City of Newburgh
Office of the Engineer
83 Broadway
Newburgh, NY 12550

Attention: Jason C. Morris, PE, City Engineer

April 26, 2016

RE: STORMWATER MANAGEMENT DESIGN
MID-BROADWAY MIXED USE DEVELOPMENT
132-148 BROADWAY
CITY OF NEWBURGH, ORANGE COUNTY, NEW YORK

Dear Mr. Morris:

The site plan for the Mid-Broadway Redevelopment Project has been revised from the original project design plans from 2013. A stormwater management design was also prepared with the original project submission in 2013 including a letter dated February 21, 2014, and a Stormwater Management Report, last revised July 2013.

To demonstrate compliance with the 2013 design, the drainage areas for the 2016 site plan were delineated and the CN calculations were updated. A comparison of the drainage areas, impervious cover, and CN values for the 2013 and 2016 plans are summarized in the table below. The reduction in impervious cover and CN values in the 2016 design would therefore have less discharge to the combined sewer than the accepted 2013 amounts.

Year	PDA-1			PDA-2		
	Area (acres)	Impervious Area (acres)	CN	Area (acres)	Impervious Area (acres)	CN
2013	1.00	0.92	96	0.94	0.88	97
2016	1.00	0.82	95	0.94	0.74	94

If you should have any questions or comments in this regard, please do not hesitate to contact the undersigned directly at (845) 534-5959 x2131.

Sincerely,
TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

Casey O'Mara, PE
Senior Engineer

STATE OF NEW YORK
CASEY CATHERINE O'MARA
090164
LICENSED PROFESSIONAL ENGINEER

Attachments: CN Calculation Sheet dated April 16, 2016
Stormwater Quality Letter, dated February 21, 2014, with supporting calculations
Stormwater Management Report, last revision date July 2013

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CURVE NUMBER WORKSHEET

WO. NO.	DATE	SHEET 1 OF 2
6660.01	4/16/2016	

PROJECT TITLE	LOCATION
Mid-Broadway Multi-Use Development	City of Newburgh, NY

ESTIMATED BY	APPROVED BY	REF DRAWING(S)
CCO		

1. Runoff curve number (CN) Present [Developed] Area: **PDA-1**

Soil Name & Hydrologic Group	Cover Description (cover type, treatment & conditions)	CN	Area (acres)	Product of CN x Area
HSG D	Parking Lot	98	0.30	29.84
HSG D	Grass	84	0.17	14.28
HSG B	Proposed Building	98	0.52	50.96
HSG B	Grass	69	0.01	0.35
	TOTAL =		1.00	95.43

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{95.43}{1.00}$$

CN (weighted) = 95.47 Use **CN =** **95**

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CURVE NUMBER WORKSHEET

WO. NO.	DATE	SHEET 2 OF 2
6660.01	4/16/2016	

PROJECT TITLE	LOCATION
Mid-Broadway Multi-Use Development	City of Newburgh, NY

ESTIMATED BY	APPROVED BY	REF DRAWING(S)
CCO		

1. Runoff curve number (CN) Present [Developed] Area: **PDA-2**

Soil Name & Hydrologic Group	Cover Description (cover type, treatment & conditions)	CN	Area (acres)	Product of CN x Area
	Parking Lot	98	0.74	72.60
D	Grass	84	0.10	8.57
B	Grass	69	0.09	6.42
	TOTAL =		0.94	87.59

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{87.59}{0.94}$$

CN (weighted) = 93.59 Use **CN = 94**

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City of Newburgh
Office of the Engineer
83 Broadway
Newburgh, NY 12550

Attn: Jason C. Morris, PE, City Engineer

February 21, 2014

VIA HAND DELIVERY

RE: MID-BROADWAY MIXED USE SITE PLAN
STORMWATER QUALITY

Dear Mr. Morris:

Enclosed please find the following stormwater calculations and documentation for the Mid-Broadway Mixed-Use Site Plan:

- One (1) Water Quality Calculation Sheet
- One (1) Peak Water Quality Calculation Sheet
- One (1) CDS Unit Sizing Information

The calculations provided, along with the Stormwater Management Report, last revised July 2013, and the Project Plan and Detail Sheets, revision date 2/20/14, demonstrate the site is compliant with the NYSDEC Stormwater Design Manual: Chapter 9: Redevelopment Projects.

If you should have any questions or comments in this regard, please do not hesitate to contact the undersigned directly at (845) 534-5959 x2131.

Sincerely,

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

Casey O'Mara, PE
Senior Engineer

STATE OF NEW YORK
CASEY CATHERINE O'MARA
091164
LICENSED PROFESSIONAL ENGINEER

Enclosures: Water Quality Calculation
Peak Water Quality Calculation
CDS Unit Sizing Information

c: William Moran, P.E.- TECTONIC

TECTONIC Practical Solutions, Exceptional Service	STORMWATER QUALITY			
	WO. NO. 6660.01	DATE: 2/20/2014	PROJECT TITLE: Mid-Broadway	LOCATION: City of Newburgh, NY

NYSDEC Stormwater Manual Chapter 9- Redevelopment

Total Required Water Quality for the Site:

90% Rainfall Event Number (Fig 4.1)	P =	1.20	in
0.05+0.009(I) (minimum Rv = 0.2)	R_v =	0.9500	
Total Drainage Area	A_T =	1.80	Ac
Impervious Area	A_I =	1.80	Ac
Impervious Area Percentage	I =	100	%
90% Rule	Wqv =	**7,449**	**ft^3**

$$W_{qv} = \frac{(p)(R_v)(A_T)}{12}$$

RRV Provided at the Site- Tree Planting

Number of Large Trees Proposed	**47**	
Water Quality Reduction Per Large Trees	**100**	**ft^2/Tree**
Water Quality Reduction for Large Trees	**4,700**	**ft^2**
Number of Medium Proposed	**10**	
Water Quality Reduction Per Medium Trees	**75**	**ft^2/Tree**
Water Quality Reduction for Medium Trees	**750**	**ft^2**
Total WQv Reduction	**5,450**	**ft^2** or **0.125 acres**

ReCalculate WQv with RRv

90% Rainfall Event Number (Fig 4.1)	P =	1.20	in
0.05+0.009(I) (minimum Rv = 0.2)	R_v =	0.8875	
Total Drainage Area	A_T =	1.80	Ac
Impervious Area (after RRv Reduction)	A_I =	1.68	Ac
Impervious Area Percentage	I =	93	%
90% Rule	WQv =	**6,959**	**ft^3**
	% RRv	7%	

Required WQv treatment by Alternative Practice

%WQv treatment by Alternative practice = (25 - (% runoff reduction)) Eq from NYSDEC SWDM Section 9.3.2 (B) IV

%WQv treatment Requirement (Alternative practice)=		54	%
Water Quality Required	WQv =	**3,758**	**ft^3**

Determine WQv provided by Parking Lot Network

90% Rainfall Event Number (Fig 4.1)	P =	1.20	in
0.05+0.009(I) (minimum Rv = 0.2)	R_v =	0.9500	
Parking Lot Drainage Area	A_I =	0.92	Ac
Impervious Area Percentage	I =	100	%
Water Quality Provided	WQv =	**3,807**	**ft^3**

The WQv has been met on site because the WQv provided is greater than the WQv required.

TECTONIC Practical Solutions, Exceptional Service	Water Quality Peak Flow Calculation		
	WO. NO. 6660.01	DATE 2/20/2014	SHEET 1 OF 1
PROJECT TITLE Mid-Broadway		LOCATION City of Newburgh, Orange County, NY	

Worksheet based upon NYSDEC Design Manual, August 2005 Appendix B

90% Rainfall Event Number (Fig 4.1)	P =	1.20	in
area	A =	0.972	Ac
Water Quality Volume	WQv =	4022	ft^3
runnoff volume	Q =	1.14	in
Curve Number	CN =	99	
Ia = (200/CN) - 2	I_a =	0.01	
Ia/P	I_a/P =	0.01	
qu (From Exhibits 4-I to 4-III)*	q_u =	650	
$Q_p = q_u * A * WQ_v$	**Qp =**	**0.52**	**cfs**

The CDS unit must have a peak capacity of 0.52 cfs.

CONTECH ENGINEERED SOLUTIONS

Sizing Estimate

Prepared by Josh Stackhouse on February 21, 2014

Stormwater Treatment System Design Summary

Mountainville, NY

Information provided by Casey O'Mara (Tectonic Engineering Consultants)

Site information:

Structure ID	WQF- 90% Average Runoff Flow (cfs)	Peak Flow (cfs)	Rim Elevation	Invert Elevation
Hydrodynamic Separator	0.5	6.5	120.0	115.0

Assumptions:

- NYSDEC has adopted the NJCAT/NJDEP verified flow rates for the CDS system. NYSDEC has effectively created three categories of treatment, new development (standalone), redevelopment and pretreatment. Specific approval and sizing criteria are applied to each category. Per the specifying engineer, this project falls under **Redevelopment.**

CDS System Sizing:

The CDS Stormwater Treatment System is a high-performance hydrodynamic separator. Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, preventing re-suspension and release of previously trapped pollutants.

Contech typically selects the CDS model that based on the NJCAT/NJDEP verified flow rates meets or exceeds the Water Quality Flow generated by the Water Quality Volume. 74% TSS removal is the removal percentage verified by NJCAT/NJDEP (and adopted by NYSDEC) in laboratory testing for the CDS unit corresponding to these flows. It exceeds the 50% requirement that was laid out by NYSDEC on page 9-10 of the New York State Stormwater Management Design Manual for redevelopment projects. No such specification exists for pretreatment projects, but in the best interest of the environment Contech holds to those flows for pretreatment projects as well. Based on the flows above, Contech recommends:

Structure ID	Treatment Device	NYSDEC Approved Treatment Flow (cfs)	Internal Bypass Capacity (cfs) (Site Specific)
Hydrodynamic Separator	CDS2015-4W (CDS-4)	0.70	8.6

Maintenance:

Like any stormwater best management practice, the CDS system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the CDS system requires annual removal of accumulated pollutants. Please contact us if you have any questions or need any additional information. Again, thank you for your interest in the CDS system. We look forward to receiving your feedback and working with you.

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Toll-free: 877.907.8676 Fax: 207.885.9825

STORMWATER MANAGEMENT REPORT
FOR
MID-BROADWAY
LARGE- SCALE MIXED-USE DEVELOPMENT

140 BROADWAY
CITY OF NEWBURGH
ORANGE COUNTY
NEW YORK

PREPARED BY:

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.
70 PLEASANT HILL ROAD - PO BOX 37
MOUNTAINVILLE, NEW YORK 10953

MAY 2013
REVISED JULY 2013

STATE OF NEW YORK
WILLIAM MORAN
072968
LICENSED PROFESSIONAL ENGINEER

William Moran
New York State Professional Engineer #072968

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6660.01

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APPENDIX F ..... MAINTENANCE PLAN

I. INTRODUCTION

This report has been prepared to describe the stormwater management analysis performed for the located on Block 3, Lots 21-38 in City of Newburgh, New York. The project is located in part of the City that is served by a combined sewer. Therefore the stormwater design was prepared in accordance with Chapter 248, Article II and III, of the City's code titled Sewer Use and Wastewater Discharge, respectively. To ensure the proposed development would not cause an increase in flows to the combined sewer during rain events, the existing (pre-construction) and proposed (post-construction) conditions were analyzed and detention measures were design to mitigate the stormwater quantity impacts. Review of this plan should be in conjunction with the engineering drawings for this project prepared by Tectonic Engineering & Surveying Consultants, P.C.

II. EXISTING HYDROLOGY

The proposed site is a 1.94± acre property located at 140 Broadway in the City of Newburgh, Orange County, New York. The site is designated as Block 3, Lot 21-38.

The soils of the site consists of approximately sixty percent (60%) Mardin gravelly silt loam, hydrologic group "D," and forty percent (40%) Urban land according to the United States Department of Agriculture (USDA), Soil Conservation Service's Soil Survey of Orange County, New York. To determine the hydrologic characteristics of the soils described as Urban Land, the Geotechnical Report for the project was reviewed. Based on the boring log description of the sandy soils, this area is considered to be hydrologic group "B." The Soil Web Survey Report and the boring logs from the Geotechnical Report have been included in Appendix B.

The site, under current conditions, has been analyzed as one drainage areas which is depicted on the Existing Drainage Area Map included in Appendix A. The area is composed of existing buildings, an existing parking lot and open space. Hydrologic calculations have been performed for this drainage area and are included in Appendix B.

The peak runoff flows were calculated for the existing conditions of the site at the point where the flow combines within the combined sewer, DP-1. The methodology utilized for this analysis is based upon the USDA, Soil Conservation Service's Technical Release No. 20 and Technical Release No. 55, as utilized by the software entitled Hydraflow Hydrographs version 9.21. Hydraflow Hydrographs, developed by Intelisolve of Alpharetta, Georgia, is a Microsoft Windows based program for analyzing the hydrology and hydraulics of stormwater runoff. It utilizes the latest techniques to predict the consequences of a given storm event. Hydraflow Hydrographs has the capability of computing hydrographs (representing discharge rates characteristic of specific watershed conditions, precipitation and geologic factors), combining hydrographs, and routing flows through pipes, streams and ponds. For this analysis, the property was analyzed for both the existing and proposed conditions. The area consists of a

relatively homogeneous type of land, which produces a volume and rate of runoff unique to that watershed.

Rainfall data utilized in the analysis was taken from the data published in the NYSDEC Stormwater Management Design Manual. A summary of the parameters results are tabulated below in Table 1.

Table 1 : Existing Drainage Area Characteristics and Peak Runoff Rates

Drainage Area	Area (acres)	Tc (min)	CN	1-Year (cfs)	10-Year (cfs)	100-Year (cfs)
EDA	1.94	6	90	4.143	9.186	13.02

III. PROPOSED HYDROLOGY

The site, under proposed conditions, will include a multi-story residence and associated driveway which divide two of the drainage areas each into two sub-areas which are depicted on a Proposed Drainage Area Map included in the Appendix A. The proposed sub-drainage area combine and drain to DP-1 Hydrologic calculations have been performed for each drainage area as described in the prior section and are included in the appendices. A summary of the results are tabulated below in Table 2.

Table 2: Proposed Drainage Area Characteristics and Peak Runoff Rates

Drainage Area	Area (acres)	Tc (min)	CN	Description
PDA 1	1.00	6	96	Building, sidewalk, northern portion of parking lot.
PDA 2	0.94	6	97	Parking lot

IV. FLOW MITIGATION

In order to mitigate the increased runoff resulting from the proposed conditions, a subsurface arched chamber detentions system has been designed. The stormwater detention system is designed to store excess runoff from the proposed development and thereby control the peak runoff. Infiltration is not included with this design due to the variability of infiltration rate parameters. The soiling boring logs, included in Appendix B, indicate that there is no groundwater or bedrock in the location of the subsurface storage system. A pretreatment unit will be installed upstream of the storage to reduce floatables, debris and oil entering the system. For more detailed formation, refer to the attached drainage plan and detail sheets.

Table 3: Underground Detention Hydraulics

Parameter	1-Year	10-Year	100-Year

Parameter	1-Year	10-Year	100-Year
Inflow (cfs)	2.501	4.852	6.648
Outflow (cfs)	1.679	3.753	6.349
Peak Storage (cf)	1,125	1,824	2,168
Peak Flood Elevation (ft)	116.11	117.03	117.69
Top of System (ft)	118.0	118.0	118.0

V. STORM PIPE SIZING

A storm drainage collection system is proposed to improve stormwater collection within the existing and expanded parking lot. The piping for this system is designed for a 25-year storm event. The design is based upon the rational method utilizing the equation Q=CIA. Where "Q" is the flow, "C" is the runoff coefficient, "I" is the intensity, and "A is the contributing area. For this analysis the following assumptions were made:

- The coefficient of runoff, "C", for all grassed areas equals 0.65;
- The coefficient of runoff, "C", for all impervious areas (pavement and roof areas) is equal to 0.99.
- The intensity, "I", is based upon the Orange County, New York, Rainfall Intensity-Duration-Frequency Curve, Technical Paper No. 55, published by the United States Weather Bureau, December 1955.
- The calculated area contributing to the individual drainage structure and piping, accumulates as indicated in the attached computations. The calculation is included in Appendix C.

In addition, a storm drainage collection system is proposed to convey stormwater collection of the roof. The sizing of the horizontal storm drain pipe is based on the Building Code of New York State (BCNYS).

VI. SOIL EROSION AND SEDIMENT CONTROLS

The soil erosion and sediment control measures outlined herein are incorporated into the development plans. Additionally, a construction schedule to aid in the proper implementation of erosion and sediment controls has been included with the Erosion Control Plan. General measures that will be implemented are as follows:

a) There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions. There shall be no increase in suspended, colloidal and settleable solids that will cause deposition or impair the waters for their best

usage. There shall be no residue from oil and floating substances, or visible oil film, or globules of grease.

b) As much as practical, existing vegetation shall be preserved. Following the completion of construction activities in any portion of the site, permanent vegetation shall be established on all exposed soils.
c) Site preparation activities shall be planned to minimize the area and duration of soil disruption.
d) Permanent traffic corridors shall be established and “routes of convenience” shall be avoided. Stabilized construction entrances shall be installed at all points of entry onto the project site.
e) Silt Fence: Installation of silt fence shall be on contours across a slope in order to intercept sediment laden runoff from small drainage areas of disturbed soil.
f) Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving the construction site to or from a public right of way shall be installed.
g) Dust Control: Dust control shall be maintained in order to control the air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.
h) Permanent vegetative cover: Immediately following the completion of construction activity in any portion of the site, permanent vegetation shall be established on all exposed soils.
i) All disturbed areas shall receive temporary stabilization if they are to remain fallow for longer than 14 days.

To assure proper function, siltation barriers shall be maintained in good condition and reinforced, extended, repaired or replaced as necessary. Washouts shall be immediately repaired, re-seeded and protected from further erosion. All accumulated sediment shall be removed and contained in appropriate spoil areas. Water shall be applied to newly seeded areas as needed until grass cover is well established. To effectively control wind erosion, water shall be applied to all exposed soils as necessary of the project site as designed.

VII. CONCLUSIONS

The peak discharge flow rates for the existing and proposed conditions have been calculated for the Design Points, reduced for the 1-year, 10-year and 25-year 24-hour storm design events, and will safely pass through the system. These values are tabulated below.

Table 4: Summary of Peak Flows

Design Point	Existing	Proposed
1-Year (cfs)	4.143	3.834

Design Point	Existing	Proposed
10-Year (cfs)	9.186	8.549
100-Year (cfs)	13.02	12.59

APPENDIX A: MAPS

LOCATION MAP

NORTH

MID-BROADWAY
LARGE- SCALE MIXED-USE
DEVELOPMENT
140 BROADWAY
CITY OF NEWBURGH
NEW YORK

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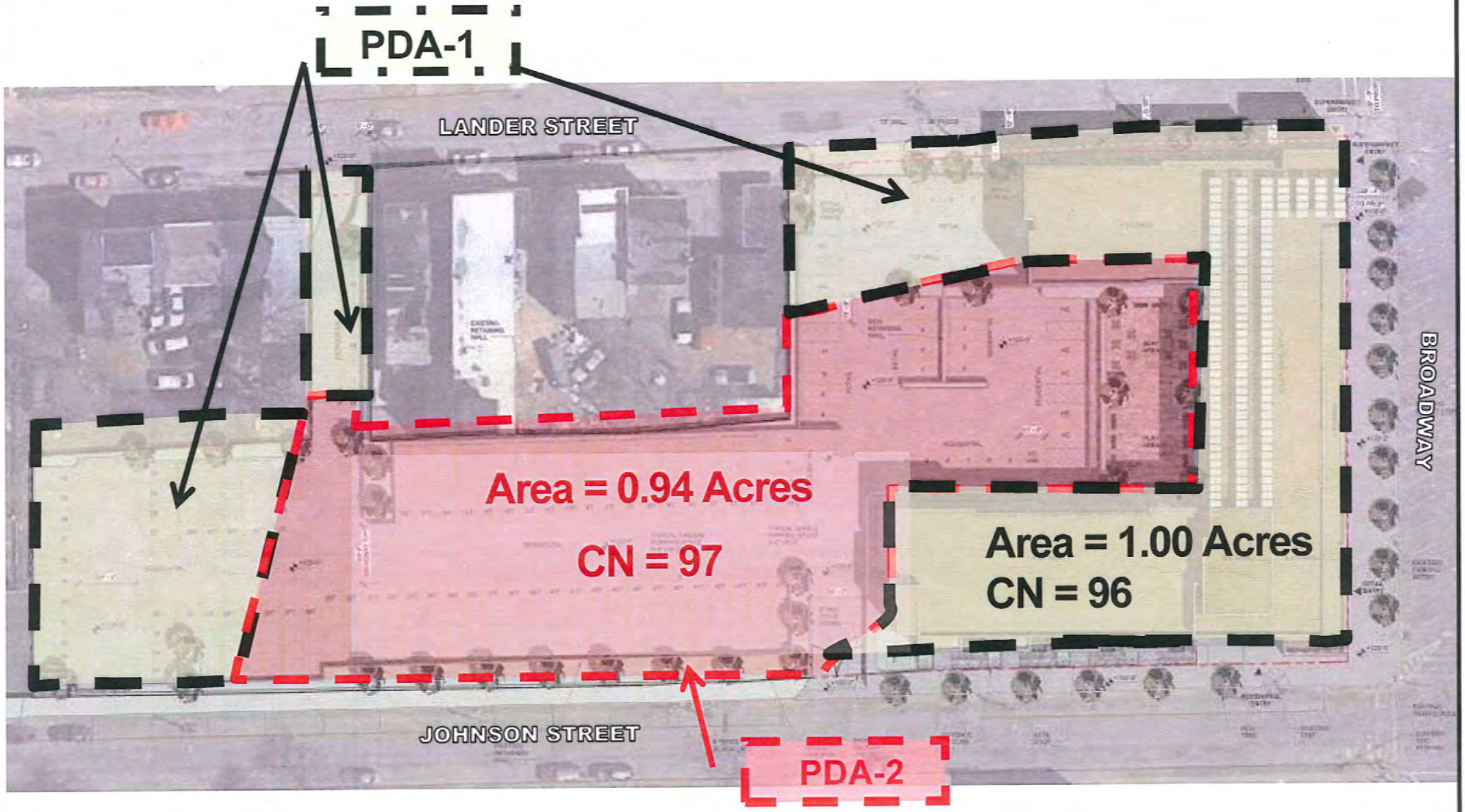
NTS	5/10/13	CCO	6660.01



NORTH

MID-BROADWAY
LARGE- SCALE MIXED-USE
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140 BROADWAY
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Proposed Drainage Areas

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APPENDIX B: SOILS

Soil information from USDA National Resources Conservation Service Web Soil Survey

SOILS MAP

NORTH

MID-BROADWAY
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MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:1,390 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: Orange County, New York
Survey Area Data: Version 13, Sep 21, 2012

Date(s) aerial images were photographed: 11/6/2006

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Orange County, New York (NY071)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	D	3.5	57.2%
Ur	Urban land		2.6	42.9%
Totals for Area of Interest			**6.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

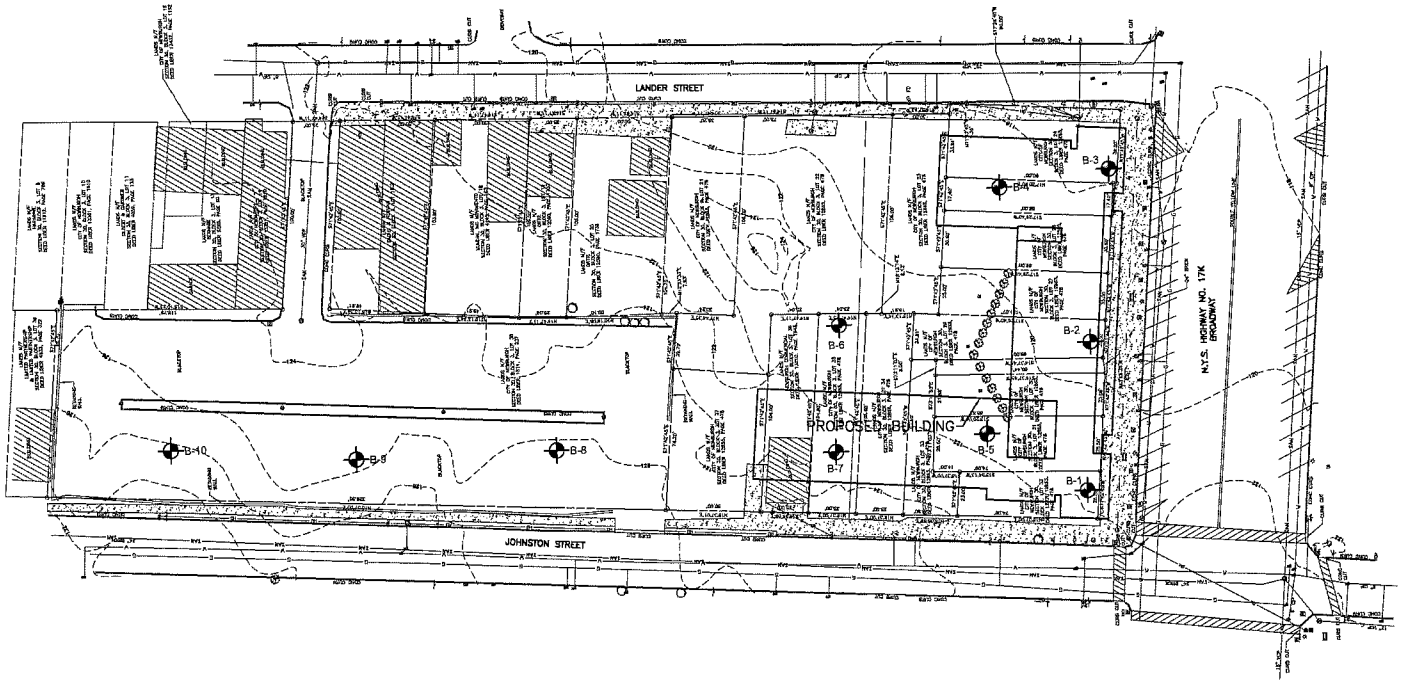
The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.



NOTE:

THIS PLAN IS FOR LOCATING BORINGS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

LEGEND

B-1 BORING NO. & APPROX. LOCATION

REFERENCES:

1. EXIST CONDITIONS & TOPOGRAPHY ARE TAKEN FROM DRAWING ENTITLED "SURVEY", PREPARED BY FUSCO ENGINEERING & LAND SURVEYING, P.C. CONSULTING ENGINEERS, DATED 2/1/13.
2. PROPOSED BUILDING TAKEN FROM DRAWING PREPARED BY MAGNUSSON ARCHITECTURE AND PLANNING PC, DATED 11/30/12.

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rev	date	description

drawn by: YY
checked by: MSP
scale: 1"=30'
date: 2/27/13

SESI CONSULTING ENGINEERS, P.C.
SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
1 ERA MAPLE AVE, PINE BROOK, N.J. 07058 PH: 973-808-9300

project: MID - BROADWAY MIXED - USE DEVELOPMENT
NEWBURGH, N. Y.

drawing title: BORING LOCATION PLAN

job no. B441
drawing no.

FIG-1

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-1
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	122+/-
BORING BY: GBI	DATE STARTED: 2/12/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/12/2013	0 Hr. 9' 3" / 3. Hr. 9' 3" / 4 Hr. 9'	Date 2/12/13

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	12	0		7	6				FILL: Brown/ gray medium to fine SAND, some Silt,	
				2			9	12	15	little medium Gravel, trace Brick	
	S-2	6	2		4	3					
				4			5	5	8		
5											
	S-3	3	5		5	9					
				7			7	6	16	Light brown coarse to fine Sand and coarse to fine Gravel,	
	S-4	16	7		9	9				little Silt	
				9			6	8	15	Light Brown/gray/red-brown medium to fine SAND and Silt,	
10										trace Gravel (mottled)	
	S-5	12	10		5	19				Brown silty CLAY, little medium to fine Sand, trace Gravel	
				12			26	17	45		
										Brown/gray coarse to fine Gravel, some coarse to fine Sand,	
										little Silt	
15											
	S-6	6	15	15.8	18	50/4"				Brown/gray coarse to fine SAND, some medium to fine Gravel,	
										little clayey Silt	
20											
	S-7		20	20.75	40	53/3"				Gray coarse to fine SAND, some medium to fine Gravel,	
										little Silt	
										...hit boulder at 22'	
25											
	S-8	5	25	25.75	20	50/3"					
										Boring Complete at 25.75 Feet	
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #2

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-2
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	119.5+/-
BORING BY: GBI	DATE STARTED: 2/12/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/12/2013	0 Hr. 9' 6" / 1. Hr. 9' 7" / N/A N/A / Date 2/12/13	

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1		0		9	16				FILL: Dark Brown/ gray Silt, some medium to fine Gravel,	
				2			11	8	27	some coarse to fine Sand	
	S-2	2	2		10	5					
				4			3	3	8	...with concrete and Brick	
5											
	S-3	4	5		3	3				FILL: Red brown/ gray coarse to fine Gravel, and coarse	
				7			1	3	4	to fine Sand, little Silt with Brick	
	S-4	3	7		3	2				FILL: Gray coarse to fine Sand and Silt, trace Gravel with Brick	
				9			3	7	5		
10											
	S-5	14	10		10	19					
				12			18	29	37	Gray coarse to fine Sand and coarse to fine Gravel,	
										little Silt	
15											
	S-6	4	15		7	20				Gray coarse to fine SAND, little Silt, trace Gravel	
				17			35	29	55		
20											
	S-7	8	20	20.75	17	50/3"				Light brown medium to fine SAND, little Silt, trace Gravel	
										Boring complete at 20.75 Feet	
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #3

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-3
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	118.0+/-
BORING BY: GBI	DATE STARTED: 2/12/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/12/2013	0 Hr. 10' 3" / 1. Hr. 9' 8" / N/A N/A / Date 2/12/13	

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	8	0		5	4			9	FILL: Brown/ gray Sand, Silt, Gravel with Brick	
				2			5	6			
	S-2	0	2		4	1					
				4			1	1	2		
5											
	S-3	8	5		3	3					
				7			1	3	4		
	S-4	11	7		3	2					
				9			2	2	4	Brown/ gray coarse to fine SAND and Silt	
10											
	S-5	8	10		18	11					
				12			12	13	23	Brown/ gray coarse to fine SAND, some Silt, little Gravel	
15											
	S-6	8	15		25	39				Light brown coarse to fine SAND, little Silt, little Gravel	
				16.4			50/5"		89	with Rock fragments	
20											
	S-7	6	20	20.25	52.5	50/2"				Gray coarse to fine Sand and coarse to fine Gravel, little Silt	
										Auger Refusal at 22'	
										Boring complete at 22 Feet	
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
/eight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #4

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-4
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	119.0+/-
BORING BY: GBI	DATE STARTED: 2/12/2013	GROUNDWATER TABLE DEPTH	
NSPECTOR: MBA	DATE COMPLETED: 2/12/2013	0 Hr. 10+/- N/A N/A N/A N/A Date 2/12/13	

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	8	0		11	7				FILL: Brown/ gray medium to fine SAND and clayey Silt	
				2			6	5	13	with Brick W.C. = 18.8% (-200) = 38.9%	
	S-2	6	2		13	6				FILL: Brown/ gray coarse to fine SAND, some Gravel, little	
				4			6	7	12	Silt with Brick	
5										Gray/ red-brown medium to fine SAND, some Silt, trace	
	S-3	19	5		4	6				Gravel	
				7			6	5	12		
	S-4	22	7		6	6				Gray/ red- brown SILT and medium to fine Sand	
				9			9	13	15		
10											
	S-5	5	10	10.75	22	50/3"				... little Gravel	
15											
	S-6	13	15	16.3	28	35					
							55/4"		90	Gray medium to fine SAND and Silt, trace Gravel	
20											
	S-7	8	20	20.9	34	54/5"				Gray coarse to fine SAND, some Silt, some Gravel	
										Boring complete at 20.9 Feet	
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
'eight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #5

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-5
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	121.5+/-
BORING BY: GBI	DATE STARTED: 2/12/2013	GROUNDWATER TABLE DEPTH	
NSPECTOR: MBA	DATE COMPLETED: 2/12/2013	0 Hr. N/A / N/A N/A / N/A N/A	Date 2/12/13

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	8	1		18	16				FILL: Gray/ brown coarse to fine SAND, and Silt	
				2			8	16	24		
	S-2	4	2		10	16				FILL: Gray/ red-brown coarse to fine SAND and Silt, trace	
				4			8	12	24	Gravel	
5											
	S-3	4	5		19	10				FILL: Gray coarse to fine SAND and Gravel, little Silt (wet)	
				7			16	23	26		
	S-4	17	7		23	21					
				9			26	23	47	Gray/ brown coarse to fine SAND, little Silt, little	
10										medium to fine Gravel	
	S-5	0	10		15	23					
				12			26	50	49		
15										Gray coarse to fine SAND, little Silt, little medium to fine	
	S-6	15	15		15	47				Gravel	
				16.8			50	50/4"	97		
										Auger refusal at 17' 6"	
20										Boring complete at 17.5 Feet	
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
'eight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #6

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-6
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	121+/-
BORING BY: GBI	DATE STARTED: 2/13/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/13/2013	0 Hr. 8' +/- N/A N/A N/A N/A Date 2/13/13	

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	8	0		2	8				4" Topsoil	
				2			6	6	14	Red-brown coarse to fine SAND, Silt, Gravel with Brick	
	S-2	9	2		3	3				FILL: Gray/ brown coarse to fine SAND, some Silt, trace	
				4			4	6	7	Gravel with Brick	
5											
	S-3	17	5		7	12				Gray/ red-brown SILT, trace Sand with Brick	
				7			11	15	22		
	S-4	12	8		14	18					
				9			22	30	40	Gray coarse to fine SAND and Silt, trace Gravel(wet)	
10											
	S-5	10	10	11.25	7	17				Gray coarse to fine SAND, some Silt, some Gravel	
							50/3"		67		
15											
	S-6	4	15	15.5	25	50/8"				Gray coarse to fine SAND, and Silt, trace Gravel	
20											
	S-7	9	20	21	40	70					
							50/1"		120		
25											
										Auger refusal at 24.5'	
										Boring complete at 24.5 Feet	
										\	
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #7

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-7
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	123+/-
BORING BY: GBI	DATE STARTED: 2/13/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/13/2013	0 Hr. 10' +/- N/A N/A N/A N/A	Date 2/13/13

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0	S-1	12	0		7	7				FILL: Brown/ gray coarse to fine SAND, some Silt, little	
				2			9	5	16	Gravel with Brick	
	S-2	15	2		6	8				FILL: Brown/ gray SILT, some medium to fine Sand, little	
				4			7	8	15	Gravel W.C. = 24.5% (-200) = 71.23%	
5											
	S-3	10	5		12	14				FILL: Brown/ gray coarse to fine SAND and Silt, little Gravel	
				7			13	12	27		
	S-4	22	8		13	9				Brown/ gray coarse to fine SAND, some Silt, some	
				9			13	28	22	Gravel	
10											
	S-5	18	10		14	24				Brown coarse to fine Sand, some Silt, some medium to	
				11.75			53	50/3"	77	fine Gravel	
15										Auger refusal at 14'	
										Boring complete at 14 Feet	
20											
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #8

ESI CONSULTING ENGINEERS	PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO. B-8
	LOCATION:	Newburgh, NY	JOB NO. N 8441
	METHOD	Hollow Stem Auger	GROUND ELEVATION: 126+/-
BORING BY: GBI	DATE STARTED:	2/13/2013	GROUNDWATER TABLE DEPTH
INSPECTOR: MBA	DATE COMPLETED:	2/13/2013	0 Hr. N/A; N/A N/A; N/A N/A; Date 2/13/13

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	6	0		20	46				1" Asphalt	
				2			4	7	50	FILL: Brown coarse to fine Sand, Gravel, Silt with Brick	
	S-2	8	3		4	3				FILL: Brown/ gray coarse to fine Sand, Silt, Gravel with Brick	
5				5			1	2	4		
	S-3	13	5		2	3					
				7			4	9	7		
		0	7		19	13					
				9			15	20	28	Gray/ red-brown SILT, some medium to fine Sand, trace	
10										Gravel	
	S-4		10	11	9	13				Brown SILT, some medium to fine Sand	
	S-5	24	11	12			12	14	25	Gray coarse to fine Sand, some Silt, some medium to fine	
										Gravel (wet)	
15											
	S-6	17	15		14	35					
				17			40	45	75		
20										Gray coarse to fine SAND and medium to fine Gravel, some Silt	
		6	20	20.75	41	50/3"					
										Boring complete at 20.9 Feet	
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #9

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-9
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	126+/-
BORING BY: GBI	DATE STARTED: 2/13/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/13/2013	0 Hr. 9.5+/- N/A N/A N/A N/A Date 2/13/13	

DEPTH (ft)	SAMPLE No.	REC	DEPTH FROM	DEPTH TO	Blows on Spoon 0/6	6/12	12/18	18/24	N	SOIL DESCRIPTION AND STRATIFICATION	Symbol
0		(in)	(ft)	(ft)					(bl/ft)		USCS
	S-1	8	0		6	4				FILL: Gray coarse to fine SAND, some Silt	
				2			4	3	8	FILL: Topsoil- Brown coarse to fine Sand and Silt, little Gravel with Brick	
	S-2	10	2		2	4					
				4			2	2	6	Brown coarse to fine SAND, some Silt, trace Gravel	
5										Brown/ gray clayey SILT, little Sand	
	S-3	12	5		6	8					
				7			8	7	16		
	S-4	13	7		11	16					
				9			16	13	32	Brown / gray coarse to fine SAND, some Silt, trace Gravel (wet)	
10											
	S-5	9	10	11.5	3	9				Light Brown coarse to fine SAND, some Silt, little medium to	
							65		74	fine Gravel	
15										Auger refusal at 14'	
										Boring complete at 14 Feet	
20											
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #10

SESI CONSULTING ENGINEERS

PROJECT NAME:	Mid-Broadway Mixed-Use	BORING NO.	B-10
LOCATION:	Newburgh, NY	JOB NO.	N 8441
METHOD	Hollow Stem Auger	GROUND ELEVATION:	128+/-
BORING BY: GBI	DATE STARTED: 2/13/2013	GROUNDWATER TABLE DEPTH	
INSPECTOR: MBA	DATE COMPLETED: 2/13/2013	0 Hr. N/A / N/A N/A / N/A N/A / Date 2/13/13	

DEPTH (ft)	SAMPLE No.	REC (in)	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	N (bl/ft)	SOIL DESCRIPTION AND STRATIFICATION	Symbol USCS
0											
	S-1	8	0		28	12				1.5" Asphalt	
				2			11	12	23	FILL: Brown coarse to fine SAND and clayey Silt with Brick	
	S-2	10	2		7	6					
				4			2	2	8	FILL: Gray/ brown coarse to fine SAND, little Silt with Brick	
5											
	S-3	11	5		7	4				Gray/ brown medium to fine SAND and Silt, trace Gravel	
				7			5	8	9		
	S-4	15	7		10	8				Gray/ brown SILT, little medium to fine Sand	
				9			10	12	18		
10											
	S-5	9	10		7	10				Brown coarse to fine SAND, some Silt, little Gravel (wet)	
				12			27	37	37		
15											
	S-6	15	15		17	33					
				17			21	33	54		
20											
										Auger refusal at 20'	
										Boring complete at 20 Feet	
25											
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted.

Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: _____

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #11

APPENDIX C: CALCULATIONS

TECTONIC
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CURVE NUMBER WORKSHEET

WO. NO.	DATE	SHEET
6660.01	5/16/2013	1 OF 3

PROJECT TITLE	LOCATION
Mid-Broadway Multi-Use Development	City of Newburgh, NY

ESTIMATED BY	APPROVED BY	REF DRAWING(S)
CCO		

1. Runoff curve number (CN) Present Developed Area: **EDA**

Soil Name & Hydrologic Group	Cover Description (cover type, treatment & conditions)	CN	Area (acres)	Product of CN x Area
HSG D	Parking Lot	98	0.68	66.64
HSG B	Buildings/Asphalt	98	0.70	68.60
HSG B	Pervious- Grass (fair)	69	0.56	38.64
		TOTAL =	1.94	173.88

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{173.88}{1.94}$$

CN (weighted) = 89.63 Use **CN = 90**

TECTONIC
Practical Solutions, Exceptional Service

CURVE NUMBER WORKSHEET

WO. NO.	DATE	SHEET 2 OF 3
6660.01	5/16/2013	

PROJECT TITLE	LOCATION
Mid-Broadway Multi-Use Development	City of Newburgh, NY

ESTIMATED BY	APPROVED BY	REF DRAWING(S)
CCO		

1. Runoff curve number (CN) Present [Developed] Area: **PDA-1**

Soil Name & Hydrologic Group	Cover Description (cover type, treatment & conditions)	CN	Area (acres)	Product of CN x Area
HSG D	Parking Lot-1	98	0.22	21.42
HSG D	Grass	84	0.01	0.77
HSG B	Proposed Building	98	0.53	51.72
HSG B	Parking lot-6	98	0.069	6.76
HSG B	Parking Lot-5	98	0.068	6.66
HSG B	Sidewalk	98	0.04	3.92
HSG B	Grass	69	0.07	4.83
	TOTAL =		1.00	96.09

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{96.09}{1.00}$$

CN (weighted) = 95.85 Use **CN = 96**

TECTONIC
Practical Solutions, Exceptional Service

CURVE NUMBER WORKSHEET

WO. NO.	DATE	SHEET
5526.01	5/16/2013	3 OF 3

PROJECT TITLE	LOCATION
Mid-Broadway Multi-Use Development	City of Newburgh, NY

ESTIMATED BY	APPROVED BY	REF DRAWING(S)
CCO		

1. Runoff curve number (CN) Present [Developed] Area: **PDA-2**

Soil Name & Hydrologic Group	Cover Description (cover type, treatment & conditions)	CN	Area (acres)	Product of CN x Area
HSG D	Parking Lot-2	98	0.28	27.62
HSG D	Parking Lot-3	98	0.23	22.07
HSG D	Grass- 2,3	84	0.03	2.89
HSG B	Grass-4	69	0.03	2.07
HSG B	Sidewalk-4	98	0.05	4.64
HSG B	Parking Lot-4	98	0.32	31.79
		TOTAL =	0.94	91.09

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{91.09}{0.94}$$

CN (weighted) = 96.57 Use **CN =** **97**

TECTONIC Practical Solutions, Exceptional Service	RATIONAL METHOD & MANNINGS FORMULA PIPE FLOW WORKSHEET	PROJECT TITLE:	Mid-Broadway Multi-Use Development
		LOCATION	City of Newburgh, NY
		DATE	5/21/2013
		WO. NO.	6660.01

Drainage to CB-5A

Rational Method

C = Runoff Coefficent	=	**0.99**
I = Rainfall Intensity (in/hr)	=	**7.5**
(25 yr @ 5 min/ Orange County, NY's Rainfall Intensity Curves)		
A = Drainage Area (acres)	=	**0.28**
Q = Peak Flow Rate (cfs) =	=	**2.1**

Mannings

V = velocity (ft/sec)	=	5.70	
k = unit system factor	=	1.49	
n = manning's roughness coeff.	=	**0.01**	HDPE
R = hydraulic radius (ft)	=	0.31	
S = Slope (ft/ft)	=	**0.01**	
P = Pipe Size (in)	=	**15**	
Q = Capacity (cfs)	=	**7.00**	

Capacity (Is Capacity > Peak flow?) **TRUE**

Drainage to CB-4A

Rational Method

C = Runoff Coefficent	=	**0.99**
I = Rainfall Intensity (in/hr)	=	**7.5**
(25 yr @ 5 min/ Orange County, NY's Rainfall Intensity Curves)		
A = Drainage Area (acres)	=	**0.51**
Q = Peak Flow Rate (cfs) =	=	**3.8**

Mannings

V = velocity (ft/sec)	=	10.62	
k = unit system factor	=	1.49	
n = manning's roughness coeff.	=	**0.01**	
R = hydraulic radius (ft)	=	0.31	HDPE
S = Slope (ft/ft)	=	**0.03**	
P = Pipe Size (in)	=	**15**	
Q = Capacity (cfs)	=	**13.04**	

Capacity (Is Capacity > Peak flow?) **TRUE**

Drainage to CB-3A

Rational Method

C = Runoff Coefficent	=	**0.69**
I = Rainfall Intensity (in/hr)	=	**7.5**
(25 yr @ 5 min/ Orange County, NY's Rainfall Intensity Curves)		
A = Pervious Drainage Area (acres	=	**0.14**
Q = Peak Flow Rate (cfs) =	=	**0.7**

Mannings

V = velocity (ft/sec)	=	10.62	
k = unit system factor	=	1.49	
n = manning's roughness coeff.	=	**0.01**	
R = hydraulic radius (ft)	=	0.31	HDPE
S = Slope (ft/ft)	=	**0.03**	
P = Pipe Size (in)	=	**15**	
Q = Capacity (cfs)	=	**13.04**	

Capacity (Is Capacity > Peak flow?) **TRUE**

Drainage to Pretreatment Structure

Rational Method

C = Runoff Coefficent	=	**0.99**
I = Rainfall Intensity (in/hr)	=	**7.5**
(25 yr @ 5 min/ Orange County, NY's Rainfall Intensity Curves)		
A = Drainage Area (acres)	=	**0.82**
Q = Peak Flow Rate (cfs) =	=	**6.8**

Mannings

V = velocity (ft/sec)	=	10.62	
k = unit system factor	=	1.49	
n = manning's roughness coeff.	=	**0.01**	
R = hydraulic radius (ft)	=	0.31	HDPE
S = Slope (ft/ft)	=	**0.03**	
P = Pipe Size (in)	=	**15**	
Q = Capacity (cfs)	=	**13.04**	

Capacity (Is Capacity > Peak flow?) **TRUE**

APPENDIX D: HYDRAFLOW OUTPUT

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Thursday, May 16, 2013

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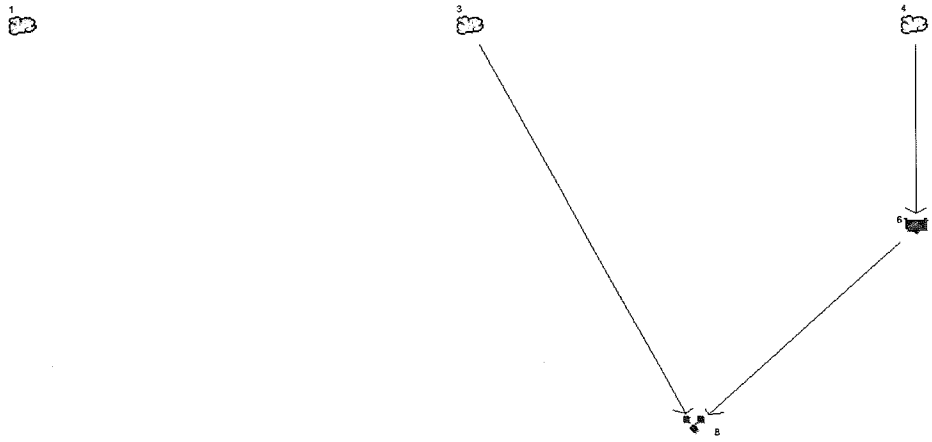
Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	EDA
3	SCS Runoff	PDA-1
4	SCS Runoff	PDA-2
6	Reservoir	Underground Detention
8	Combine	Total PDA

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	4.143	-------	-------	-------	9.186	11.11	-------	13.02	EDA
3	SCS Runoff	-------	2.602	-------	-------	-------	5.123	6.083	-------	7.041	PDA-1
4	SCS Runoff	-------	2.501	-------	-------	-------	4.852	5.751	-------	6.648	PDA-2
6	Reservoir	4	1.679	-------	-------	-------	3.753	4.544	-------	6.349	Underground Detention
8	Combine	3, 6,	3.834	-------	-------	-------	8.549	10.08	-------	12.59	Total PDA

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	4.143	2	724	12,494	----	------	------	EDA
3	SCS Runoff	2.602	2	724	8,350	----	------	------	PDA-1
4	SCS Runoff	2.501	2	724	8,187	----	------	------	PDA-2
6	Reservoir	1.679	2	728	8,183	4	116.11	1,141	Underground Detention
8	Combine	3.834	2	726	16,533	3, 6,	------	------	Total PDA

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 16, 2013

Hyd. No. 1

EDA

Hydrograph type	= SCS Runoff	Peak discharge	= 4.143 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 41,684 cuft
Drainage area	= 1.940 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 2.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Outflow (cfs)
11.07	0.208
11.17	0.238
11.27	0.271
11.37	0.306
11.47	0.342
11.57	0.423
11.67	0.701
11.77	1.039
11.87	1.414
11.97	2.257
12.07	4.143 <<
12.17	2.329
12.27	1.672
12.37	1.301
12.47	0.914
12.57	0.579
12.67	0.499
12.77	0.459
12.87	0.418
12.97	0.376
13.07	0.340
13.17	0.326
13.27	0.316
13.37	0.305
13.47	0.294
13.57	0.284
13.67	0.273
13.77	0.262
13.87	0.251
13.97	0.240
14.07	0.230
14.17	0.225
14.27	0.219
14.37	0.214
14.47	0.209

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 3

PDA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.602 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 23,897 cuft
Drainage area	= 1.000 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 2.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.50	0.132
10.60	0.138
10.70	0.145
10.80	0.152
10.90	0.158
11.00	0.165
11.10	0.178
11.20	0.201
11.30	0.224
11.40	0.248
11.50	0.272
11.60	0.375
11.70	0.591
11.80	0.817
11.90	1.051
12.00	1.981
12.10	2.316
12.20	1.187
12.30	0.921
12.40	0.691
12.50	0.459
12.60	0.311
12.70	0.283
12.80	0.258
12.90	0.234
13.00	0.210
13.10	0.193
13.20	0.186
13.30	0.180
13.40	0.173
13.50	0.167
13.60	0.160
13.70	0.154
13.80	0.148
13.90	0.141
14.00	0.135

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 4

PDA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.501 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 22,844 cuft
Drainage area	= 0.940 ac	Curve number	= 97
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 2.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.37	0.126
10.47	0.132
10.57	0.138
10.67	0.144
10.77	0.150
10.87	0.157
10.97	0.163
11.07	0.172
11.17	0.193
11.27	0.215
11.37	0.238
11.47	0.261
11.57	0.315
11.67	0.508
11.77	0.725
11.87	0.946
11.97	1.441
12.07	2.501 <<
12.17	1.352
12.27	0.953
12.37	0.732
12.47	0.511
12.57	0.322
12.67	0.277
12.77	0.253
12.87	0.230
12.97	0.207
13.07	0.187
13.17	0.179
13.27	0.173
13.37	0.167
13.47	0.161
13.57	0.154
13.67	0.148
13.77	0.142
13.87	0.136
13.97	0.130

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 16, 2013

Hyd. No. 6

Underground Detention

Hydrograph type	= Reservoir	Peak discharge	= 1.679 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 22,841 cuft
Inflow hyd. No.	= 4 - PDA-2	Reservoir name	= Underground
Max. Elevation	= 116.11 ft	Max. Storage	= 1,141 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9.50	0.089	114.69	0.090	0.086	-----	-----	-----	-----	-----	-----	-----	0.086
9.60	0.093	114.69	0.092	0.089	-----	-----	-----	-----	-----	-----	-----	0.089
9.70	0.096	114.69	0.095	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
9.80	0.099	114.70	0.098	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
9.90	0.102	114.70	0.100	0.098	-----	-----	-----	-----	-----	-----	-----	0.098
10.00	0.105	114.70	0.103	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
10.10	0.110	114.71	0.105	0.105	-----	-----	-----	-----	-----	-----	-----	0.105
10.20	0.115	114.71	0.110	0.110	-----	-----	-----	-----	-----	-----	-----	0.110
10.30	0.122	114.72	0.116	0.116	-----	-----	-----	-----	-----	-----	-----	0.116
10.40	0.128	114.72	0.123	0.122	-----	-----	-----	-----	-----	-----	-----	0.122
10.50	0.134	114.73	0.129	0.128	-----	-----	-----	-----	-----	-----	-----	0.128
10.60	0.140	114.73	0.136	0.134	-----	-----	-----	-----	-----	-----	-----	0.134
10.70	0.146	114.74	0.143	0.140	-----	-----	-----	-----	-----	-----	-----	0.140
10.80	0.153	114.75	0.149	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
10.90	0.159	114.75	0.155	0.153	-----	-----	-----	-----	-----	-----	-----	0.153
11.00	0.165	114.76	0.161	0.159	-----	-----	-----	-----	-----	-----	-----	0.159
11.10	0.178	114.77	0.169	0.167	-----	-----	-----	-----	-----	-----	-----	0.167
11.20	0.200	114.78	0.183	0.183	-----	-----	-----	-----	-----	-----	-----	0.183
11.30	0.223	114.80	0.203	0.203	-----	-----	-----	-----	-----	-----	-----	0.203
11.40	0.246	114.82	0.226	0.225	-----	-----	-----	-----	-----	-----	-----	0.225
11.50	0.269	114.83	0.250	0.250	-----	-----	-----	-----	-----	-----	-----	0.250
11.60	0.369	114.86	0.288	0.287	-----	-----	-----	-----	-----	-----	-----	0.287
11.70	0.579	114.94	0.394	0.387	-----	-----	-----	-----	-----	-----	-----	0.387
11.80	0.798	115.07	0.517	0.504	-----	-----	-----	-----	-----	-----	-----	0.504
11.90	1.021	115.24	0.640	0.617	-----	-----	-----	-----	-----	-----	-----	0.617
12.00	1.912	115.52	0.784	0.772	-----	-----	-----	-----	-----	-----	-----	0.772
12.10	2.222	116.05	1.527	0.966	0.553	-----	-----	-----	-----	-----	-----	1.519
12.20	1.135	116.04	1.500	0.964	0.535	-----	-----	-----	-----	-----	-----	1.499
12.30	0.879	115.90	1.195	0.927	0.235	-----	-----	-----	-----	-----	-----	1.162
12.40	0.659	115.78	0.979	0.890	0.069	-----	-----	-----	-----	-----	-----	0.958
12.50	0.437	115.64	0.837	0.831	0.000	-----	-----	-----	-----	-----	-----	0.831
12.60	0.296	115.46	0.752	0.740	-----	-----	-----	-----	-----	-----	-----	0.740
12.70	0.269	115.29	0.663	0.646	-----	-----	-----	-----	-----	-----	-----	0.646
12.80	0.246	115.13	0.556	0.549	-----	-----	-----	-----	-----	-----	-----	0.549
12.90	0.223	114.99	0.445	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
13.00	0.199	114.89	0.335	0.331	-----	-----	-----	-----	-----	-----	-----	0.331
13.10	0.183	114.83	0.249	0.249	-----	-----	-----	-----	-----	-----	-----	0.249
13.20	0.177	114.79	0.201	0.201	-----	-----	-----	-----	-----	-----	-----	0.201
13.30	0.171	114.78	0.182	0.182	-----	-----	-----	-----	-----	-----	-----	0.182
13.40	0.165	114.77	0.173	0.172	-----	-----	-----	-----	-----	-----	-----	0.172
13.50	0.159	114.76	0.166	0.165	-----	-----	-----	-----	-----	-----	-----	0.165
13.60	0.152	114.76	0.160	0.158	-----	-----	-----	-----	-----	-----	-----	0.158

Continues on next page...

Underground Detention

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
13.70	0.146	114.75	0.155	0.152	-----	-----	-----	-----	-----	-----	-----	0.152
13.80	0.140	114.75	0.149	0.146	-----	-----	-----	-----	-----	-----	-----	0.146
13.90	0.134	114.74	0.143	0.140	-----	-----	-----	-----	-----	-----	-----	0.140
14.00	0.128	114.74	0.136	0.134	-----	-----	-----	-----	-----	-----	-----	0.134
14.10	0.123	114.73	0.130	0.128	-----	-----	-----	-----	-----	-----	-----	0.128
14.20	0.120	114.73	0.126	0.124	-----	-----	-----	-----	-----	-----	-----	0.124
14.30	0.118	114.72	0.122	0.121	-----	-----	-----	-----	-----	-----	-----	0.121
14.40	0.115	114.72	0.118	0.118	-----	-----	-----	-----	-----	-----	-----	0.118
14.50	0.112	114.72	0.115	0.115	-----	-----	-----	-----	-----	-----	-----	0.115
14.60	0.109	114.71	0.112	0.112	-----	-----	-----	-----	-----	-----	-----	0.112
14.70	0.106	114.71	0.109	0.109	-----	-----	-----	-----	-----	-----	-----	0.109
14.80	0.103	114.71	0.106	0.106	-----	-----	-----	-----	-----	-----	-----	0.106
14.90	0.100	114.71	0.104	0.103	-----	-----	-----	-----	-----	-----	-----	0.103
15.00	0.097	114.70	0.102	0.101	-----	-----	-----	-----	-----	-----	-----	0.101
15.10	0.094	114.70	0.100	0.098	-----	-----	-----	-----	-----	-----	-----	0.098
15.20	0.091	114.70	0.097	0.095	-----	-----	-----	-----	-----	-----	-----	0.095
15.30	0.088	114.69	0.095	0.092	-----	-----	-----	-----	-----	-----	-----	0.092
15.40	0.086	114.69	0.093	0.089	-----	-----	-----	-----	-----	-----	-----	0.089
15.50	0.083	114.69	0.090	0.086	-----	-----	-----	-----	-----	-----	-----	0.086

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 16, 2013

Pond No. 1 - Underground

Pond Data

UG Chambers - Invert elev. = 115.00 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 49.00 ft, No. Barrels = 4, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 114.50 ft, Width = 4.85 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	114.50	n/a	0	0
0.35	114.85	n/a	133	133
0.70	115.20	n/a	233	366
1.05	115.55	n/a	306	672
1.40	115.90	n/a	300	972
1.75	116.25	n/a	291	1,263
2.10	116.60	n/a	277	1,540
2.45	116.95	n/a	256	1,796
2.80	117.30	n/a	224	2,020
3.15	117.65	n/a	159	2,180
3.50	118.00	n/a	133	2,313

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	6.00	10.00	0.00
Span (in)	= 24.00	6.00	10.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 114.50	114.50	115.65	0.00
Length (ft)	= 35.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.011	.011	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 117.33	0.00	0.00	0.00
Weir Coeff.	= 2.70	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	114.50	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.04	13	114.54	0.00 ic	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.00
0.07	27	114.57	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.01
0.11	40	114.61	0.03 ic	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.03
0.14	53	114.64	0.05 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.18	67	114.68	0.08 ic	0.08 ic	0.00	---	0.00	---	---	---	---	---	0.08
0.21	80	114.71	0.11 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.25	93	114.75	0.15 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
0.28	106	114.78	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
0.32	120	114.82	0.23 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.23
0.35	133	114.85	0.27 ic	0.27 ic	0.00	---	0.00	---	---	---	---	---	0.27
0.39	156	114.89	0.32 ic	0.32 ic	0.00	---	0.00	---	---	---	---	---	0.32
0.42	180	114.92	0.38 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.36
0.46	203	114.96	0.41 ic	0.41 ic	0.00	---	0.00	---	---	---	---	---	0.41
0.49	226	114.99	0.45 ic	0.45 ic	0.00	---	0.00	---	---	---	---	---	0.45
0.53	250	115.03	0.48 ic	0.48 ic	0.00	---	0.00	---	---	---	---	---	0.48
0.56	273	115.06	0.52 ic	0.50 ic	0.00	---	0.00	---	---	---	---	---	0.50
0.60	296	115.10	0.52 ic	0.52 ic	0.00	---	0.00	---	---	---	---	---	0.52
0.63	319	115.13	0.56 ic	0.55 ic	0.00	---	0.00	---	---	---	---	---	0.55
0.67	343	115.17	0.60 ic	0.57 ic	0.00	---	0.00	---	---	---	---	---	0.57
0.70	366	115.20	0.60 ic	0.59 ic	0.00	---	0.00	---	---	---	---	---	0.59
0.74	397	115.24	0.64 ic	0.61 ic	0.00	---	0.00	---	---	---	---	---	0.61
0.77	427	115.27	0.64 ic	0.64 ic	0.00	---	0.00	---	---	---	---	---	0.64
0.80	458	115.31	0.69 ic	0.65 ic	0.00	---	0.00	---	---	---	---	---	0.65
0.84	488	115.34	0.69 ic	0.68 ic	0.00	---	0.00	---	---	---	---	---	0.68
0.87	519	115.38	0.69 ic	0.69 ic	0.00	---	0.00	---	---	---	---	---	0.69
0.91	550	115.41	0.73 ic	0.71 ic	0.00	---	0.00	---	---	---	---	---	0.71
0.94	580	115.45	0.74 ic	0.74 ic	0.00	---	0.00	---	---	---	---	---	0.74
0.98	611	115.48	0.78 ic	0.75 ic	0.00	---	0.00	---	---	---	---	---	0.75
1.02	641	115.52	0.78 ic	0.77 ic	0.00	---	0.00	---	---	---	---	---	0.77
1.05	672	115.55	0.79 ic	0.79 ic	0.00	---	0.00	---	---	---	---	---	0.79
1.09	702	115.59	0.84 ic	0.80 ic	0.00	---	0.00	---	---	---	---	---	0.80

Continues on next page...

Underground

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.12	732	115.62	0.84 ic	0.82 ic	0.00	---	0.00	---	---	---	---	---	0.82
1.16	762	115.66	0.84 ic	0.84 ic	0.00 ic	---	0.00	---	---	---	---	---	0.84
1.19	792	115.69	0.89 ic	0.85 ic	0.01 ic	---	0.00	---	---	---	---	---	0.86
1.23	822	115.73	0.89 ic	0.87 ic	0.02 ic	---	0.00	---	---	---	---	---	0.89
1.26	852	115.76	0.95 ic	0.88 ic	0.05 ic	---	0.00	---	---	---	---	---	0.93
1.30	882	115.80	1.00 ic	0.89 ic	0.08 ic	---	0.00	---	---	---	---	---	0.98
1.33	912	115.83	1.07 ic	0.91 ic	0.13 ic	---	0.00	---	---	---	---	---	1.03
1.37	942	115.87	1.13 ic	0.92 ic	0.18 ic	---	0.00	---	---	---	---	---	1.09
1.40	972	115.90	1.20 ic	0.93 ic	0.24 ic	---	0.00	---	---	---	---	---	1.16
1.44	1,002	115.94	1.26 ic	0.94 ic	0.30 ic	---	0.00	---	---	---	---	---	1.24
1.47	1,031	115.97	1.34 ic	0.95 ic	0.38 ic	---	0.00	---	---	---	---	---	1.33
1.51	1,060	116.01	1.41 ic	0.96 ic	0.45 ic	---	0.00	---	---	---	---	---	1.41
1.54	1,089	116.04	1.50 ic	0.96 ic	0.53 ic	---	0.00	---	---	---	---	---	1.50
1.58	1,118	116.08	1.64 ic	0.97 ic	0.63 ic	---	0.00	---	---	---	---	---	1.60
1.61	1,147	116.11	1.73 ic	0.98 ic	0.72 ic	---	0.00	---	---	---	---	---	1.70
1.65	1,176	116.15	1.81 ic	0.99 ic	0.82 ic	---	0.00	---	---	---	---	---	1.81
1.68	1,205	116.18	1.91 ic	1.00 ic	0.91 ic	---	0.00	---	---	---	---	---	1.91
1.72	1,234	116.22	2.08 ic	1.00 ic	1.02 ic	---	0.00	---	---	---	---	---	2.02
1.75	1,263	116.25	2.18 ic	1.01 ic	1.12 ic	---	0.00	---	---	---	---	---	2.13
1.79	1,291	116.29	2.28 ic	1.02 ic	1.22 ic	---	0.00	---	---	---	---	---	2.24
1.82	1,319	116.32	2.38 ic	1.03 ic	1.31 ic	---	0.00	---	---	---	---	---	2.34
1.86	1,346	116.36	2.48 ic	1.04 ic	1.41 ic	---	0.00	---	---	---	---	---	2.45
1.89	1,374	116.39	2.59 ic	1.05 ic	1.50 ic	---	0.00	---	---	---	---	---	2.55
1.93	1,402	116.43	2.70 ic	1.06 ic	1.58 ic	---	0.00	---	---	---	---	---	2.64
1.96	1,429	116.46	2.72 ic	1.07 ic	1.66 ic	---	0.00	---	---	---	---	---	2.72
2.00	1,457	116.50	2.81 ic	1.08 ic	1.72 ic	---	0.00	---	---	---	---	---	2.80
2.03	1,485	116.53	2.92 ic	1.09 ic	1.79 ic	---	0.00	---	---	---	---	---	2.88
2.07	1,512	116.57	3.03 ic	1.10 ic	1.85 ic	---	0.00	---	---	---	---	---	2.95
2.10	1,540	116.60	3.03 ic	1.11 ic	1.92 ic	---	0.00	---	---	---	---	---	3.03
2.14	1,566	116.64	3.15 ic	1.12 ic	1.98 ic	---	0.00	---	---	---	---	---	3.10
2.17	1,591	116.67	3.17 ic	1.13 ic	2.04 ic	---	0.00	---	---	---	---	---	3.17
2.21	1,617	116.71	3.27 ic	1.14 ic	2.10 ic	---	0.00	---	---	---	---	---	3.24
2.24	1,642	116.74	3.30 ic	1.15 ic	2.15 ic	---	0.00	---	---	---	---	---	3.30
2.28	1,668	116.78	3.39 ic	1.16 ic	2.21 ic	---	0.00	---	---	---	---	---	3.37
2.31	1,693	116.81	3.52 ic	1.17 ic	2.26 ic	---	0.00	---	---	---	---	---	3.43
2.35	1,719	116.85	3.52 ic	1.18 ic	2.32 ic	---	0.00	---	---	---	---	---	3.50
2.38	1,745	116.88	3.64 ic	1.19 ic	2.37 ic	---	0.00	---	---	---	---	---	3.56
2.42	1,770	116.92	3.64 ic	1.20 ic	2.42 ic	---	0.00	---	---	---	---	---	3.62
2.45	1,796	116.95	3.68 ic	1.21 ic	2.47 ic	---	0.00	---	---	---	---	---	3.68
2.49	1,818	116.99	3.77 ic	1.22 ic	2.52 ic	---	0.00	---	---	---	---	---	3.74
2.52	1,841	117.02	3.80 ic	1.23 ic	2.56 ic	---	0.00	---	---	---	---	---	3.80
2.56	1,863	117.06	3.90 ic	1.24 ic	2.61 ic	---	0.00	---	---	---	---	---	3.85
2.59	1,886	117.09	3.91 ic	1.25 ic	2.66 ic	---	0.00	---	---	---	---	---	3.91
2.63	1,908	117.13	4.03 ic	1.26 ic	2.70 ic	---	0.00	---	---	---	---	---	3.96
2.66	1,930	117.16	4.03 ic	1.27 ic	2.75 ic	---	0.00	---	---	---	---	---	4.02
2.70	1,953	117.20	4.07 ic	1.28 ic	2.79 ic	---	0.00	---	---	---	---	---	4.07
2.73	1,975	117.23	4.17 ic	1.29 ic	2.83 ic	---	0.00	---	---	---	---	---	4.13
2.77	1,998	117.27	4.18 ic	1.30 ic	2.87 ic	---	0.00	---	---	---	---	---	4.18
2.80	2,020	117.30	4.30 ic	1.31 ic	2.92 ic	---	0.00	---	---	---	---	---	4.23
2.84	2,036	117.34	4.30 ic	1.32 ic	2.96 ic	---	0.00	---	---	---	---	---	4.28
2.87	2,052	117.37	4.44 ic	1.33 ic	3.00 ic	---	0.09	---	---	---	---	---	4.41
2.91	2,068	117.41	4.59 ic	1.33 ic	3.04 ic	---	0.22	---	---	---	---	---	4.59
2.94	2,084	117.44	4.87 ic	1.34 ic	3.08 ic	---	0.39	---	---	---	---	---	4.81
2.98	2,100	117.48	5.05 ic	1.34 ic	3.12 ic	---	0.60	---	---	---	---	---	5.05
3.01	2,116	117.51	5.32 ic	1.34 ic	3.15 ic	---	0.82	---	---	---	---	---	5.32
3.05	2,132	117.55	5.62 ic	1.35 ic	3.19 ic	---	1.08	---	---	---	---	---	5.62
3.08	2,148	117.58	5.93 ic	1.35 ic	3.23 ic	---	1.35	---	---	---	---	---	5.93
3.12	2,164	117.62	6.26 ic	1.34 ic	3.27 ic	---	1.64	---	---	---	---	---	6.26
3.15	2,180	117.65	6.69 ic	1.35 ic	3.30 ic	---	1.96	---	---	---	---	---	6.60
3.19	2,193	117.69	7.00 ic	1.35 ic	3.34 ic	---	2.28	---	---	---	---	---	6.97
3.22	2,206	117.72	7.35 ic	1.34 ic	3.38 ic	---	2.63	---	---	---	---	---	7.35
3.26	2,219	117.76	7.80 ic	1.34 ic	3.41 ic	---	2.99	---	---	---	---	---	7.75
3.29	2,233	117.79	8.16 ic	1.34 ic	3.45 ic	---	3.37	---	---	---	---	---	8.16
3.33	2,246	117.83	8.60 ic	1.34 ic	3.48 ic	---	3.76	---	---	---	---	---	8.59
3.36	2,259	117.86	9.07 ic	1.34 ic	3.52 ic	---	4.17	---	---	---	---	---	9.02
3.40	2,273	117.90	9.54 ic	1.34 ic	3.55 ic	---	4.59	---	---	---	---	---	9.47
3.43	2,286	117.93	10.00 ic	1.33 ic	3.58 ic	---	5.02	---	---	---	---	---	9.94
3.47	2,299	117.97	10.44 ic	1.33 ic	3.62 ic	---	5.47	---	---	---	---	---	10.41
3.50	2,313	118.00	10.90 ic	1.33 ic	3.65 ic	---	5.92	---	---	---	---	---	10.90

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 8

Total PDA

Hydrograph type	= Combine	Peak discharge	= 3.834 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 46,738 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 1.000 ac

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 + (cfs)	Outflow (cfs)
9.90	0.099	0.098	0.197
10.00	0.102	0.101	0.204
10.10	0.107	0.105	0.212
10.20	0.113	0.110	0.223
10.30	0.119	0.116	0.235
10.40	0.125	0.122	0.247
10.50	0.132	0.128	0.260
10.60	0.138	0.134	0.272
10.70	0.145	0.140	0.285
10.80	0.152	0.146	0.298
10.90	0.158	0.153	0.311
11.00	0.165	0.159	0.324
11.10	0.178	0.167	0.346
11.20	0.201	0.183	0.383
11.30	0.224	0.203	0.427
11.40	0.248	0.225	0.473
11.50	0.272	0.250	0.521
11.60	0.375	0.287	0.662
11.70	0.591	0.387	0.977
11.80	0.817	0.504	1.321
11.90	1.051	0.617	1.668
12.00	1.981	0.772	2.753
12.10	2.316	1.519	3.834 <<
12.20	1.187	1.499	2.687
12.30	0.921	1.162	2.083
12.40	0.691	0.958	1.649
12.50	0.459	0.831	1.290
12.60	0.311	0.740	1.051
12.70	0.283	0.646	0.928
12.80	0.258	0.549	0.807
12.90	0.234	0.445	0.679
13.00	0.210	0.331	0.540
13.10	0.193	0.249	0.442
13.20	0.186	0.201	0.387
13.30	0.180	0.182	0.362
13.40	0.173	0.172	0.345
13.50	0.167	0.165	0.332
13.60	0.160	0.158	0.319
13.70	0.154	0.152	0.306
13.80	0.148	0.146	0.294
13.90	0.141	0.140	0.282
14.00	0.135	0.134	0.269
14.10	0.130	0.128	0.258
14.20	0.127	0.124	0.251

Continues on next page...

Total PDA

Hydrograph Discharge Table

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 + (cfs)	Outflow (cfs)
14.30	0.124	0.121	0.245
14.40	0.121	0.118	0.238
14.50	0.118	0.115	0.232
14.60	0.115	0.112	0.226
14.70	0.112	0.109	0.220
14.80	0.109	0.106	0.215
14.90	0.105	0.103	0.209
15.00	0.102	0.101	0.203
15.10	0.099	0.098	0.197

...End

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	9.186	2	724	28,784	----	------	------	EDA
3	SCS Runoff	5.123	2	724	17,117	----	------	------	PDA-1
4	SCS Runoff	4.852	2	724	16,460	----	------	------	PDA-2
6	Reservoir	3.753	2	728	16,456	4	117.03	1,824	Underground Detention
8	Combine	8.549	2	724	33,573	3, 6,	------	------	Total PDA

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 1

EDA

Hydrograph type	= SCS Runoff	Peak discharge	= 9.186 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 41,684 cuft
Drainage area	= 1.940 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 5.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.67	0.464
10.77	0.488
10.87	0.512
10.97	0.536
11.07	0.569
11.17	0.641
11.27	0.721
11.37	0.803
11.47	0.887
11.57	1.081
11.67	1.756
11.77	2.538
11.87	3.361
11.97	5.197
12.07	9.186 <<
12.17	5.030
12.27	3.564
12.37	2.750
12.47	1.923
12.57	1.213
12.67	1.044
12.77	0.957
12.87	0.870
12.97	0.783
13.07	0.706
13.17	0.676
13.27	0.654
13.37	0.631
13.47	0.609
13.57	0.586
13.67	0.563
13.77	0.540
13.87	0.517
13.97	0.495
14.07	0.474
14.17	0.461

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 16, 2013

Hyd. No. 3

PDA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 5.123 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 23,897 cuft
Drainage area	= 1.000 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 5.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.27	0.257
10.37	0.269
10.47	0.282
10.57	0.294
10.67	0.307
10.77	0.319
10.87	0.332
10.97	0.345
11.07	0.363
11.17	0.406
11.27	0.452
11.37	0.499
11.47	0.546
11.57	0.659
11.67	1.057
11.77	1.504
11.87	1.956
11.97	2.965
12.07	5.123 <<
12.17	2.761
12.27	1.942
12.37	1.492
12.47	1.040
12.57	0.655
12.67	0.563
12.77	0.516
12.87	0.468
12.97	0.421
13.07	0.379
13.17	0.363
13.27	0.351
13.37	0.339
13.47	0.326
13.57	0.314
13.67	0.302
13.77	0.289
13.87	0.277
13.97	0.265

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 4

PDA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.852 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 22,844 cuft
Drainage area	= 0.940 ac	Curve number	= 97
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 5.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.23	0.246
10.33	0.257
10.43	0.269
10.53	0.281
10.63	0.293
10.73	0.305
10.83	0.317
10.93	0.329
11.03	0.342
11.13	0.376
11.23	0.420
11.33	0.464
11.43	0.509
11.53	0.566
11.63	0.870
11.73	1.293
11.83	1.719
11.93	2.253
12.03	4.611
12.13	3.380
12.23	1.977
12.33	1.551
12.43	1.124
12.53	0.710
12.63	0.546
12.73	0.501
12.83	0.457
12.93	0.412
13.03	0.368
13.13	0.347
13.23	0.335
13.33	0.323
13.43	0.312
13.53	0.300
13.63	0.288
13.73	0.277
13.83	0.265
13.93	0.253

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 16, 2013

Hyd. No. 6

Underground Detention

Hydrograph type	= Reservoir	Peak discharge	= 3.753 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 22,841 cuft
Inflow hyd. No.	= 4 - PDA-2	Reservoir name	= Underground
Max. Elevation	= 117.03 ft	Max. Storage	= 1,824 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9.60	0.199	114.79	0.193	0.193	-----	-----	-----	-----	-----	-----	-----	0.193
9.70	0.204	114.79	0.199	0.199	-----	-----	-----	-----	-----	-----	-----	0.199
9.80	0.210	114.80	0.205	0.205	-----	-----	-----	-----	-----	-----	-----	0.205
9.90	0.216	114.80	0.211	0.211	-----	-----	-----	-----	-----	-----	-----	0.211
10.00	0.222	114.81	0.217	0.217	-----	-----	-----	-----	-----	-----	-----	0.217
10.10	0.230	114.81	0.223	0.223	-----	-----	-----	-----	-----	-----	-----	0.223
10.20	0.242	114.82	0.233	0.233	-----	-----	-----	-----	-----	-----	-----	0.233
10.30	0.254	114.83	0.244	0.244	-----	-----	-----	-----	-----	-----	-----	0.244
10.40	0.265	114.84	0.256	0.256	-----	-----	-----	-----	-----	-----	-----	0.256
10.50	0.277	114.85	0.268	0.268	-----	-----	-----	-----	-----	-----	-----	0.268
10.60	0.289	114.85	0.277	0.277	-----	-----	-----	-----	-----	-----	-----	0.277
10.70	0.301	114.86	0.287	0.287	-----	-----	-----	-----	-----	-----	-----	0.287
10.80	0.313	114.87	0.298	0.298	-----	-----	-----	-----	-----	-----	-----	0.298
10.90	0.325	114.88	0.309	0.309	-----	-----	-----	-----	-----	-----	-----	0.309
11.00	0.337	114.89	0.321	0.321	-----	-----	-----	-----	-----	-----	-----	0.321
11.10	0.362	114.90	0.339	0.334	-----	-----	-----	-----	-----	-----	-----	0.334
11.20	0.405	114.92	0.374	0.358	-----	-----	-----	-----	-----	-----	-----	0.358
11.30	0.449	114.95	0.401	0.396	-----	-----	-----	-----	-----	-----	-----	0.396
11.40	0.494	114.98	0.432	0.432	-----	-----	-----	-----	-----	-----	-----	0.432
11.50	0.539	115.01	0.467	0.466	-----	-----	-----	-----	-----	-----	-----	0.466
11.60	0.738	115.08	0.520	0.513	-----	-----	-----	-----	-----	-----	-----	0.513
11.70	1.152	115.26	0.640	0.631	-----	-----	-----	-----	-----	-----	-----	0.631
11.80	1.577	115.53	0.786	0.780	-----	-----	-----	-----	-----	-----	-----	0.780
11.90	2.005	115.90	1.193	0.927	0.233	-----	-----	-----	-----	-----	-----	1.160
12.00	3.727	116.32	2.387	1.031	1.322	-----	-----	-----	-----	-----	-----	2.353
12.10	4.302	116.97	3.743	1.219	2.502	-----	-----	-----	-----	-----	-----	3.720
12.20	2.190	116.72	3.280	1.142	2.114	-----	-----	-----	-----	-----	-----	3.256
12.30	1.693	116.31	2.358	1.029	1.294	-----	-----	-----	-----	-----	-----	2.323
12.40	1.267	116.10	1.698	0.978	0.688	-----	-----	-----	-----	-----	-----	1.666
12.50	0.839	115.93	1.255	0.936	0.295	-----	-----	-----	-----	-----	-----	1.231
12.60	0.569	115.76	0.954	0.885	0.054	-----	-----	-----	-----	-----	-----	0.939
12.70	0.516	115.63	0.836	0.825	0.000	-----	-----	-----	-----	-----	-----	0.825
12.80	0.472	115.50	0.783	0.762	-----	-----	-----	-----	-----	-----	-----	0.762
12.90	0.427	115.38	0.705	0.700	-----	-----	-----	-----	-----	-----	-----	0.700
13.00	0.382	115.28	0.647	0.640	-----	-----	-----	-----	-----	-----	-----	0.640
13.10	0.351	115.17	0.597	0.570	-----	-----	-----	-----	-----	-----	-----	0.570
13.20	0.339	115.06	0.517	0.502	-----	-----	-----	-----	-----	-----	-----	0.502
13.30	0.327	114.99	0.445	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
13.40	0.316	114.94	0.394	0.386	-----	-----	-----	-----	-----	-----	-----	0.386
13.50	0.304	114.91	0.358	0.347	-----	-----	-----	-----	-----	-----	-----	0.347
13.60	0.292	114.89	0.325	0.323	-----	-----	-----	-----	-----	-----	-----	0.323
13.70	0.281	114.87	0.304	0.304	-----	-----	-----	-----	-----	-----	-----	0.304

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Underground Detention

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
13.80	0.269	114.86	0.288	0.288	-----	-----	-----	-----	-----	-----	-----	0.288
13.90	0.257	114.85	0.275	0.275	-----	-----	-----	-----	-----	-----	-----	0.275
14.00	0.246	114.84	0.258	0.258	-----	-----	-----	-----	-----	-----	-----	0.258
14.10	0.236	114.83	0.245	0.245	-----	-----	-----	-----	-----	-----	-----	0.245
14.20	0.231	114.82	0.236	0.236	-----	-----	-----	-----	-----	-----	-----	0.236
14.30	0.225	114.82	0.230	0.230	-----	-----	-----	-----	-----	-----	-----	0.230
14.40	0.220	114.81	0.224	0.224	-----	-----	-----	-----	-----	-----	-----	0.224
14.50	0.214	114.81	0.219	0.219	-----	-----	-----	-----	-----	-----	-----	0.219
14.60	0.208	114.81	0.213	0.213	-----	-----	-----	-----	-----	-----	-----	0.213
14.70	0.203	114.80	0.208	0.208	-----	-----	-----	-----	-----	-----	-----	0.208
14.80	0.197	114.80	0.202	0.202	-----	-----	-----	-----	-----	-----	-----	0.202
14.90	0.192	114.79	0.197	0.197	-----	-----	-----	-----	-----	-----	-----	0.197
15.00	0.186	114.79	0.191	0.191	-----	-----	-----	-----	-----	-----	-----	0.191

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 8

Total PDA

Hydrograph type	= Combine	Peak discharge	= 8.549 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 46,738 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 1.000 ac

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 + (cfs)	Outflow (cfs)
9.90	0.221	0.211	0.432
10.00	0.227	0.217	0.444
10.10	0.236	0.223	0.460
10.20	0.248	0.233	0.481
10.30	0.261	0.244	0.505
10.40	0.273	0.256	0.529
10.50	0.286	0.268	0.553
10.60	0.298	0.277	0.575
10.70	0.311	0.287	0.598
10.80	0.324	0.298	0.621
10.90	0.336	0.309	0.645
11.00	0.349	0.321	0.670
11.10	0.376	0.334	0.709
11.20	0.421	0.358	0.779
11.30	0.468	0.396	0.864
11.40	0.515	0.432	0.947
11.50	0.562	0.466	1.028
11.60	0.771	0.513	1.283
11.70	1.206	0.631	1.837
11.80	1.654	0.780	2.434
11.90	2.108	1.160	3.268
12.00	3.928	2.353	6.281
12.10	4.545	3.720	8.265
12.20	2.316	3.256	5.572
12.30	1.792	2.323	4.115
12.40	1.341	1.666	3.007
12.50	0.889	1.231	2.121
12.60	0.603	0.939	1.542
12.70	0.547	0.825	1.372
12.80	0.500	0.762	1.262
12.90	0.452	0.700	1.152
13.00	0.405	0.640	1.045
13.10	0.372	0.570	0.943
13.20	0.359	0.502	0.861
13.30	0.347	0.445	0.792
13.40	0.334	0.386	0.720
13.50	0.322	0.347	0.669
13.60	0.310	0.323	0.633
13.70	0.297	0.304	0.601
13.80	0.285	0.288	0.573
13.90	0.273	0.275	0.547
14.00	0.260	0.258	0.519
14.10	0.251	0.245	0.496
14.20	0.245	0.236	0.481

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Total PDA

Hydrograph Discharge Table

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 + (cfs)	Outflow (cfs)
14.30	0.239	0.230	0.469
14.40	0.233	0.224	0.457
14.50	0.227	0.219	0.446
14.60	0.221	0.213	0.434

...End

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	13.02	2	724	41,684	----	------	------	EDA
3	SCS Runoff	7.041	2	724	23,897	----	------	------	PDA-1
4	SCS Runoff	6.648	2	724	22,844	----	------	------	PDA-2
6	Reservoir	6.349	2	726	22,841	4	117.69	2,168	Underground Detention
8	Combine	12.59	2	726	46,738	3, 6,	------	------	Total PDA

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 1

EDA

Hydrograph type	= SCS Runoff	Peak discharge	= 13.02 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 41,684 cuft
Drainage area	= 1.940 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.50	0.655
10.60	0.688
10.70	0.720
10.80	0.754
10.90	0.787
11.00	0.821
11.10	0.888
11.20	1.000
11.30	1.117
11.40	1.235
11.50	1.355
11.60	1.870
11.70	2.946
11.80	4.080
11.90	5.251
12.00	9.904
12.10	11.59
12.20	5.944
12.30	4.614
12.40	3.460
12.50	2.297
12.60	1.559
12.70	1.415
12.80	1.294
12.90	1.172
13.00	1.050
13.10	0.965
13.20	0.931
13.30	0.899
13.40	0.868
13.50	0.836
13.60	0.804
13.70	0.772
13.80	0.740
13.90	0.708
14.00	0.676
14.10	0.651

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 3

PDA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 7.041 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 23,897 cuft
Drainage area	= 1.000 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.23	0.357
10.33	0.374
10.43	0.391
10.53	0.408
10.63	0.425
10.73	0.442
10.83	0.460
10.93	0.477
11.03	0.496
11.13	0.545
11.23	0.609
11.33	0.674
11.43	0.739
11.53	0.821
11.63	1.262
11.73	1.877
11.83	2.495
11.93	3.270
12.03	6.691
12.13	4.904
12.23	2.869
12.33	2.250
12.43	1.631
12.53	1.030
12.63	0.792
12.73	0.728
12.83	0.663
12.93	0.598
13.03	0.535
13.13	0.503
13.23	0.486
13.33	0.469
13.43	0.452
13.53	0.435
13.63	0.418
13.73	0.401
13.83	0.384
13.93	0.368

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 4

PDA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 6.648 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 22,844 cuft
Drainage area	= 0.940 ac	Curve number	= 97
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 7.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time -- (hrs	Outflow cfs)
10.20	0.337
10.30	0.353
10.40	0.370
10.50	0.386
10.60	0.402
10.70	0.418
10.80	0.434
10.90	0.450
11.00	0.466
11.10	0.501
11.20	0.560
11.30	0.621
11.40	0.682
11.50	0.743
11.60	1.017
11.70	1.586
11.80	2.169
11.90	2.754
12.00	5.112
12.10	5.892
12.20	2.996
12.30	2.316
12.40	1.732
12.50	1.148
12.60	0.778
12.70	0.706
12.80	0.645
12.90	0.584
13.00	0.523
13.10	0.480
13.20	0.463
13.30	0.447
13.40	0.431
13.50	0.415
13.60	0.399
13.70	0.383
13.80	0.367
13.90	0.351
14.00	0.336

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, May 16, 2013

Hyd. No. 6

Underground Detention

Hydrograph type	= Reservoir	Peak discharge	= 6.349 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 22,841 cuft
Inflow hyd. No.	= 4 - PDA-2	Reservoir name	= Underground
Max. Elevation	= 117.69 ft	Max. Storage	= 2,168 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
10.20	0.337	114.89	0.320	0.320	-----	-----	-----	-----	-----	-----	-----	0.320
10.30	0.353	114.90	0.338	0.332	-----	-----	-----	-----	-----	-----	-----	0.332
10.40	0.370	114.91	0.358	0.347	-----	-----	-----	-----	-----	-----	-----	0.347
10.50	0.386	114.92	0.378	0.362	-----	-----	-----	-----	-----	-----	-----	0.362
10.60	0.402	114.93	0.390	0.379	-----	-----	-----	-----	-----	-----	-----	0.379
10.70	0.418	114.95	0.401	0.396	-----	-----	-----	-----	-----	-----	-----	0.396
10.80	0.434	114.96	0.412	0.412	-----	-----	-----	-----	-----	-----	-----	0.412
10.90	0.450	114.97	0.425	0.425	-----	-----	-----	-----	-----	-----	-----	0.425
11.00	0.466	114.98	0.440	0.440	-----	-----	-----	-----	-----	-----	-----	0.440
11.10	0.501	115.00	0.457	0.456	-----	-----	-----	-----	-----	-----	-----	0.456
11.20	0.560	115.03	0.489	0.482	-----	-----	-----	-----	-----	-----	-----	0.482
11.30	0.621	115.08	0.521	0.516	-----	-----	-----	-----	-----	-----	-----	0.516
11.40	0.682	115.15	0.575	0.558	-----	-----	-----	-----	-----	-----	-----	0.558
11.50	0.743	115.21	0.614	0.602	-----	-----	-----	-----	-----	-----	-----	0.602
11.60	1.017	115.30	0.685	0.653	-----	-----	-----	-----	-----	-----	-----	0.653
11.70	1.586	115.54	0.787	0.785	-----	-----	-----	-----	-----	-----	-----	0.785
11.80	2.169	115.94	1.265	0.938	0.304	-----	-----	-----	-----	-----	-----	1.242
11.90	2.754	116.26	2.208	1.015	1.149	-----	-----	-----	-----	-----	-----	2.164
12.00	5.112	116.72	3.282	1.143	2.118	-----	-----	-----	-----	-----	-----	3.261
12.10	5.892	117.62 <<	6.372	1.345	3.277	-----	1.727	-----	-----	-----	-----	6.349 <<
12.20	2.996	117.16	4.034	1.273	2.743	-----	-----	-----	-----	-----	-----	4.017
12.30	2.316	116.66	3.165	1.127	2.029	-----	-----	-----	-----	-----	-----	3.156
12.40	1.732	116.32	2.388	1.031	1.322	-----	-----	-----	-----	-----	-----	2.353
12.50	1.148	116.09	1.672	0.975	0.660	-----	-----	-----	-----	-----	-----	1.635
12.60	0.778	115.89	1.184	0.925	0.225	-----	-----	-----	-----	-----	-----	1.150
12.70	0.706	115.77	0.962	0.886	0.059	-----	-----	-----	-----	-----	-----	0.945
12.80	0.645	115.68	0.872	0.849	0.005	-----	-----	-----	-----	-----	-----	0.853
12.90	0.584	115.59	0.835	0.805	-----	-----	-----	-----	-----	-----	-----	0.805
13.00	0.523	115.49	0.783	0.757	-----	-----	-----	-----	-----	-----	-----	0.757
13.10	0.480	115.40	0.718	0.706	-----	-----	-----	-----	-----	-----	-----	0.706
13.20	0.463	115.31	0.686	0.656	-----	-----	-----	-----	-----	-----	-----	0.656
13.30	0.447	115.23	0.640	0.612	-----	-----	-----	-----	-----	-----	-----	0.612
13.40	0.431	115.16	0.594	0.567	-----	-----	-----	-----	-----	-----	-----	0.567
13.50	0.415	115.10	0.524	0.524	-----	-----	-----	-----	-----	-----	-----	0.524
13.60	0.399	115.04	0.498	0.488	-----	-----	-----	-----	-----	-----	-----	0.488
13.70	0.383	115.00	0.456	0.455	-----	-----	-----	-----	-----	-----	-----	0.455
13.80	0.367	114.97	0.421	0.421	-----	-----	-----	-----	-----	-----	-----	0.421
13.90	0.351	114.94	0.397	0.390	-----	-----	-----	-----	-----	-----	-----	0.390
14.00	0.336	114.92	0.380	0.365	-----	-----	-----	-----	-----	-----	-----	0.365
14.10	0.323	114.91	0.358	0.347	-----	-----	-----	-----	-----	-----	-----	0.347
14.20	0.315	114.90	0.339	0.334	-----	-----	-----	-----	-----	-----	-----	0.334
14.30	0.308	114.89	0.324	0.323	-----	-----	-----	-----	-----	-----	-----	0.323

Continues on next page...

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 Thursday, May 16, 2013

Hyd. No. 8

Total PDA

Hydrograph type	= Combine	Peak discharge	= 12.59 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 46,738 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 1.000 ac

Hydrograph Discharge Table

(Printed values >= 5.00% of Qp. Print interval = 3)

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 + (cfs)	Outflow (cfs)
10.10	0.334	0.309	0.643
10.20	0.351	0.320	0.671
10.30	0.368	0.332	0.701
10.40	0.385	0.347	0.732
10.50	0.402	0.362	0.764
10.60	0.420	0.379	0.799
10.70	0.437	0.396	0.833
10.80	0.454	0.412	0.866
10.90	0.471	0.425	0.896
11.00	0.489	0.440	0.928
11.10	0.525	0.456	0.981
11.20	0.588	0.482	1.070
11.30	0.652	0.516	1.168
11.40	0.717	0.558	1.275
11.50	0.782	0.602	1.384
11.60	1.071	0.653	1.724
11.70	1.671	0.785	2.457
11.80	2.288	1.242	3.530
11.90	2.910	2.164	5.074
12.00	5.409	3.261	8.669
12.10	6.243	6.349 <<	12.59 <<
12.20	3.177	4.017	7.194
12.30	2.456	3.156	5.612
12.40	1.838	2.353	4.191
12.50	1.218	1.635	2.853
12.60	0.826	1.150	1.976
12.70	0.749	0.945	1.694
12.80	0.684	0.853	1.538
12.90	0.620	0.805	1.424
13.00	0.555	0.757	1.312
13.10	0.509	0.706	1.216
13.20	0.492	0.656	1.148
13.30	0.475	0.612	1.087
13.40	0.458	0.567	1.024
13.50	0.441	0.524	0.965
13.60	0.424	0.488	0.912
13.70	0.407	0.455	0.862
13.80	0.390	0.421	0.811
13.90	0.373	0.390	0.763
14.00	0.356	0.365	0.721
14.10	0.343	0.347	0.690
14.20	0.335	0.334	0.668
14.30	0.327	0.323	0.649
14.40	0.318	0.313	0.631

...End

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	24.5432	4.6000	0.6871	--------
3	0.0000	0.0000	0.0000	--------
5	31.8256	5.9000	0.6995	--------
10	21.3579	2.8000	0.5721	--------
25	48.2920	8.0000	0.7215	--------
50	37.3151	5.6000	0.6322	--------
100	70.1804	10.3000	0.7492	--------

File name: rockland.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.19	3.89	3.18	2.72	2.39	2.15	1.96	1.81	1.68	1.57	1.48	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.99	4.60	3.80	3.27	2.89	2.60	2.37	2.19	2.04	1.91	1.80	1.70
10	6.60	4.97	4.11	3.57	3.19	2.90	2.67	2.49	2.34	2.21	2.10	2.00
25	7.59	6.00	5.03	4.36	3.88	3.50	3.20	2.96	2.75	2.58	2.43	2.30
50	8.39	6.57	5.51	4.80	4.29	3.90	3.59	3.33	3.12	2.94	2.79	2.65
100	9.09	7.36	6.24	5.45	4.86	4.40	4.03	3.73	3.47	3.25	3.06	2.90

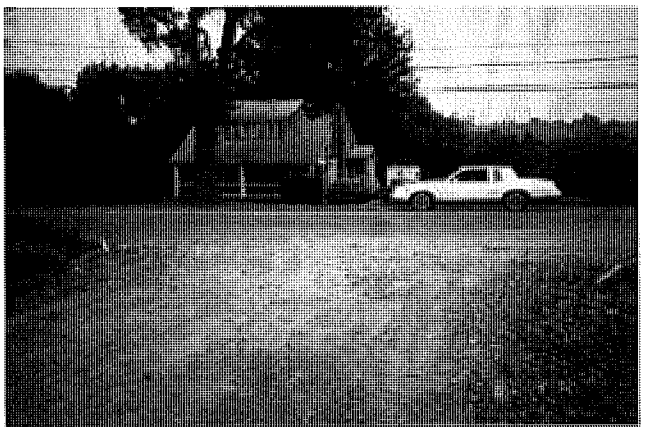
Tc = time in minutes. Values may exceed 60.

Precip. file name: orange.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.90	3.50	0.00	4.50	5.50	6.50	7.00	7.50
SCS 6-Hr	0.00	2.52	0.00	3.22	3.80	4.64	5.35	6.12
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX E: EROSION CONTROL MEASURES

STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ENTRANCE



Definition

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area.

Purpose

The purpose of stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

A stabilized construction entrance shall be used at all points of construction ingress and egress.

Design Criteria

See Figure 5A.35 on page 5A.76 for details.

Aggregate Size: Use a matrix of 1-4 inch stone, or reclaimed or recycled concrete equivalent.

Thickness: Not less than six (6) inches.

Width: 12-foot minimum but not less than the full width of points where ingress or egress occurs. 24-foot minimum if there is only one access to the site.

Length: As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

Geotextile: To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single-family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

Criteria for Geotextile

The geotextile shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

Fabric Properties[3]	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Brust Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 modified
Equivalent Opening Size	40-80	40-80	US Std Sieve CW-02215
Aggregate Depth	6	10	--

[1]Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[2]Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.

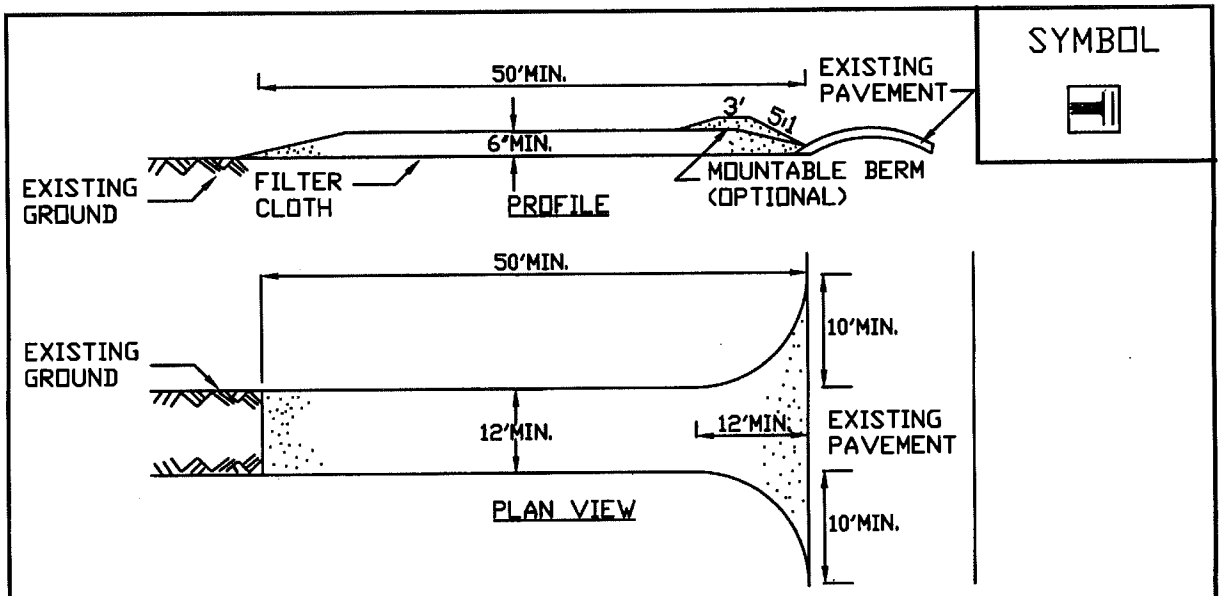
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Figure 5A.35
Stabilized Construction Entrance



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STABILIZED CONSTRUCTION ENTRANCE

STANDARD AND SPECIFICATIONS FOR CONSTRUCTION ROAD STABILIZATION

Definition

The stabilization of temporary construction access routes, on-site vehicle transportation routes, and construction parking areas.

Purpose

To control erosion on temporary construction routes and parking areas.

Condition Where Practice Applies

All traffic routes and parking areas for temporary use by construction traffic.

Design Criteria

Construction roads should be located to reduce erosion potential, minimize impact on existing site resources, and maintain operations in a safe manner. Highly erosive soils, wet or rocky areas, and steep slopes should be avoided. Roads should be routed where seasonal water tables are deeper than 18 inches. Surface runoff and control should be in accordance with other standards.

Road Grade – A maximum grade of 12% is recommended, although grades up to 15% are possible for short distances.

Road Width – 14 foot minimum for one-way traffic or 24 foot minimum for two-way traffic.

Side Slope of Road Embankment – 2:1 or flatter.

Ditch Capacity – On-site roadside ditch and culvert capacities shall be the 10 yr. peak runoff.

Composition – Use a 6-inch layer of NYS DOT sub-base Types 1,2,3, 4 or equivalent as specified in NYS – Standards and Specifications for Highways.

Construction Specifications

1. Clear and strip roadbed and parking areas of all vegetation, roots, and other objectionable material.

2. Locate parking areas on naturally flat areas as available. Keep grades sufficient for drainage, but not more than 2 to 3 percent.

3. Provide surface drainage and divert excess runoff to stabilized areas.

4. Maintain cut and fill slopes to 2:1 or flatter and stabilized with vegetation as soon as grading is accomplished.

5. Spread 6-inch layer of sub-base material evenly over the full width of the road and smooth to avoid depressions.

6. Provide appropriate sediment control measures to prevent offsite sedimentation.

Maintenance

Inspect construction roads and parking areas periodically for condition of surface. Topdress with new gravel as needed. Check ditches for erosion and sedimentation after rainfall events. Maintain vegetation in a health, vigorous condition. Areas producing sediment should be treated immediately.

STANDARD AND SPECIFICATIONS FOR DUST CONTROL

Definition

The control of dust resulting from land-disturbing activities.

Purpose

To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the local permitting authority.

Construction Specifications

A. Non-driving Areas – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. Driving Areas – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geotextiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

All Stormwater Pollution Prevention Plans must contain the NYS DEC issued "Conditions for Use" and "Application Instructions" for any polymers used on the site. This information can be obtained from the NYS DEC website.

Maintenance

Maintain dust control measures through dry weather periods until all disturbed areas are stabilized.

STANDARD AND SPECIFICATIONS FOR STORM DRAIN INLET PROTECTION

Definition

A temporary, somewhat permeable barrier, installed around inlets in the form of a fence, berm or excavation around an opening, trapping water and thereby reducing the sediment content of sediment laden water by settling.

Purpose

To prevent heavily sediment laden water from entering a storm drain system through inlets.

Conditions Where Practice Applies

This practice shall be used where the drainage area to an inlet is disturbed, it is not possible to temporarily divert the storm drain outfall into a trapping device, and watertight blocking of inlets is not advisable. **It is not to be used in place of sediment trapping devices.** This may be used in conjunction with storm drain diversion to help prevent siltation of pipes installed with low slope angle.

Types of Storm Drain Inlet Practices

There are four (4) specific types of storm drain inlet protection practices that vary according to their function, location, drainage area, and availability of materials:

I. Excavated Drop Inlet Protection
II. Fabric Drop Inlet Protection
III. Stone & Block Drop Inlet Protection
IV. Curb Drop Inlet Protection

Design Criteria

Drainage Area – The drainage area for storm drain inlets shall not exceed one acre. The crest elevations of these practices shall provide storage and minimize bypass flow.

Type I – Excavated Drop Inlet Protection

See details for Excavated Drop Inlet Protection in Figure 5A.11 on page 5A.29.

Limit the drainage area to the inlet device to 1 acre. Excavated side slopes shall be no steeper than 2:1. The minimum depth shall be 1 foot and the maximum depth 2 feet as measured from the crest of the inlet structure. Shape the excavated basin to fit conditions with the longest dimension oriented toward the longest inflow area to provide maximum trap efficiency. The capacity of the excavated basin should be established to contain 900 cubic feet per acre of disturbed area. Weep holes, protected by fabric and stone, should be provided for draining the temporary pool.

Inspect and clean the excavated basin after every storm. Sediment should be removed when 50 percent of the storage volume is achieved This material should be incorporated into the site in a stabilized manner.

Type II – Fabric Drop Inlet Protection

See Figure 5A.12 for details on Filter Fabric Drop Inlet Protection on page 5A.30.

Limit the drainage area to 1 acre per inlet device. Land area slope immediately surrounding this device should not exceed 1 percent. The maximum height of the fabric above the inlet crest shall not exceed 1.5 feet unless reinforced.

The top of the barrier should be maintained to allow overflow to drop into the drop inlet and not bypass the inlet to unprotected lower areas. Support stakes for fabric shall be a minimum of 3 feet long, spaced a maximum 3 feet apart. They should be driven close to the inlet so any overflow drops into the inlet and not on the unprotected soil. Improved performance and sediment storage volume can be obtained by excavating the area.

Inspect the fabric barrier after each rain event and make repairs as needed. Remove sediment from the pool area as

necessary with care not to undercut or damage the filter fabric. Upon stabilization of the drainage area, remove all materials and unstable sediment and dispose of properly. Bring the adjacent area of the drop inlet to grade, smooth and compact and stabilize in the appropriate manner to the site.

If straw bales are used in lieu of filter fabric, they should be placed tight with the cut edge adhering to the ground at least 3 inches below the elevation of the drop inlet. Two anchor stakes per bale shall be driven flush to bale surface. Straw bales will be replaced every 4 months until the area is stabilized.

Type III – Stone and Block Drop Inlet Protection

See Figure 5A.13 for details on Stone and Block Drop Inlet Protection on page 5A.31.

Limit the drainage area to 1 acre at the drop inlet. The stone barrier should have a minimum height of 1 foot and a maximum height of 2 feet. Do not use mortar. The height should be limited to prevent excess ponding and bypass flow.

Recess the first course of blocks at least 2 inches below the crest opening of the storm drain for lateral support. Subsequent courses can be supported laterally if needed by placing a 2x4 inch wood stud through the block openings perpendicular to the course. The bottom row should have a few blocks oriented so flow can drain through the block to dewater the basin area.

The stone should be placed just below the top of the blocks on slopes of 2:1 or flatter. Place hardware cloth of wire mesh with ½ inch openings over all block openings to hold stone in place.

As an optional design, the concrete blocks may be omitted and the entire structure constructed of stone, ringing the outlet ("doughnut"). The stone should be kept at a 3:1 slope toward the inlet to keep it from being washed into the inlet. A level area 1 foot wide and four inches below the crest will further prevent wash. Stone on the slope toward the inlet should be at least 3 inches in size for stability and 1 inch or smaller away from the inlet to control flow rate. The elevation of the top of the stone crest must be maintained 6 inches lower than the ground elevation down slope from the inlet to ensure that all storm flows pass over the stone into the storm drain and not past the structure. Temporary diking should be used as necessary to prevent bypass flow.

The barrier should be inspected after each rain event and repairs made where needed. Remove sediment as necessary to provide for accurate storage volume for subsequent rains. Upon stabilization of contributing drainage area, remove all materials and any unstable soil and dispose of properly.

Bring the disturbed area to proper grade, smooth, compact and stabilized in a manner appropriate to the site.

Type IV – Curb Drop Inlet Protection

See Figure 5A. 14 for details on Curb Drop Inlet Protection on page 5A.32.

The drainage area should be limited to 1 acre at the drop inlet. The wire mesh must be of sufficient strength to support the filter fabric and stone with the water fully impounded against it. Stone is to be 2 inches in size and clean. The filter fabric must be of a type approved for this purpose with an equivalent opening size (EOS) of 40-85. The protective structure will be constructed to extend beyond the inlet 2 feet in both directions. Assure that storm flow does not bypass the inlet by installing temporary dikes (such as sand bags) directing flow into the inlet. Make sure that the overflow weir is stable. Traffic safety shall be integrated with the use of this practice.

The structure should be inspected after every storm event. Any sediment should be removed and disposed of on the site. Any stone missing should be replaced. Check materials for proper anchorage and secure as necessary.

Figure 5A.11
Excavated Drop Inlet Protection

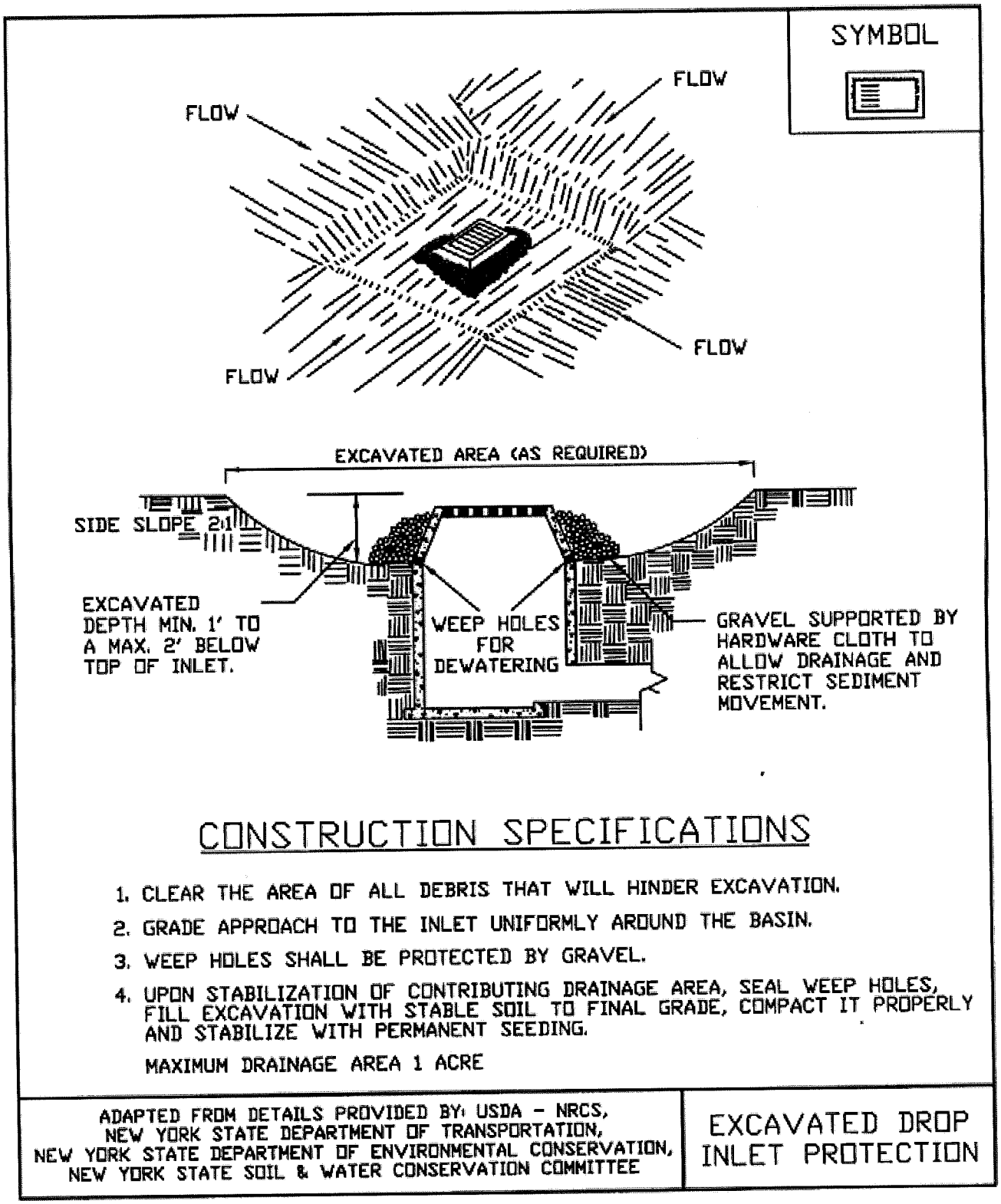
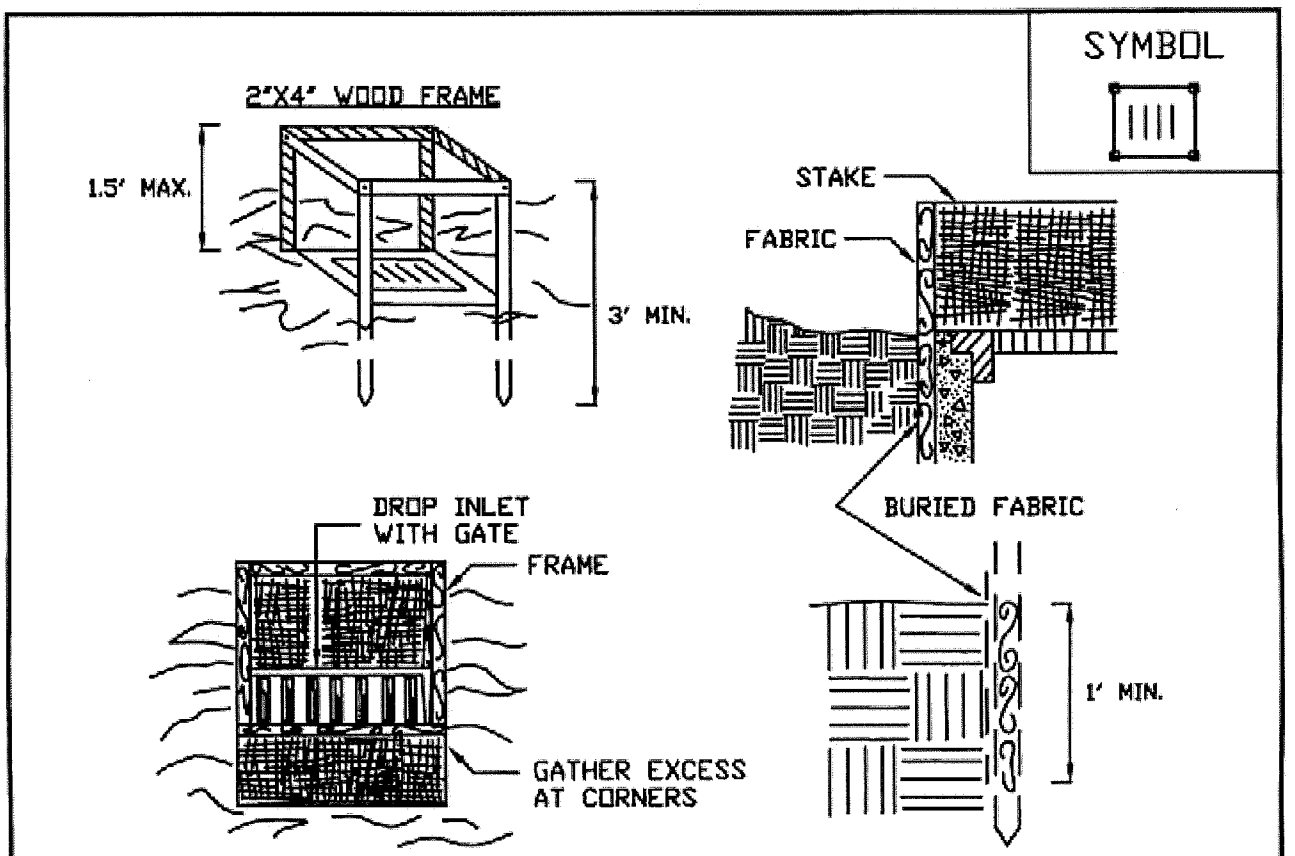


Figure 5A.12
Filter Fabric Drop Inlet Protection



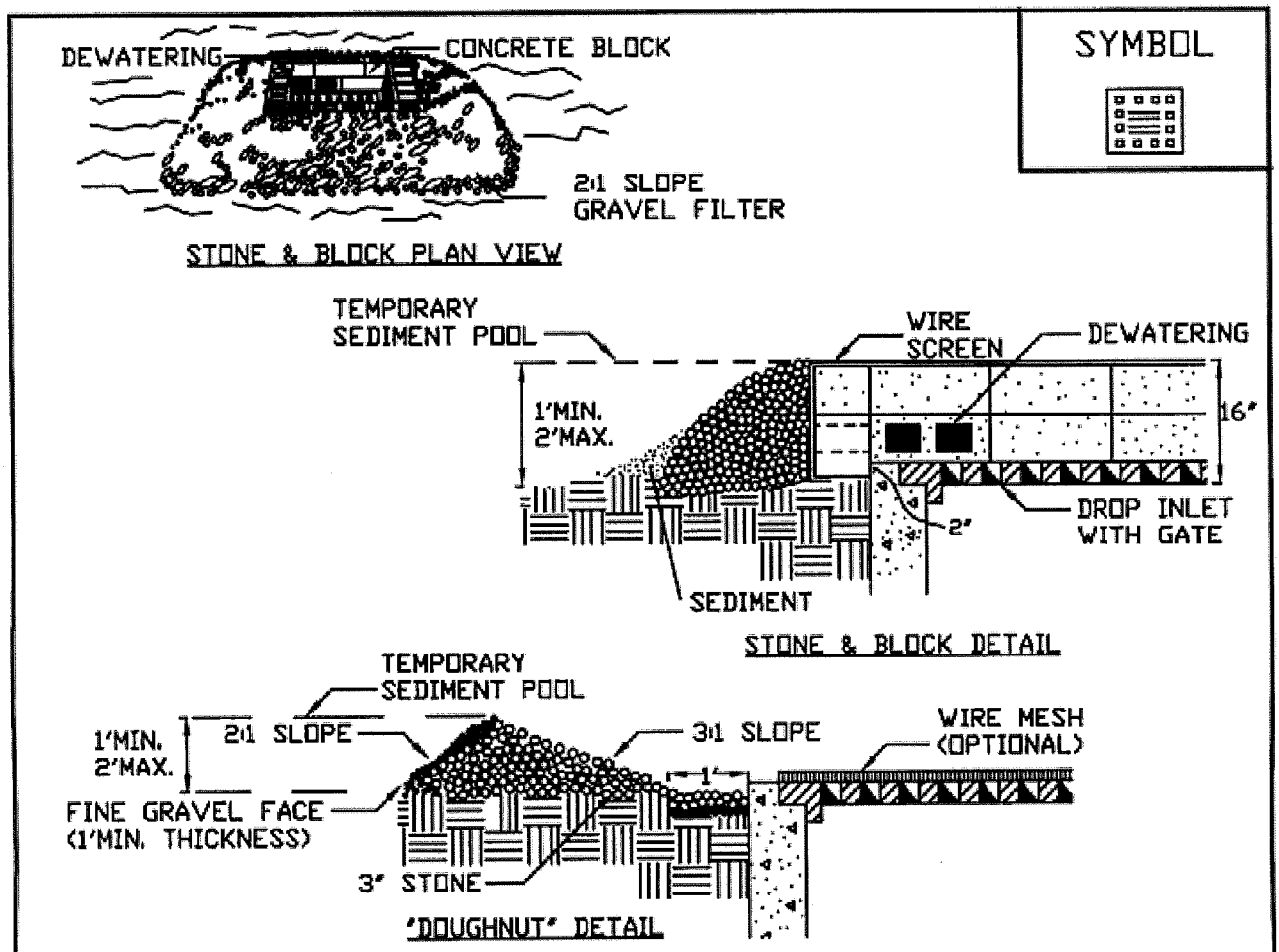
CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85. BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT. METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.

MAXIMUN DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	FILTER FABRIC DROP INLET PROTECTION

Figure 5A.13
Stone & Block Drop Inlet Protection



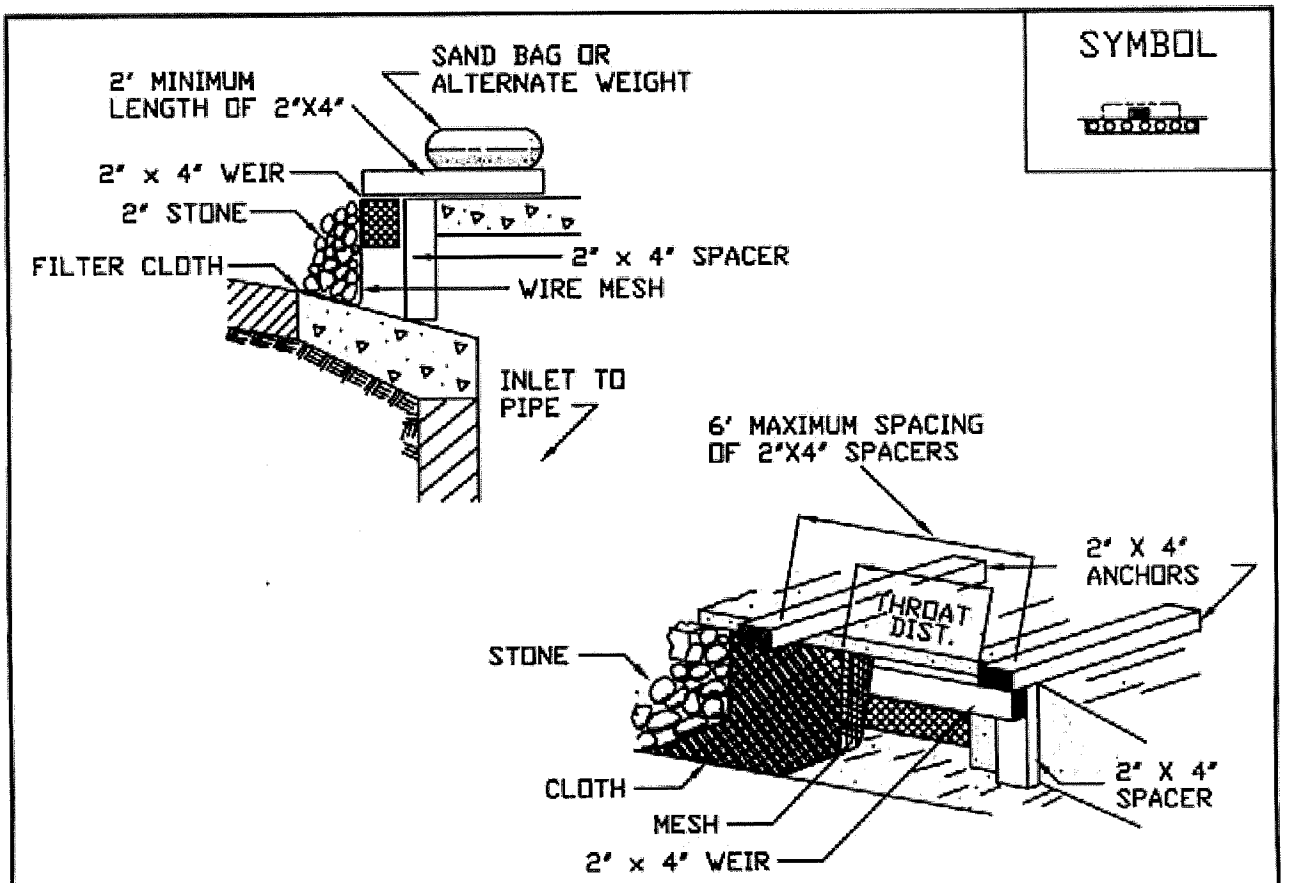
CONSTRUCTION SPECIFICATIONS

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2 INCHES MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
2. HARDWARE CLOTH OR 1/2" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
3. USE CLEAN STONE OR GRAVEL 1/2-3/4 INCH IN DIAMETER PLACED 2 INCHES BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.
4. FOR STONE STRUCTURES ONLY, A 1 FOOT THICK LAYER OF THE FILTER STONE WILL BE PLACED AGAINST THE 3 INCH STONE AS SHOWN ON THE DRAWINGS.

MAXIMUM DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STONE & BLOCK DROP INLET PROTECTION

Figure 5A.14
Curb Drop Inlet Protection



CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN AOS OF 40-85.
2. WOODEN FRAME SHALL BE CONSTRUCTED OF 2" x 4" CONSTRUCTION GRADE LUMBER.
3. WIRE MESH ACROSS THROAT SHALL BE A CONTINUOUS PIECE 30 INCH MINIMUM WIDTH WITH A LENGTH 4 FEET LONGER THAN THE THROAT. IT SHALL BE SHAPED AND SECURELY NAILED TO A 2" x 4" WEIR.
4. THE WEIR SHALL BE SECURELY NAILED TO 2" x 4" SPACERS 9 INCHES LONG SPACED NO MORE THAN 6 FEET APART.
5. THE ASSEMBLY SHALL BE PLACED AGAINST THE INLET AND SECURED BY 2" x 4" ANCHORS 2 FEET LONG EXTENDING ACROSS THE TOP OF THE INLET AND HELD IN PLACE BY SANDBAGS OR ALTERNATE WEIGHTS.

MAXIMUM DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	CURB DROP INLET PROTECTION

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence placed on a slope are:

Slope Steepness	Maximum Length (ft.)
2:1	25
3:1	50
4:1	75
5:1 or flatter	100

2. Maximum drainage area for overland flow to a silt fence shall not exceed ¼ acre per 100 feet of fence, with maximum ponding depth of 1.5 feet behind the fence; and

3. Erosion would occur in the form of sheet erosion; and

4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff. All silt fences shall be placed as close to the areas as possible, but at least 10 feet from the toe of a slope to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.

Sensitive areas to be protected by silt fence may need to be reinforced by using heavy wire fencing for added support to prevent collapse.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. A detail of the silt fence shall be shown on the plan. See Figure 5A.8 on page 5A.21 for details.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682

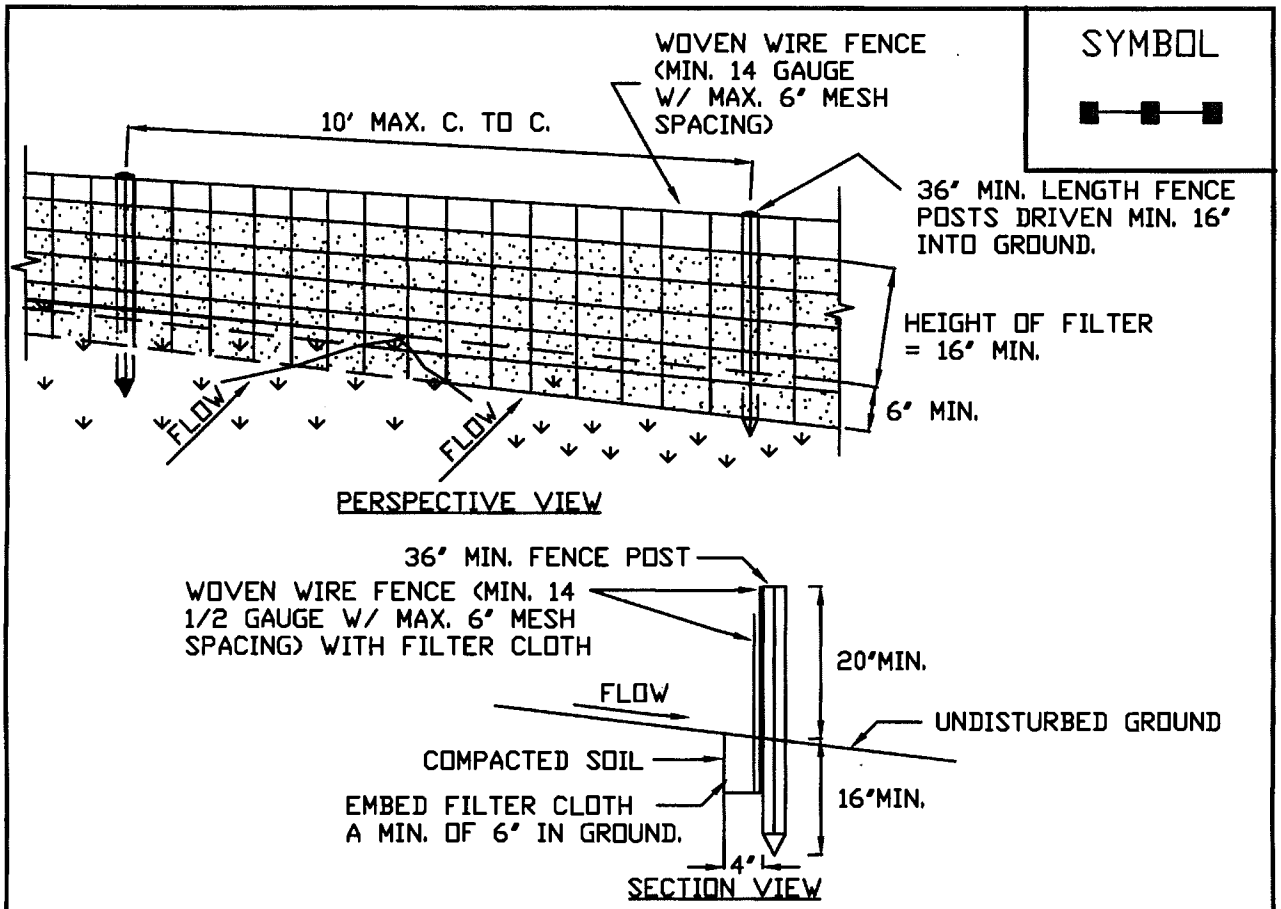
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated Units: Envirofence, Geofab, or approved equal, may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.8.

Figure 5A.8
Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	SILT FENCE

APPENDIX F: MAINTENANCE PLAN

Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Monthly)		
Trench dewaters between storms		
4. Sediment Cleanout of Trench (Annual)		
No evidence of sedimentation in trench		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repair		
No evidence of erosion		
7. Aggregate Repairs (Annual)		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench does not need rehabilitation		

Comments:

_____

_____

_____

_____

_____

_____

Actions to be Taken:

_____

_____

_____

_____

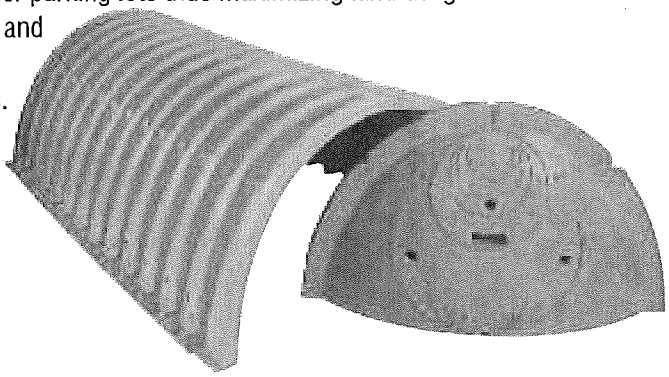
_____

_____

StormTech SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.

StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠



StormTech SC-740 Chamber
(not to scale)

Nominal Chamber Specifications

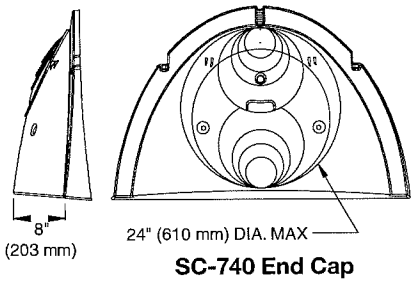
Size (L x W x H)
85.4" x 51.0" x 30.0"
(2170 x 1295 x 762 mm)

Chamber Storage
45.9 ft³ (1.30 m³)

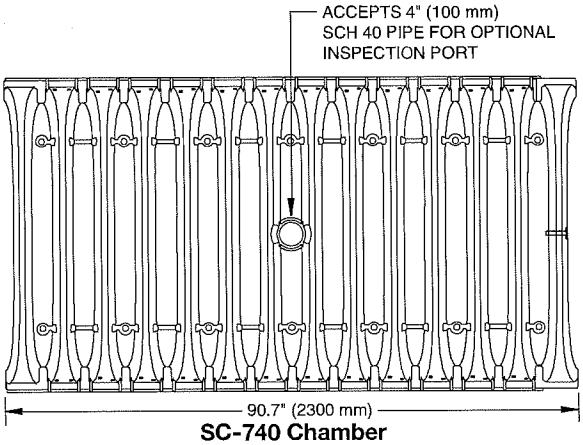
Minimum Installed Storage*
74.9 ft³ (2.12 m³)

Weight
74.0 lbs (33.6 kg)

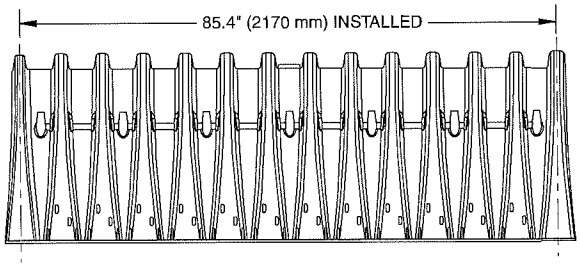
Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

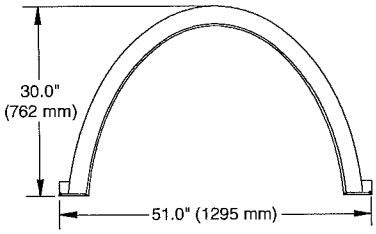


SC-740 End Cap

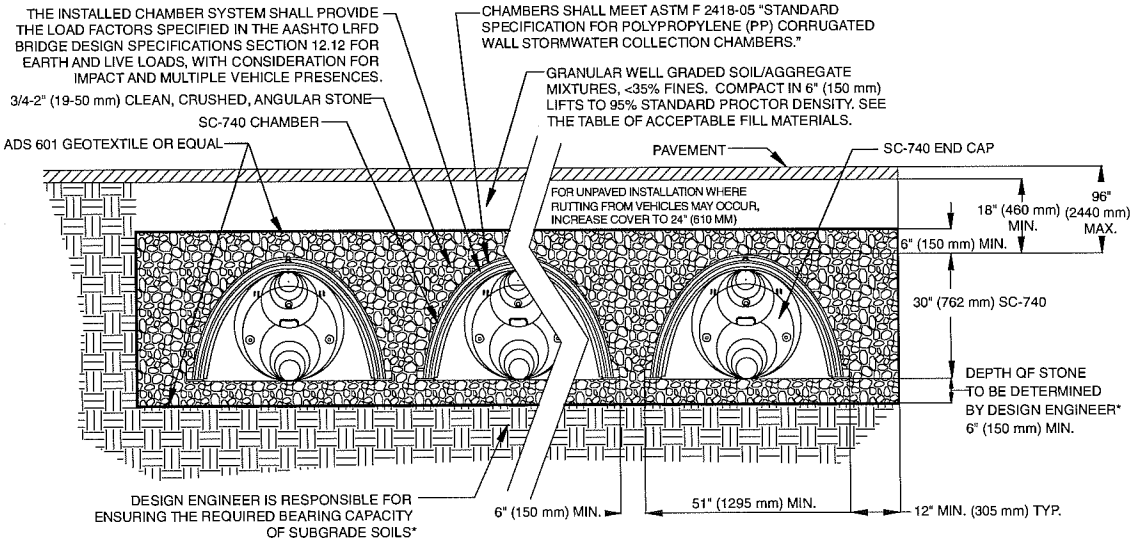


SC-740 Chamber





Typical Cross Section Detail
(not to scale)



THIS CROSS SECTION DETAILS THE REQUIREMENTS NECESSARY TO SATISFY THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS USING STORMTECH CHAMBERS

MADE IN THE U.S.A.

SC-740 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (152 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage Ft³ (m³)	Total System Cumulative Storage Ft³ (m³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone 45.90 (1.300)	72.64 (2.057)
39 (991)	Cover 45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (948)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	41.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0	6.76 (0.191)
5 (127)	0	5.63 (0.160)
4 (102)	Stone Foundation 0	4.51 (0.125)
3 (76)	0	3.38 (0.095)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 cu. ft. (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber

	Bare Chamber Storage	Chamber and Stone Stone Foundation Depth in. (mm)		
	ft³ (m³)	6 (150)	12 (305)	18 (460)
StormTech SC-740	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Storage volumes are in cubic feet per chamber. Assumes 40% porosity for the stone plus the chamber volume.

Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH TONS (CUBIC YARDS)	6"	12"	18"
StormTech SC-740	3.8 (2.8 yd³)	4.6 (3.3 yd³)	5.5 (3.9 yd³)
METRIC KILOGRAMS (METER³)	**150 mm**	**305 mm**	**460 mm**
StormTech SC-740	3450 (2.1 m³)	4170 (2.5 m³)	4490 (3.0 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber

	Stone Foundation Depth		
	6" (150 mm)	12" (305 mm)	18" (460 mm)
StormTech SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Volumes are in cubic yards (cubic meters) per chamber. Assumes 6" (150 mm) of separation between chamber rows and 18" (460 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and endplates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and endplates are collectively referred to as the "Products."

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.

(C) **THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANT-ABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. **UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.**

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

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