be reduced by installing a smaller orifice using the plate and cutter provided to adjust flow rate for the particular drawdown time required. Please use the sizing template at www.fairclothskimmer.com .

7. Ships assembled. User glues inlet extension and barrel, installs vent, cuts orifice in plate and attaches to outlet pipe or structure. Includes float, flexible hose, rope, and orifice plate and cutter. User supplies 6” Sch 40 PVC barrel.

Temporary Sediment Basin #2

Routed Dishcarge Calculations

Maximum Drainage Area to Temporary Sediment Basin #2

Temporary Sediment Basin #2

Subcat Reach Pond Link

Routing Diagram for 22-0123-005 - E&S
Prepared by Landworks Civil Design LLC, Printed 1/3/2023
HydroCAD® 10.20-2g s/n 12370 © 2022 HydroCAD Software Solutions LLC

Summary for Subcatchment 2D: Maximum Drainage Area to Temporary Sediment Basin #2

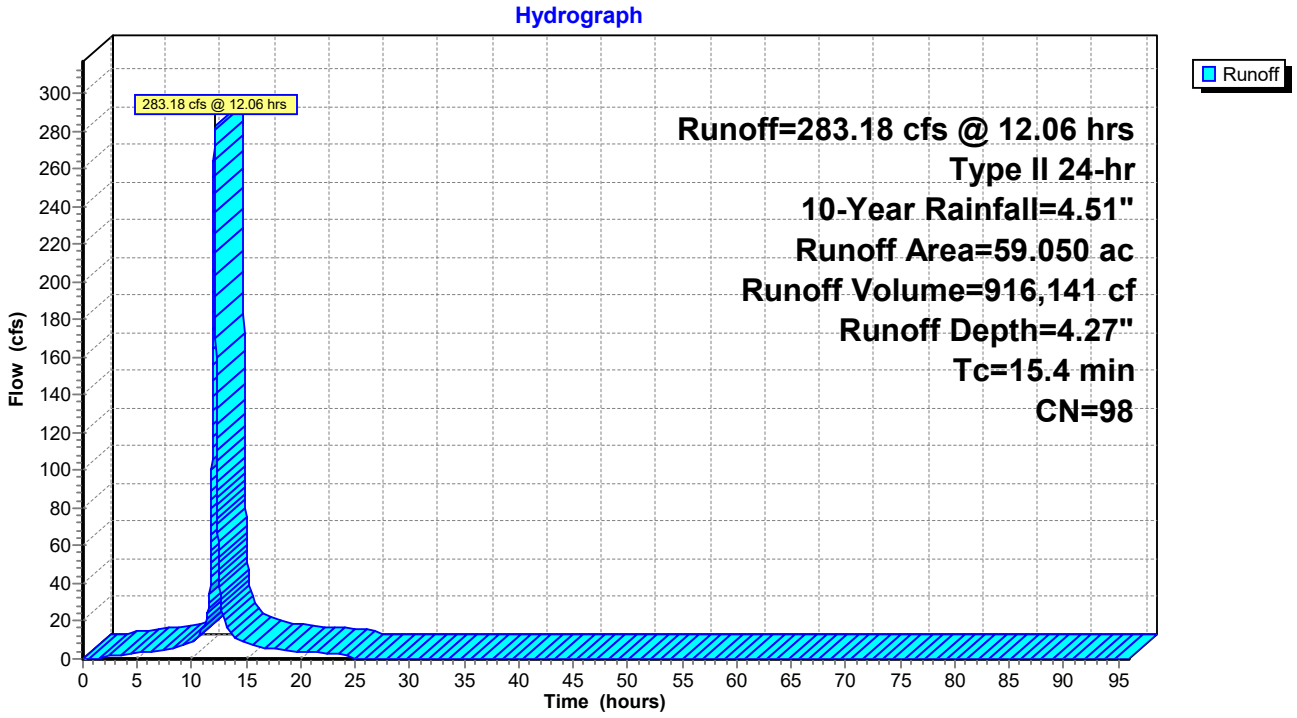
Runoff = 283.18 cfs @ 12.06 hrs, Volume= 916,141 cf, Depth= 4.27"
Routed to Pond 2P : Temporary Sediment Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=4.51"

	Area (ac)	CN	Description
*	59.050	98	Bare Construction Site
	59.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4					**Direct Entry, Storm Sewer Tc**

Subcatchment 2D: Maximum Drainage Area to Temporary Sediment Basin #2



Summary for Pond 2P: Temporary Sediment Basin #2

Inflow Area = 2,572,218 sf,100.00% Impervious, Inflow Depth = 4.27" for 10-Year event
Inflow = 283.18 cfs @ 12.06 hrs, Volume= 916,141 cf
Outflow = 16.74 cfs @ 13.23 hrs, Volume= 520,566 cf, Atten= 94%, Lag= 69.7 min
Primary = 16.74 cfs @ 13.23 hrs, Volume= 520,566 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 436.57' @ 13.23 hrs Surf.Area= 183,541 sf Storage= 640,115 cf

Plug-Flow detention time= 1,146.6 min calculated for 520,511 cf (57% of inflow)
Center-of-Mass det. time= 1,030.4 min (1,784.9 - 754.4)

Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	1,323,747 cf	**Basin Storage (Irregular)** Listed below (Recalc)

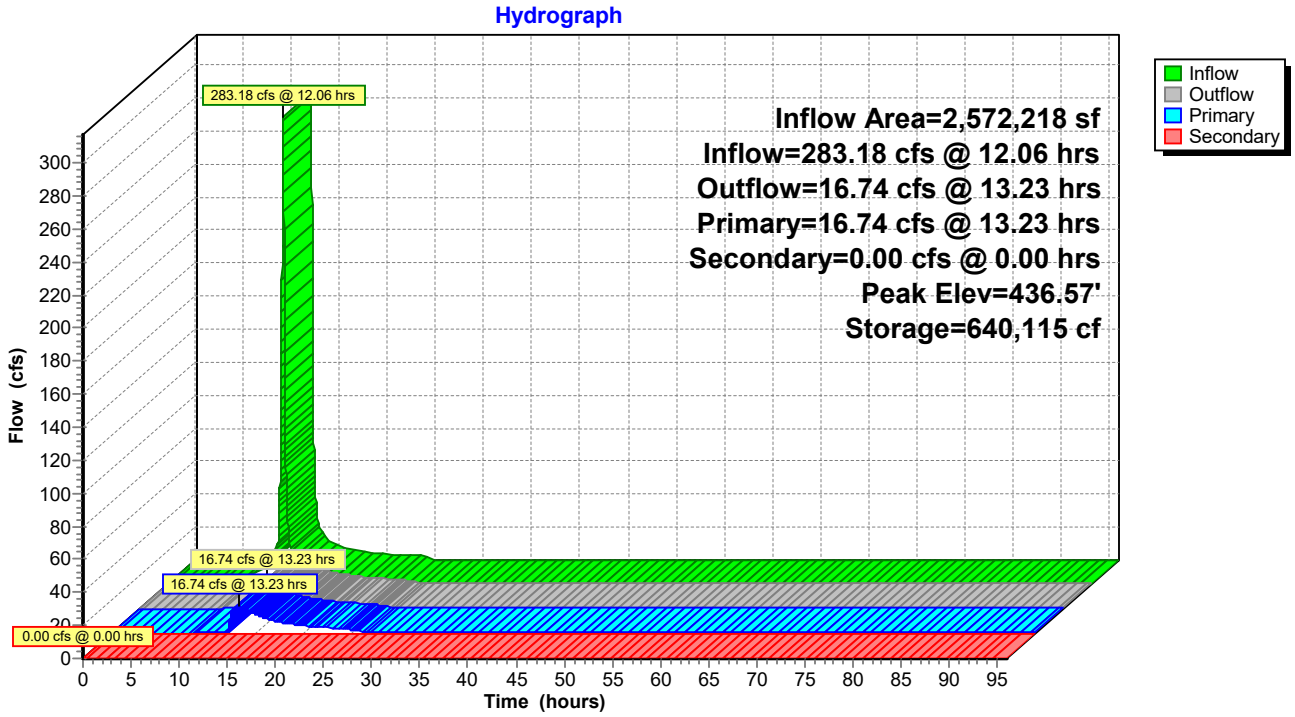
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
432.00	76,712	1,767.8	0	0	76,712
433.00	82,044	1,786.7	79,363	79,363	82,346
434.00	160,416	2,979.1	119,061	198,424	534,570
435.00	169,382	2,998.0	164,879	363,302	544,043
436.00	178,404	3,016.8	173,873	537,176	553,531
437.00	187,483	3,035.7	182,925	720,101	563,124
438.00	196,618	3,054.5	192,032	912,133	572,731
439.00	205,810	3,073.4	201,197	1,113,330	582,443
440.00	215,058	3,092.2	210,417	1,323,747	592,169

Device	Routing	Invert	Outlet Devices
#1	Primary	429.78'	**24.0" Round Outlet Pipe** L= 55.6' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 429.78' / 429.22' S= 0.0101 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	433.00'	**0.600 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	436.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Secondary	437.60'	**70.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=16.73 cfs @ 13.23 hrs HW=436.57' (Free Discharge)
└**1=Outlet Pipe** (Passes 16.73 cfs of 43.58 cfs potential flow)
  ├**2=Skimmer** (Constant Controls 0.60 cfs)
  └**3=Type M Inlet (No Grate)** (Weir Controls 16.13 cfs @ 2.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=432.00' (Free Discharge)
└**4=Emergency Spillway** (Controls 0.00 cfs)

Pond 2P: Temporary Sediment Basin #2



Summary for Subcatchment 2D: Maximum Drainage Area to Temporary Sediment Basin #2

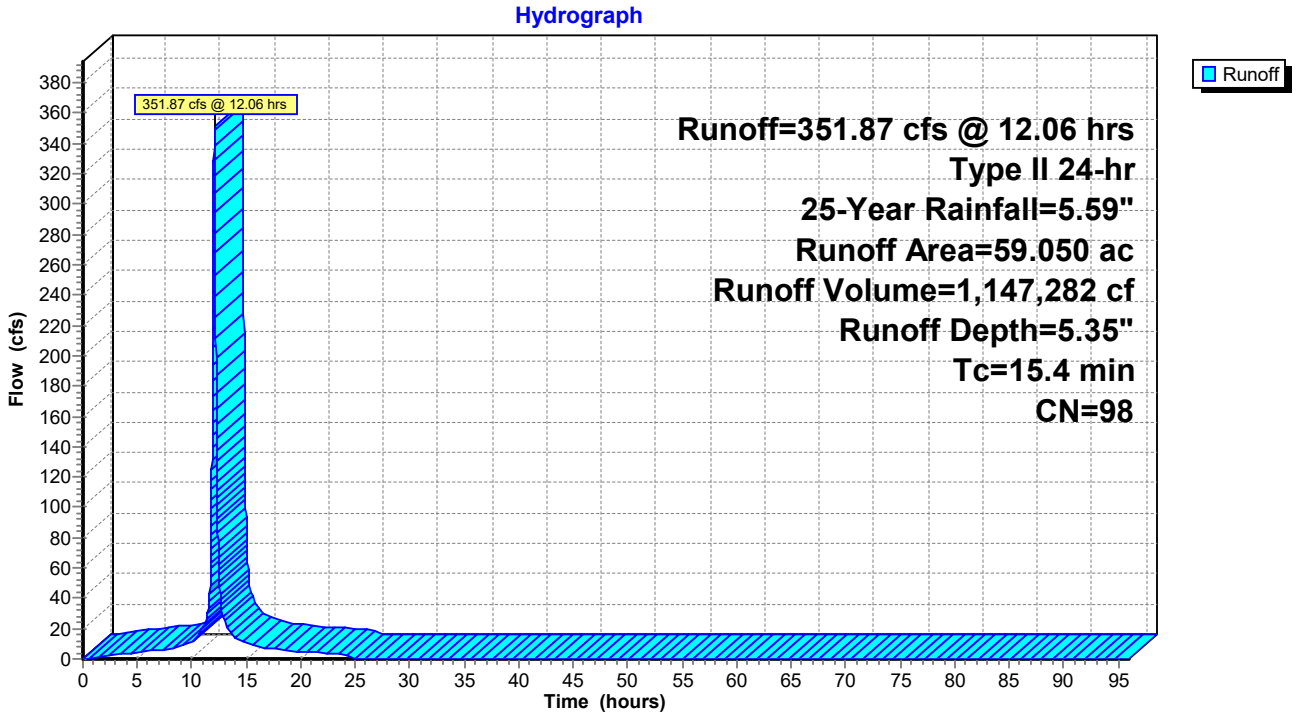
Runoff = 351.87 cfs @ 12.06 hrs, Volume= 1,147,282 cf, Depth= 5.35"
Routed to Pond 2P : Temporary Sediment Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=5.59"

	Area (ac)	CN	Description
*	59.050	98	Bare Construction Site
	59.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4					**Direct Entry, Storm Sewer Tc**

Subcatchment 2D: Maximum Drainage Area to Temporary Sediment Basin #2



Summary for Pond 2P: Temporary Sediment Basin #2

Inflow Area = 2,572,218 sf,100.00% Impervious, Inflow Depth = 5.35" for 25-Year event
Inflow = 351.87 cfs @ 12.06 hrs, Volume= 1,147,282 cf
Outflow = 38.95 cfs @ 12.64 hrs, Volume= 750,815 cf, Atten= 89%, Lag= 34.4 min
Primary = 38.95 cfs @ 12.64 hrs, Volume= 750,815 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 437.13' @ 12.64 hrs Surf.Area= 188,637 sf Storage= 744,099 cf

Plug-Flow detention time= 859.7 min calculated for 750,815 cf (65% of inflow)
Center-of-Mass det. time= 754.9 min (1,505.7 - 750.8)

Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	1,323,747 cf	**Basin Storage (Irregular)** Listed below (Recalc)

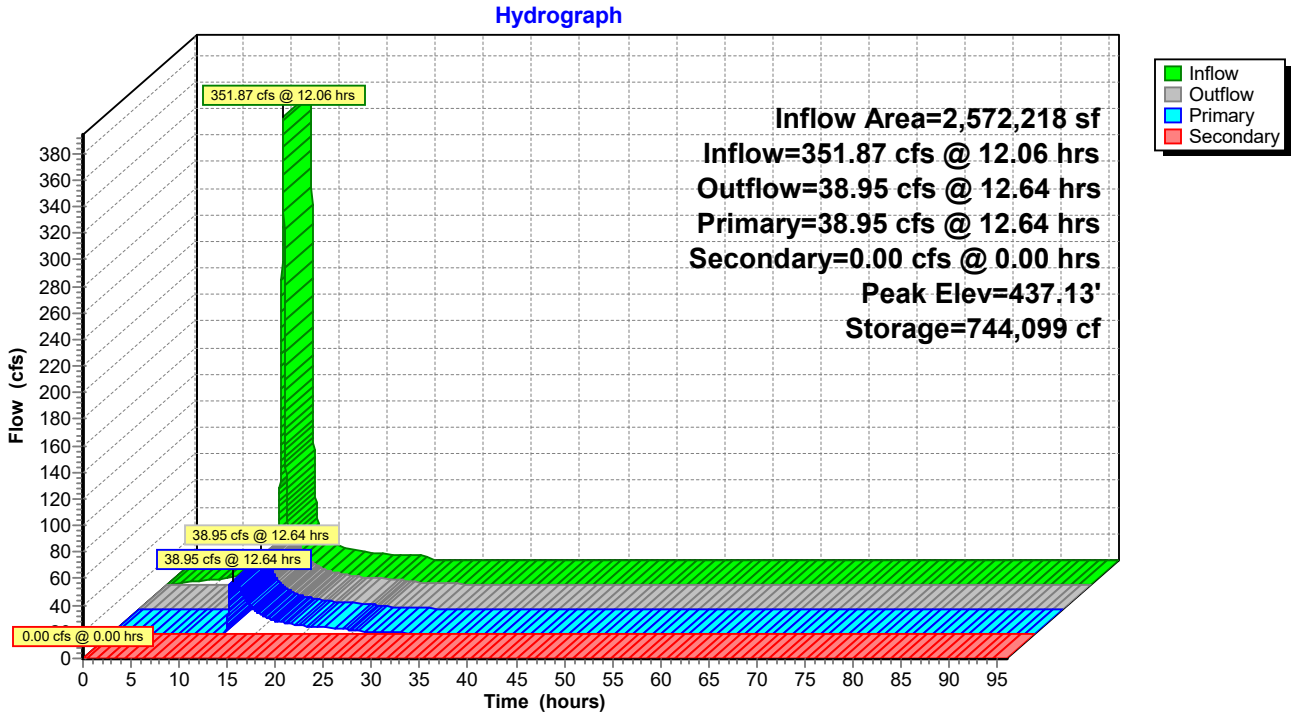
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
432.00	76,712	1,767.8	0	0	76,712
433.00	82,044	1,786.7	79,363	79,363	82,346
434.00	160,416	2,979.1	119,061	198,424	534,570
435.00	169,382	2,998.0	164,879	363,302	544,043
436.00	178,404	3,016.8	173,873	537,176	553,531
437.00	187,483	3,035.7	182,925	720,101	563,124
438.00	196,618	3,054.5	192,032	912,133	572,731
439.00	205,810	3,073.4	201,197	1,113,330	582,443
440.00	215,058	3,092.2	210,417	1,323,747	592,169

Device	Routing	Invert	Outlet Devices
#1	Primary	429.78'	**24.0" Round Outlet Pipe** L= 55.6' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 429.78' / 429.22' S= 0.0101 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	433.00'	**0.600 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	436.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Secondary	437.60'	**70.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=38.95 cfs @ 12.64 hrs HW=437.13' (Free Discharge)
└**1=Outlet Pipe** (Passes 38.95 cfs of 45.80 cfs potential flow)
  └**2=Skimmer** (Constant Controls 0.60 cfs)
  └**3=Type M Inlet (No Grate)** (Orifice Controls 38.35 cfs @ 5.11 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=432.00' (Free Discharge)
└**4=Emergency Spillway** (Controls 0.00 cfs)

Pond 2P: Temporary Sediment Basin #2



Summary for Subcatchment 2D: Maximum Drainage Area to Temporary Sediment Basin #2

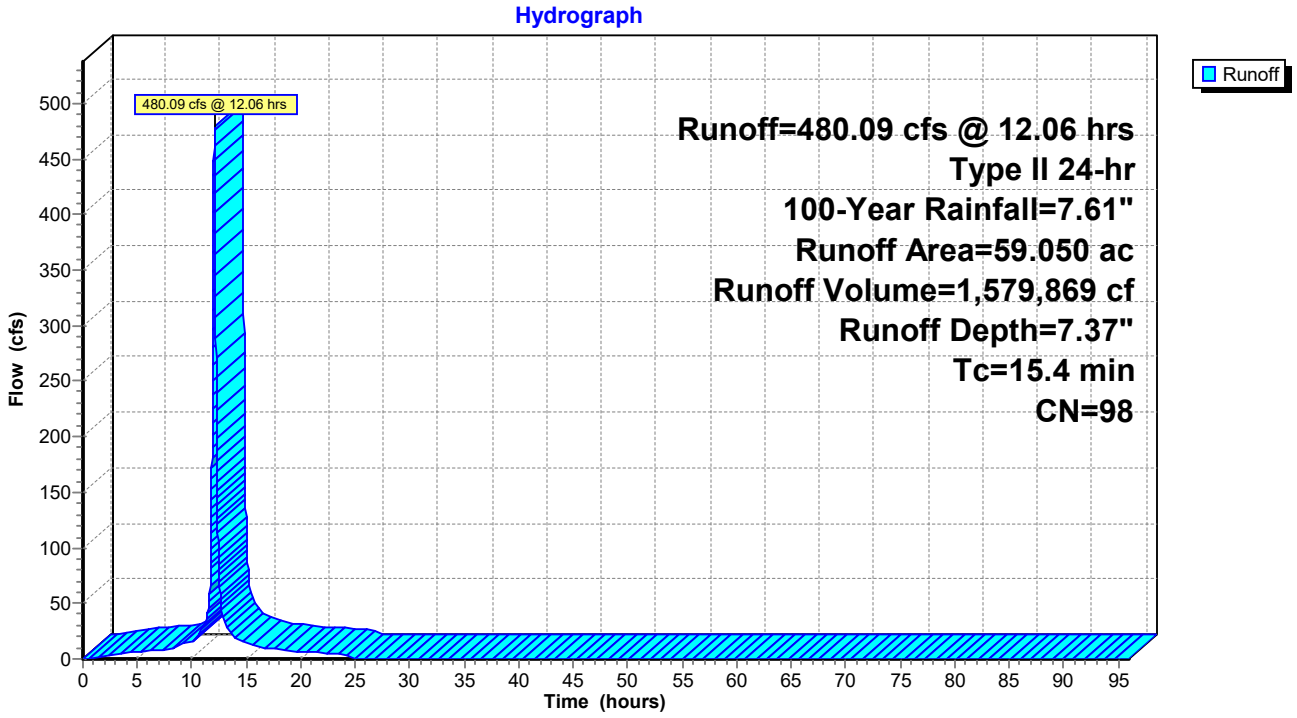
Runoff = 480.09 cfs @ 12.06 hrs, Volume= 1,579,869 cf, Depth= 7.37"
Routed to Pond 2P : Temporary Sediment Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.61"

	Area (ac)	CN	Description
*	59.050	98	Bare Construction Site
	59.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4					**Direct Entry, Storm Sewer Tc**

Subcatchment 2D: Maximum Drainage Area to Temporary Sediment Basin #2



Summary for Pond 2P: Temporary Sediment Basin #2

Inflow Area = 2,572,218 sf,100.00% Impervious, Inflow Depth = 7.37" for 100-Year event
Inflow = 480.09 cfs @ 12.06 hrs, Volume= 1,579,869 cf
Outflow = 125.30 cfs @ 12.35 hrs, Volume= 1,182,226 cf, Atten= 74%, Lag= 17.3 min
Primary = 49.55 cfs @ 12.35 hrs, Volume= 1,041,341 cf
Secondary = 75.75 cfs @ 12.35 hrs, Volume= 140,884 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 438.14' @ 12.35 hrs Surf.Area= 197,859 sf Storage= 939,029 cf

Plug-Flow detention time= 619.5 min calculated for 1,182,226 cf (75% of inflow)
Center-of-Mass det. time= 527.9 min (1,274.3 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	1,323,747 cf	**Basin Storage (Irregular)** Listed below (Recalc)

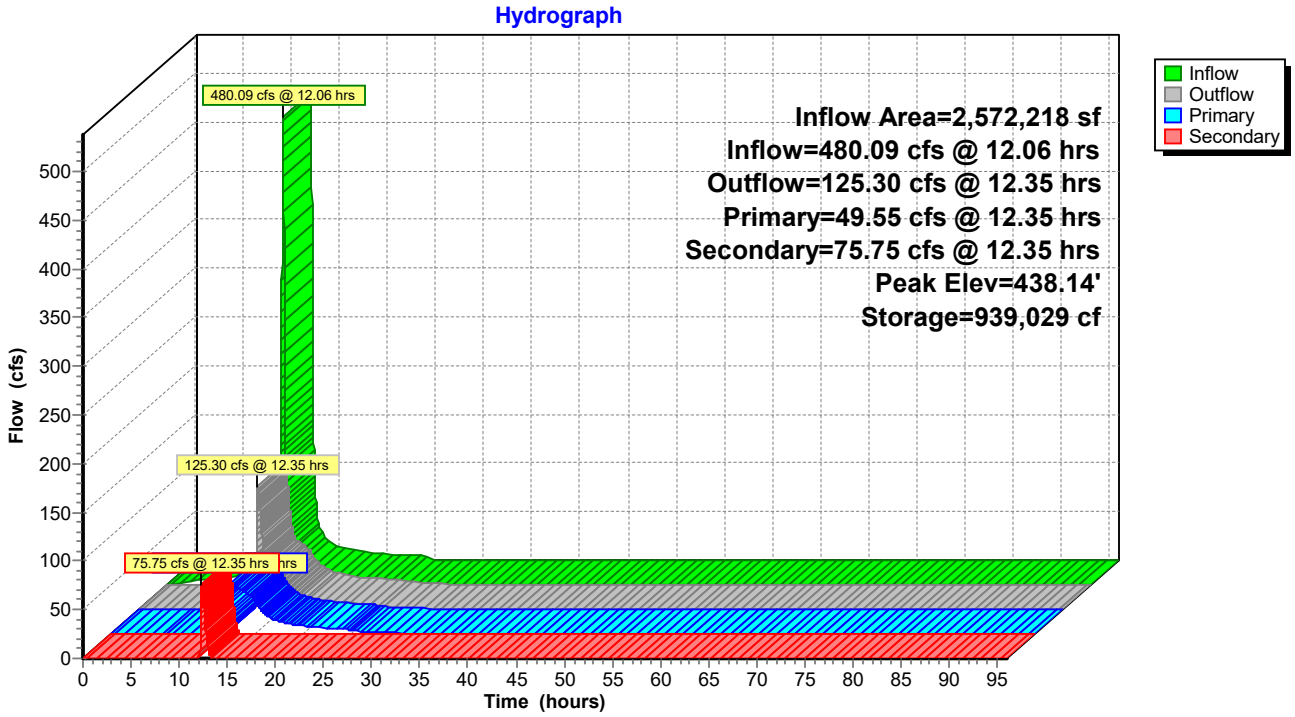
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
432.00	76,712	1,767.8	0	0	76,712
433.00	82,044	1,786.7	79,363	79,363	82,346
434.00	160,416	2,979.1	119,061	198,424	534,570
435.00	169,382	2,998.0	164,879	363,302	544,043
436.00	178,404	3,016.8	173,873	537,176	553,531
437.00	187,483	3,035.7	182,925	720,101	563,124
438.00	196,618	3,054.5	192,032	912,133	572,731
439.00	205,810	3,073.4	201,197	1,113,330	582,443
440.00	215,058	3,092.2	210,417	1,323,747	592,169

Device	Routing	Invert	Outlet Devices
#1	Primary	429.78'	**24.0" Round Outlet Pipe** L= 55.6' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 429.78' / 429.22' S= 0.0101 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	433.00'	**0.600 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	436.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Secondary	437.60'	**70.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=49.55 cfs @ 12.35 hrs HW=438.14' (Free Discharge)
└**1=Outlet Pipe** (Barrel Controls 49.55 cfs @ 15.77 fps)
└**2=Skimmer** (Passes < 0.60 cfs potential flow)
└**3=Type M Inlet (No Grate)** (Passes < 52.78 cfs potential flow)

Secondary OutFlow Max=75.59 cfs @ 12.35 hrs HW=438.14' (Free Discharge)
└**4=Emergency Spillway** (Weir Controls 75.59 cfs @ 1.97 fps)

Pond 2P: Temporary Sediment Basin #2



TEMPORARY SEDIMENT BASIN #3 DESIGN

STANDARD E&S WORKSHEET # 12
Sediment Basin Capacity Requirements

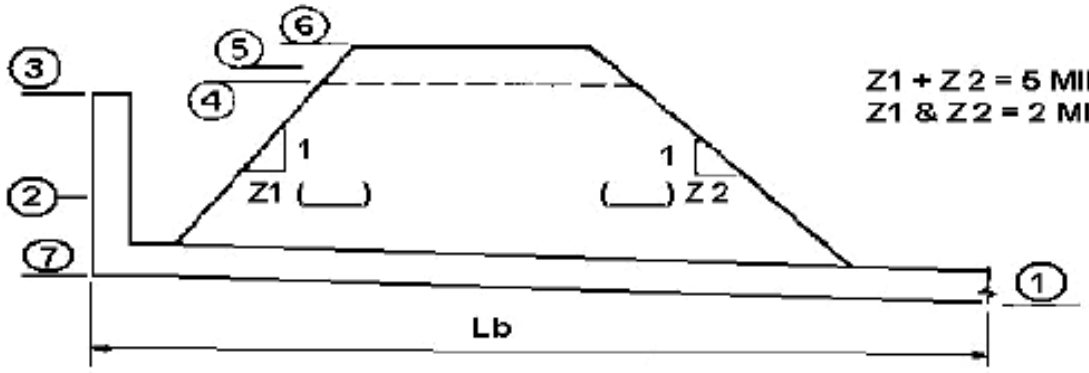
PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

BASIN NUMBER		Temp #3
PERMANENT OR TEMPORARY BASIN?	(P or T)	P
SPECIAL PROTECTION WATERSHED?	(YES OR NO)	No
Karst Soils?	(YES OR NO)	No
(A) MAXIMUM TOTAL DRAINAGE AREA	(AC)	9.05
IS DRAINAGE AREA (A) MORE THAN 10% LARGER THAN THE PRECONSTRUCTION CONDITION?	(YES OR NO)	Yes
(A_1) DISTURBED ACRES IN DRAINAGE AREA (AC)		12.45
(I) INITIAL REQ'D DEWATERING ZONE (5,000 X A)	(CF)	45,250
(T) REDUCTION FOR TOP DEWATERING (-700 X A)	(CF)	0
(P) REDUCTION FOR PERMANENT POOL (-700 X A)	(CF)	0
(L) REDUCTION FOR 4:1 FLOW LENGTH:WIDTH (-350 X A)	(CF)	0
(D) REDUCTION FOR 4 TO 7 DAY DEWATERING (-350 X A)	(CF)	0
(Sv) REQUIRED DEWATERING ZONE [I - (T+P+L)][1]	(CF)	45,250
(Sd) REQUIRED SEDIMENT STORAGE VOLUME (1000 X A_1)	(CF)	12,450
(St) TOTAL REQUIRED STORAGE VOLUME (Sv + Sd)	(CF)	57,700
TOTAL STORAGE VOLUME PROVIDED (@ ELEV 3)[2]	(CF)	102,733
DEWATERING TIME FOR DEWATERING ZONE	(DAYS)	4.6
REQUIRED DISCHARGE CAPACITY (2 X A)	(CFS)[3]	18.10
PRINCIPAL SPILLWAY TYPE (PERFORATED RISER, SKIMMER, etc.)		SKIMMER
PEAK FLOW FROM 10 YR/24R HR STORM FOR DRAINAGE AREA (A)	(CFS)[4]	63.97
PRINCIPAL SPILLWAY CAPACITY (@ ELEV 5)	(CFS)[4]	34.85
EMERGENCY SPILLWAY CAPACITY (@ ELEV 5)	(CFS)	0.07
TOTAL BASIN DISCHARGE CAPACITY (@ ELEV 5)		34.92
EMERGENCY SPILLWAY PROTECTIVE LINER[5]		SC250
OUTLET TO A SURFACE WATER?	(YES OR NO)[6]	No
PEAK FLOW FROM A 100 YR/24 HR STORM FOR DRG AREA (A)		113.38

1 The minimum dewatering zone capacity for sediment basins is (3,600 X A). No reduction is permitted in Special Protection (HQ and EV) Watersheds
2 Total Storage Volume provided at riser crest.
3 Or Provide calculations to show peak flow from 25 yr./24 hour storm for area (A) is routed through the basin
4 Provide supporting calculations.
5 If grass lining is proposed, spillway should be constructed in original ground unless a suitable TRM lining is use. Wherever a TRM is used, riprap should be placed at the bottom of the embankment to prevent scour.
6 If no, and basin is permanent or drainage area is more than 10% larger than pre-construction, provide supporting calculations to show accelerated erosion will not result from the proposed discharge. For discharges increasing volume or rate of flow onto a neighboring property prior to entering a surface water, an easement should be obtained prior to plan submittal.

STANDARD E&S WORKSHEET # 13
Sediment Basin Dimensions and Elevations

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03



BASIN NUMBER		Temp #3	
1. DISCHARGE PIPE ELEVATION	(FT)	441.55	
2. ELEVATION AT TOP OF SEDIMENT STORAGE ZONE (@Sd) (MIN. 1.0' ABOVE ELEVATION 7)	(FT)	443.00	
3. ELEVATION AT TOP OF DEWATERING ZONE (St) (CREST OF PRINCIPAL SPILLWAY)	(FT)	446.00	
4. EMERGENCY SPILLWAY CREST ELEVATION (MIN. 0.5' ABOVE ELEVATION 3)	(FT)	448.00	
5. 2 CFS/ACRE OR 100-YR/24 HOUR FLOW ELEVATION	(FT)	447.84	(100-Yr)
6. TOP OF EMBANKMENT ELEVATION (MIN 24" ABOVE ELEVATION 5 OR 12" WITH ROUTED 100-YR/24-HR STORM)	(FT)	450.00	
7. BASIN BOTTOM ELEVATION	(FT)	442.00	
AVERAGE BOTTOM WIDTH	(FT)	130	
AVERAGE BOTTOM LENGTH	(FT)	136	
(SA_{min}) REQUIRED SURFACE AREA AT ELEVATION 2	(SQ. FT)	11,300	
SURFACE AREA PROVIDED AT ELEVATION 2	(SQ. FT)	23,802	
AVERAGE BASIN WIDTH (W) AT ELEVATION 3	(FT)	77	
FLOW LENGTH (L) AT ELEVATION 3	(FT)	384	
FLOW LENGTH:WIDTH RATIO AT ELEVATION 3	(FT)	5:1	
SILT CURTAIN OR FOREBAY? (IF YES, INDICATE WHICH)		Forebay	
EMBANKMENT TOP WIDTH	(FT, 8' MIN.)	10	
EMBANKMENT SOIL TYPE(S)		CL, ML	
KEY TRENCH DEPTH	(FT, 2' MIN.)	2.0	
KEY TRENCH WIDTH	(FT. 4' MIN)	4.0	
RISER DIAMETER/TYPE	(15" MIN)	N/A	
BARREL DIAMETER/TYPE	(12" MIN)	24	
Lb (BARREL LENGTH)	(FT)	51.90	
EMERGENCY SPILLWAY WIDTH	(FT)	25	
EMERGENCY SPILLWAY SIDE SLOPES	(H:V)	3:1	
EMERGENCY SPILLWAY DEPTH	(FT)	2.00	

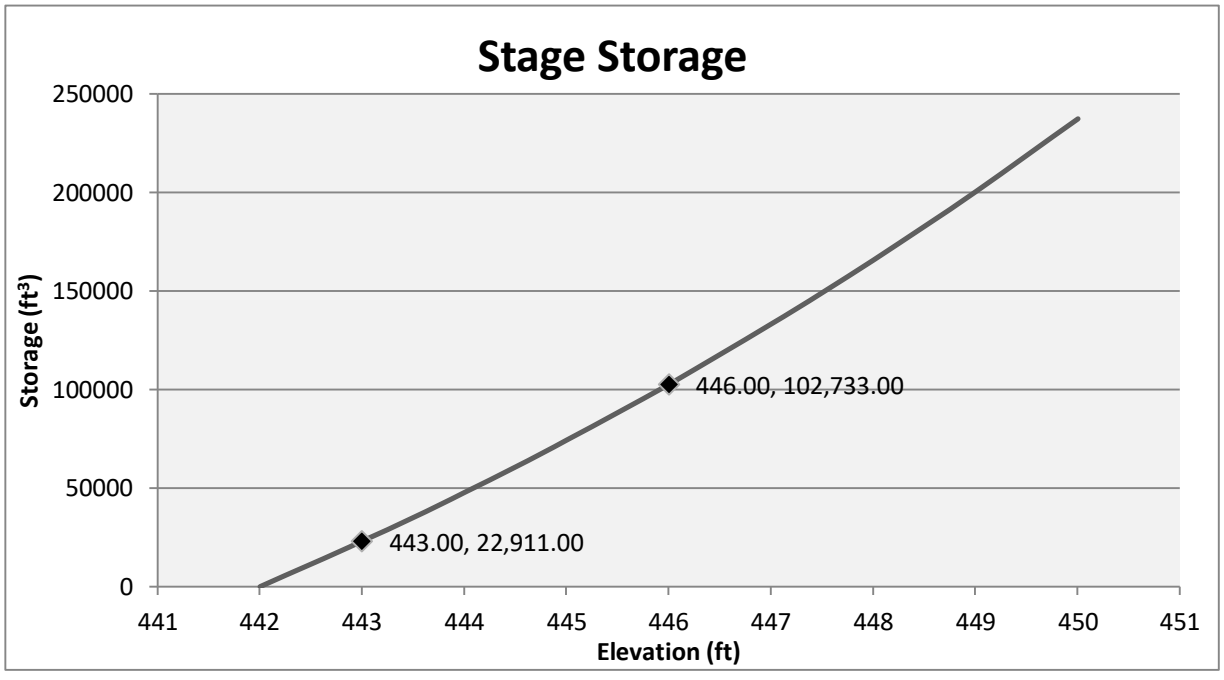
For irregular shaped traps, provide stage storage data

STANDARD E&S WORKSHEET # 14
Sediment Basin/Sediment Trap Storage Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

WATER SURFACE ELEVATION (FEET)	AREA (SQ. FT)	AVERAGE AREA (SQ. FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
442.00	22,020				0
443.00	23,802	22,911	1.00	22,911	22,911
444.00	25,641	24,722	1.00	24,722	47,633
445.00	27,536	26,589	1.00	26,589	74,221
446.00	29,488	28,512	1.00	28,512	102,733
447.00	31,496	30,492	1.00	30,492	133,225
448.00	33,561	32,529	1.00	32,529	165,754
449.00	35,682	34,622	1.00	34,622	200,375
450.00	38,588	37,135	1.00	37,135	237,510

ELEV. 2:	W.S.E.	443.00	ELEV. 3:	W.S.E.	446.00
	SURF. AREA:	23,802		SURF. AREA:	29,488
TOTAL STORAGE (CF):		22,911	TOTAL STORAGE (CF):		102,733



Determining the Skimmer Size and the Required Orifice for the *Faircloth Skimmer®* Surface Drain

November 2007

Important note: *The orifice sizing chart in the Pennsylvania Erosion Control Manual and reproduced in the North Carolina Design Manual* ***DOES NOT APPLY*** *to our skimmers. It will give the wrong size orifice and not specify which size skimmer is required. Please use the information below to choose the size skimmer required for the basin volume provided and determine the orifice size required for the drawdown time, typically 4-7 days in Pennsylvania and 3 days in North Carolina.*

The **size** of a Faircloth Skimmer®, for example a 4" skimmer, refers to the maximum diameter of the skimmer inlet. The inlet on each of the 8 sizes offered can be reduced to adjust the flow rate by cutting a hole or ***orifice*** in a plug using an adjustable cutter (both supplied).

Determining the skimmer size needed and the orifice for that skimmer required to drain the sediment basin's volume in the required time involves two steps: **First**, determining the size skimmer required based on the volume to be drained and the number of days to drain it; and **Second,** calculate the orifice size to adjust the flow rate and "customize" the skimmer for the basin's volume. *The second step is not always necessary* if the flow rate for the skimmer with the inlet wide open equals or is close to the flow rate required for the basin volume and the drawdown time.

Both the skimmer size and the required orifice radius for the skimmer should be shown for each basin on the erosion and sediment control plan. Make it clear that the dimension is either the radius or the diameter. It is also helpful to give the basin volume in case there are questions. During the skimmer installation the required orifice can be cut in the plastic plug using the supplied adjustable cutter and installed in the skimmer using the instructions provided.

The plan review and enforcement authority may require the calculations showing that the skimmer used can drain the basin in the required time.

Determining the Skimmer Size

Step 1. Below are approximate **skimmer maximum flow capacities** based on typical draw down requirements, which can vary between States and jurisdictions and watersheds. If one 6" skimmer does not provide enough capacity, multiple skimmers can be used to drain the basin. For drawdown times not shown, multiply the 24-hour figure by the number of days required.

Example: A basin's volume is 29,600 cubic feet and it must be drained in 3 days. A 3" skimmer with the inlet wide open will work perfectly. (Actually, the chart below gives 29,322 cubic feet but this is well within the accuracy of the calculations and the basin's constructed volume.)
Example: A basin's volume is 39,000 cubic feet and it must be drained in 3 days. The 3" skimmer is too small; a 4" skimmer has enough capacity but it is too large, so the inlet will need

Step 1:

Dewatering Volume Required:	45,250	CF
Number of Skimmers Required:	1	
Skimmer Size Required:	3"	

to be reduced using step 2 to adjust the flow rate for the basin's volume. (It needs a 3.2" diameter orifice.)

1½" skimmer:	1,728 cubic feet in **24 hours**	6,912 cubic feet in **4 days**
with a 1½" head	3,456 cubic feet in **2 days**	12,096 cubic feet in **7 days**
	5,184 cubic feet in **3 days**	
2" skimmer:	3,283 cubic feet in **24 hours**	13,132 cubic feet in **4 days**
with a 2" head	6,566 cubic feet in **2 days**	22,982 cubic feet in **7 days**
	9,849 cubic feet in **3 days**	
2½" skimmer:	6,234 cubic feet in **24 hours**	24,936 cubic feet in **4 days**
with a 2.5" head	12,468 cubic feet in **2 days**	43,638 cubic feet in **7 days**
Revised 11-6-07	18,702 cubic feet in **3 days**	
3" skimmer:	9,774 cubic feet in **24 hours**	39,096 cubic feet in **4 days**
with a 3" head	19,547 cubic feet in **2 days**	68,415 cubic feet in **7 days**
	29,322 cubic feet in **3 days**	
4" skimmer:	20,109 cubic feet in **24 hours**	80,436 cubic feet in **4 days**
with a 4" head	40,218 cubic feet in **2 days**	140,763 cubic feet in **7 days**
Revised 11-6-07	60,327 cubic feet in **3 days**	
5" skimmer:	32,832 cubic feet in **24 hours**	131,328 cubic feet in **4 days**
with a 4" head	65,664 cubic feet in **2 days**	229,824 cubic feet in **7 days**
	98,496 cubic feet in **3 days**	
6" skimmer:	51,840 cubic feet in **24 hours**	207,360 cubic feet in **4 days**
with a 5" head	103,680 cubic feet in **2 days**	362,880 cubic feet in **7 days**
	155,520 cubic feet in **3 days**	
8" skimmer:	97,978 cubic feet in **24 hours**	391,912 cubic feet in **4 days**
with a 6" head	195,956 cubic feet in **2 days**	685,846 cubic feet in **7 days**
CUSTOM	293,934 cubic feet in **3 days**	
MADE BY ORDER	**CALL!**	

Determining the Orifice

Step 2. To determine the orifice required to reduce the flow rate for the basin's volume and the number of days to drain the basin, simply use the formula volume ÷ **factor** (from the chart below) for the same size skimmer chosen in the first step and the same number of days. This calculation will give the **area** of the required orifice. Then calculate the orifice radius using Area = πr^2 and solving for r, $r = \sqrt{(Area / 3.14)}$ .The supplied cutter can be adjusted to this radius to cut the orifice in the plug. The instructions with the plug and cutter has a ruler divided into tenths of inches. Again, this step is not always necessary as explained above.

An alternative method is to use the orifice equation with the head for a particular skimmer shown on the previous page and determine the orifice needed to give the required flow for the volume and draw down time. C = 0.59 is used in this chart.

Example: A 4" skimmer is the smallest skimmer that will drain 39,000 cubic feet in 3 days but a 4" inlet will drain the basin too fast (in 1.9 days) To determine the orifice required use the factor of 4,803 from the chart below for a 4" skimmer and a drawdown time of 3 days. 39,000 cubic

Step 2: No Custom Orifice Required

feet ÷ 4,803 = 8.12 square inches of orifice required. Calculate the orifice radius using Area = $\pi \cdot r^2$ and solving for r, $r = \sqrt{(8.12/3.14)}$ and r = 1.61". As a practical matter 1.6" is about as close as the cutter can be adjusted and the orifice cut..

Factors (in cubic feet of flow per square inch of opening through a **round** orifice with the head for that skimmer and for the drawdown times shown) for determining the **orifice radius** for a basin's volume to be drained. This quick method works because the orifice is centered and has a constant head (given above in Step 1).

1½" skimmer:	960 to drain in **24 hours**	3,840 to drain in **4 days**
	1,920 to drain in **2 days**	6,720 to drain in **7 days**
	2,880 to drain in **3 days**	
2" skimmer:	1,123 to drain in **24 hours**	4,492 to drain in **4 days**
	2,246 to drain in **2 days**	7,861 to drain in **7 days**
	3,369 to drain in **3 days**	
2½" skimmer: Revised 11-6-07	1,270 to drain in **24 hours**	5,080 to drain in **4 days**
	2,540 to drain in **2 days**	8,890 to drain in **7 days**
	3,810 to drain in **3 days**	
3" skimmer:	1,382 to drain in **24 hours**	5,528 to drain in **4 days**
	2,765 to drain in **2 days**	9,677 to drain in **7 days**
	4,146 to drain in **3 days**	
4" skimmer: Revised 11-6-07	1,601 to drain in **24 hours**	6,404 to drain in **4 days**
	3,202 to drain in **2 days**	11,207 to drain in **7 days**
	4,803 to drain in **3 days**	
5" skimmer:	1,642 to drain in **24 hours**	6,568 to drain in **4 days**
	3,283 to drain in **2 days**	11,491 to drain in **7 days**
	4,926 to drain in **3 days**	
6" skimmer:	1,814 to drain in **24 hours**	7,256 to drain in **4 days**
	3,628 to drain in **2 days**	12,701 to drain in **7 days**
	5,442 to drain in **3 days**	
8" skimmer:	1,987 to drain in **24 hours**	7,948 to drain in **4 days**
	3,974 to drain in **2 days**	13,909 to drain in **7 days**
	5,961 to drain in **3 days**	

J. W. Faircloth & Son, Inc.
Post Office Box 757
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Hillsborough, North Carolina 27278
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FairclothSkimmer.com jwfaircloth@embarqmail.com

Orifice sizing Revised 2-2-01; 3-3-05; 2-1-07; 11-6-07

Dewatering Time:	Discharge Rate per Skimmer=	0.113 CFS
	x 1 Skimmer=	0.113 CFS
	Total Dewatering Time=	4.6 Days

STANDARD E&S WORKSHEET # 17
Sediment Basin Discharge Capacity

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

PRINCIPAL SPILLWAY DISCHARGE CAPACITY

BASIN NO:

WATER SURFACE ELEVATION[4] (FT)	Flow into Top of TEMPORARY RISER			Flow into Top of PERMANENT RISER			BARREL PIPE FLOW		PRINCIPAL SPILLWAY CAPACITY[3] (CFS)
	HEAD (FT)	ORIFICE FLOW[1] Q (CFS)	WEIR FLOW Q (CFS)	HEAD (FT)	ORIFICE FLOW[1] Q (CFS)	WEIR FLOW Q (CFS)	HEAD[2] (FT)	Q (CFS)	
448.01	-	-	-	2.01	54.61	88.34	5.46	34.85	34.85

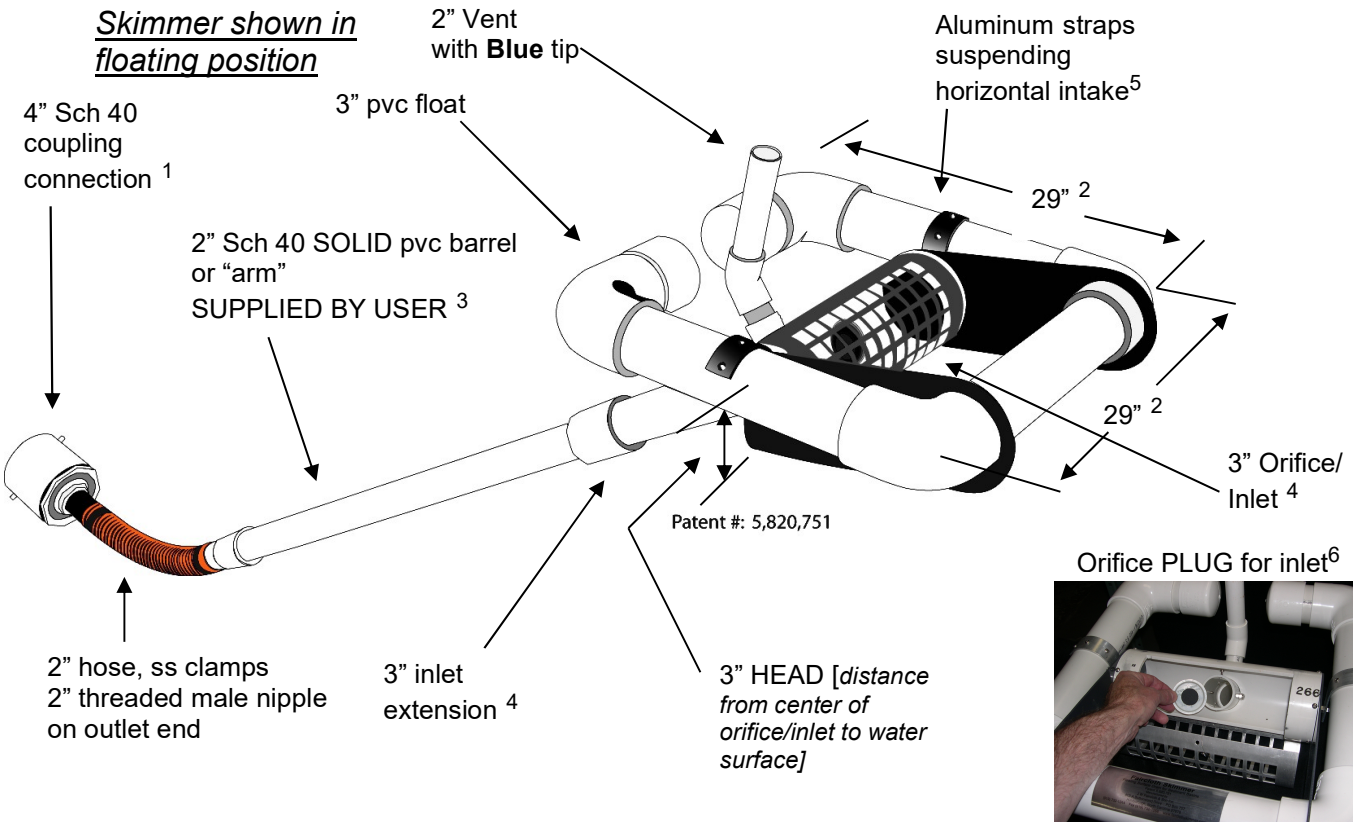
EMERGENCY SPILLWAY DISCHARGE CAPACITY

WATER SURFACE ELEVATION[4] (FT)	EMERGENCY SPILLWAY BOTTOM WIDTH[5] (FT)	TABLE OR C VALUE USED[6]	EMERGENCY SPILLWAY CAPACITY (CFS)	REQUIRED DISCHARGE CAPACITY (CFS)	TOTAL DISCHARGE CAPACITY PROVIDED[7]
448.01	25.00	2.80	0.07	18.10	34.92

1. Flow into top of riser only (Flow through perforations not included)
2. Water surface elevation minus elevation at centerline of pipe outlet
3. Least of orifice, weir, or pipe flow (Peak flow from 10yr/24 hr storm Min.)
4. 24" below top of embankment (12" if 100-year storm routed through basin)
5. 8 Ft. minimum
6. Use Tables 7.5 through 7.8 or equation for broad crested weir [$Q=CLH^{1.5}$ where C <= 2.8 (MAX)]; for Riprap larger than R-3 or flows less than 1.5' deep, adjust C downward]
7. Principal Spillway Capacity + Emergency Spillway Capacity

3” *Faircloth Skimmer®* Cut Sheet

J. W. Faircloth & Son, Inc.
www.FairclothSkimmer.com



1. Coupling can be removed and hose attached to outlet using the threaded 2” nipple. Typical methods: a) a metal structure with a steel stub out welded on the side at the bottom with a 2” threaded coupling or reducer(s); b) a concrete structure with a hole or orifice at the bottom - use a steel plate with a hole cut in it and coupling welded to it that will fit over the hole in the concrete and bolted to the structure with sealant; or c) grout a 4” pvc pipe in a hole in the concrete to connect the skimmer. It can be attached to a straight 4” sch 40 pipe through the dam but the pipe needs to be anchored to the bottom at the connection so it is secure.

2. Dimensions are approximate, not intended as plans for construction.

3. Barrel (solid, not foam core pipe) should be 1.4 times the depth of water with a minimum length of 8’ so the inlet can be pulled to the side for maintenance. If more than 10’ long weight may have to be added to inlet to counter the increased buoyancy.

4. Orifice/inlet tapers down from a 3” maximum inlet to a 2” barrel and hose. Barrel is smaller to reduce buoyancy and tendency to lift inlet but is sufficient for flow through inlet because of slope. The orifice/inlet can be reduced using the plug and cutter provided to control the outflow rate – see #6.

5. Horizontal intake is 6” pipe between the straps with aluminum screen door for access to the 3” inlet and orifice inside.

6. **Capacity:** 9,774 cubic feet per day maximum with 3” inlet and 3” head. Inlet can be reduced by installing a smaller orifice using the plug and cutter provided to adjust flow rate for the particular drawdown time required. Please use the sizing template at www.fairclothskimmer.com .

7. Ships assembled. User glues inlet extension and barrel, installs vent, cuts orifice in plug and attaches to outlet pipe or structure. Includes float, flexible hose, rope, orifice plug & cutter. Does NOT include 2” Sch 40 SOLID pvc barrel or “arm” SUPPLIED BY USER.

Temporary Sediment Basin #3

Routed Dishcarge Calculations

Maximum Drainage Area to Temporary Sediment Basin #3

Temporary Sediment Basin #3

Subcat Reach Pond Link

Routing Diagram for 22-0123-005 - E&S
Prepared by Landworks Civil Design LLC, Printed 1/3/2023
HydroCAD® 10.20-2g s/n 12370 © 2022 HydroCAD Software Solutions LLC

Summary for Subcatchment 3D: Maximum Drainage Area to Temporary Sediment Basin #3

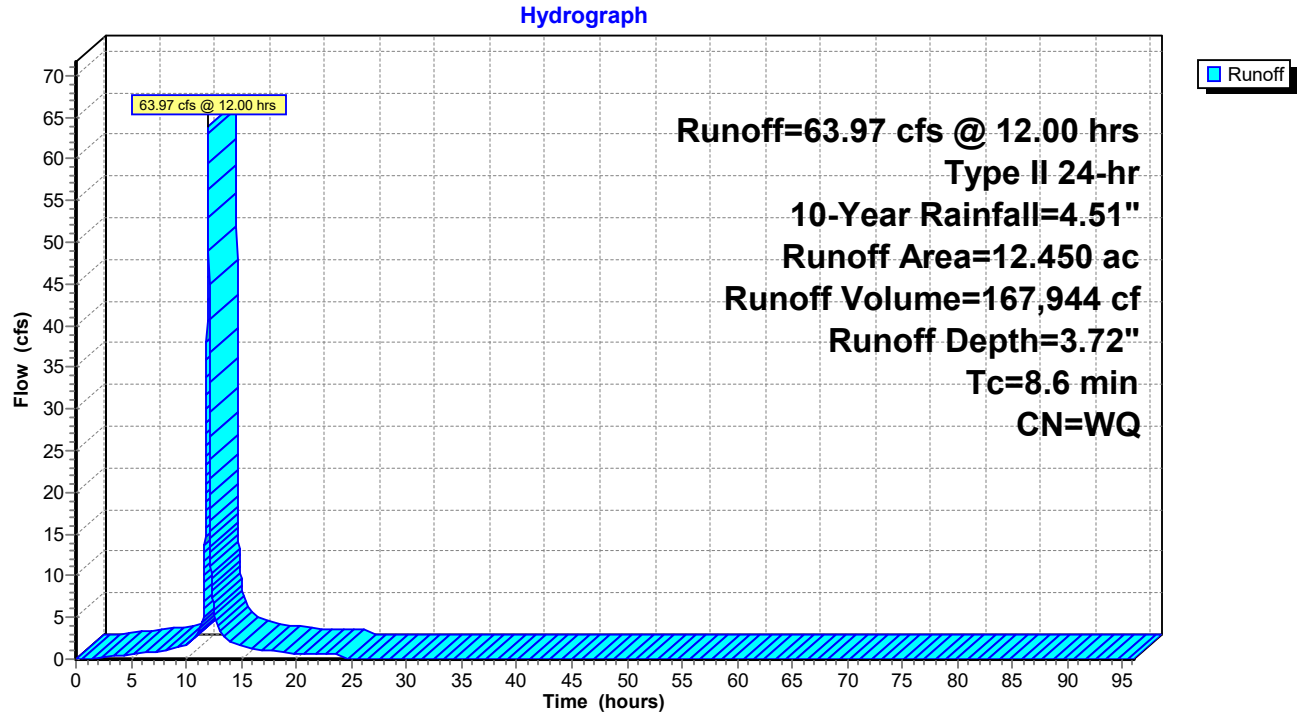
Runoff = 63.97 cfs @ 12.00 hrs, Volume= 167,944 cf, Depth= 3.72"
Routed to Pond 3P : Temporary Sediment Basin #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=4.51"

	Area (ac)	CN	Description
*	9.052	98	Impervious
*	0.105	58	Meadow / HSG B (Offsite)
*	0.014	71	Meadow / HSG C (Offsite)
*	1.295	98	Impervious (Offsite)
*	1.303	61	Open Space / Good Condition / HSG B (Offsite)
*	0.681	55	Woods / Good Condition / HSG B (Offsite)
	12.450		Weighted Average
	2.103		16.89% Pervious Area
	10.347		83.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6					**Direct Entry, Storm Sewer Tc**

Subcatchment 3D: Maximum Drainage Area to Temporary Sediment Basin #3



Summary for Pond 3P: Temporary Sediment Basin #3

Inflow Area = 542,322 sf, 83.11% Impervious, Inflow Depth = 3.72" for 10-Year event
Inflow = 63.97 cfs @ 12.00 hrs, Volume= 167,944 cf
Outflow = 5.50 cfs @ 12.54 hrs, Volume= 93,950 cf, Atten= 91%, Lag= 32.5 min
Primary = 5.50 cfs @ 12.54 hrs, Volume= 93,950 cf
Routed to nonexistent node 3L
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to nonexistent node 3L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 446.27' @ 12.54 hrs Surf.Area= 30,029 sf Storage= 110,820 cf

Plug-Flow detention time= 1,147.0 min calculated for 93,950 cf (56% of inflow)
Center-of-Mass det. time= 1,027.3 min (1,781.5 - 754.2)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	237,461 cf	**Basin Storage (Irregular)** Listed below (Recalc)

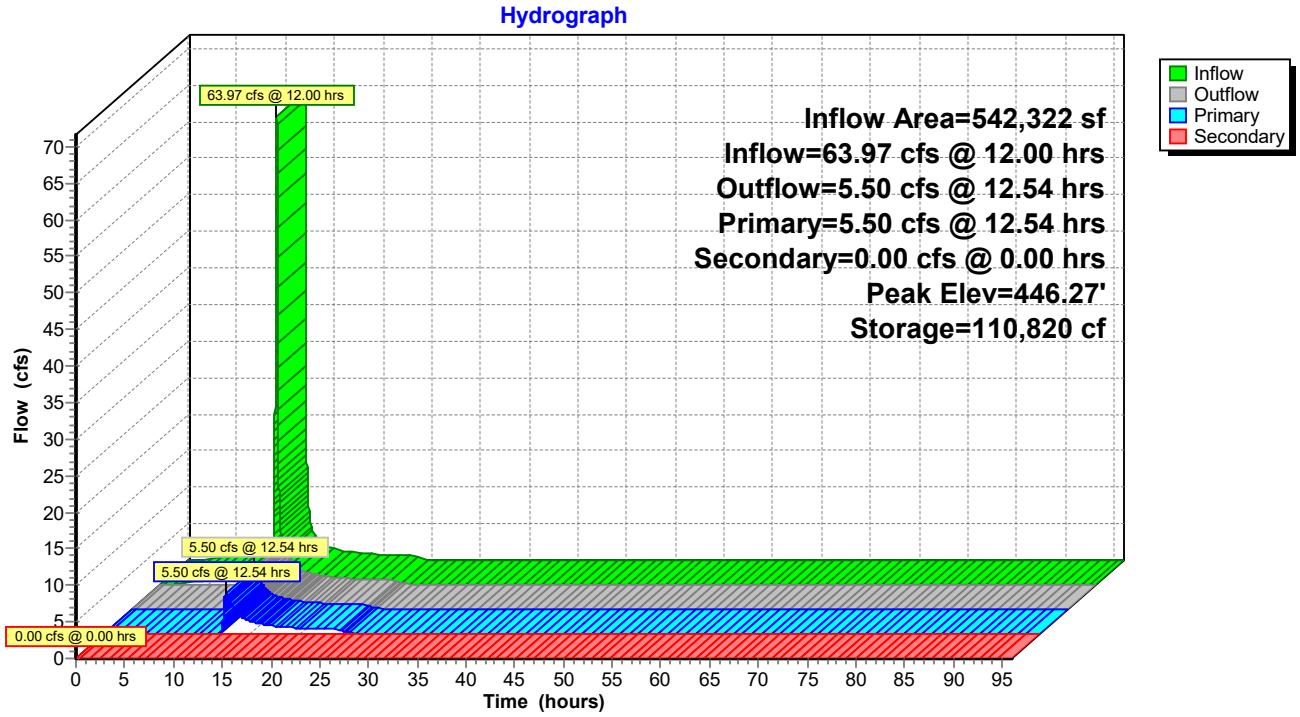
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	22,020	584.6	0	0	22,020
443.00	23,802	603.4	22,905	22,905	23,894
444.00	25,641	622.3	24,716	47,621	25,837
445.00	27,536	641.1	26,583	74,204	27,830
446.00	29,488	660.0	28,506	102,710	29,892
447.00	31,496	678.8	30,486	133,197	32,003
448.00	33,561	697.7	32,523	165,720	34,185
449.00	35,682	716.5	34,616	200,336	36,416
450.00	38,588	768.5	37,126	237,461	42,606

Device	Routing	Invert	Outlet Devices
#1	Primary	441.81'	**24.0" Round Primary Outlet Pipe** L= 51.9' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 441.81' / 441.55' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	443.00'	**0.113 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	446.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Secondary	448.00'	**25.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.46 cfs @ 12.54 hrs HW=446.27' (Free Discharge)
└**1=Primary Outlet Pipe** (Passes 5.46 cfs of 28.15 cfs potential flow)
└**2=Skimmer** (Constant Controls 0.11 cfs)
└**3=Type M Inlet (No Grate)** (Weir Controls 5.35 cfs @ 1.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=442.00' (Free Discharge)
└**4=Emergency Spillway** (Controls 0.00 cfs)

Pond 3P: Temporary Sediment Basin #3



Summary for Subcatchment 3D: Maximum Drainage Area to Temporary Sediment Basin #3

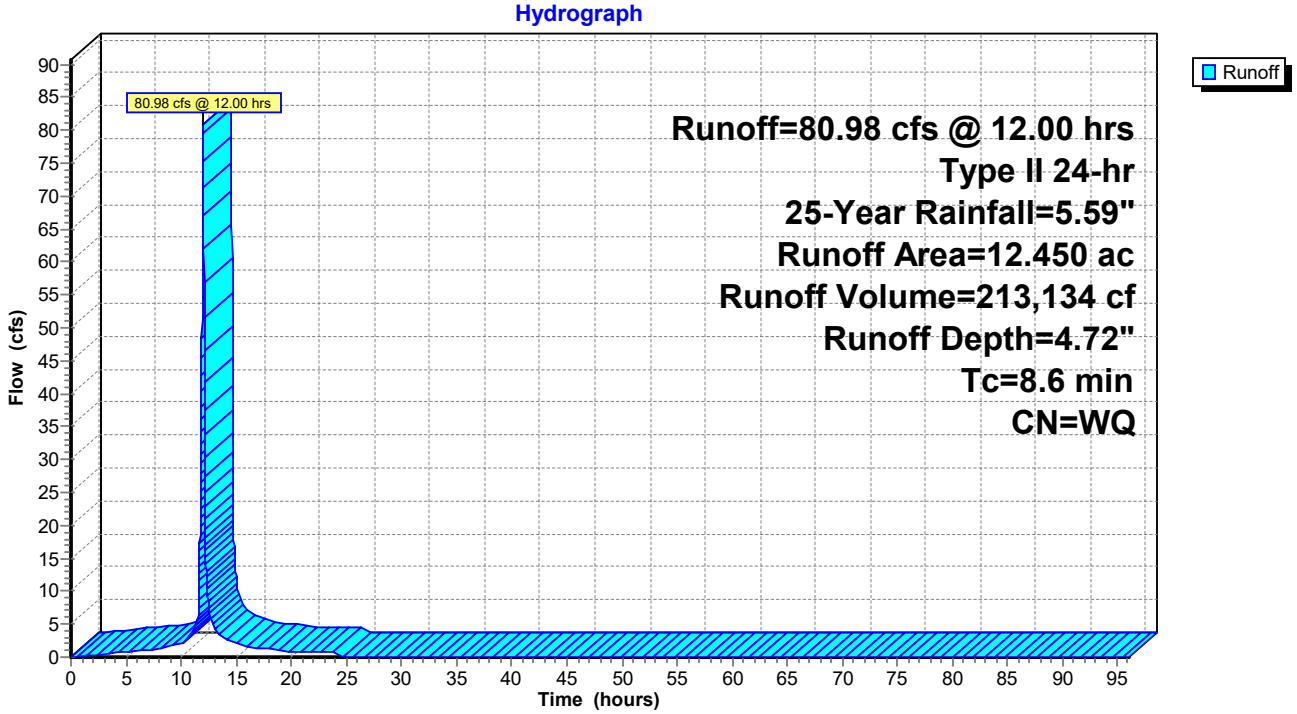
Runoff = 80.98 cfs @ 12.00 hrs, Volume= 213,134 cf, Depth= 4.72"
Routed to Pond 3P : Temporary Sediment Basin #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=5.59"

	Area (ac)	CN	Description
*	9.052	98	Impervious
*	0.105	58	Meadow / HSG B (Offsite)
*	0.014	71	Meadow / HSG C (Offsite)
*	1.295	98	Impervious (Offsite)
*	1.303	61	Open Space / Good Condition / HSG B (Offsite)
*	0.681	55	Woods / Good Condition / HSG B (Offsite)
	12.450		Weighted Average
	2.103		16.89% Pervious Area
	10.347		83.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6					**Direct Entry, Storm Sewer Tc**

Subcatchment 3D: Maximum Drainage Area to Temporary Sediment Basin #3



Summary for Pond 3P: Temporary Sediment Basin #3

Inflow Area = 542,322 sf, 83.11% Impervious, Inflow Depth = 4.72" for 25-Year event
Inflow = 80.98 cfs @ 12.00 hrs, Volume= 213,134 cf
Outflow = 22.81 cfs @ 12.16 hrs, Volume= 139,067 cf, Atten= 72%, Lag= 9.9 min
Primary = 22.81 cfs @ 12.16 hrs, Volume= 139,067 cf
Routed to nonexistent node 3L
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to nonexistent node 3L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 446.71' @ 12.16 hrs Surf.Area= 30,915 sf Storage= 124,270 cf

Plug-Flow detention time= 824.4 min calculated for 139,067 cf (65% of inflow)
Center-of-Mass det. time= 717.4 min (1,469.0 - 751.6)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	237,461 cf	**Basin Storage (Irregular)** Listed below (Recalc)

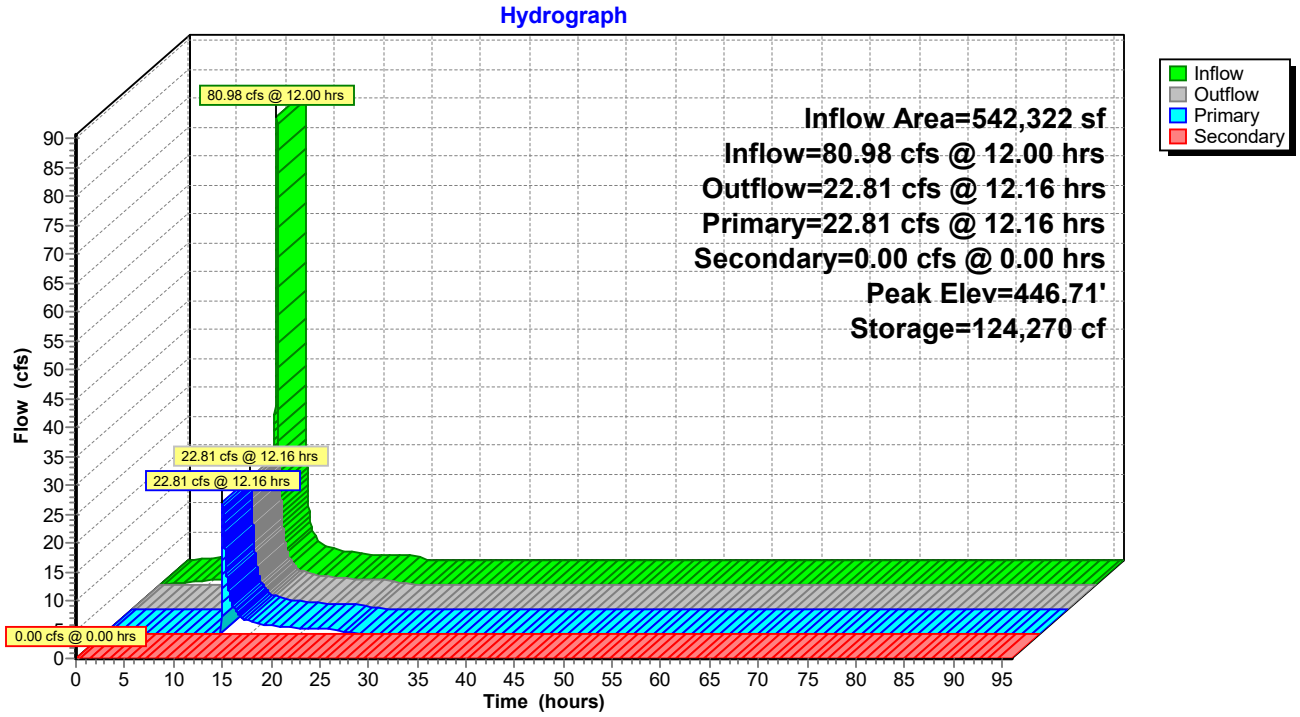
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	22,020	584.6	0	0	22,020
443.00	23,802	603.4	22,905	22,905	23,894
444.00	25,641	622.3	24,716	47,621	25,837
445.00	27,536	641.1	26,583	74,204	27,830
446.00	29,488	660.0	28,506	102,710	29,892
447.00	31,496	678.8	30,486	133,197	32,003
448.00	33,561	697.7	32,523	165,720	34,185
449.00	35,682	716.5	34,616	200,336	36,416
450.00	38,588	768.5	37,126	237,461	42,606

Device	Routing	Invert	Outlet Devices
#1	Primary	441.81'	**24.0" Round Primary Outlet Pipe** L= 51.9' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 441.81' / 441.55' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	443.00'	**0.113 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	446.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Secondary	448.00'	**25.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.79 cfs @ 12.16 hrs HW=446.71' (Free Discharge)
└**1=Primary Outlet Pipe** (Passes 22.79 cfs of 29.89 cfs potential flow)
└**2=Skimmer** (Constant Controls 0.11 cfs)
└**3=Type M Inlet (No Grate)** (Weir Controls 22.68 cfs @ 2.76 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=442.00' (Free Discharge)
└**4=Emergency Spillway** (Controls 0.00 cfs)

Pond 3P: Temporary Sediment Basin #3



Summary for Subcatchment 3D: Maximum Drainage Area to Temporary Sediment Basin #3

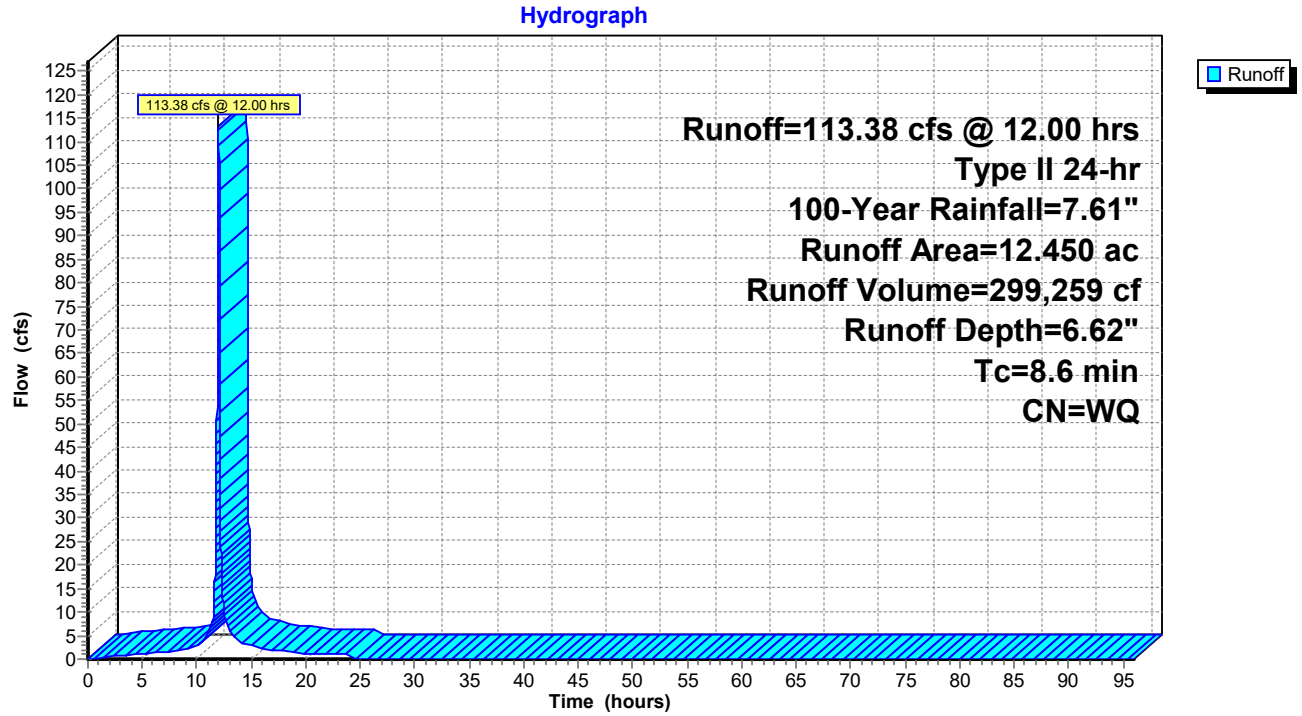
Runoff = 113.38 cfs @ 12.00 hrs, Volume= 299,259 cf, Depth= 6.62"
Routed to Pond 3P : Temporary Sediment Basin #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.61"

	Area (ac)	CN	Description
*	9.052	98	Impervious
*	0.105	58	Meadow / HSG B (Offsite)
*	0.014	71	Meadow / HSG C (Offsite)
*	1.295	98	Impervious (Offsite)
*	1.303	61	Open Space / Good Condition / HSG B (Offsite)
*	0.681	55	Woods / Good Condition / HSG B (Offsite)
	12.450		Weighted Average
	2.103		16.89% Pervious Area
	10.347		83.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6					**Direct Entry, Storm Sewer Tc**

Subcatchment 3D: Maximum Drainage Area to Temporary Sediment Basin #3



Summary for Pond 3P: Temporary Sediment Basin #3

Inflow Area = 542,322 sf, 83.11% Impervious, Inflow Depth = 6.62" for 100-Year event
Inflow = 113.38 cfs @ 12.00 hrs, Volume= 299,259 cf
Outflow = 33.94 cfs @ 12.15 hrs, Volume= 225,101 cf, Atten= 70%, Lag= 9.5 min
Primary = 33.94 cfs @ 12.15 hrs, Volume= 225,101 cf
Routed to nonexistent node 3L
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to nonexistent node 3L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 447.84' @ 12.15 hrs Surf.Area= 33,236 sf Storage= 160,536 cf

Plug-Flow detention time= 564.2 min calculated for 225,078 cf (75% of inflow)
Center-of-Mass det. time= 472.2 min (1,220.4 - 748.3)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	237,461 cf	**Basin Storage (Irregular)** Listed below (Recalc)

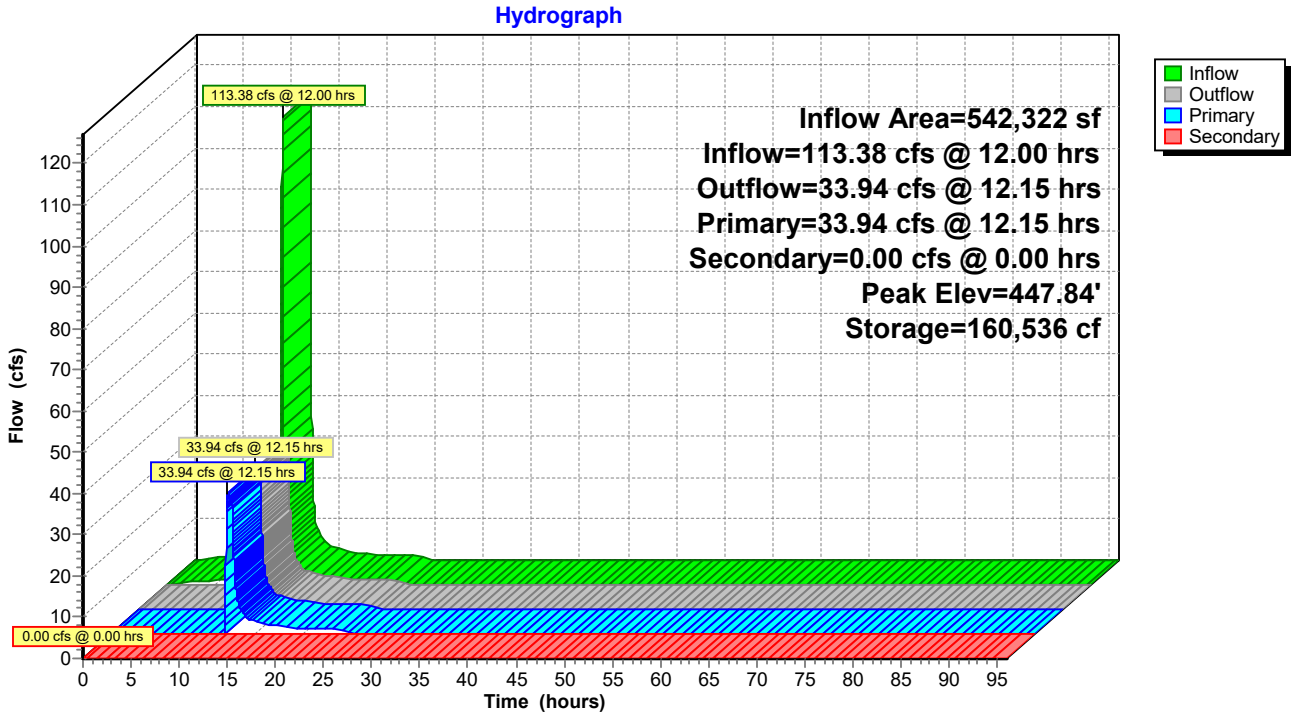
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	22,020	584.6	0	0	22,020
443.00	23,802	603.4	22,905	22,905	23,894
444.00	25,641	622.3	24,716	47,621	25,837
445.00	27,536	641.1	26,583	74,204	27,830
446.00	29,488	660.0	28,506	102,710	29,892
447.00	31,496	678.8	30,486	133,197	32,003
448.00	33,561	697.7	32,523	165,720	34,185
449.00	35,682	716.5	34,616	200,336	36,416
450.00	38,588	768.5	37,126	237,461	42,606

Device	Routing	Invert	Outlet Devices
#1	Primary	441.81'	**24.0" Round Primary Outlet Pipe** L= 51.9' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 441.81' / 441.55' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	443.00'	**0.113 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	446.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Secondary	448.00'	**25.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=33.94 cfs @ 12.15 hrs HW=447.84' (Free Discharge)
└**1=Primary Outlet Pipe** (Inlet Controls 33.94 cfs @ 10.80 fps)
└**2=Skimmer** (Passes < 0.11 cfs potential flow)
└**3=Type M Inlet (No Grate)** (Passes < 49.04 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=442.00' (Free Discharge)
└**4=Emergency Spillway** (Controls 0.00 cfs)

Pond 3P: Temporary Sediment Basin #3



TEMPORARY SEDIMENT BASIN #4 DESIGN

STANDARD E&S WORKSHEET # 12
Sediment Basin Capacity Requirements

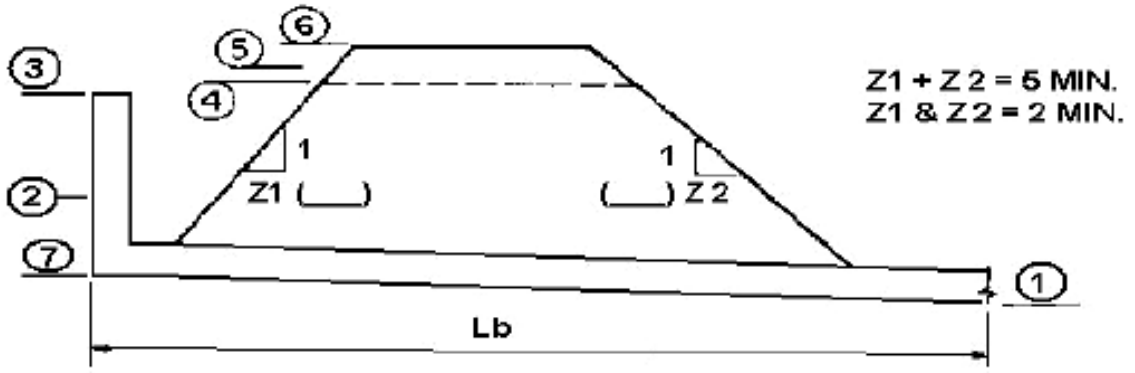
PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

BASIN NUMBER		Temp #4
PERMANENT OR TEMPORARY BASIN?	(P or T)	P
SPECIAL PROTECTION WATERSHED?	(YES OR NO)	No
Karst Soils?	(YES OR NO)	No
(A) MAXIMUM TOTAL DRAINAGE AREA	(AC)	1.65
IS DRAINAGE AREA (A) MORE THAN 10% LARGER THAN THE PRECONSTRUCTION CONDITION?	(YES OR NO)	Yes
(A_1) DISTURBED ACRES IN DRAINAGE AREA (AC)		6.29
(I) INITIAL REQ'D DEWATERING ZONE (5,000 X A)	(CF)	8,250
(T) REDUCTION FOR TOP DEWATERING (-700 X A)	(CF)	0
(P) REDUCTION FOR PERMANENT POOL (-700 X A)	(CF)	0
(L) REDUCTION FOR 4:1 FLOW LENGTH:WIDTH (-350 X A)	(CF)	0
(D) REDUCTION FOR 4 TO 7 DAY DEWATERING (-350 X A)	(CF)	0
(Sv) REQUIRED DEWATERING ZONE [I - (T+P+L)][1]	(CF)	8,250
(Sd) REQUIRED SEDIMENT STORAGE VOLUME (1000 X A_1)	(CF)	6,290
(St) TOTAL REQUIRED STORAGE VOLUME (Sv + Sd)	(CF)	14,540
TOTAL STORAGE VOLUME PROVIDED (@ ELEV 3)[2]	(CF)	39,418
DEWATERING TIME FOR DEWATERING ZONE	(DAYS)	4.8
REQUIRED DISCHARGE CAPACITY (2 X A)	(CFS)[3]	3.30
PRINCIPAL SPILLWAY TYPE (PERFORATED RISER, SKIMMER, etc.)		SKIMMER
PEAK FLOW FROM 10 YR/24R HR STORM FOR DRAINAGE AREA (A)	(CFS)[4]	23.23
PRINCIPAL SPILLWAY CAPACITY (@ ELEV 5)	(CFS)[4]	20.66
EMERGENCY SPILLWAY CAPACITY (@ ELEV 5)	(CFS)	0.07
TOTAL BASIN DISCHARGE CAPACITY (@ ELEV 5)		20.73
EMERGENCY SPILLWAY PROTECTIVE LINER[5]		SC250
OUTLET TO A SURFACE WATER?	(YES OR NO)[6]	No
PEAK FLOW FROM A 100 YR/24 HR STORM FOR DRG AREA (A)		48.80

1 The minimum dewatering zone capacity for sediment basins is (3,600 X A). No reduction is permitted in Special Protection (HQ and EV) Watersheds
2 Total Storage Volume provided at riser crest.
3 Or Provide calculations to show peak flow from 25 yr./24 hour storm for area (A) is routed through the basin
4 Provide supporting calculations.
5 If grass lining is proposed, spillway should be constructed in original ground unless a suitable TRM lining is use. Wherever a TRM is used, riprap should be placed at the bottom of the embankment to prevent scour.
6 If no, and basin is permanent or drainage area is more than 10% larger than pre-construction, provide supporting calculations to show accelerated erosion will not result from the proposed discharge. For discharges increasing volume or rate of flow onto a neighboring property prior to entering a surface water, an easement should be obtained prior to plan submittal.

STANDARD E&S WORKSHEET # 13
Sediment Basin Dimensions and Elevations

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03



BASIN NUMBER		Temp #4	
1. DISCHARGE PIPE ELEVATION	(FT)	445.55	
2. ELEVATION AT TOP OF SEDIMENT STORAGE ZONE (@Sd) (MIN. 1.0' ABOVE ELEVATION 7)	(FT)	447.00	
3. ELEVATION AT TOP OF DEWATERING ZONE (St) (CREST OF PRINCIPAL SPILLWAY)	(FT)	449.00	
4. EMERGENCY SPILLWAY CREST ELEVATION (MIN. 0.5' ABOVE ELEVATION 3)	(FT)	451.00	
5. 2 CFS/ACRE OR 100-YR/24 HOUR FLOW ELEVATION	(FT)	449.92	(100-Yr)
6. TOP OF EMBANKMENT ELEVATION (MIN 24" ABOVE ELEVATION 5 OR 12" WITH ROUTED 100-YR/24-HR STORM)	(FT)	453.00	
7. BASIN BOTTOM ELEVATION	(FT)	446.00	
AVERAGE BOTTOM WIDTH	(FT)	68	
AVERAGE BOTTOM LENGTH	(FT)	24	
(SA_{min}) REQUIRED SURFACE AREA AT ELEVATION 2	(SQ. FT)	2,000	
SURFACE AREA PROVIDED AT ELEVATION 2	(SQ. FT)	12,314	
AVERAGE BASIN WIDTH (W) AT ELEVATION 3	(FT)	62	
FLOW LENGTH (L) AT ELEVATION 3	(FT)	250	
FLOW LENGTH:WIDTH RATIO AT ELEVATION 3	(FT)	4:1	
SILT CURTAIN OR FOREBAY? (IF YES, INDICATE WHICH)		Forebay	
EMBANKMENT TOP WIDTH	(FT, 8' MIN.)	10	
EMBANKMENT SOIL TYPE(S)		CL, ML	
KEY TRENCH DEPTH	(FT, 2' MIN.)	2.0	
KEY TRENCH WIDTH	(FT. 4' MIN)	4.0	
RISER DIAMETER/TYPE	(15" MIN)	N/A	
BARREL DIAMETER/TYPE	(12" MIN)	18	
Lb (BARREL LENGTH)	(FT)	9.00	
EMERGENCY SPILLWAY WIDTH	(FT)	25	
EMERGENCY SPILLWAY SIDE SLOPES	(H:V)	3:1	
EMERGENCY SPILLWAY DEPTH	(FT)	2.00	

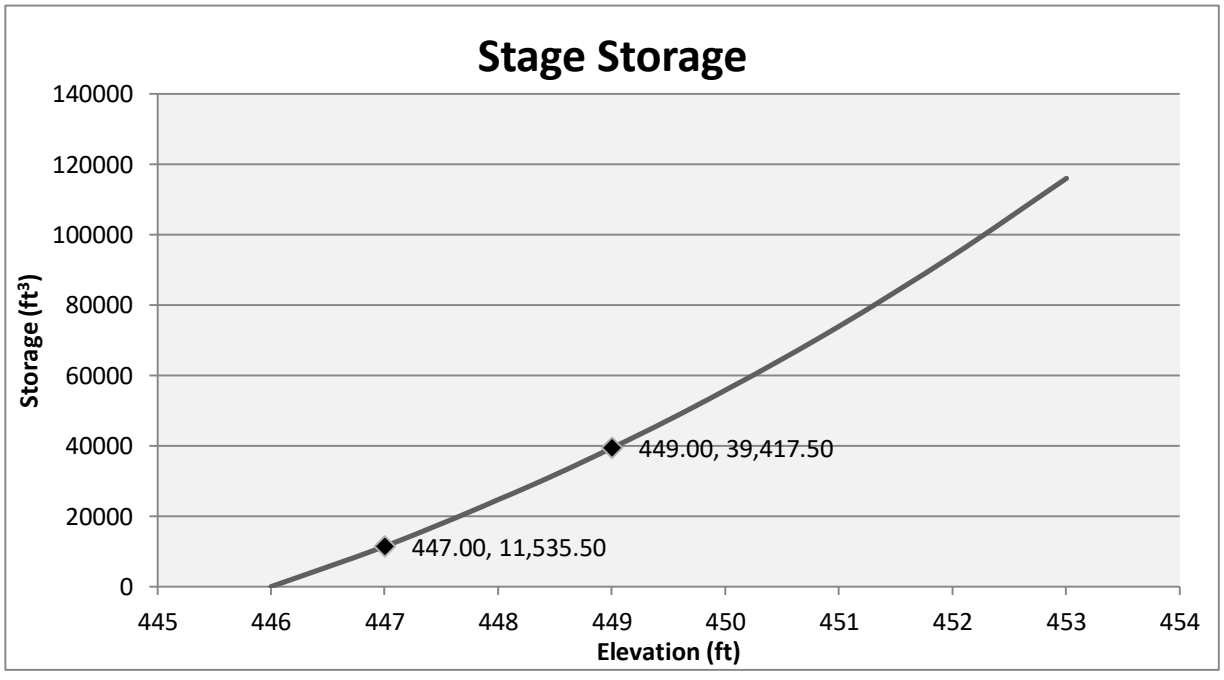
For irregular shaped traps, provide stage storage data

STANDARD E&S WORKSHEET # 14
Sediment Basin/Sediment Trap Storage Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

WATER SURFACE ELEVATION (FEET)	AREA (SQ. FT)	AVERAGE AREA (SQ. FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
446.00	10,757				0
447.00	12,314	11,536	1.00	11,536	11,536
448.00	13,927	13,121	1.00	13,121	24,656
449.00	15,596	14,762	1.00	14,762	39,418
450.00	17,323	16,460	1.00	16,460	55,877
451.00	19,105	18,214	1.00	18,214	74,091
452.00	20,945	20,025	1.00	20,025	94,116
453.00	22,841	21,893	1.00	21,893	116,009

ELEV. 2:	W.S.E.	447.00	ELEV. 3:	W.S.E.	449.00
	SURF. AREA:	12,314		SURF. AREA:	15,596
TOTAL STORAGE (CF):		11,536	TOTAL STORAGE (CF):		39,418



Determining the Skimmer Size and the Required Orifice for the *Faircloth Skimmer®* Surface Drain

November 2007

Important note: *The orifice sizing chart in the Pennsylvania Erosion Control Manual and reproduced in the North Carolina Design Manual* ***DOES NOT APPLY*** *to our skimmers. It will give the wrong size orifice and not specify which size skimmer is required. Please use the information below to choose the size skimmer required for the basin volume provided and determine the orifice size required for the drawdown time, typically 4-7 days in Pennsylvania and 3 days in North Carolina.*

The **size** of a Faircloth Skimmer®, for example a 4" skimmer, refers to the maximum diameter of the skimmer inlet. The inlet on each of the 8 sizes offered can be reduced to adjust the flow rate by cutting a hole or ***orifice*** in a plug using an adjustable cutter (both supplied).

Determining the skimmer size needed and the orifice for that skimmer required to drain the sediment basin's volume in the required time involves two steps: **First**, determining the size skimmer required based on the volume to be drained and the number of days to drain it; and **Second,** calculate the orifice size to adjust the flow rate and "customize" the skimmer for the basin's volume. *The second step is not always necessary* if the flow rate for the skimmer with the inlet wide open equals or is close to the flow rate required for the basin volume and the drawdown time.

Both the skimmer size and the required orifice radius for the skimmer should be shown for each basin on the erosion and sediment control plan. Make it clear that the dimension is either the radius or the diameter. It is also helpful to give the basin volume in case there are questions. During the skimmer installation the required orifice can be cut in the plastic plug using the supplied adjustable cutter and installed in the skimmer using the instructions provided.

The plan review and enforcement authority may require the calculations showing that the skimmer used can drain the basin in the required time.

Determining the Skimmer Size

Step 1. Below are approximate **skimmer maximum flow capacities** based on typical draw down requirements, which can vary between States and jurisdictions and watersheds. If one 6" skimmer does not provide enough capacity, multiple skimmers can be used to drain the basin. For drawdown times not shown, multiply the 24-hour figure by the number of days required.

Example: A basin's volume is 29,600 cubic feet and it must be drained in 3 days. A 3" skimmer with the inlet wide open will work perfectly. (Actually, the chart below gives 29,322 cubic feet but this is well within the accuracy of the calculations and the basin's constructed volume.)
Example: A basin's volume is 39,000 cubic feet and it must be drained in 3 days. The 3" skimmer is too small; a 4" skimmer has enough capacity but it is too large, so the inlet will need

Step 1:

Dewatering Volume Required:	8,250	CF
Number of Skimmers Required:	1	
Skimmer Size Required:	1.5"	

to be reduced using step 2 to adjust the flow rate for the basin's volume. (It needs a 3.2" diameter orifice.)

1½" skimmer:	1,728 cubic feet in **24 hours**	6,912 cubic feet in **4 days**
with a 1½" head	3,456 cubic feet in **2 days**	12,096 cubic feet in **7 days**
	5,184 cubic feet in **3 days**	
2" skimmer:	3,283 cubic feet in **24 hours**	13,132 cubic feet in **4 days**
with a 2" head	6,566 cubic feet in **2 days**	22,982 cubic feet in **7 days**
	9,849 cubic feet in **3 days**	
2½" skimmer:	6,234 cubic feet in **24 hours**	24,936 cubic feet in **4 days**
with a 2.5" head	12,468 cubic feet in **2 days**	43,638 cubic feet in **7 days**
Revised 11-6-07	18,702 cubic feet in **3 days**	
3" skimmer:	9,774 cubic feet in **24 hours**	39,096 cubic feet in **4 days**
with a 3" head	19,547 cubic feet in **2 days**	68,415 cubic feet in **7 days**
	29,322 cubic feet in **3 days**	
4" skimmer:	20,109 cubic feet in **24 hours**	80,436 cubic feet in **4 days**
with a 4" head	40,218 cubic feet in **2 days**	140,763 cubic feet in **7 days**
Revised 11-6-07	60,327 cubic feet in **3 days**	
5" skimmer:	32,832 cubic feet in **24 hours**	131,328 cubic feet in **4 days**
with a 4" head	65,664 cubic feet in **2 days**	229,824 cubic feet in **7 days**
	98,496 cubic feet in **3 days**	
6" skimmer:	51,840 cubic feet in **24 hours**	207,360 cubic feet in **4 days**
with a 5" head	103,680 cubic feet in **2 days**	362,880 cubic feet in **7 days**
	155,520 cubic feet in **3 days**	
8" skimmer:	97,978 cubic feet in **24 hours**	391,912 cubic feet in **4 days**
with a 6" head	195,956 cubic feet in **2 days**	685,846 cubic feet in **7 days**
CUSTOM	293,934 cubic feet in **3 days**	
MADE BY ORDER	**CALL!**	

Determining the Orifice

Step 2. To determine the orifice required to reduce the flow rate for the basin's volume and the number of days to drain the basin, simply use the formula volume ÷ **factor** (from the chart below) for the same size skimmer chosen in the first step and the same number of days. This calculation will give the **area** of the required orifice. Then calculate the orifice radius using Area = πr^2 and solving for r, $r = \sqrt{(Area / 3.14)}$ .The supplied cutter can be adjusted to this radius to cut the orifice in the plug. The instructions with the plug and cutter has a ruler divided into tenths of inches. Again, this step is not always necessary as explained above.

An alternative method is to use the orifice equation with the head for a particular skimmer shown on the previous page and determine the orifice needed to give the required flow for the volume and draw down time. C = 0.59 is used in this chart.

Example: A 4" skimmer is the smallest skimmer that will drain 39,000 cubic feet in 3 days but a 4" inlet will drain the basin too fast (in 1.9 days) To determine the orifice required use the factor of 4,803 from the chart below for a 4" skimmer and a drawdown time of 3 days. 39,000 cubic

Step 2: No Custom Orifice Required

feet ÷ 4,803 = 8.12 square inches of orifice required. Calculate the orifice radius using Area = $\pi \cdot r^2$ and solving for r, $r = \sqrt{(8.12/3.14)}$ and r = 1.61". As a practical matter 1.6" is about as close as the cutter can be adjusted and the orifice cut..

Factors (in cubic feet of flow per square inch of opening through a **round** orifice with the head for that skimmer and for the drawdown times shown) for determining the **orifice radius** for a basin's volume to be drained. This quick method works because the orifice is centered and has a constant head (given above in Step 1).

1½" skimmer:	960 to drain in **24 hours**	3,840 to drain in **4 days**
	1,920 to drain in **2 days**	6,720 to drain in **7 days**
	2,880 to drain in **3 days**	
2" skimmer:	1,123 to drain in **24 hours**	4,492 to drain in **4 days**
	2,246 to drain in **2 days**	7,861 to drain in **7 days**
	3,369 to drain in **3 days**	
2½" skimmer: Revised 11-6-07	1,270 to drain in **24 hours**	5,080 to drain in **4 days**
	2,540 to drain in **2 days**	8,890 to drain in **7 days**
	3,810 to drain in **3 days**	
3" skimmer:	1,382 to drain in **24 hours**	5,528 to drain in **4 days**
	2,765 to drain in **2 days**	9,677 to drain in **7 days**
	4,146 to drain in **3 days**	
4" skimmer: Revised 11-6-07	1,601 to drain in **24 hours**	6,404 to drain in **4 days**
	3,202 to drain in **2 days**	11,207 to drain in **7 days**
	4,803 to drain in **3 days**	
5" skimmer:	1,642 to drain in **24 hours**	6,568 to drain in **4 days**
	3,283 to drain in **2 days**	11,491 to drain in **7 days**
	4,926 to drain in **3 days**	
6" skimmer:	1,814 to drain in **24 hours**	7,256 to drain in **4 days**
	3,628 to drain in **2 days**	12,701 to drain in **7 days**
	5,442 to drain in **3 days**	
8" skimmer:	1,987 to drain in **24 hours**	7,948 to drain in **4 days**
	3,974 to drain in **2 days**	13,909 to drain in **7 days**
	5,961 to drain in **3 days**	

J. W. Faircloth & Son, Inc.
Post Office Box 757
412-A Buttonwood Drive
Hillsborough, North Carolina 27278
Telephone (919) 732-1244 FAX (919) 732-1266
FairclothSkimmer.com jwfaircloth@embarqmail.com

Dewatering Time:	Discharge Rate per Skimmer=	0.020 CFS
	x 1 Skimmer=	0.020 CFS
	Total Dewatering Time=	4.8 Days

STANDARD E&S WORKSHEET # 17
Sediment Basin Discharge Capacity

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. Date: 2023.01.03
CHECKED BY: Joshua C. George, P.E. Date: 2023.01.03

PRINCIPAL SPILLWAY DISCHARGE CAPACITY

BASIN NO:

WATER SURFACE ELEVATION[4] (FT)	Flow into Top of TEMPORARY RISER			Flow into Top of PERMANENT RISER			BARREL PIPE FLOW		PRINCIPAL SPILLWAY CAPACITY[3] (CFS)
	HEAD (FT)	ORIFICE FLOW[1] Q (CFS)	WEIR FLOW Q (CFS)	HEAD (FT)	ORIFICE FLOW[1] Q (CFS)	WEIR FLOW Q (CFS)	HEAD[2] (FT)	Q (CFS)	
451.01	-	-	-	2.01	54.61	88.34	4.71	20.66	20.66

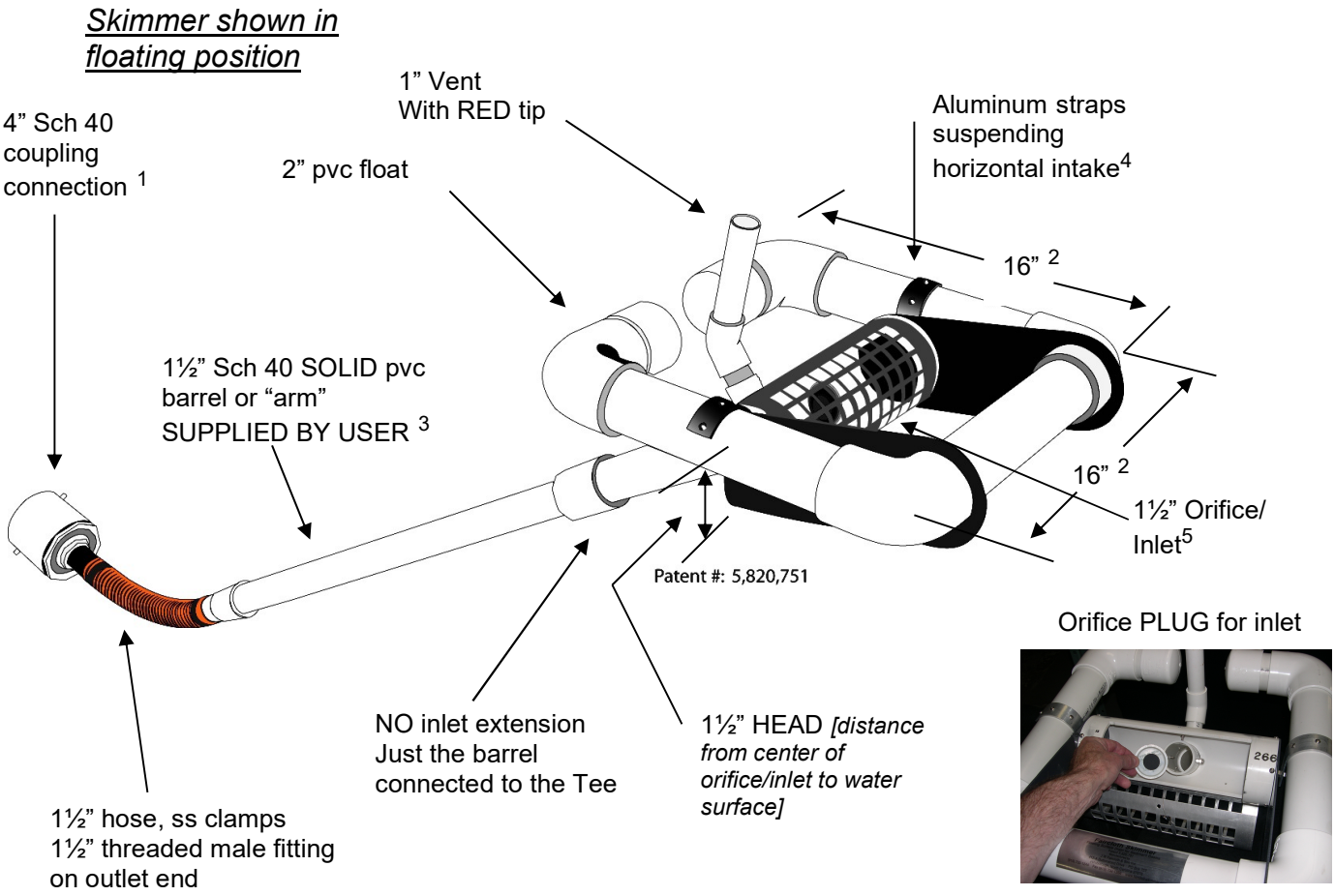
EMERGENCY SPILLWAY DISCHARGE CAPACITY

WATER SURFACE ELEVATION[4] (FT)	EMERGENCY SPILLWAY BOTTOM WIDTH[5] (FT)	TABLE OR C VALUE USED[6]	EMERGENCY SPILLWAY CAPACITY (CFS)	REQUIRED DISCHARGE CAPACITY (CFS)	TOTAL DISCHARGE CAPACITY PROVIDED[7]
451.01	25.00	2.80	0.07	3.30	20.73

1. Flow into top of riser only (Flow through perforations not included)
2. Water surface elevation minus elevation at centerline of pipe outlet
3. Least of orifice, weir, or pipe flow (Peak flow from 10yr/24 hr storm Min.)
4. 24" below top of embankment (12" if 100-year storm routed through basin)
5. 8 Ft. minimum
6. Use Tables 7.5 through 7.8 or equation for broad crested weir [$Q=CLH^{1.5}$ where C <= 2.8 (MAX)]; for Riprap larger than R-3 or flows less than 1.5' deep, adjust C downward]
7. Principal Spillway Capacity + Emergency Spillway Capacity

1½" *Faircloth Skimmer®* Cut Sheet

J. W. Faircloth & Son, Inc.
www.FairclothSkimmer.com



1. Skimmer can be attached to a straight 4" sch 40 pipe through the dam but the pipe may need to be anchored to the bottom at the connection so it is secure. Coupling can be removed and hose attached to outlet using the threaded 1½" fitting. Typical methods: a) a metal structure with a steel stub out welded on the side at the bottom with a 1½" threaded coupling or reducer(s); b) a concrete structure with a hole or orifice at the bottom - use a steel plate with a hole cut in it and coupling welded to it that will fit over the hole in the concrete and bolted to the structure with sealant, or c) grout a 4" PVC pipe in a hole in the concrete to connect the skimmer.

2. Dimensions are approximate, not intended as plans for construction.

3. Barrel (solid, not foam core pipe) should be 1.4 times the depth of water with **a maximum length of 6'** so the inlet can be pulled to the side for maintenance. Skimmer is made for small sediment "traps" with a maximum depth of 4'.

4. Horizontal intake is 3" pipe between the straps with aluminum screen door for access to the 1½" orifice/inlet inside.

5. **Capacity:** 1,728 cubic feet per day maximum with 1½" inlet and 1½" head. Orifice/inlet can be reduced by installing a smaller orifice using the plug and cutter provided to adjust flow rate for the particular drawdown time required. Please use the sizing template at www.fairclothskimmer.com .

6. Ships assembled. User glues inlet extension and barrel, installs vent, cuts orifice in plug and attaches to outlet pipe or structure. **Includes** float, flexible hose, rope, orifice plug & cutter. Does NOT include 1½" Sch 40 SOLID pvc barrel or "arm".

Temporary Sediment Basin #4

Routed Dishcarge Calculations

Maximum Drainage Area to Temporary Sediment Basin #4

Temporary Sediment Basin #4

Subcat Reach Pond Link

Routing Diagram for 22-0123-005 - E&S
Prepared by Landworks Civil Design LLC, Printed 1/3/2023
HydroCAD® 10.20-2g s/n 12370 © 2022 HydroCAD Software Solutions LLC

Summary for Subcatchment 4D: Maximum Drainage Area to Temporary Sediment Basin #4

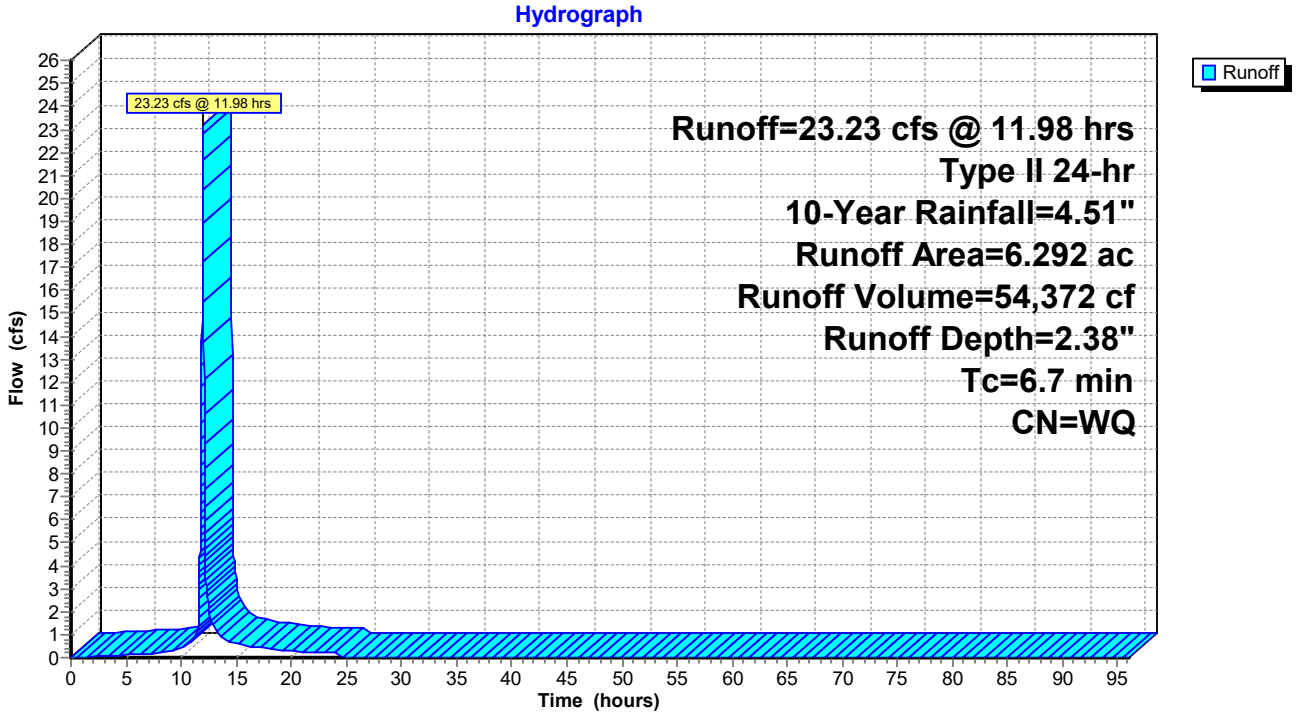
Runoff = 23.23 cfs @ 11.98 hrs, Volume= 54,372 cf, Depth= 2.38"
Routed to Pond 4P : Temporary Sediment Basin #4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=4.51"

	Area (ac)	CN	Description
*	1.650	98	Bare Construction Site
*	1.565	78	Farm / Straight Row / Good Condition / HSG B (Offsite)
*	0.394	98	Impervious (Offsite)
*	1.886	61	Open Space / Good Condition / HSG B (Offsite)
*	0.797	55	Woods / Good Condition / HSG B (Offsite)
	6.292		Weighted Average
	4.248		67.51% Pervious Area
	2.044		32.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7					**Direct Entry, Storm Sewer Tc**

Subcatchment 4D: Maximum Drainage Area to Temporary Sediment Basin #4



Summary for Pond 4P: Temporary Sediment Basin #4

Inflow Area = 274,080 sf, 32.49% Impervious, Inflow Depth = 2.38" for 10-Year event
Inflow = 23.23 cfs @ 11.98 hrs, Volume= 54,372 cf
Outflow = 0.67 cfs @ 14.72 hrs, Volume= 20,030 cf, Atten= 97%, Lag= 164.5 min
Primary = 0.67 cfs @ 14.72 hrs, Volume= 20,030 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 449.06' @ 14.72 hrs Surf.Area= 15,701 sf Storage= 40,367 cf

Plug-Flow detention time= 1,100.2 min calculated for 20,030 cf (37% of inflow)
Center-of-Mass det. time= 944.7 min (1,735.2 - 790.4)

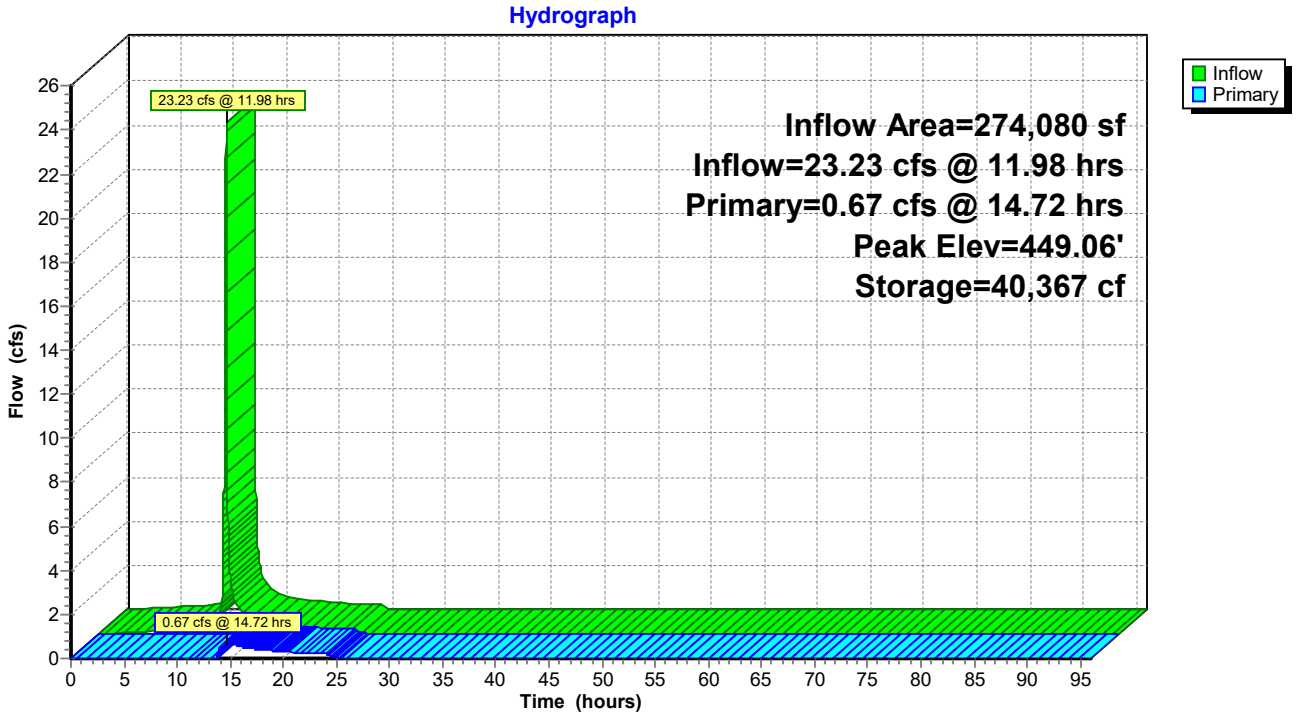
Volume	Invert	Avail.Storage	Storage Description
#1	446.00'	115,955 cf	**Basin Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
446.00	10,757	509.4	0	0	10,757
447.00	12,314	528.3	11,527	11,527	12,402
448.00	13,927	547.1	13,112	24,639	14,098
449.00	15,596	566.0	14,754	39,393	15,862
450.00	17,323	584.8	16,452	55,845	17,678
451.00	19,105	603.7	18,207	74,051	19,561
452.00	20,945	622.6	20,018	94,069	21,505
453.00	22,841	641.4	21,886	115,955	23,499

Device	Routing	Invert	Outlet Devices
#1	Primary	445.60'	**18.0" Round Primary Outlet Pipe** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 445.60' / 445.55' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	447.00'	**0.020 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	449.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Device 1	451.00'	**1.6" x 3.2" Horiz. Emergency Type DH Inlet X 7.00 columns** X 46 rows C= 0.600 in 24.0" x 93.0" Grate (74% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.60 cfs @ 14.72 hrs HW=449.06' (Free Discharge)
└**1=Primary Outlet Pipe** (Passes 0.60 cfs of 14.01 cfs potential flow)
├**2=Skimmer** (Constant Controls 0.02 cfs)
├**3=Type M Inlet (No Grate)** (Weir Controls 0.58 cfs @ 0.82 fps)
└**4=Emergency Type DH Inlet** (Controls 0.00 cfs)

Pond 4P: Temporary Sediment Basin #4



Summary for Subcatchment 4D: Maximum Drainage Area to Temporary Sediment Basin #4

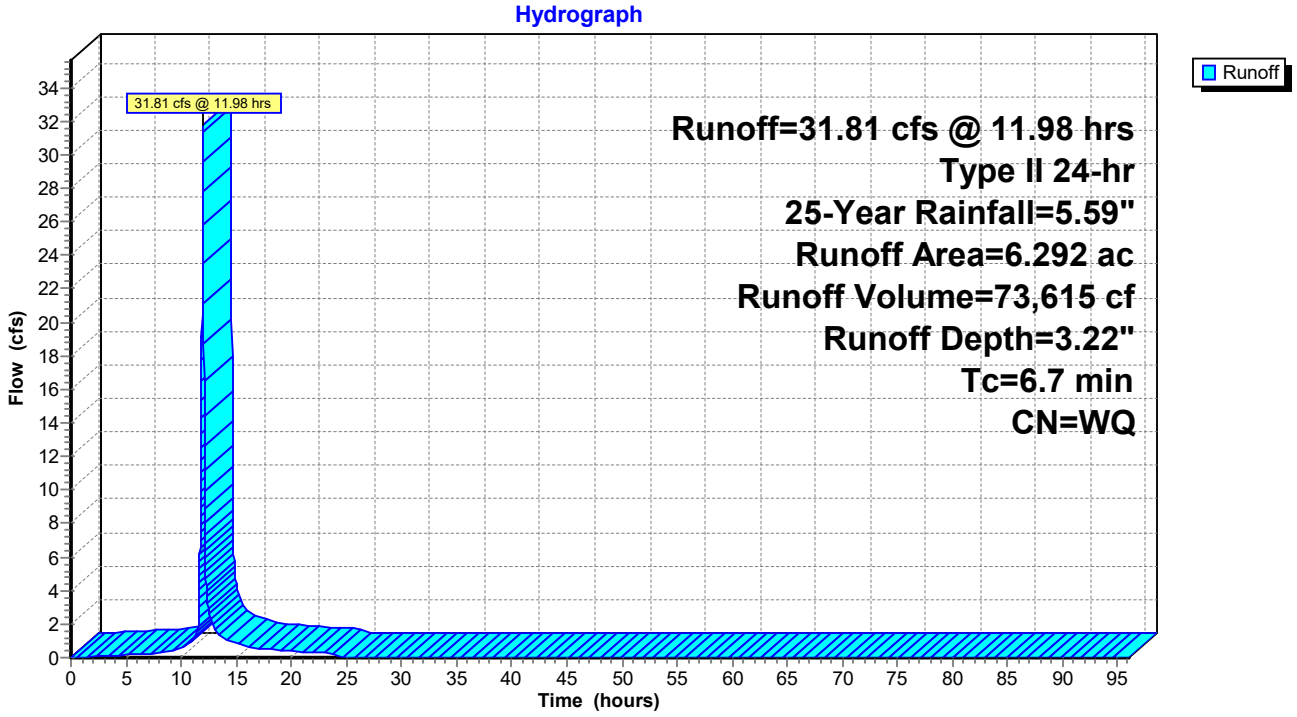
Runoff = 31.81 cfs @ 11.98 hrs, Volume= 73,615 cf, Depth= 3.22"
Routed to Pond 4P : Temporary Sediment Basin #4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=5.59"

	Area (ac)	CN	Description
*	1.650	98	Bare Construction Site
*	1.565	78	Farm / Straight Row / Good Condition / HSG B (Offsite)
*	0.394	98	Impervious (Offsite)
*	1.886	61	Open Space / Good Condition / HSG B (Offsite)
*	0.797	55	Woods / Good Condition / HSG B (Offsite)
	6.292		Weighted Average
	4.248		67.51% Pervious Area
	2.044		32.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7					**Direct Entry, Storm Sewer Tc**

Subcatchment 4D: Maximum Drainage Area to Temporary Sediment Basin #4



Summary for Pond 4P: Temporary Sediment Basin #4

Inflow Area = 274,080 sf, 32.49% Impervious, Inflow Depth = 3.22" for 25-Year event
Inflow = 31.81 cfs @ 11.98 hrs, Volume= 73,615 cf
Outflow = 3.46 cfs @ 12.39 hrs, Volume= 39,266 cf, Atten= 89%, Lag= 24.8 min
Primary = 3.46 cfs @ 12.39 hrs, Volume= 39,266 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 449.20' @ 12.39 hrs Surf.Area= 15,937 sf Storage= 42,576 cf

Plug-Flow detention time= 642.0 min calculated for 39,266 cf (53% of inflow)
Center-of-Mass det. time= 515.0 min (1,303.1 - 788.1)

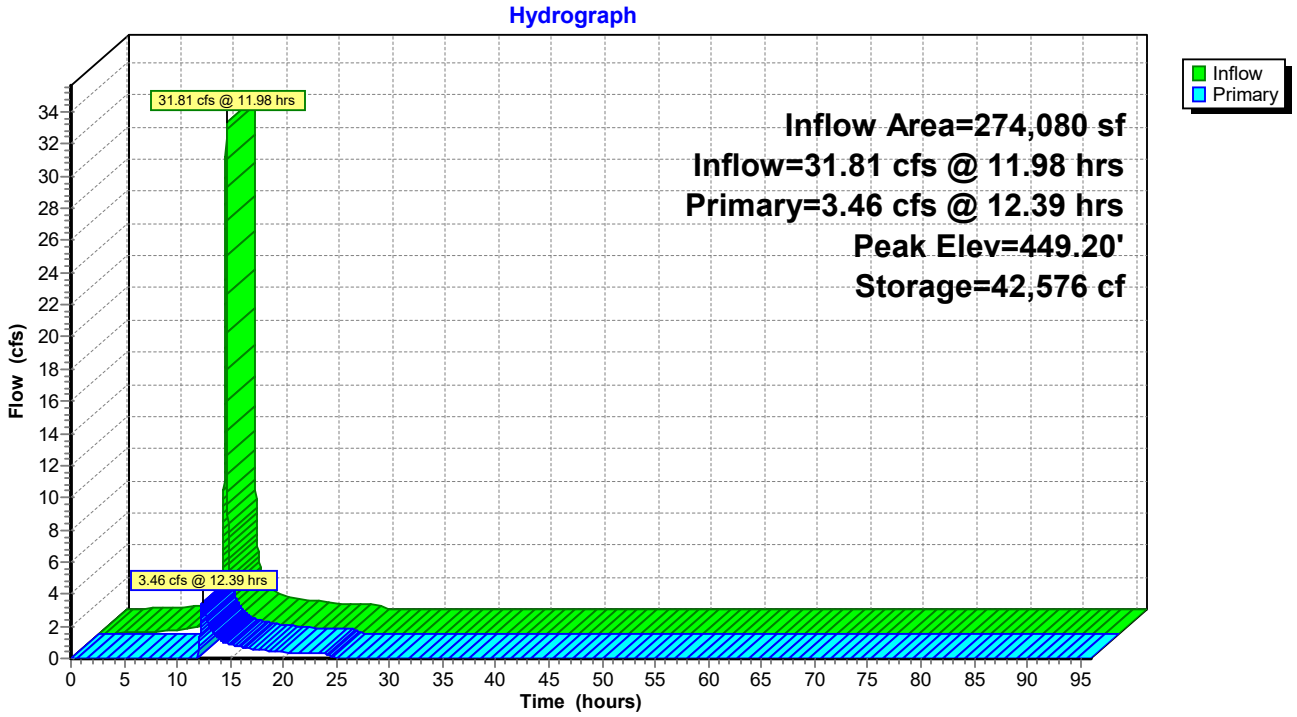
Volume	Invert	Avail.Storage	Storage Description
#1	446.00'	115,955 cf	**Basin Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
446.00	10,757	509.4	0	0	10,757
447.00	12,314	528.3	11,527	11,527	12,402
448.00	13,927	547.1	13,112	24,639	14,098
449.00	15,596	566.0	14,754	39,393	15,862
450.00	17,323	584.8	16,452	55,845	17,678
451.00	19,105	603.7	18,207	74,051	19,561
452.00	20,945	622.6	20,018	94,069	21,505
453.00	22,841	641.4	21,886	115,955	23,499

Device	Routing	Invert	Outlet Devices
#1	Primary	445.60'	**18.0" Round Primary Outlet Pipe** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 445.60' / 445.55' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	447.00'	**0.020 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	449.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Device 1	451.00'	**1.6" x 3.2" Horiz. Emergency Type DH Inlet X 7.00 columns** X 46 rows C= 0.600 in 24.0" x 93.0" Grate (74% open area) Limited to weir flow at low heads

Primary OutFlow Max=3.43 cfs @ 12.39 hrs HW=449.20' (Free Discharge)
└**1=Primary Outlet Pipe** (Passes 3.43 cfs of 14.37 cfs potential flow)
├**2=Skimmer** (Constant Controls 0.02 cfs)
├**3=Type M Inlet (No Grate)** (Weir Controls 3.41 cfs @ 1.47 fps)
└**4=Emergency Type DH Inlet** (Controls 0.00 cfs)

Pond 4P: Temporary Sediment Basin #4



Summary for Subcatchment 4D: Maximum Drainage Area to Temporary Sediment Basin #4

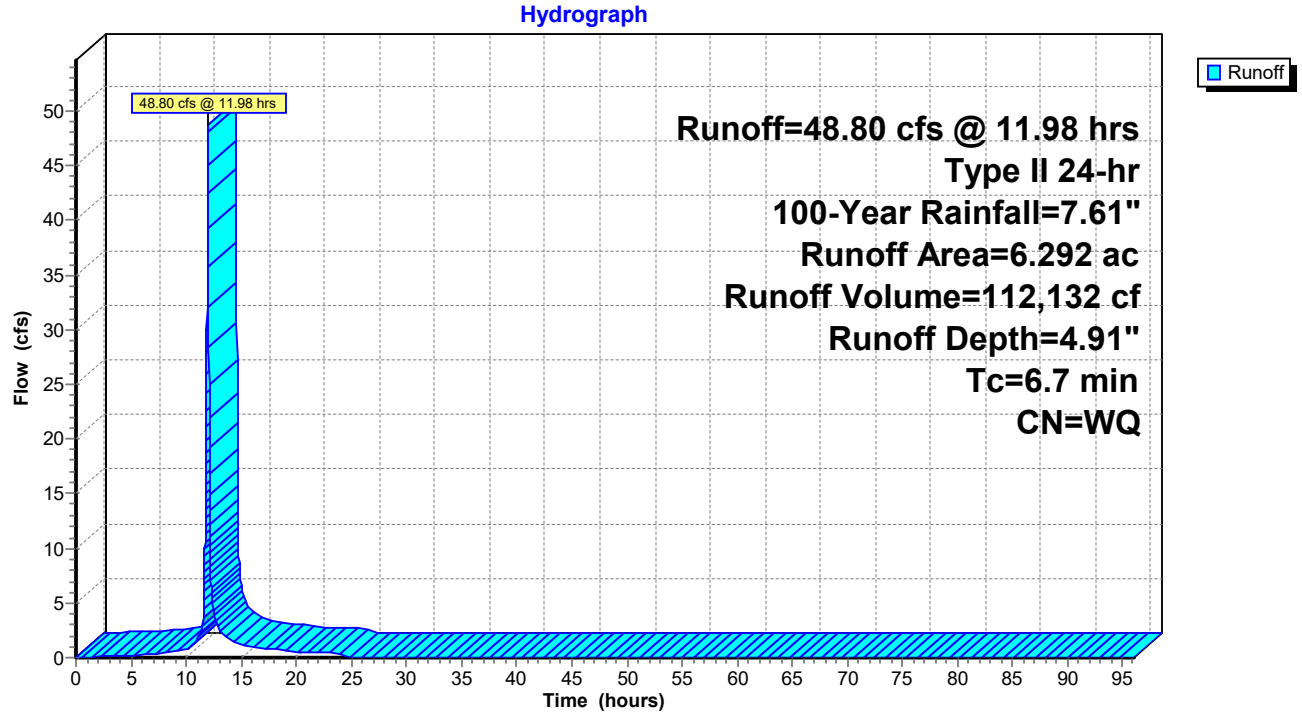
Runoff = 48.80 cfs @ 11.98 hrs, Volume= 112,132 cf, Depth= 4.91"
Routed to Pond 4P : Temporary Sediment Basin #4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=7.61"

	Area (ac)	CN	Description
*	1.650	98	Bare Construction Site
*	1.565	78	Farm / Straight Row / Good Condition / HSG B (Offsite)
*	0.394	98	Impervious (Offsite)
*	1.886	61	Open Space / Good Condition / HSG B (Offsite)
*	0.797	55	Woods / Good Condition / HSG B (Offsite)
	6.292		Weighted Average
	4.248		67.51% Pervious Area
	2.044		32.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7					**Direct Entry, Storm Sewer Tc**

Subcatchment 4D: Maximum Drainage Area to Temporary Sediment Basin #4



Summary for Pond 4P: Temporary Sediment Basin #4

Inflow Area = 274,080 sf, 32.49% Impervious, Inflow Depth = 4.91" for 100-Year event
Inflow = 48.80 cfs @ 11.98 hrs, Volume= 112,132 cf
Outflow = 16.10 cfs @ 12.10 hrs, Volume= 77,771 cf, Atten= 67%, Lag= 7.5 min
Primary = 16.10 cfs @ 12.10 hrs, Volume= 77,771 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 449.93' @ 12.10 hrs Surf.Area= 17,200 sf Storage= 54,647 cf

Plug-Flow detention time= 386.0 min calculated for 77,763 cf (69% of inflow)
Center-of-Mass det. time= 281.5 min (1,065.4 - 783.9)

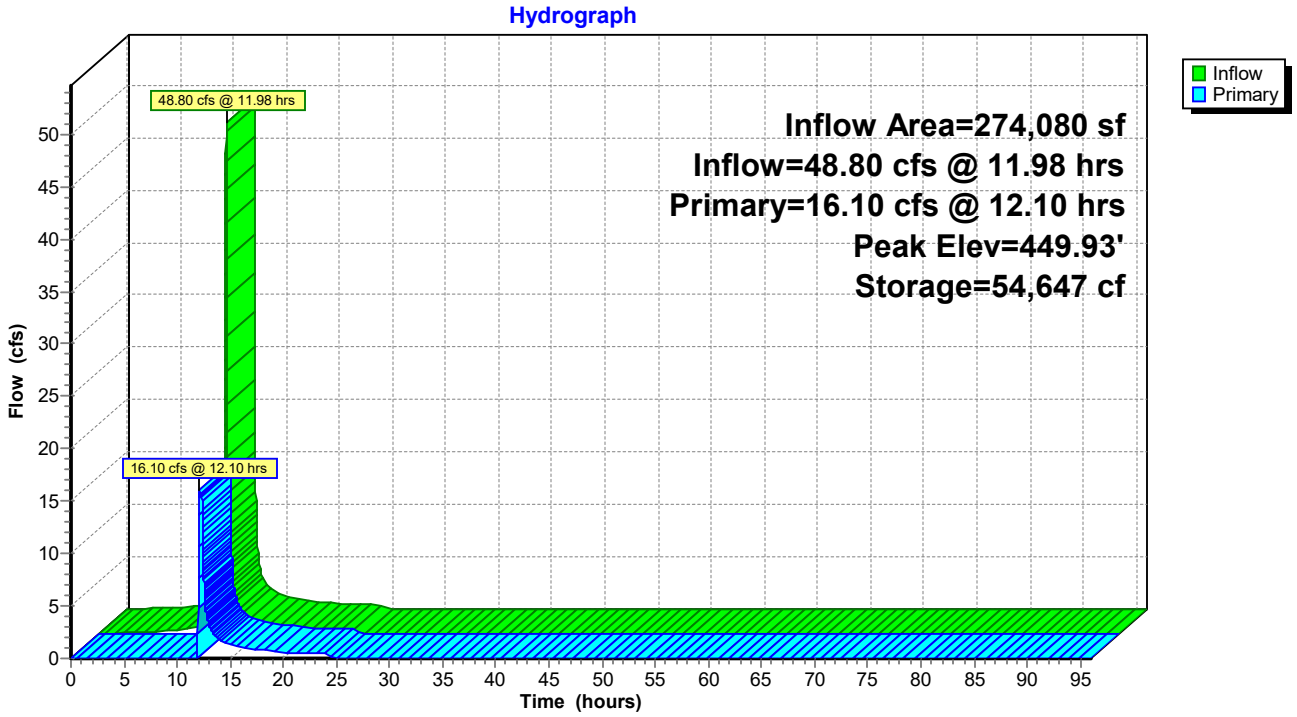
Volume	Invert	Avail.Storage	Storage Description
#1	446.00'	115,955 cf	**Basin Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
446.00	10,757	509.4	0	0	10,757
447.00	12,314	528.3	11,527	11,527	12,402
448.00	13,927	547.1	13,112	24,639	14,098
449.00	15,596	566.0	14,754	39,393	15,862
450.00	17,323	584.8	16,452	55,845	17,678
451.00	19,105	603.7	18,207	74,051	19,561
452.00	20,945	622.6	20,018	94,069	21,505
453.00	22,841	641.4	21,886	115,955	23,499

Device	Routing	Invert	Outlet Devices
#1	Primary	445.60'	**18.0" Round Primary Outlet Pipe** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 445.60' / 445.55' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	447.00'	**0.020 cfs Skimmer** Phase-In= 0.01'
#3	Device 1	449.00'	**24.0" x 45.0" Horiz. Type M Inlet (No Grate)** C= 0.600 Limited to weir flow at low heads
#4	Device 1	451.00'	**1.6" x 3.2" Horiz. Emergency Type DH Inlet X 7.00 columns** X 46 rows C= 0.600 in 24.0" x 93.0" Grate (74% open area) Limited to weir flow at low heads

Primary OutFlow Max=16.10 cfs @ 12.10 hrs HW=449.93' (Free Discharge)
└**1=Primary Outlet Pipe** (Inlet Controls 16.10 cfs @ 9.11 fps)
├**2=Skimmer** (Passes < 0.02 cfs potential flow)
├**3=Type M Inlet (No Grate)** (Passes < 33.73 cfs potential flow)
└**4=Emergency Type DH Inlet** (Controls 0.00 cfs)

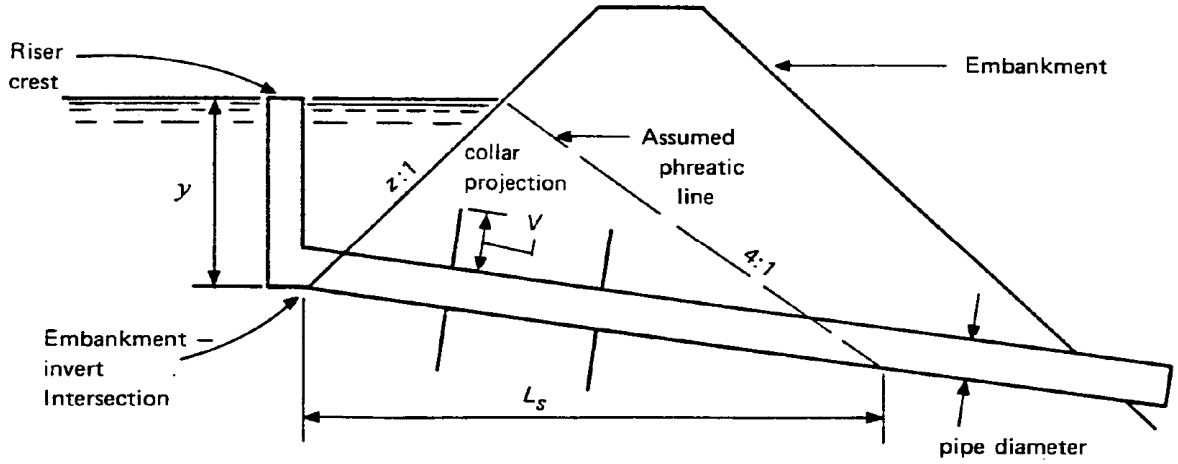
Pond 4P: Temporary Sediment Basin #4



ANTI-SEEP COLLAR DESIGN

STANDARD WORKSHEET # 18

Anti-seep Collar Design



BASIN NO.	TEMP. OR PERM.	Y (FT)	Z	Ls (FT)	Lf (FT)	V (IN)	BARREL DIA. (IN)	COLLAR SIZE (IN)	NO. COLLARS	COLLAR SPACING (FT)	DISTANCE TO 1ST COLLAR (FT)
1	P	10.16	3	74.1	85.2	34	24	92	2	15.0	6.0
2	P	7.53	3	54.9	63.1	25	24	74	2	11.0	15.0
3	P	4.17	3	29.8	34.3	14	24	52	2	10.0	12.0
4	P	4.46	3	31.9	36.6	29	18	76	1	7.0	15.0

EMERGENCY SPILLWAY DESIGN

Emergency Spillway Design - Basin 1

BASIN:	1
Project:	22-0123-005
Date:	1/3/2023

The basin will use an emergency spillway over the proposed berm to serve as an emergency outflow device. The spillway has been designed to convey the respective 100 year design flow entirely through the spillway **in the event that all primary outfall devices fail**. The following calculations demonstrate the adequacy of the emergency spillway:

1. 100-yr Peak Inflow to Basin, Q 354.57 CFS

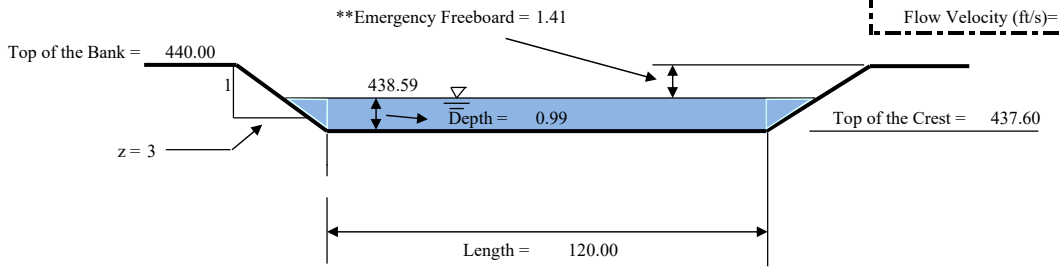
2. Spillway Design

Weir Coefficient, C =	3.0
Weir Length, L =	120.00
Flow Depth, H =	0.99
Freeboard (minimum 1' required) =	1.41

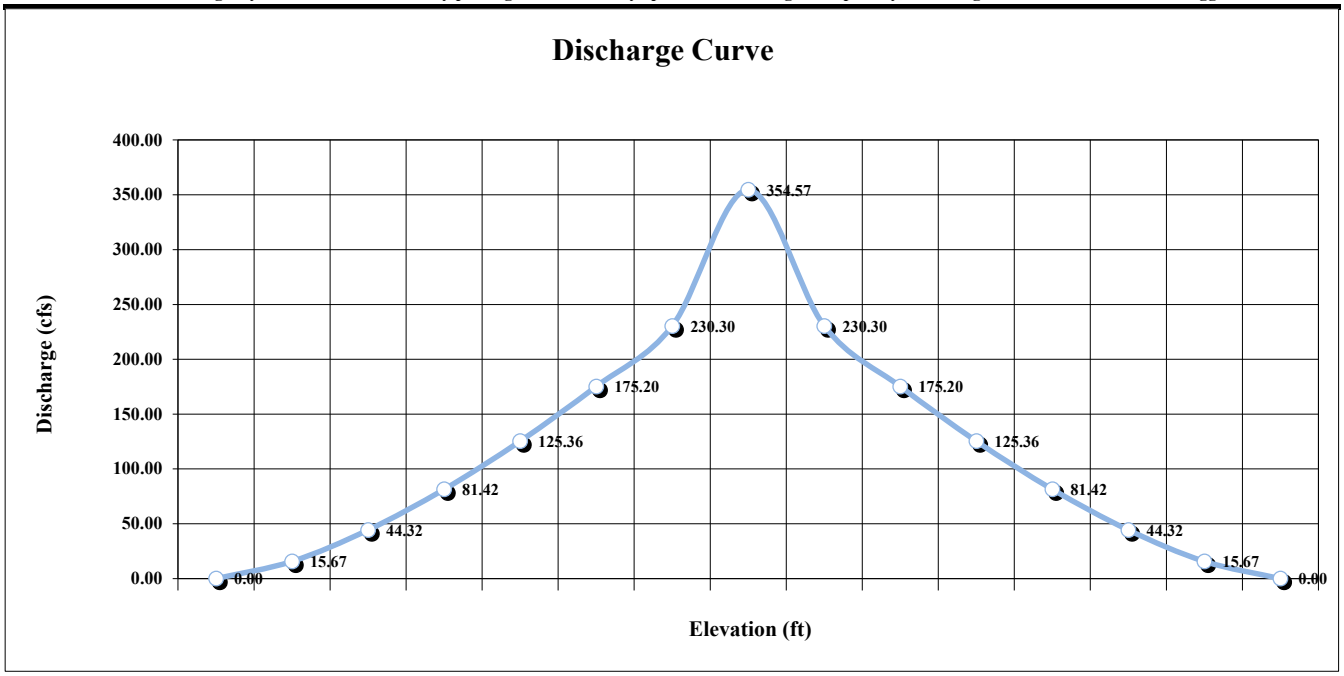
Weir Flow Equation: $Q=CLH^{3/2}$

3. Top of the Crest Elevation = 437.60
4. Top of the Berm Elevation = 440.00

Top Width (ft) =	134.40
Flow Area (SF)=	121.73
Flow Velocity (ft/s)=	2.91



****Note: Emergency Freeboard calculated by passing the entire 100-yr post inflow through the spillway, assuming all outfall structures are clogged.**



Emergency Spillway Design - Basin 2

BASIN:	2
Project:	22-0123-005
Date:	1/3/2023

The basin will use an emergency spillway over the proposed berm to serve as an emergency outflow device. The spillway has been designed to convey the respective 100 year design flow entirely through the spillway **in the event that all primary outfall devices fail**. The following calculations demonstrate the adequacy of the emergency spillway:

1. 100-yr Peak Inflow to Basin, Q 318.00 CFS

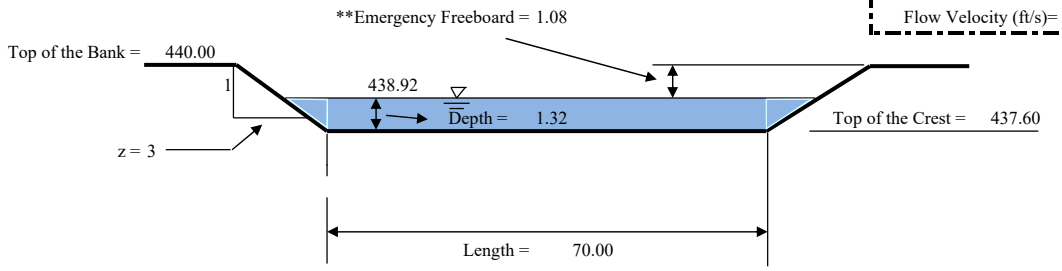
2. Spillway Design

Weir Coefficient, C =	3.0
Weir Length, L =	70.00
Flow Depth, H =	1.32
Freeboard (minimum 1' required) =	1.08

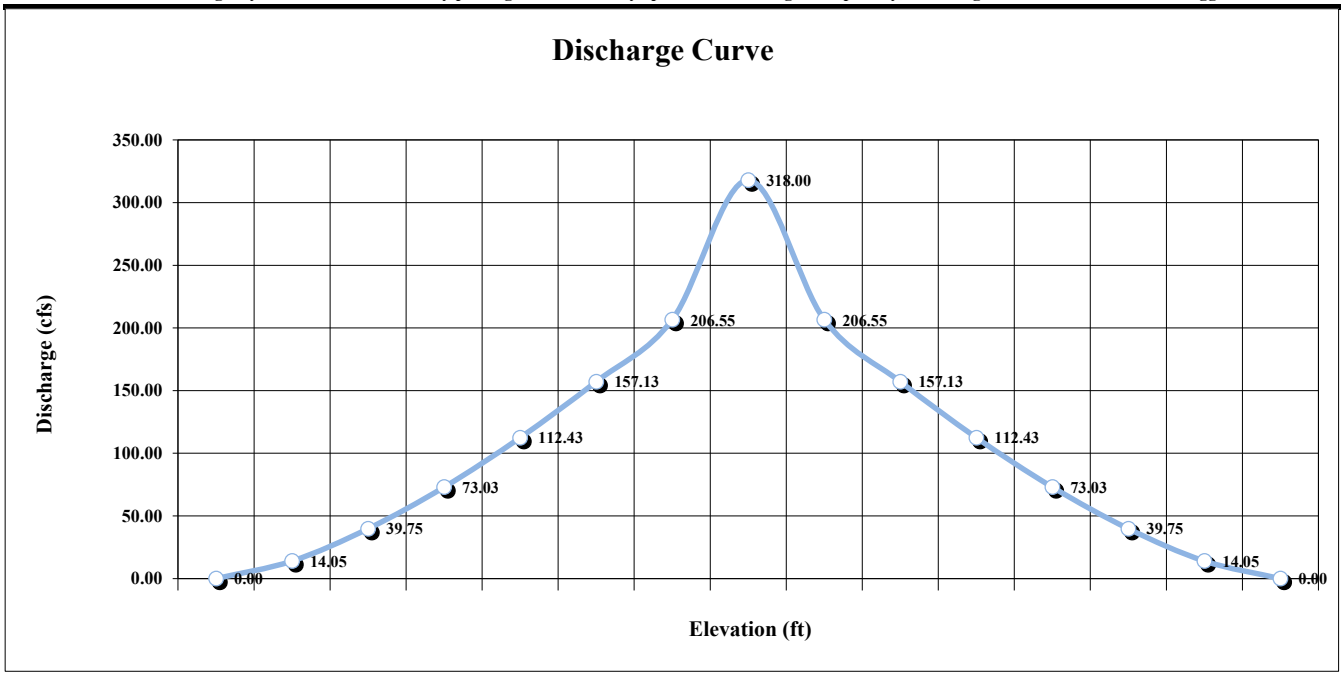
Weir Flow Equation: $Q=CLH^{3/2}$

3. Top of the Crest Elevation = 437.60
4. Top of the Berm Elevation = 440.00

Top Width (ft) =	84.40
Flow Area (SF)=	97.52
Flow Velocity (ft/s)=	3.26



****Note: Emergency Freeboard calculated by passing the entire 100-yr post inflow through the spillway, assuming all outfall structures are clogged.**



Emergency Spillway Design - Basin 3

BASIN:	3
Project:	22-0123-005
Date:	1/3/2023

The basin will use an emergency spillway over the proposed berm to serve as an emergency outflow device. The spillway has been designed to convey the respective 100 year design flow entirely through the spillway **in the event that all primary outfall devices fail**. The following calculations demonstrate the adequacy of the emergency spillway:

1. 100-yr Peak Inflow to Basin, Q 72.11 CFS

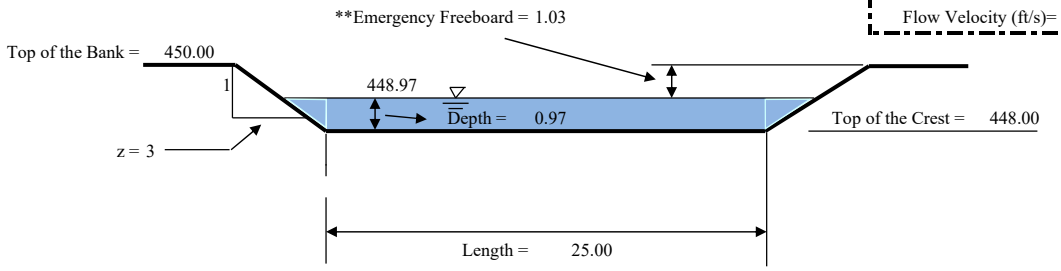
2. Spillway Design

Weir Coefficient, C =	3.0
Weir Length, L =	25.00
Flow Depth, H =	0.97
Freeboard (minimum 1' required) =	1.03

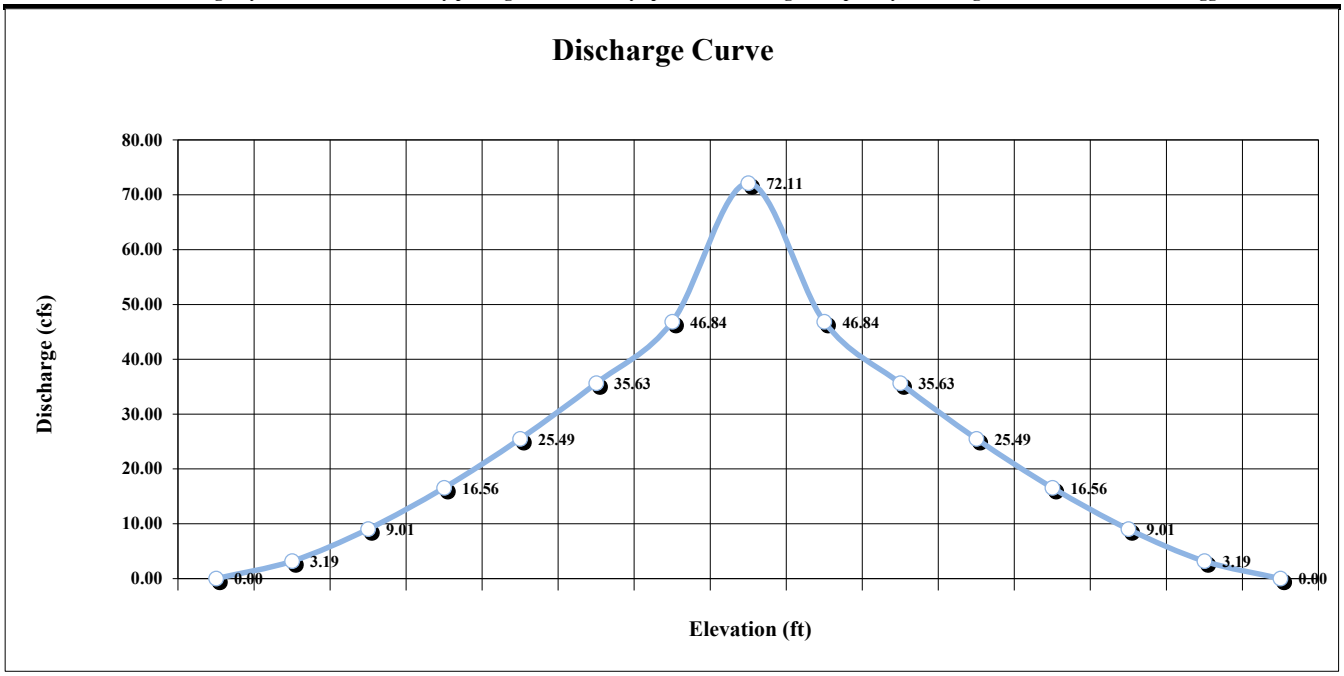
Weir Flow Equation: $Q=CLH^{3/2}$

3. Top of the Crest Elevation = 448.00
4. Top of the Berm Elevation = 450.00

Top Width (ft) =	37.00
Flow Area (SF)=	27.20
Flow Velocity (ft/s)=	2.65



****Note: Emergency Freeboard calculated by passing the entire 100-yr post inflow through the spillway, assuming all outfall structures are clogged.**



STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		1-Spillway	2-Spillway	3-Spillway		
TEMPORARY OR PERMANENT	(T OR P)	P	P	P		
DESIGN STORM	~~(2,5, OR 10 YR)~~	100 YR	100 YR	100 YR		
ACRES	(AC)	N/A	N/A	N/A		
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	N/A	N/A	N/A		
Qr (REQUIRED CAPACITY)	(CFS)	354.57	318.00	72.11		
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	354.59	318.00	72.11		
PROTECTIVE LINING		SC250	SC250	SC250		
n (MANNING'S COEFFICIENT)[2]		0.040	0.040	0.040		
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A	N/A		
V (CALCULATED AT FLOW DEPTH d)	(FPS)	9.64	11.37	9.34		
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	10.00	10.00	10.00		
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	6.32	8.17	6.20		
CHANNEL BOTTOM WIDTH	(FT)	120.0	70.0	25.0		
CHANNEL SIDE SLOPES	(H:1)	3.0	3.0	3.0		
D (TOTAL DEPTH)	(FT)	1.0	1.0	1.0		
CHANNEL TOP WIDTH @ D	(FT)	126.0	76.0	31.0		
d (CALCULATED FLOW DEPTH)	(FT)	0.3	0.4	0.3		
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	121.8	72.4	26.8		
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	394.65:1	178.12:1	83.82:1		
d_{50} STONE SIZE	(IN)	-	-	-		
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	36.77	27.97	7.72		
R (HYDRAULIC RADIUS)		0.30	0.39	0.29		
S (BED SLOPE)[3]	(FT/FT)	0.333	0.333	0.333		
S_c (CRITICAL SLOPE)	(FT/FT)	0.035	0.032	0.035		
$.7S_c$	(FT/FT)	0.024	0.022	0.025		
$1.3S_c$	(FT/FT)	0.045	0.042	0.046		
STABLE FLOW?	(Y/N)	Yes	Yes	Yes		
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-	-		
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	0.70	0.61	0.70		
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50	0.50		
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S		
VEGETATED OR UNVEGETATED?		Vegetated	Vegetated	Vegetated		

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.

5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

Summary for Pond 1P: MRC Facility #1

Inflow Area = 2,089,816 sf, 83.11% Impervious, Inflow Depth = 6.64" for 100-Year event
Inflow = 354.57 cfs @ 12.07 hrs, Volume= 1,155,746 cf
Outflow = 334.51 cfs @ 12.11 hrs, Volume= 1,106,308 cf, Atten= 6%, Lag= 2.6 min
Discarded = 0.18 cfs @ 6.28 hrs, Volume= 60,110 cf
Primary = 27.59 cfs @ 12.11 hrs, Volume= 213,239 cf
Routed to Link 1L : Discharge Point 001
Secondary = 306.74 cfs @ 12.11 hrs, Volume= 832,959 cf
Routed to Pond 2P : SWM/BMP Facility #2

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 438.67' @ 12.11 hrs Surf.Area= 76,079 sf Storage= 262,949 cf

Plug-Flow detention time= 428.6 min calculated for 1,106,193 cf (96% of inflow)
Center-of-Mass det. time= 402.3 min (1,156.9 - 754.6)

Volume	Invert	Avail.Storage	Storage Description
#1	433.00'	55,746 cf	**Soil Storage (Irregular)** Listed below (Recalc)
#2	436.00'	19,995 cf	**Forebay 1-0 Storage (Irregular)** Listed below (Recalc) -Impervious
#3	436.00'	306,235 cf	**Main Storage (Irregular)** Listed below (Recalc) -Impervious
		381,976 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
433.00	72,050	1,333.3	0.0	0	0	72,050
434.00	73,387	1,339.6	15.0	10,908	10,908	73,943
435.00	74,730	1,345.9	30.0	22,217	33,125	75,844
436.00	76,079	1,352.1	30.0	22,621	55,746	77,739

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
436.00	8,843	372.7	0	0	8,843
437.00	9,989	391.6	9,410	9,410	10,054
438.00	11,192	410.4	10,585	19,995	11,319

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
436.00	63,692	1,350.8	0	0	63,692
437.00	67,772	1,369.6	65,721	65,721	67,983
438.00	71,909	1,388.5	69,830	135,552	72,355
439.00	88,502	1,408.7	80,062	215,614	77,063
440.00	92,757	1,427.5	90,621	306,235	81,537

Device	Routing	Invert	Outlet Devices
#1	Primary	428.51'	**24.0" Round Primary Outlet Pipe** L= 46.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 428.51' / 428.05' S= 0.0099 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	434.00'	**2.9" Vert. MRC Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	437.70'	**1.6" x 3.2" Horiz. Type M Inlet X 7.00 columns**

			X 23 rows C= 0.600 in 24.0" x 45.0" Grate (76% open area)
			Limited to weir flow at low heads
#4	Secondary	437.70'	**120.0' long + 3.0 '/' SideZ x 22.0' breadth Overflow Spillway**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#5	Discarded	433.00'	**0.100 in/hr Infiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.18 cfs @ 6.28 hrs HW=436.00' (Free Discharge)
└**5=Infiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=27.59 cfs @ 12.11 hrs HW=438.67' (Free Discharge)
└**1=Primary Outlet Pipe** (Passes 27.59 cfs of 45.78 cfs potential flow)
  ├**2=MRC Orifice** (Orifice Controls 0.47 cfs @ 10.27 fps)
  └**3=Type M Inlet** (Orifice Controls 27.12 cfs @ 4.74 fps)

Secondary OutFlow Max=306.62 cfs @ 12.11 hrs HW=438.67' (Free Discharge)
└**4=Overflow Spillway** (Weir Controls 306.62 cfs @ 2.58 fps)

Summary for Pond 2P: SWM/BMP Facility #2

Inflow Area = 328,533 sf, 0.00% Impervious, Inflow Depth = 33.30" for 100-Year event
Inflow = 318.00 cfs @ 12.10 hrs, Volume= 911,696 cf
Outflow = 36.07 cfs @ 12.77 hrs, Volume= 868,103 cf, Atten= 89%, Lag= 40.0 min
Primary = 36.07 cfs @ 12.77 hrs, Volume= 868,103 cf
Routed to Link 1L : Discharge Point 001
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 1L : Discharge Point 001

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 437.31' @ 12.77 hrs Surf.Area= 105,667 sf Storage= 521,705 cf

Plug-Flow detention time= 761.0 min calculated for 868,013 cf (95% of inflow)
Center-of-Mass det. time= 734.3 min (1,554.3 - 820.0)

Volume	Invert	Avail.Storage	Storage Description
#1	431.50'	826,303 cf	**Basin Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
431.50	75,829	1,764.7	0.0	0	0	75,829
432.00	76,712	1,767.8	100.0	38,135	38,135	77,070
433.00	82,044	1,786.7	100.0	79,363	117,498	82,703
434.00	87,432	1,805.5	100.0	84,724	202,222	88,370
435.00	92,877	1,824.4	100.0	90,141	292,363	94,123
436.00	98,379	1,843.2	100.0	95,615	387,977	99,908
437.00	103,937	1,862.1	100.0	101,145	489,123	105,781
438.00	109,551	1,880.9	100.0	106,732	595,854	111,685
439.00	115,222	1,899.8	100.0	112,375	708,229	117,677
440.00	120,950	1,918.6	100.0	118,074	826,303	123,700

Device	Routing	Invert	Outlet Devices
#1	Primary	429.78'	**24.0" Round Outlet Pipe** L= 55.6' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 429.78' / 429.22' S= 0.0101 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	432.00'	**10.0" W x 6.0" H Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	436.00'	**1.6" x 3.2" Horiz. Type M Inlet X 23.00 columns** X 7 rows C= 0.600 in 24.0" x 45.0" Grate (76% open area) Limited to weir flow at low heads
#4	Secondary	437.60'	**70.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.07 cfs @ 12.77 hrs HW=437.31' (Free Discharge)
└**1=Outlet Pipe** (Passes 36.07 cfs of 46.50 cfs potential flow)
└**2=Orifice** (Orifice Controls 4.51 cfs @ 10.83 fps)
└**3=Type M Inlet** (Orifice Controls 31.56 cfs @ 5.51 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=431.50' (Free Discharge)
└**4=Emergency Spillway** (Controls 0.00 cfs)

Summary for Pond 3P: MRC #3

Inflow Area = 427,293 sf, 25.58% Impervious, Inflow Depth = 4.87" for 100-Year event
Inflow = 72.11 cfs @ 12.00 hrs, Volume= 173,587 cf
Outflow = 2.09 cfs @ 14.70 hrs, Volume= 172,299 cf, Atten= 97%, Lag= 162.3 min
Discarded = 0.05 cfs @ 9.82 hrs, Volume= 17,138 cf
Primary = 2.04 cfs @ 14.70 hrs, Volume= 155,161 cf
Routed to Link 3L : Discharge Point 003
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 3L : Discharge Point 003

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 445.98' @ 14.70 hrs Surf.Area= 22,020 sf Storage= 111,874 cf

Plug-Flow detention time= 789.0 min calculated for 172,299 cf (99% of inflow)
Center-of-Mass det. time= 784.2 min (1,576.8 - 792.6)

Volume	Invert	Avail.Storage	Storage Description
#1	440.00'	9,691 cf	**Soil Storage (Irregular)** Listed below (Recalc)
#2	442.00'	237,461 cf	**Basin Storage (Irregular)** Listed below (Recalc) -Impervious
		247,153 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
440.00	20,864	272.0	0.0	0	0	20,864
441.00	21,439	578.3	15.0	3,173	3,173	41,594
442.00	22,020	587.6	30.0	6,519	9,691	42,635

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	22,020	584.6	0	0	22,020
443.00	23,802	603.4	22,905	22,905	23,894
444.00	25,641	622.3	24,716	47,621	25,837
445.00	27,536	641.1	26,583	74,204	27,830
446.00	29,488	660.0	28,506	102,710	29,892
447.00	31,496	678.8	30,486	133,197	32,003
448.00	33,561	697.7	32,523	165,720	34,185
449.00	35,682	716.5	34,616	200,336	36,416
450.00	38,588	768.5	37,126	237,461	42,606

Device	Routing	Invert	Outlet Devices
#1	Primary	441.81'	**24.0" Round Primary Outlet Pipe** L= 51.9' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 441.81' / 441.55' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	441.00'	**2.0" Vert. MRC Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	442.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.00'	**1.6" x 3.2" Horiz. Type M Inlet X 7.00 columns** X 23 rows C= 0.600 in 24.0" x 45.0" Grate (76% open area) Limited to weir flow at low heads
#5	Secondary	448.00'	**25.0' long + 3.0 '/' SideZ x 22.0' breadth Emergency Spillway**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#6 Discarded 440.00' **0.100 in/hr Infiltration over Surface area** Phase-In= 0.01'

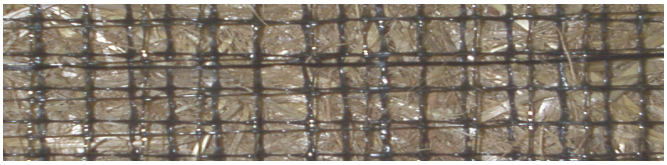
Discarded OutFlow Max=0.05 cfs @ 9.82 hrs HW=442.00' (Free Discharge)
└**6=Infiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=2.04 cfs @ 14.70 hrs HW=445.98' (Free Discharge)
└**1=Primary Outlet Pipe** (Passes 2.04 cfs of 26.94 cfs potential flow)
├**2=MRC Orifice** (Orifice Controls 0.21 cfs @ 9.83 fps)
├**3=Orifice** (Orifice Controls 1.83 cfs @ 9.30 fps)
└**4=Type M Inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=440.00' (Free Discharge)
└**5=Emergency Spillway** (Controls 0.00 cfs)

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet
VMax® SC250® Turf Reinforcement Mat



DESCRIPTION

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 70% straw and 30% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The SC250 shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	70% Straw Fiber	0.35 lb/sq yd (0.19 kg/sm)
	30% Coconut Fiber	0.15 lbs/sq yd (0.08 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene	5 lb/1000 sq ft (2.44 kg/100 sm)
	Middle, Corrugated UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene, UV Stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44m)
Length	55.5 ft (16.9 m)	90 ft (27.4 m)
Weight ± 10%	34 lbs (15.42 kg)	70 lbs (31.8 kg)
Area	40 sq yd (33.4 sm)	80 sq. yd. (66.8 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.62 in. (15.75 mm)
Resiliency	ASTM 6524	95.2%
Density	ASTM D792	0.891 g/cm^3
Mass/Unit Area	ASTM 6566	16.13 oz/sy (548 g/sm)
UV Stability	ASTM D4355/ 1000 HR	80%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz-in.
Light Penetration	ASTM D6567	4.1%
Tensile Strength – MD	ASTM D6818	709 lbs/ft (10.51 kN/m)
Elongation – MD	ASTM D6818	23.9%
Tensile Strength – TD	ASTM D6818	712 lbs/ft (10.56 kN/m)
Elongation – TD	ASTM D6818	36.9%
Biomass Improvement	ASTM D7322	441%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.5 psf (120 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	10.0 psf (480 Pa)	8.0 psf (383 Pa)
Unvegetated Velocity	9.5 fps (2.9 m/s)	
Vegetated Velocity	15 fps (4.6 m/s)	

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2.1	≥ 2:1
≤ 20 ft (6 m)	0.0010	0.0209	0.0507
20-50 ft	0.0081	0.0266	0.0574
≥ 50 ft (15.2 m)	0.0455	0.0555	0.081

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.040
0.50 – 2.0 ft	0.040-0.012
≥ 2.0 ft (0.60 m)	0.011

NORTH AMERICAN GREEN®

Western Green
4609 E. Boonville-New Harmony Rd.
Evansville, IN 47725

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800-772-2040

Summary for Pond 4P-ES: MRC #4 (Emergency Spillway Only)

Inflow Area = 274,116 sf, 15.62% Impervious, Inflow Depth = 5.03" for 100-Year event
Inflow = 51.76 cfs @ 11.98 hrs, Volume= 114,880 cf
Outflow = 4.05 cfs @ 12.55 hrs, Volume= 47,011 cf, Atten= 92%, Lag= 34.2 min
Primary = 4.05 cfs @ 12.55 hrs, Volume= 47,011 cf

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 451.16' @ 12.55 hrs Surf.Area= 12,314 sf Storage= 70,932 cf

Plug-Flow detention time= 310.0 min calculated for 47,006 cf (41% of inflow)
Center-of-Mass det. time= 179.0 min (974.0 - 795.0)

Volume	Invert	Avail.Storage	Storage Description
#1	445.00'	5,344 cf	**Soil Storage (Irregular)** Listed below (Recalc)
#2	447.00'	104,429 cf	**Basin Storage (Irregular)** Listed below (Recalc) -Impervious
		109,773 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
445.00	11,270	515.7	0.0	0	0	11,270
446.00	11,788	522.0	15.0	1,729	1,729	12,005
447.00	12,314	528.3	30.0	3,615	5,344	12,748

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
447.00	12,314	528.3	0	0	12,314
448.00	13,927	547.1	13,112	13,112	14,010
449.00	15,596	566.0	14,754	27,866	15,775
450.00	17,323	584.8	16,452	44,318	17,590
451.00	19,105	603.7	18,207	62,525	19,474
452.00	20,945	622.6	20,018	82,542	21,417
453.00	22,841	641.4	21,886	104,429	23,411

Device	Routing	Invert	Outlet Devices
#1	Primary	451.00'	**1.6" x 3.2" Horiz. Emergency Type DH Inlet X 7.00 columns** X 46 rows C= 0.600 in 24.0" x 93.0" Grate (74% open area) Limited to weir flow at low heads

Primary OutFlow Max=4.05 cfs @ 12.55 hrs HW=451.16' (Free Discharge)
└**1=Emergency Type DH Inlet** (Weir Controls 4.05 cfs @ 1.30 fps)

Stage-Discharge for Pond 4P-ES: MRC #4 (Emergency Spillway Only)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
445.00	0.00	445.52	0.00	446.04	0.00	446.56	0.00
445.01	0.00	445.53	0.00	446.05	0.00	446.57	0.00
445.02	0.00	445.54	0.00	446.06	0.00	446.58	0.00
445.03	0.00	445.55	0.00	446.07	0.00	446.59	0.00
445.04	0.00	445.56	0.00	446.08	0.00	446.60	0.00
445.05	0.00	445.57	0.00	446.09	0.00	446.61	0.00
445.06	0.00	445.58	0.00	446.10	0.00	446.62	0.00
445.07	0.00	445.59	0.00	446.11	0.00	446.63	0.00
445.08	0.00	445.60	0.00	446.12	0.00	446.64	0.00
445.09	0.00	445.61	0.00	446.13	0.00	446.65	0.00
445.10	0.00	445.62	0.00	446.14	0.00	446.66	0.00
445.11	0.00	445.63	0.00	446.15	0.00	446.67	0.00
445.12	0.00	445.64	0.00	446.16	0.00	446.68	0.00
445.13	0.00	445.65	0.00	446.17	0.00	446.69	0.00
445.14	0.00	445.66	0.00	446.18	0.00	446.70	0.00
445.15	0.00	445.67	0.00	446.19	0.00	446.71	0.00
445.16	0.00	445.68	0.00	446.20	0.00	446.72	0.00
445.17	0.00	445.69	0.00	446.21	0.00	446.73	0.00
445.18	0.00	445.70	0.00	446.22	0.00	446.74	0.00
445.19	0.00	445.71	0.00	446.23	0.00	446.75	0.00
445.20	0.00	445.72	0.00	446.24	0.00	446.76	0.00
445.21	0.00	445.73	0.00	446.25	0.00	446.77	0.00
445.22	0.00	445.74	0.00	446.26	0.00	446.78	0.00
445.23	0.00	445.75	0.00	446.27	0.00	446.79	0.00
445.24	0.00	445.76	0.00	446.28	0.00	446.80	0.00
445.25	0.00	445.77	0.00	446.29	0.00	446.81	0.00
445.26	0.00	445.78	0.00	446.30	0.00	446.82	0.00
445.27	0.00	445.79	0.00	446.31	0.00	446.83	0.00
445.28	0.00	445.80	0.00	446.32	0.00	446.84	0.00
445.29	0.00	445.81	0.00	446.33	0.00	446.85	0.00
445.30	0.00	445.82	0.00	446.34	0.00	446.86	0.00
445.31	0.00	445.83	0.00	446.35	0.00	446.87	0.00
445.32	0.00	445.84	0.00	446.36	0.00	446.88	0.00
445.33	0.00	445.85	0.00	446.37	0.00	446.89	0.00
445.34	0.00	445.86	0.00	446.38	0.00	446.90	0.00
445.35	0.00	445.87	0.00	446.39	0.00	446.91	0.00
445.36	0.00	445.88	0.00	446.40	0.00	446.92	0.00
445.37	0.00	445.89	0.00	446.41	0.00	446.93	0.00
445.38	0.00	445.90	0.00	446.42	0.00	446.94	0.00
445.39	0.00	445.91	0.00	446.43	0.00	446.95	0.00
445.40	0.00	445.92	0.00	446.44	0.00	446.96	0.00
445.41	0.00	445.93	0.00	446.45	0.00	446.97	0.00
445.42	0.00	445.94	0.00	446.46	0.00	446.98	0.00
445.43	0.00	445.95	0.00	446.47	0.00	446.99	0.00
445.44	0.00	445.96	0.00	446.48	0.00	447.00	0.00
445.45	0.00	445.97	0.00	446.49	0.00	447.01	0.00
445.46	0.00	445.98	0.00	446.50	0.00	447.02	0.00
445.47	0.00	445.99	0.00	446.51	0.00	447.03	0.00
445.48	0.00	446.00	0.00	446.52	0.00	447.04	0.00
445.49	0.00	446.01	0.00	446.53	0.00	447.05	0.00
445.50	0.00	446.02	0.00	446.54	0.00	447.06	0.00
445.51	0.00	446.03	0.00	446.55	0.00	447.07	0.00

Stage-Discharge for Pond 4P-ES: MRC #4 (Emergency Spillway Only) (continued)

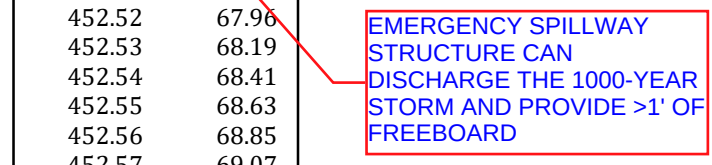
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
447.08	0.00	447.60	0.00	448.12	0.00	448.64	0.00
447.09	0.00	447.61	0.00	448.13	0.00	448.65	0.00
447.10	0.00	447.62	0.00	448.14	0.00	448.66	0.00
447.11	0.00	447.63	0.00	448.15	0.00	448.67	0.00
447.12	0.00	447.64	0.00	448.16	0.00	448.68	0.00
447.13	0.00	447.65	0.00	448.17	0.00	448.69	0.00
447.14	0.00	447.66	0.00	448.18	0.00	448.70	0.00
447.15	0.00	447.67	0.00	448.19	0.00	448.71	0.00
447.16	0.00	447.68	0.00	448.20	0.00	448.72	0.00
447.17	0.00	447.69	0.00	448.21	0.00	448.73	0.00
447.18	0.00	447.70	0.00	448.22	0.00	448.74	0.00
447.19	0.00	447.71	0.00	448.23	0.00	448.75	0.00
447.20	0.00	447.72	0.00	448.24	0.00	448.76	0.00
447.21	0.00	447.73	0.00	448.25	0.00	448.77	0.00
447.22	0.00	447.74	0.00	448.26	0.00	448.78	0.00
447.23	0.00	447.75	0.00	448.27	0.00	448.79	0.00
447.24	0.00	447.76	0.00	448.28	0.00	448.80	0.00
447.25	0.00	447.77	0.00	448.29	0.00	448.81	0.00
447.26	0.00	447.78	0.00	448.30	0.00	448.82	0.00
447.27	0.00	447.79	0.00	448.31	0.00	448.83	0.00
447.28	0.00	447.80	0.00	448.32	0.00	448.84	0.00
447.29	0.00	447.81	0.00	448.33	0.00	448.85	0.00
447.30	0.00	447.82	0.00	448.34	0.00	448.86	0.00
447.31	0.00	447.83	0.00	448.35	0.00	448.87	0.00
447.32	0.00	447.84	0.00	448.36	0.00	448.88	0.00
447.33	0.00	447.85	0.00	448.37	0.00	448.89	0.00
447.34	0.00	447.86	0.00	448.38	0.00	448.90	0.00
447.35	0.00	447.87	0.00	448.39	0.00	448.91	0.00
447.36	0.00	447.88	0.00	448.40	0.00	448.92	0.00
447.37	0.00	447.89	0.00	448.41	0.00	448.93	0.00
447.38	0.00	447.90	0.00	448.42	0.00	448.94	0.00
447.39	0.00	447.91	0.00	448.43	0.00	448.95	0.00
447.40	0.00	447.92	0.00	448.44	0.00	448.96	0.00
447.41	0.00	447.93	0.00	448.45	0.00	448.97	0.00
447.42	0.00	447.94	0.00	448.46	0.00	448.98	0.00
447.43	0.00	447.95	0.00	448.47	0.00	448.99	0.00
447.44	0.00	447.96	0.00	448.48	0.00	449.00	0.00
447.45	0.00	447.97	0.00	448.49	0.00	449.01	0.00
447.46	0.00	447.98	0.00	448.50	0.00	449.02	0.00
447.47	0.00	447.99	0.00	448.51	0.00	449.03	0.00
447.48	0.00	448.00	0.00	448.52	0.00	449.04	0.00
447.49	0.00	448.01	0.00	448.53	0.00	449.05	0.00
447.50	0.00	448.02	0.00	448.54	0.00	449.06	0.00
447.51	0.00	448.03	0.00	448.55	0.00	449.07	0.00
447.52	0.00	448.04	0.00	448.56	0.00	449.08	0.00
447.53	0.00	448.05	0.00	448.57	0.00	449.09	0.00
447.54	0.00	448.06	0.00	448.58	0.00	449.10	0.00
447.55	0.00	448.07	0.00	448.59	0.00	449.11	0.00
447.56	0.00	448.08	0.00	448.60	0.00	449.12	0.00
447.57	0.00	448.09	0.00	448.61	0.00	449.13	0.00
447.58	0.00	448.10	0.00	448.62	0.00	449.14	0.00
447.59	0.00	448.11	0.00	448.63	0.00	449.15	0.00

Stage-Discharge for Pond 4P-ES: MRC #4 (Emergency Spillway Only) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
449.16	0.00	449.68	0.00	450.20	0.00	450.72	0.00
449.17	0.00	449.69	0.00	450.21	0.00	450.73	0.00
449.18	0.00	449.70	0.00	450.22	0.00	450.74	0.00
449.19	0.00	449.71	0.00	450.23	0.00	450.75	0.00
449.20	0.00	449.72	0.00	450.24	0.00	450.76	0.00
449.21	0.00	449.73	0.00	450.25	0.00	450.77	0.00
449.22	0.00	449.74	0.00	450.26	0.00	450.78	0.00
449.23	0.00	449.75	0.00	450.27	0.00	450.79	0.00
449.24	0.00	449.76	0.00	450.28	0.00	450.80	0.00
449.25	0.00	449.77	0.00	450.29	0.00	450.81	0.00
449.26	0.00	449.78	0.00	450.30	0.00	450.82	0.00
449.27	0.00	449.79	0.00	450.31	0.00	450.83	0.00
449.28	0.00	449.80	0.00	450.32	0.00	450.84	0.00
449.29	0.00	449.81	0.00	450.33	0.00	450.85	0.00
449.30	0.00	449.82	0.00	450.34	0.00	450.86	0.00
449.31	0.00	449.83	0.00	450.35	0.00	450.87	0.00
449.32	0.00	449.84	0.00	450.36	0.00	450.88	0.00
449.33	0.00	449.85	0.00	450.37	0.00	450.89	0.00
449.34	0.00	449.86	0.00	450.38	0.00	450.90	0.00
449.35	0.00	449.87	0.00	450.39	0.00	450.91	0.00
449.36	0.00	449.88	0.00	450.40	0.00	450.92	0.00
449.37	0.00	449.89	0.00	450.41	0.00	450.93	0.00
449.38	0.00	449.90	0.00	450.42	0.00	450.94	0.00
449.39	0.00	449.91	0.00	450.43	0.00	450.95	0.00
449.40	0.00	449.92	0.00	450.44	0.00	450.96	0.00
449.41	0.00	449.93	0.00	450.45	0.00	450.97	0.00
449.42	0.00	449.94	0.00	450.46	0.00	450.98	0.00
449.43	0.00	449.95	0.00	450.47	0.00	450.99	0.00
449.44	0.00	449.96	0.00	450.48	0.00	451.00	0.00
449.45	0.00	449.97	0.00	450.49	0.00	451.01	0.06
449.46	0.00	449.98	0.00	450.50	0.00	451.02	0.18
449.47	0.00	449.99	0.00	450.51	0.00	451.03	0.33
449.48	0.00	450.00	0.00	450.52	0.00	451.04	0.51
449.49	0.00	450.01	0.00	450.53	0.00	451.05	0.71
449.50	0.00	450.02	0.00	450.54	0.00	451.06	0.94
449.51	0.00	450.03	0.00	450.55	0.00	451.07	1.18
449.52	0.00	450.04	0.00	450.56	0.00	451.08	1.44
449.53	0.00	450.05	0.00	450.57	0.00	451.09	1.72
449.54	0.00	450.06	0.00	450.58	0.00	451.10	2.02
449.55	0.00	450.07	0.00	450.59	0.00	451.11	2.33
449.56	0.00	450.08	0.00	450.60	0.00	451.12	2.65
449.57	0.00	450.09	0.00	450.61	0.00	451.13	2.99
449.58	0.00	450.10	0.00	450.62	0.00	451.14	3.34
449.59	0.00	450.11	0.00	450.63	0.00	451.15	3.70
449.60	0.00	450.12	0.00	450.64	0.00	451.16	4.08
449.61	0.00	450.13	0.00	450.65	0.00	451.17	4.47
449.62	0.00	450.14	0.00	450.66	0.00	451.18	4.87
449.63	0.00	450.15	0.00	450.67	0.00	451.19	5.28
449.64	0.00	450.16	0.00	450.68	0.00	451.20	5.70
449.65	0.00	450.17	0.00	450.69	0.00	451.21	6.14
449.66	0.00	450.18	0.00	450.70	0.00	451.22	6.58
449.67	0.00	450.19	0.00	450.71	0.00	451.23	7.03

Stage-Discharge for Pond 4P-ES: MRC #4 (Emergency Spillway Only) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
451.24	7.50	451.76	42.25	452.28	62.37	452.80	73.96
451.25	7.97	451.77	43.08	452.29	62.61	452.81	74.16
451.26	8.45	451.78	43.93	452.30	62.85	452.82	74.37
451.27	8.95	451.79	44.77	452.31	63.09	452.83	74.57
451.28	9.45	451.80	45.63	452.32	63.34	452.84	74.78
451.29	9.96	451.81	46.48	452.33	63.57	452.85	74.98
451.30	10.48	451.82	47.35	452.34	63.81	452.86	75.18
451.31	11.01	451.83	48.22	452.35	64.05	452.87	75.38
451.32	11.54	451.84	49.09	452.36	64.29	452.88	75.59
451.33	12.09	451.85	49.97	452.37	64.52	452.89	75.79
451.34	12.64	451.86	50.85	452.38	64.76	452.90	75.99
451.35	13.20	451.87	51.42	452.39	64.99	452.91	76.19
451.36	13.77	451.88	51.71	452.40	65.23	452.92	76.39
451.37	14.35	451.89	52.01	452.41	65.46	452.93	76.58
451.38	14.94	451.90	52.30	452.42	65.69	452.94	76.78
451.39	15.53	451.91	52.59	452.43	65.92	452.95	76.98
451.40	16.13	451.92	52.88	452.44	66.15	452.96	77.18
451.41	16.74	451.93	53.16	452.45	66.38	452.97	77.37
451.42	17.36	451.94	53.45	452.46	66.61	452.98	77.57
451.43	17.98	451.95	53.73	452.47	66.84	452.99	77.76
451.44	18.61	451.96	54.01	452.48	67.06	453.00	**77.96**
451.45	19.25	451.97	54.29	452.49	67.29		
451.46	19.89	451.98	54.57	452.50	67.52		
451.47	20.55	451.99	54.85	452.51	67.74		
451.48	21.21	452.00	55.13	452.52	67.96		
451.49	21.87	452.01	55.40	452.53	68.19		
451.50	22.54	452.02	55.67	452.54	68.41		
451.51	23.22	452.03	55.95	452.55	68.63		
451.52	23.91	452.04	56.22	452.56	68.85		
451.53	24.60	452.05	56.49	452.57	69.07		
451.54	25.30	452.06	56.76	452.58	69.29		
451.55	26.01	452.07	57.02	452.59	69.51		
451.56	26.72	452.08	57.29	452.60	69.73		
451.57	27.44	452.09	57.55	452.61	69.95		
451.58	28.17	452.10	57.82	452.62	70.16		
451.59	28.90	452.11	58.08	452.63	70.38		
451.60	29.64	452.12	58.34	452.64	70.60		
451.61	30.38	452.13	58.60	452.65	70.81		
451.62	31.13	452.14	58.86	452.66	71.03		
451.63	31.89	452.15	59.12	452.67	71.24		
451.64	32.65	452.16	59.37	452.68	71.45		
451.65	33.42	452.17	59.63	452.69	71.66		
451.66	34.19	452.18	59.88	452.70	71.88		
451.67	34.97	452.19	60.14	452.71	72.09		
451.68	35.76	452.20	60.39	452.72	72.30		
451.69	36.55	452.21	60.64	452.73	72.51		
451.70	37.34	452.22	60.89	452.74	72.72		
451.71	38.15	452.23	61.14	452.75	72.93		
451.72	38.96	452.24	61.39	452.76	73.13		
451.73	39.77	452.25	61.63	452.77	73.34		
451.74	40.59	452.26	61.88	452.78	73.55		
451.75	41.42	452.27	62.12	452.79	73.75		



Dynamic Berm / Top Of Slope Berm / Runoff Diversion Filter Sock Design

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		Dyn #1	FS #1	FS #2		
TEMPORARY OR PERMANENT	(T OR P)	T	T	T		
DESIGN STORM	(2,5, OR 10 YR)	2 YR	2 YR	2 YR		
ACRES	(AC)	5.9	5.45	0.33		
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	1.6	1.6	1.6		
Qr (REQUIRED CAPACITY)	(CFS)	9.44	8.72	0.53		
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	9.44	8.72	0.53		
PROTECTIVE LINING		N/A	N/A	N/A		
n (MANNING'S COEFFICIENT)[2]		0.065	0.066	0.094		
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A	N/A		
V (CALCULATED AT FLOW DEPTH d)	(FPS)	1.84	1.79	0.67		
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	-	-	-		
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	1.00	0.97	0.39		
CHANNEL BOTTOM WIDTH	(FT)	0.0	0.0	0.0		
CHANNEL SIDE SLOPES	(H:1)	2.0	2.0	2.0		
D (TOTAL DEPTH)	(FT)	2.5	2.5	1.5		
CHANNEL TOP WIDTH @ D	(FT)	10.0	10.0	6.0		
d (CALCULATED FLOW DEPTH)	(FT)	1.6	1.6	0.6		
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	6.4	6.2	2.5		
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	0.01:1	0.01:1	0.02:1		
d_{50} STONE SIZE	(IN)	-	-	-		
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	5.14	4.88	0.78		
R (HYDRAULIC RADIUS)		0.72	0.70	0.28		
S (BED SLOPE)[3]	(FT/FT)	0.010	0.010	0.010		
S_c (CRITICAL SLOPE)	(FT/FT)	0.076	0.079	0.222		
$.7S_c$	(FT/FT)	0.054	0.055	0.155		
$1.3S_c$	(FT/FT)	0.099	0.102	0.288		
STABLE FLOW?	(Y/N)	Yes	Yes	Yes		
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-	-		
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	0.90	0.94	0.88		
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50	0.50		
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S		
VEGETATED OR UNVEGETATED?		Unvegetated	Unvegetated	Unvegetated		

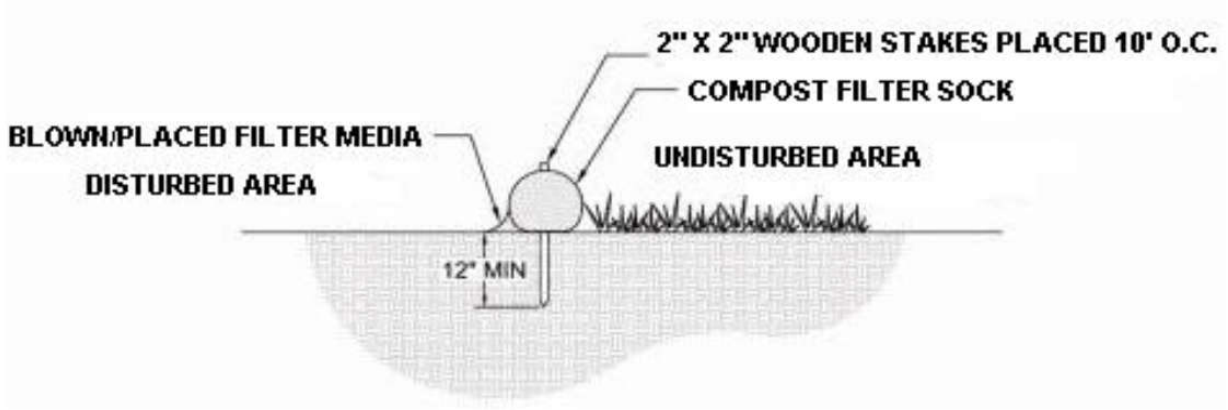
1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.

5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

Compost Filter Sock Design

E&S WORKSHEET #1
Compost Filter Socks

PROJECT NAME:	283 Commerce Center - Building #1		
LOCATION:	Mount Joy Township, Lancaster County, Pennsylvania		
PREPARED BY:	Timothy Fink, E.I.T.	DATE:	2023.01.03
CHECKED BY:	Joshua C. George, P.E.	DATE:	2023.01.03

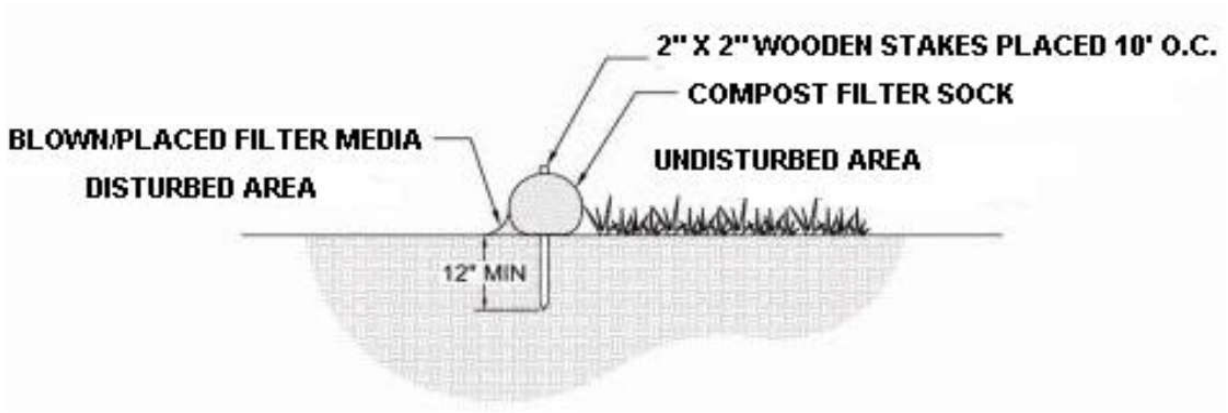


SOCK NO.	SOCK DIA.	SEGMENT 1		SEGMENT 2		SLOPE LENGTH ABOVE BARRIER	
		LENGTH (FT)	SLOPE (%)	LENGTH (FT)	SLOPE (%)	ALLOWABLE* (FT)	PROPOSED (FT)
1	18"	280	4.0			430	280
2	18"	360	4.0			430	360
3	24"	325	6.0			435	325
4	24"	350	6.0			435	350
5	24"	400	6.0			435	400
6	32"	500	6.0			560	500
7	32"	500	5.0			650	500
8	32"	505	5.0			650	505
9	32"	515	5.0			650	515
10	32"	540	5.0			650	540
11	32"	560	5.0			650	560
12	32"	565	5.0			650	565
13	32"	570	5.0			650	570
14	32"	600	5.0			650	600
15	32"	610	5.0			650	610
16	32"	590	5.0			650	590
17	32"	560	6.0			560	560
18	32"	560	6.0			560	560
19	32"	560	6.0			560	560
20	32"	550	6.0			560	550

*Allowable length calculated per the Pennyslvania Erosion and Sedimentation Control Manual, Figure 4.2 and methodology outlined on page 77 for two slope segments tributary to proposed filter sock.

E&S WORKSHEET #1
Compost Filter Socks

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

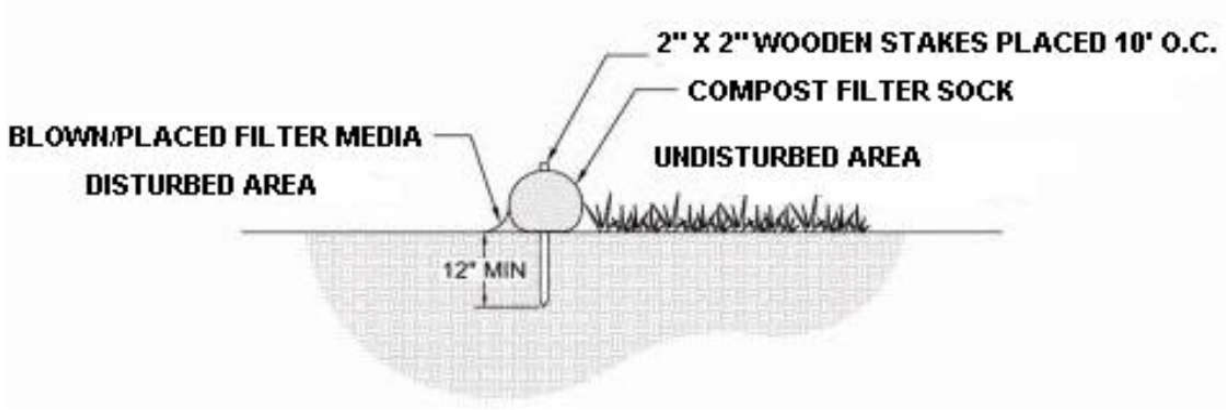


SOCK NO.	SOCK DIA.	SEGMENT 1		SEGMENT 2		SLOPE LENGTH ABOVE BARRIER	
		LENGTH (FT)	SLOPE (%)	LENGTH (FT)	SLOPE (%)	ALLOWABLE* (FT)	PROPOSED (FT)
21	32"	81	33.3			117	81
22	32"	79	33.3			117	79
23	32"	75	33.3			117	75
24	32"	85	33.3			117	85
25	32"	73	33.3			117	73
26	32"	85	33.3			117	85
27	32"	87	33.3			117	87
28	32"	77	33.3			117	77
29	32"	72	33.3			117	72
30	32"	58	33.3			117	58
31	24"	220	16.0			240	220
32	24"	170	16.0			240	170
33	24"	160	16.0			240	160
34	24"	150	14.0			255	150
35	24"	140	14.0			255	140
36	24"	130	13.0			265	130
37	24"	130	13.0			265	130
38	24"	100	12.0			275	100
39	24"	90	10.0			300	90
40	12"	100	2.0			510	100

*Allowable length calculated per the Pennyslvania Erosion and Sedimentation Control Manual, Figure 4.2 and methodology outlined on page 77 for two slope segments tributary to proposed filter sock.

E&S WORKSHEET #1
Compost Filter Socks

PROJECT NAME:	283 Commerce Center - Building #1		
LOCATION:	Mount Joy Township, Lancaster County, Pennsylvania		
PREPARED BY:	Timothy Fink, E.I.T.	DATE:	2023.01.03
CHECKED BY:	Joshua C. George, P.E.	DATE:	2023.01.03

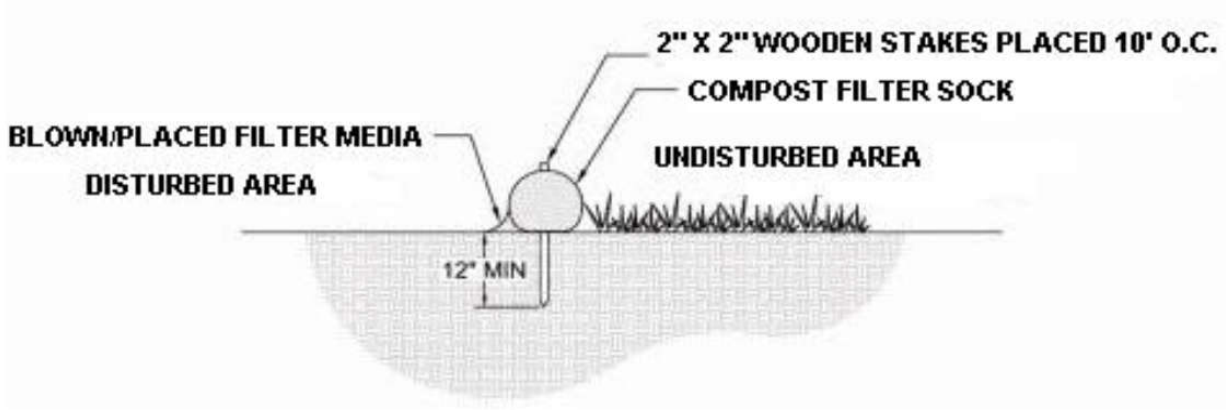


SOCK NO.	SOCK DIA.	SEGMENT 1		SEGMENT 2		SLOPE LENGTH ABOVE BARRIER	
		LENGTH (FT)	SLOPE (%)	LENGTH (FT)	SLOPE (%)	ALLOWABLE* (FT)	PROPOSED (FT)
41	18"	280	3.0			520	280
42	18"	505	3.0			520	505
43	18"	160	5.0			350	160
44	18"	190	5.0			350	190
45	18"	210	6.0			310	210
46	32"	530	4.0			800	530
47	18"	50	8.0			275	50
48	18"	90	8.0			275	90
49	18"	120	8.0			275	120
50	18"	150	8.0			275	150
51	18"	170	8.0			275	170
52	18"	190	8.0			275	190
53	18"	220	8.0			275	220
54	18"	245	8.0			275	245
55	24"	300	8.0			350	300
56	32"	750	4.0			800	750
57	18"	45	33.3			72	45
58	18"	60	33.3			72	60
59	18"	60	33.3			72	60
60	18"	70	33.3			72	70

*Allowable length calculated per the Pennyslvania Erosion and Sedimentation Control Manual, Figure 4.2 and methodology outlined on page 77 for two slope segments tributary to proposed filter sock.

E&S WORKSHEET #1
Compost Filter Socks

PROJECT NAME:	283 Commerce Center - Building #1		
LOCATION:	Mount Joy Township, Lancaster County, Pennsylvania		
PREPARED BY:	Timothy Fink, E.I.T.	DATE:	2023.01.03
CHECKED BY:	Joshua C. George, P.E.	DATE:	2023.01.03



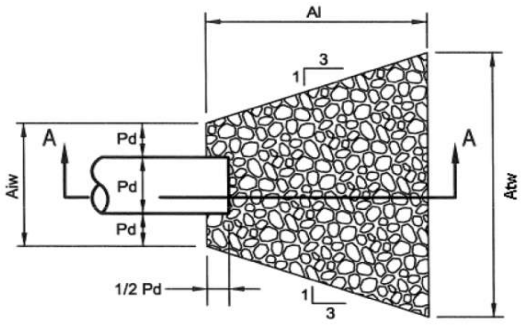
SOCK NO.	SOCK DIA.	SEGMENT 1		SEGMENT 2		SLOPE LENGTH ABOVE BARRIER	
		LENGTH (FT)	SLOPE (%)	LENGTH (FT)	SLOPE (%)	ALLOWABLE* (FT)	PROPOSED (FT)
61	32"	94	33.3			117	94
62	18"	33	33.0			72	33
63	18"	31	33.0			72	31
64	12"	150	2.0			510	150
65	12"	150	2.0			510	150
66	12"	150	2.0			510	150
67	12"	140	8.0			190	140
68	12"	60	8.0			190	60
69	12"	120	8.0			190	120
70	18"	20	33.3			72	20
71	12"	55	8.0			190	55

*Allowable length calculated per the Pennyslvania Erosion and Sedimentation Control Manual, Figure 4.2 and methodology outlined on page 77 for two slope segments tributary to proposed filter sock.

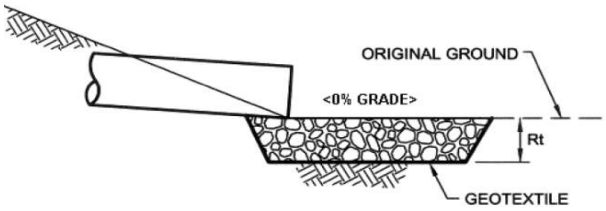
RIPRAP DESIGN

STANDARD E&S WORKSHEET #20
Riprap Apron Outlet Protection

PROJECT NAME:	283 Commerce Center - Building #1		
LOCATION:	Mount Joy Township, Lancaster County, Pennsylvania		
PREPARED BY:	Timothy Fink, E.I.T.	Date:	2023.01.03
CHECKED BY:	Joshua C. George, P.E.	Date:	2023.01.03



PLAN VIEW



SECTION A - A

NO.	PIPE DIA. Do (in.)	TAIL WATER COND. (Max or Min)	MAN "n" FOR PIPE	PIPE SLOPE (FT/FT)	Q (CFS)	V* (FPS)	RIPRAP SIZE	Rt (in)	Al (ft)	Aiw (ft)	Atw (ft)
1-0	60	Max.	0.011	0.005	218.23	11.11	R-5	27	33	15	29
2-0	18	Min.	0.011	0.005	8.80	4.98	R-3	9	8	5	13
3-0	30	Max.	0.011	0.005	34.37	7.00	R-4	18	12	8	13
4-0	24	Min.	0.011	0.005	18.96	6.04	R-3	9	12	6	18
5-0	30	Min.	0.012	0.005	31.51	6.42	R-3	9	19	8	27
6-0	30	Min.	0.012	0.005	31.51	6.42	R-3	9	19	8	27
7-0	15	Max.	0.011	0.005	5.41	4.41	R-3	9	6	4	7
8-0	15	Max.	0.011	0.005	5.41	4.41	R-3	9	6	4	7
9-0	30	Min.	0.011	0.005	34.37	7.00	R-4	18	21	8	29

***:The anticipated velocity (V) should not exceed the maximum permissible shown in Table 6.6 for the proposed riprap protection. Adjust for less than full pipe flow. Use Mannings equation to calculate velocity for pipe slopes greater than or equal to 0.05 ft/ft**

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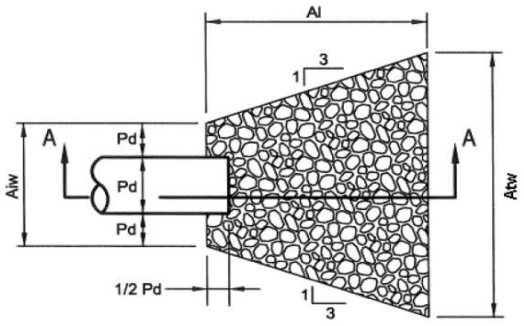
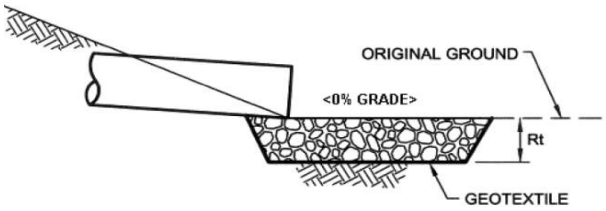
STANDARD E&S WORKSHEET #20
Riprap Apron Outlet Protection

PROJECT NAME:	283 Commerce Center - Building #1		
LOCATION:	Mount Joy Township, Lancaster County, Pennsylvania		
PREPARED BY:	Timothy Fink, E.I.T.	Date:	2023.01.03
CHECKED BY:	Joshua C. George, P.E.	Date:	2023.01.03



PLAN VIEW



SECTION A - A

NO.	PIPE DIA. Do (in.)	TAIL WATER COND. (Max or Min)	MAN "n" FOR PIPE	PIPE SLOPE (FT/FT)	Q (CFS)	V* (FPS)	RIPRAP SIZE	Rt (in)	Al (ft)	Aiw (ft)	Atw (ft)
OS-1B	24	Min.	0.012	0.010	17.38	8.48	R-4	18	12	6	18
OS-2B	24	Min.	0.012	0.010	17.38	8.48	R-4	18	12	6	18
OS-4C	36	Min.	0.012	0.005	51.23	7.25	R-4	18	20	9	29

***:The anticipated velocity (V) should not exceed the maximum permissible shown in Table 6.6 for the proposed riprap protection. Adjust for less than full pipe flow. Use Mannings equation to calculate velocity for pipe slopes greater than or equal to 0.05 ft/ft**

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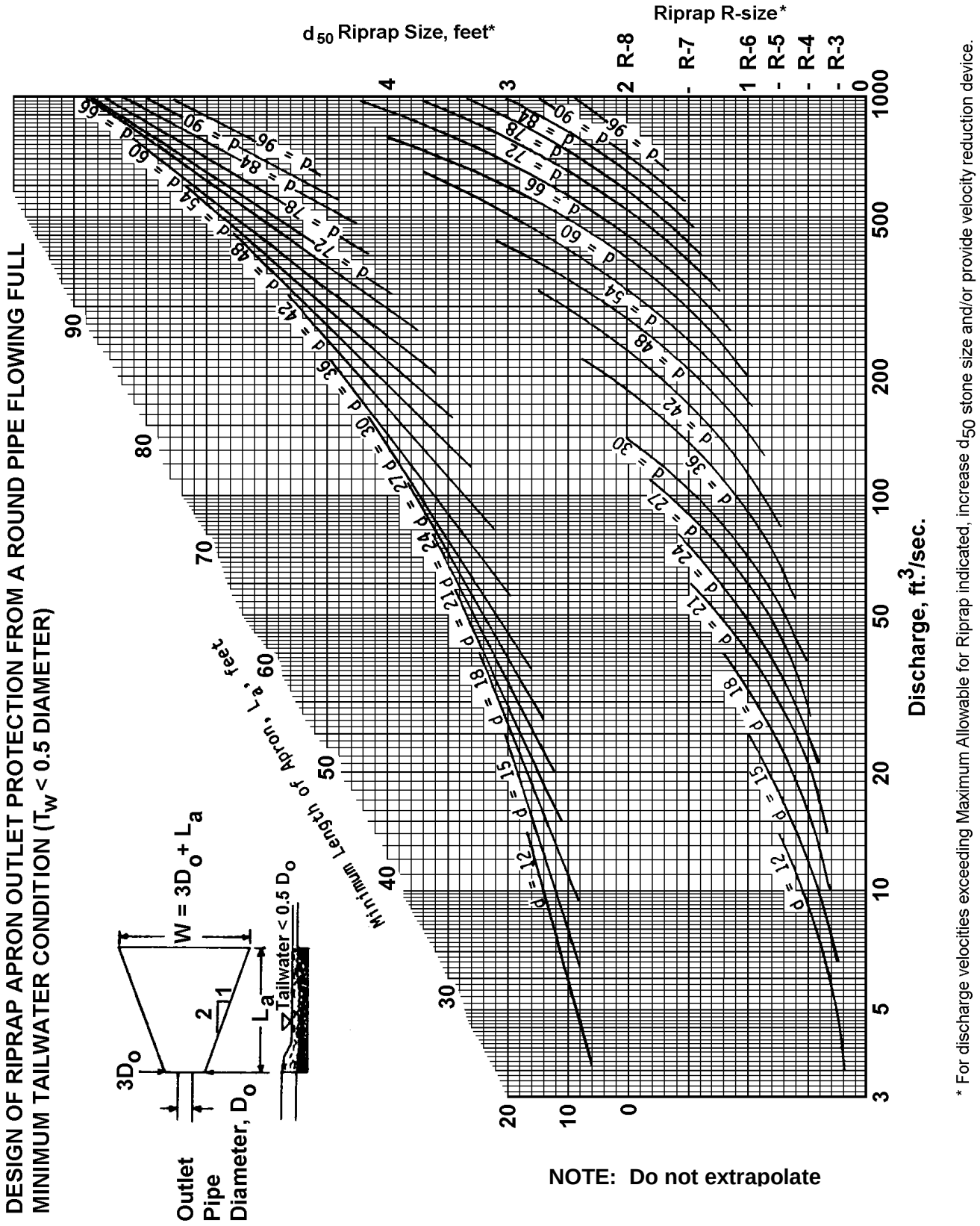
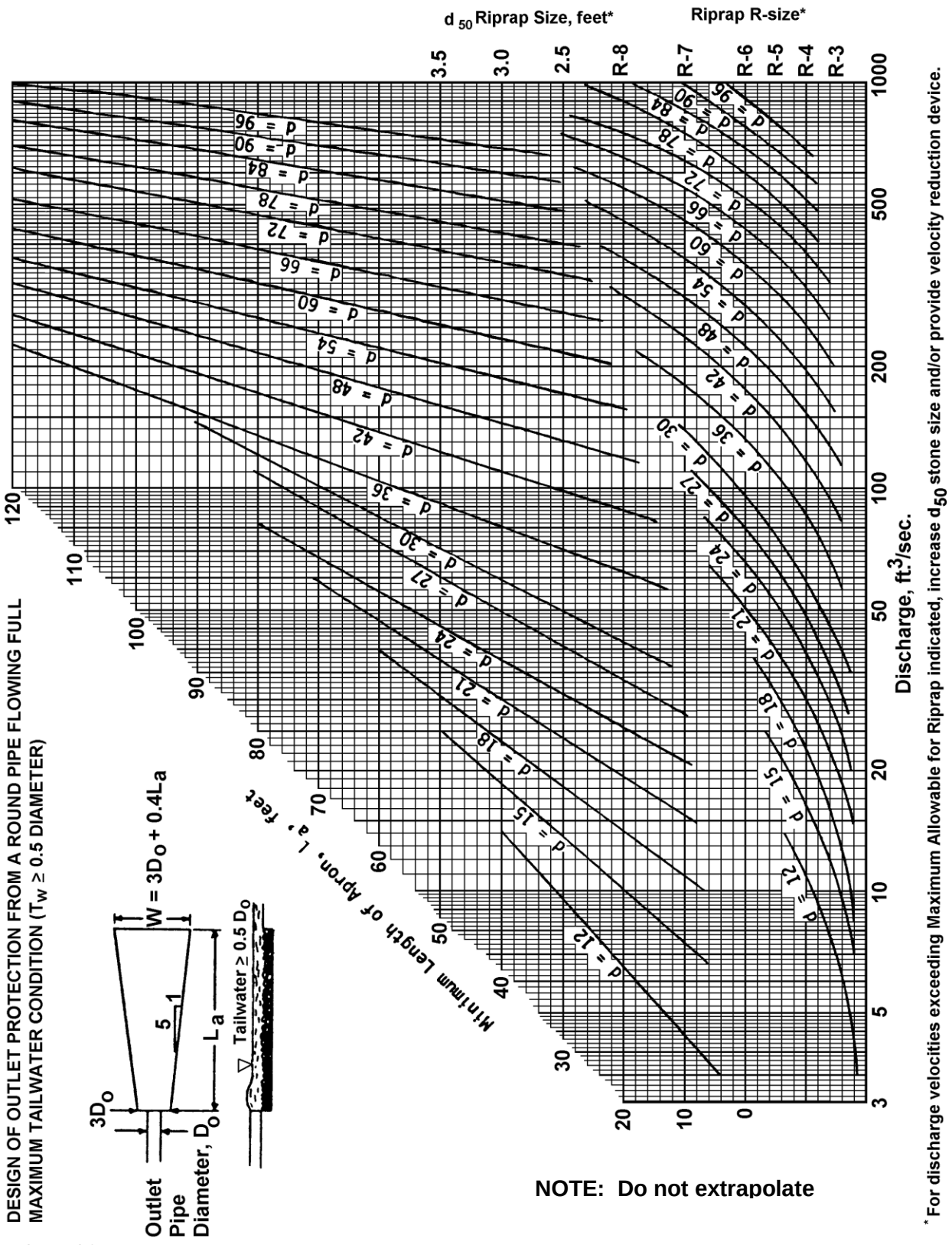
FIGURE 9.3
Riprap Apron Design, Minimum Tailwater Condition



Adapted from USDA - NRCS

Not to be used for Box Culverts

FIGURE 9.4
Riprap Apron Design, Maximum Tailwater Condition



Adapted from USDA - NRCS

Not to be used for Box Culverts

Permanent Channel Design

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		#1	#1	#2A	#2A	
TEMPORARY OR PERMANENT	(T OR P)	T	P	T	P	
DESIGN STORM	(2,5, OR 10 YR)	2 YR	10 YR	2 YR	10 YR	
ACRES	(AC)	4.451	4.451	0.81	0.81	
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	N/A	N/A	N/A	N/A	
Qr (REQUIRED CAPACITY)	(CFS)	11.63	15.37	1.82	2.38	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	11.63	15.37	1.82	2.38	
PROTECTIVE LINING		S75	N/A	S75	N/A	
n (MANNING'S COEFFICIENT)[2]		0.053	0.068	0.055	0.056	
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A	N/A	N/A	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	1.74	1.62	2.02	2.15	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	1.55	1.00	1.55	1.00	
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.36	0.48	0.77	0.90	
CHANNEL BOTTOM WIDTH	(FT)	10.0	10.0	2.0	2.0	
CHANNEL SIDE SLOPES	(H:1)	3.0	3.0	3.0	3.0	
D (TOTAL DEPTH)	(FT)	2.0	2.0	1.5	1.5	
CHANNEL TOP WIDTH @ D	(FT)	22.0	22.0	11.0	11.0	
d (CALCULATED FLOW DEPTH)	(FT)	0.6	0.8	0.3	0.4	
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	13.4	14.6	3.9	4.2	
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	17.49:1	12.98:1	6.48:1	5.58:1	
d_{50} STONE SIZE	(IN)	-	-	-	-	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	6.70	9.49	0.90	1.10	
R (HYDRAULIC RADIUS)		0.49	0.64	0.23	0.26	
S (BED SLOPE)[3]	(FT/FT)	0.010	0.010	0.040	0.040	
S_c (CRITICAL SLOPE)	(FT/FT)	0.053	0.079	0.074	0.074	
$.7S_c$	(FT/FT)	0.037	0.056	0.052	0.052	
$1.3S_c$	(FT/FT)	0.069	0.103	0.096	0.096	
STABLE FLOW?	(Y/N)	Yes	Yes	Yes	Yes	
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-	-	-	
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	1.43	1.23	1.19	1.14	
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50	0.50	0.50	
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S	S	
VEGETATED OR UNVEGETATED?		Unvegetated	Vegetated	Unvegetated	Vegetated	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		#2B	#2B	#2C	#2C	
TEMPORARY OR PERMANENT	(T OR P)	T	P	T	P	
DESIGN STORM	(2,5, OR 10 YR)	2 YR	10 YR	2 YR	10 YR	
ACRES	(AC)	0.145	0.145	0.158	0.158	
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	N/A	N/A	N/A	N/A	
Qr (REQUIRED CAPACITY)	(CFS)	0.35	0.46	0.39	0.51	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	0.35	0.46	0.39	0.51	
PROTECTIVE LINING		S75	N/A	S75	N/A	
n (MANNING'S COEFFICIENT)[2]		0.055	0.072	0.055	0.071	
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A	N/A	N/A	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	1.21	1.10	1.25	1.15	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	1.55	1.00	1.55	1.00	
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.31	0.42	0.33	0.44	
CHANNEL BOTTOM WIDTH	(FT)	2.0	2.0	2.0	2.0	
CHANNEL SIDE SLOPES	(H:1)	3.0	3.0	3.0	3.0	
D (TOTAL DEPTH)	(FT)	1.5	1.5	1.5	1.5	
CHANNEL TOP WIDTH @ D	(FT)	11.0	11.0	11.0	11.0	
d (CALCULATED FLOW DEPTH)	(FT)	0.1	0.2	0.1	0.2	
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	2.7	3.0	2.8	3.1	
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	16.15:1	11.9:1	15.2:1	11.31:1	
d_{50} STONE SIZE	(IN)	-	-	-	-	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	0.29	0.42	0.32	0.45	
R (HYDRAULIC RADIUS)		0.11	0.14	0.11	0.14	
S (BED SLOPE)[3]	(FT/FT)	0.040	0.040	0.040	0.040	
S_c (CRITICAL SLOPE)	(FT/FT)	0.095	0.149	0.093	0.142	
$.7S_c$	(FT/FT)	0.066	0.105	0.065	0.100	
$1.3S_c$	(FT/FT)	0.123	0.194	0.121	0.185	
STABLE FLOW?	(Y/N)	Yes	Yes	Yes	Yes	
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-	-	-	
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	1.38	1.33	1.37	1.32	
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50	0.50	0.50	
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S	S	
VEGETATED OR UNVEGETATED?		Unvegetated	Vegetated	Unvegetated	Vegetated	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		#2D	#2D	#3	#3	
TEMPORARY OR PERMANENT	(T OR P)	T	P	T	P	
DESIGN STORM	(2,5, OR 10 YR)	2 YR	10 YR	2 YR	10 YR	
ACRES	(AC)	0.138	0.138	1.148	1.148	
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	N/A	N/A	N/A	N/A	
Qr (REQUIRED CAPACITY)	(CFS)	0.24	0.32	1.91	2.49	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	0.24	0.32	1.91	2.49	
PROTECTIVE LINING		R-4	R-4	S75	N/A	
n (MANNING'S COEFFICIENT)[2]		0.063	0.063	0.055	0.054	
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A	N/A	N/A	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	1.93	2.12	2.12	2.31	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	2.00	2.00	1.55	1.00	
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	1.21	1.41	0.85	0.97	
CHANNEL BOTTOM WIDTH	(FT)	2.0	2.0	2.0	2.0	
CHANNEL SIDE SLOPES	(H:1)	3.0	3.0	3.0	3.0	
D (TOTAL DEPTH)	(FT)	1.5	1.5	1.5	1.5	
CHANNEL TOP WIDTH @ D	(FT)	11.0	11.0	11.0	11.0	
d (CALCULATED FLOW DEPTH)	(FT)	0.1	0.1	0.3	0.4	
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	2.3	2.4	3.9	4.1	
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	34.46:1	29.47:1	6.48:1	5.67:1	
d_{50} STONE SIZE	(IN)	6	6	-	-	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	0.13	0.15	0.90	1.08	
R (HYDRAULIC RADIUS)		0.05	0.06	0.23	0.25	
S (BED SLOPE)[3]	(FT/FT)	0.333	0.333	0.044	0.044	
S_c (CRITICAL SLOPE)	(FT/FT)	0.155	0.148	0.074	0.069	
$.7S_c$	(FT/FT)	0.108	0.103	0.052	0.049	
$1.3S_c$	(FT/FT)	0.201	0.192	0.096	0.090	
STABLE FLOW?	(Y/N)	Yes	Yes	Yes	Yes	
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-	-	-	
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	1.44	1.43	1.19	1.15	
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50	0.50	0.50	
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S	S	
VEGETATED OR UNVEGETATED?		Unvegetated	Unvegetated	Unvegetated	Vegetated	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		#4	#4	#5A	#5A	
TEMPORARY OR PERMANENT	(T OR P)	T	P	T	P	
DESIGN STORM	(2,5, OR 10 YR)	2 YR	10 YR	2 YR	10 YR	
ACRES	(AC)	0.61	0.61	2.292	2.292	
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	N/A	N/A	N/A	N/A	
Qr (REQUIRED CAPACITY)	(CFS)	6.36	8.30	3.56	4.65	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	6.36	8.30	3.56	4.65	
PROTECTIVE LINING		S75	N/A	S75	N/A	
n (MANNING'S COEFFICIENT)[2]		0.046	0.083	0.055	0.058	
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A	N/A	N/A	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	1.52	1.05	2.04	2.09	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	1.55	1.00	1.55	1.00	
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.28	0.41	0.75	0.88	
CHANNEL BOTTOM WIDTH	(FT)	2.0	2.0	2.0	2.0	
CHANNEL SIDE SLOPES	(H:1)	3.0	3.0	3.0	3.0	
D (TOTAL DEPTH)	(FT)	2.0	2.0	1.5	1.5	
CHANNEL TOP WIDTH @ D	(FT)	14.0	14.0	11.0	11.0	
d (CALCULATED FLOW DEPTH)	(FT)	0.9	1.3	0.5	0.6	
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	7.4	9.9	5.0	5.5	
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	2.24:1	1.51:1	4:1	3.4:1	
d_{50} STONE SIZE	(IN)	-	-	-	-	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	4.18	7.91	1.75	2.22	
R (HYDRAULIC RADIUS)		0.55	0.76	0.34	0.39	
S (BED SLOPE)[3]	(FT/FT)	0.005	0.005	0.024	0.024	
S_c (CRITICAL SLOPE)	(FT/FT)	0.039	0.116	0.065	0.071	
$.7S_c$	(FT/FT)	0.028	0.081	0.046	0.049	
$1.3S_c$	(FT/FT)	0.051	0.151	0.085	0.092	
STABLE FLOW?	(Y/N)	Yes	Yes	Yes	Yes	
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-	-	-	
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	1.11	0.68	1.00	0.91	
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50	0.50	0.50	
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S	S	
VEGETATED OR UNVEGETATED?		Unvegetated	Vegetated	Unvegetated	Vegetated	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: 283 Commerce Center - Building #1
LOCATION: Mount Joy Township, Lancaster County, Pennsylvania
PREPARED BY: Timothy Fink, E.I.T. DATE: 2023.01.03
CHECKED BY: Joshua C. George, P.E. DATE: 2023.01.03

CHANNEL OR CHANNEL SECTION		#5B	#5B			
TEMPORARY OR PERMANENT	(T OR P)	T	P			
DESIGN STORM	(2,5, OR 10 YR)	2 YR	10 YR			
ACRES	(AC)	1.024	1.024			
MULTIPLIER	(1.6,2.25, OR 2.75)[1]	N/A	N/A			
Qr (REQUIRED CAPACITY)	(CFS)	5.39	7.03			
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	5.39	7.03			
PROTECTIVE LINING		S75	N/A			
n (MANNING'S COEFFICIENT)[2]		0.051	0.063			
V_a (ALLOWABLE VELOCITY)	(FPS)	N/A	N/A			
V (CALCULATED AT FLOW DEPTH d)	(FPS)	2.02	1.87			
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	1.55	1.00			
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.62	0.78			
CHANNEL BOTTOM WIDTH	(FT)	2.0	2.0			
CHANNEL SIDE SLOPES	(H:1)	3.0	3.0			
D (TOTAL DEPTH)	(FT)	1.5	1.5			
CHANNEL TOP WIDTH @ D	(FT)	11.0	11.0			
d (CALCULATED FLOW DEPTH)	(FT)	0.7	0.8			
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	6.0	7.0			
BOTTOM WIDTH:FLOW DEPTH RATIO	(12:1 MAX)	3:1	2.39:1			
d_{50} STONE SIZE	(IN)	-	-			
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	2.67	3.77			
R (HYDRAULIC RADIUS)		0.43	0.52			
S (BED SLOPE)[3]	(FT/FT)	0.015	0.015			
S_c (CRITICAL SLOPE)	(FT/FT)	0.052	0.074			
$.7S_c$	(FT/FT)	0.037	0.052			
$1.3S_c$	(FT/FT)	0.068	0.097			
STABLE FLOW?	(Y/N)	Yes	Yes			
FREEBOARD PROVIDED BASED ON UNSTABLE FLOW	(FT)	-	-			
FREEBOARD PROVIDED BASED ON STABLE FLOW	(FT)	0.83	0.66			
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.50	0.50			
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S			
VEGETATED OR UNVEGETATED?		Unvegetated	Vegetated			

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft or 1/4 Total Channel Depth, whichever is greater.

5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

Channel #1						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	626	0.014	0.0030	0.26
Farm	C	0.26	121	0.003	0.0007	
Impervious	N/A	0.93	0	0.000	0.0000	
Open Space	B	0.26	189,171	4.343	1.1291	
Open Space	C	0.30	3,899	0.090	0.0269	
Woods	B	0.18	62	0.001	0.0003	
Total			193,879	4.451		

Channel #2A						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	0	0.000	0.0000	0.49
Farm	C	0.26	0	0.000	0.0000	
Impervious	N/A	0.93	12,021	0.276	0.2566	
Open Space	B	0.26	22,470	0.516	0.1341	
Open Space	C	0.30	774	0.018	0.0053	
Woods	B	0.18	0	0.000	0.0000	
Total			35,265	0.810		

Channel #2B						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	0	0.000	0.0000	0.53
Farm	C	0.26	0	0.000	0.0000	
Impervious	N/A	0.93	2,552	0.059	0.0545	
Open Space	B	0.26	3,773	0.087	0.0225	
Open Space	C	0.30	0	0.000	0.0000	
Woods	B	0.18	0	0.000	0.0000	
Total			6,325	0.145		

Channel #2C						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	0	0.000	0.0000	0.54
Farm	C	0.26	0	0.000	0.0000	
Impervious	N/A	0.93	2,859	0.066	0.0610	
Open Space	B	0.26	3,483	0.080	0.0208	
Open Space	C	0.30	554	0.013	0.0038	
Woods	B	0.18	0	0.000	0.0000	
Total			6,896	0.158		

Channel #2D						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	0	0.000	0.0000	0.38
Farm	C	0.26	0	0.000	0.0000	
Impervious	N/A	0.93	1,105	0.025	0.0236	
Open Space	B	0.26	4,907	0.113	0.0293	
Open Space	C	0.30	0	0.000	0.0000	
Woods	B	0.18	0	0.000	0.0000	
Total			6,012	0.138		

Channel #3						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	0	0.000	0.0000	0.36
Farm	C	0.26	0	0.000	0.0000	
Impervious	N/A	0.93	7,531	0.173	0.1608	
Open Space	B	0.26	41,340	0.949	0.2467	
Open Space	C	0.30	1,154	0.026	0.0079	
Woods	B	0.18	0	0.000	0.0000	
Total			50,025	1.148		

Channel #4						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	0	0.000	0.0000	0.35
Farm	C	0.26	0	0.000	0.0000	
Impervious	N/A	0.93	2,369	0.054	0.0506	
Open Space	B	0.26	6,489	0.149	0.0387	
Open Space	C	0.30	17,702	0.406	0.1219	
Woods	B	0.18	0	0.000	0.0000	
Total			26,560	0.610		

Channel #5A						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	27,105	0.622	0.1307	0.34
Farm	C	0.26	22,007	0.505	0.1314	
Impervious	N/A	0.93	12,670	0.291	0.2705	
Open Space	B	0.26	22,311	0.512	0.1332	
Open Space	C	0.30	15,768	0.362	0.1086	
Woods	B	0.18	0	0.000	0.0000	
Total			99,861	2.292		

Channel #5B						
Cover	HSG	C Value	Area (ft^2)	Area (Acres)	(CxA)	C_w
Farm	B	0.21	6,032	0.138	0.0291	0.39
Farm	C	0.26	9,385	0.215	0.0560	
Impervious	N/A	0.93	9,017	0.207	0.1925	
Open Space	B	0.26	20,170	0.463	0.1204	
Open Space	C	0.30	12	0.000	0.0001	
Woods	B	0.18	0	0.000	0.0000	
Total			44,616	1.024		

Channel 2-year Runoff Calculations						
Channel	C	I (in/hr)	A (Acres)	Q (cfs)	Upstream Q (cfs)	Total Q (cfs)
#1	0.26	4.60	4.451	5.34	6.29	11.63
#2A	0.49	4.60	0.810	1.82	0	1.82
#2B	0.53	4.60	0.145	0.35	0	0.35
#2C	0.54	4.60	0.158	0.39	0	0.39
#2D	0.38	4.60	0.138	0.24	0	0.24
#3	0.36	4.60	1.148	1.91	0	1.91
#4	0.35	4.60	0.610	0.97	5.39	6.36
#5A	0.34	4.60	2.292	3.56	0	3.56
#5B	0.39	4.60	1.024	1.83	3.56	5.39

Channel 10-year Runoff Calculations						
Channel	C	I (in/hr)	A (Acres)	Q (cfs)	Upstream Q (cfs)	Total Q (cfs)
#1	0.26	6.00	4.451	6.96	8.41	15.37
#2A	0.49	6.00	0.810	2.38	0	2.38
#2B	0.53	6.00	0.145	0.46	0	0.46
#2C	0.54	6.00	0.158	0.51	0	0.51
#2D	0.38	6.00	0.138	0.32	0	0.32
#3	0.36	6.00	1.148	2.49	0	2.49
#4	0.35	6.00	0.610	1.27	7.03	8.30
#5A	0.34	6.00	2.292	4.65	0	4.65
#5B	0.39	6.00	1.024	2.39	4.65	7.03

Erosion Control Matting References

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet
EroNet™ S75® Erosion Control Blanket

DESCRIPTION

The short-term single net erosion control blanket shall be a machine-produced mat of 100% agricultural straw with a functional longevity of up to 12 months. (NOTE: functional longevity may vary depending upon climatic conditions, soil, geographical location, and elevation). The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with a lightweight photodegradable polypropylene netting having an approximate 0.50 x 0.50 in. (1.27 x 1.27 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The S75 shall meet Type 2.C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.17

Material Content		
Matrix	100% Straw Fiber	0.5 lbs/sq yd (0.27 kg/sm)
Netting	Top side only, lightweight photodegradable	1.5 lb/1000 sq ft (0.73 kg/100 sm)
Thread	Degradable	

Standard Roll Sizes			
Width	6.67 ft (2.03 m)	8.0 ft (2.4 m)	16 ft (4.87 m)
Length	108 ft (32.92 m)	112 ft (34.14 m)	112 ft (34.14 m)
Weight ± 10%	40 lbs (18.14 kg)	50 lbs (22.68 kg)	100 lbs (45.36 kg)
Area	80 sq yd (66.9 sm)	100 sq yd (83.61 sm)	200 sq yd (167.22 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.28 in. (7 mm)
Resiliency	ECTC Guidelines	78.8%
Water Absorbency	ASTM D1117	301%
Mass/Unit Area	ASTM D6475	9.76 oz/sy (332 g/sm)
Swell	ECTC Guidelines	15%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	6.31 oz-in
Light Penetration	ASTM D6567	6.0%
Tensile Strength - MD	ASTM D6818	122.4 lbs/ft (1.81 kN/m)
Elongation - MD	ASTM D6818	36.1%
Tensile Strength - TD	ASTM D6818	79.2 lbs/ft (1.17 kN/m)
Elongation - TD	ASTM D6818	26.8%
Biomass Improvement	ASTM D7322	301%

Design Permissible Shear Stress	
Unvegetated Shear Stress	1.55 psf (74 Pa)
Unvegetated Velocity	5.00 fps (1.52 m/s)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.029	N/A	N/A
20-50 ft	0.11	N/A	N/A
≥ 50 ft (15.2 m)	0.19	N/A	N/A

NTPEP Large-Scale Slope Testing
ASTM D6459 - C-factor = 0.012

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.055
0.50 – 2.0 ft	0.055-0.021
≥ 2.0 ft (0.60 m)	0.021

NORTH AMERICAN GREEN®

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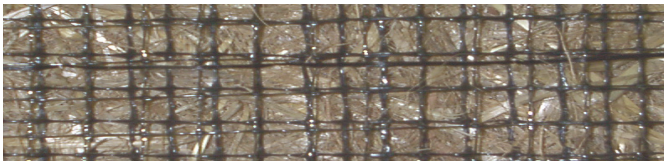
ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet
VMax® SC250® Turf Reinforcement Mat



DESCRIPTION

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 70% straw and 30% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The SC250 shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	70% Straw Fiber	0.35 lb/sq yd (0.19 kg/sm)
	30% Coconut Fiber	0.15 lbs/sq yd (0.08 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene	5 lb/1000 sq ft (2.44 kg/100 sm)
	Middle, Corrugated UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene, UV Stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44m)
Length	55.5 ft (16.9 m)	90 ft (27.4 m)
Weight ± 10%	34 lbs (15.42 kg)	70 lbs (31.8 kg)
Area	40 sq yd (33.4 sm)	80 sq. yd. (66.8 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.62 in. (15.75 mm)
Resiliency	ASTM 6524	95.2%
Density	ASTM D792	0.891 g/cm^3
Mass/Unit Area	ASTM 6566	16.13 oz/sy (548 g/sm)
UV Stability	ASTM D4355/ 1000 HR	80%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz-in.
Light Penetration	ASTM D6567	4.1%
Tensile Strength – MD	ASTM D6818	709 lbs/ft (10.51 kN/m)
Elongation – MD	ASTM D6818	23.9%
Tensile Strength – TD	ASTM D6818	712 lbs/ft (10.56 kN/m)
Elongation – TD	ASTM D6818	36.9%
Biomass Improvement	ASTM D7322	441%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.5 psf (120 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	10.0 psf (480 Pa)	8.0 psf (383 Pa)
Unvegetated Velocity	9.5 fps (2.9 m/s)	
Vegetated Velocity	15 fps (4.6 m/s)	

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2.1	≥ 2:1
≤ 20 ft (6 m)	0.0010	0.0209	0.0507
20-50 ft	0.0081	0.0266	0.0574
≥ 50 ft (15.2 m)	0.0455	0.0555	0.081

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.040
0.50 – 2.0 ft	0.040-0.012
≥ 2.0 ft (0.60 m)	0.011

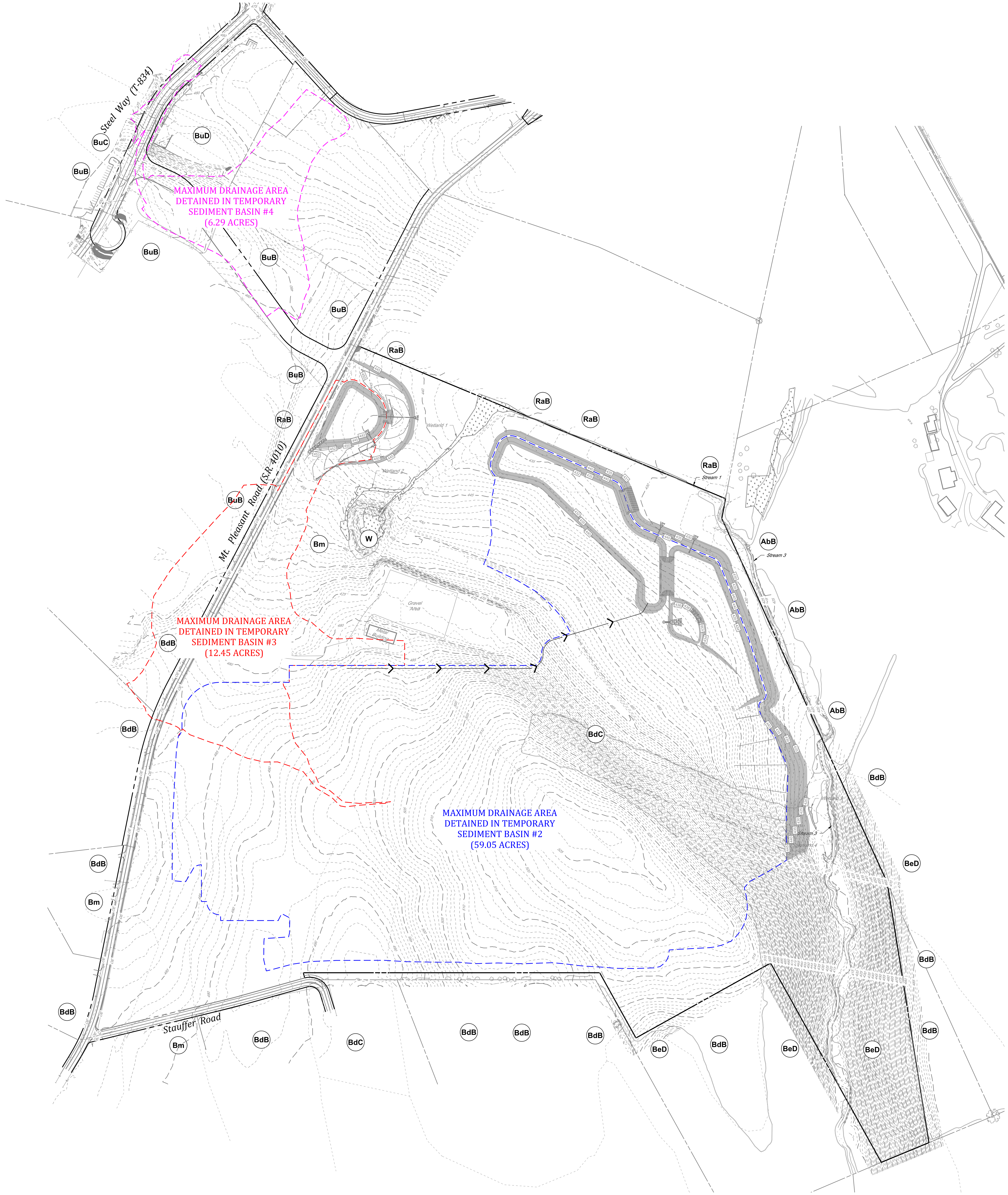
NORTH AMERICAN GREEN®

Western Green
4609 E. Boonville-New Harmony Rd.
Evansville, IN 47725

nagreen.com
800-772-2040

APPENDIX D

DRAINAGE AREA EXHIBITS



LEGEND

SEDIMENT BASIN #2 DA BOUNDARY
SEDIMENT BASIN #3 DA BOUNDARY
SEDIMENT BASIN #4 DA BOUNDARY
SOIL TYPE DESIGNATION (HaB)
SOIL TYPE BOUNDARY LINE

SOIL CLASSIFICATION

AbB: ABBOTTSTOWN SILT LOAM, 3% TO 8% SLOPES, HSG D
BdA: BEDINGTON SILT LOAM, 0% TO 3% SLOPES, HSG B
BdB: BEDINGTON SILT LOAM, 3% TO 8% SLOPES, HSG B
BdC: BEDINGTON SILT LOAM, 8% TO 15% SLOPES, HSG B
BeD: BEDINGTON CHANNERY SILT LOAM, 15% TO 25% SLOPES, HSG B
Bm: BLAIRTON SILT LOAM, 3% TO 10% SLOPES, HSG C
BuB: BUCKS SILT LOAM, 3% TO 8% SLOPES, HSG B
BuC: BUCKS SILT LOAM, 8% TO 15% SLOPES, HSG B
BuD: BUCKS SILT LOAM, 15% TO 25% SLOPES, HSG B
LaD: LANSDALE LOAM, 15% TO 25% SLOPES, HSG B
RaB: READINGTON SILT LOAM, 3% TO 8% SLOPES, HSG C
W: WATER

RECEIVING WATER CLASSIFICATION & DESIGNATION

RECEIVING WATER: UNT TO LITTLE CHIQUES CREEK

EXISTING USE: NONE

DESIGNATED USE: TROUT STOCKED FISHERY, MIGRATORY FISHES (TSF, MF)

GRAPHIC SCALE

150' 75' 0' 150'

SCALE: 1" = 150'

PROJ. MGR. -	JJB
DESIGN -	TBF
CADD -	TBF
CHECKED -	JJB

NO.	DATE	REVISION	BY

LANDWORKS
CIVIL DESIGN, LLC
land development consultants
1195 VIRGINIA AVENUE
YORK, PA 17403
p (717) 891-1195
www.landworkscd.com

TEMPORARY SEDIMENT BASIN DRAINAGE AREA EXHIBIT

FOR

283 COMMERCE CENTER - BUILDING #1

FOR

PDC NORTHEAST LPIV, LLC

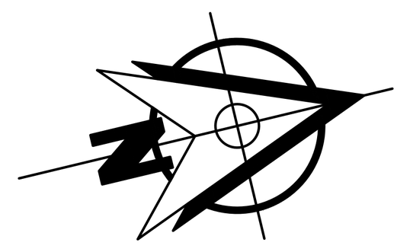
MOUNT JOY TOWNSHIP
LANCASTER COUNTY, PENNSYLVANIA

PROJECT NO. 22-0123-005

DATE: 01/03/23

SCALE: 1" = 150'

DA 3.1



LEGEND

PERM CHANNEL DA BOUNDARY	(blue dashed line)
DYNAMIC BERM #1 DA BOUNDARY	(orange dashed line)
RUNOFF DIVERSION #1 DA BOUNDARY	(magenta dashed line)
RUNOFF DIVERSION #2 DA BOUNDARY	(red dashed line)
SOIL TYPE DESIGNATION	HaB
SOIL TYPE BOUNDARY LINE	

SOIL CLASSIFICATION

AbB: ABBOTTSTOWN SILT LOAM, 3% TO 8% SLOPES, HSG D
BdA: BEDINGTON SILT LOAM, 0% TO 3% SLOPES, HSG B
BdB: BEDINGTON SILT LOAM, 3% TO 8% SLOPES, HSG B
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LaD: LANSDALE LOAM, 15% TO 25% SLOPES, HSG B
RaB: READINGTON SILT LOAM, 3% TO 8% SLOPES, HSG C
W: WATER

RECEIVING WATER CLASSIFICATION & DESIGNATION

RECEIVING WATER: UNT TO LITTLE CHIQUES CREEK

EXISTING USE: NONE
DESIGNATED USE: TROUT STOCKED FISHERY, MIGRATORY FISHES (TSF, MF)

GRAPHIC SCALE
150' 75' 0' 150'
SCALE: 1" = 150'

PROJ. MGR. -	JJB
DESIGN -	TBF
CADD -	TBF
CHECKED -	JJB

NO.	DATE	REVISION	BY

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TEMPORARY SEDIMENT BASIN DRAINAGE AREA EXHIBIT
FOR
283 COMMERCE CENTER - BUILDING #1
FOR
PDC NORTHEAST LPIV, LLC
MOUNT JOY TOWNSHIP LANCASTER COUNTY, PENNSYLVANIA

PROJECT NO. 22-0123-005
DATE: 01/03/23
SCALE: 1" = 150'

DA 3.2