PROPOSED SELF-STORAGE UNITS

Drainage Report

Prepared for:

Thomaston Comfort Control

401 McMahon Drive

Thomaston, CT 06787

SLR #141.16708.00002.0030

October 3, 2022
(Revised May 25, 2023)

Drainage Report

Proposed Self-Storage Units
895 Migeon Avenue
Torrington, Connecticut
October 3, 2022 **(Revised May 25, 2023)**
SLR #141.16708.00002.0030

This Drainage Report has been prepared in support of the proposed self-storage facility to be constructed at 895 Migeon Avenue in the city of Torrington, Connecticut. The development proposes to construct new self-storage buildings. New sidewalks and parking areas will be included as well as all associated site infrastructure.

Figure 1 – #2926 Parcel

Table 1 – Stormwater Data

Parcel Size Total	0.80 acres
Existing Impervious Area (Watershed Area)	0.07 acres
Proposed Impervious Area (Watershed Area)	0.72 acres
Soil Types (Hydrologic Soil Group)	"B"
Existing Land Use	Woods, open space, bituminous driveway, parking lot, sidewalk, and building
Proposed Land Use	Woods, open space, bituminous driveway, parking lot, sidewalk, and building
Design Storm for Stormwater Management (City of Torrington)	No increases in peak rates of runoff for the 2-, 10-, 25-, 50-, and 100-year storms, Connecticut Department of Energy & Environmental Protection (CTDEEP) Water Quality Flow (WQF)
Water Quality Measures	2-foot sump catch basins, hydrodynamic separator, retention storage
Design Storm for Storm Drainage (City of Torrington)	25-year storm
Federal Emergency Management Agency Special Flood Hazard Areas	Area of Moderate-to-Low Flood Risk (Zone B)
Connecticut Department of Energy & Environmental Protection Aquifer Protection Areas	Not Applicable

STORMWATER MANAGEMENT APPROACH

The stormwater management system for this site has been designed utilizing Best Management Practices (BMPs) to provide water quality management while attenuating the proposed peak-flow rates from the redevelopment. The design goal is to provide water quality treatment in accordance with the CTDEEP requirements for the water quality flow (WQF) and to prevent increases in the predevelopment runoff rates from the site. Existing drainage patterns will be maintained to the maximum extent practicable, and a new stormwater treatment train proposes catch basins with 2-foot sumps and a hydrodynamic separator.

The proposed redevelopment will include a detention basin that is designed to mitigate the increase in stormwater runoff from the site due to the new impervious surfaces.

The watershed upstream of the proposed self-storage site will be collected by a series of area drains and a stone trench before reaching the property and redirected to a series of drywells fitted with overflow grates. The design calls for a precast concrete curb as an overflow outlet. The concrete level spreader gradually releases stormwater in a quiescent manner as sheet flow rather than a concentrated point discharge that results from typical storm pipe outlets or flared end sections.

The computer program titled *Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2019* by Autodesk, Inc., Version 2018.3, was used for designing the proposed storm drainage collection system. Storm drainage computations performed include pipe capacity and hydraulic grade line calculations. The contributing watershed to each individual catch basin inlet was delineated to determine the drainage area and land coverage. These values were used to determine the stormwater runoff to each inlet using the Rational Method. The rainfall intensities for the site were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10, Precipitation Frequency Data Server (PFDS). The proposed storm drainage system is designed to provide adequate capacity to convey the 25-year storm event.

WATER QUALITY MANAGEMENT

Stormwater runoff from the proposed development will be collected by a subsurface pipe and catch basin drainage system. The proposed drainage system will include catch basins with 2-foot sumps to trap sediment and debris.

A hydrodynamic separator, such as a *CDS®* device manufactured by Contech Engineered Solutions, will be installed in the proposed storm drainage system prior to discharging stormwater to the stormwater management basin and the underground chamber system. The unit will further remove suspended solids before discharging downgradient, which will in turn remove other pollutants that tend to attach to the suspended solids and effectively remove other debris and floatables that may be present in stormwater runoff. The hydrodynamic separator has been designed to meet criteria recommended by the CTDEEP *2004 Stormwater Quality Manual*. The device was designed based on the determined WQF, which is the peak-flow rate associated with the Water Quality Volume (WQV) and sized based on the manufacturer's specifications.

HYDROLOGIC ANALYSIS

A hydrologic analysis was conducted to analyze the predevelopment and postdevelopment peak-flow rates from the site. A single analysis point receives runoff from the site. Analysis Point A represents the eastern property boundary, which receives runoff via overland flow. The total watershed area delineated is approximately 0.97 acres under both existing and proposed conditions.

The method of predicting the surface water runoff rates utilized in this analysis was a computer program titled *HydroCAD 10.20-2g* by HydroCAD Software Solutions LLC. The *HydroCAD* program is a computer model that utilizes the methodologies set forth in the *Technical Release No. 55* (TR-55) manual and *Technical Release No. 20* (TR-20) computer model, originally developed by the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). The *Hydrographs* computer modeling program is primarily used for conducting hydrology studies such as this one.

The *HydroCAD* computer program forecasts the rate of surface water runoff based upon several factors. The input data includes information on land use, hydrologic soil type, vegetation, contributing watershed area, time of concentration, rainfall data, storage volumes, and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time, with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains, and stormwater management basins.

The input data for rainfalls with statistical recurrence frequencies of 2, 10, 25, 50, and 100 years was obtained from the NOAA Atlas 14, Volume 10 database. The corresponding rainfall totals are listed below.

Storm Frequency	Rainfall (inches)
2-year	3.50
10-year	5.69
25-year	7.06
50-year	8.06
100-year	9.17

Land use for the site under existing and proposed conditions was determined from field survey and aerial photogrammetry. Land use types used in the analysis included woods, grassed or open space, gravel, building, and pervious pavement and impervious (paved) cover. Soil types in the watershed were determined from the CTDEEP Geographic Information System (GIS) database of the USDA-NRCS soil survey for Litchfield County, Connecticut. For the analysis, the site was determined to contain hydrologic soil type "B" as classified by USDA-NRCS. A composite runoff Curve Number (CN) for each subwatershed was calculated based on the different land use and soil types. The time of concentration (Tc) was estimated for each subwatershed using the TR-55 methodology and was computed by summing all travel times through the watershed as sheet flow, shallow concentrated flow, and channel flow.

Onsite soil testing was performed to determine the feasibility of stormwater infiltration in the area of the proposed detention basin. The soil testing consisted of multiple test pits and visual field identifications. Based on the subsurface conditions encountered and guidance from USDA-NRCS, an infiltration rate of 9.67 inches per hour was used in the design of the proposed detention basin.

The existing conditions were modeled with the *Hydrographs* program to determine the peak-flow rates for the various storm events at each analysis point. A revised model was developed incorporating the proposed site conditions and the underground detention system. The flows obtained with the revised model were then compared to the results of the existing conditions model.

The following peak rates of runoff were obtained from the *Hydrographs* hydrology results:

Analysis Point A – Eastern Property Boundary					
	Peak Runoff Rate (cubic feet per second)				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Existing Conditions	0.8	2.7	4.2	5.3	6.5
Proposed Conditions	0.0	0.1	0.2	0.3	5.3

Detention Basin 120*					
	Water Surface Elevation (feet)				
Storm Frequency (years)	**2**	**10**	**25**	**50**	**100**
Proposed Conditions	621.7	623.5	624.3	624.8	625.5

*Overflow Elevation = 625.2

CONCLUSION

The results of the hydrologic analysis demonstrate that there will be no increases in peak-flow rates from the proposed development. This was achieved for the storm events modeled through a planned stormwater management system with detention provided in the proposed detention basin. The proposed development will also introduce a new stormwater treatment train consisting of several water quality measures such as catch basins with 2-foot sumps, and a hydrodynamic separator.

The hydrodynamic separator will pretreat stormwater runoff generated from the proposed impervious surfaces prior to it entering the receiving detention basin. A CDS unit, manufactured by Contech Engineered Solutions, was selected and sized based on the contributing WQF, which is the peak-flow rate associated with the WQV. The stormwater runoff discharge from the proposed drywells will be directed to concrete level spreader that will gradually release runoff to eastern property boundary.

All supporting documentation and stormwater-related computations are attached to this report along with the *HydroCAD* model results for stormwater management and *Hydraflow Storm Sewers* model results for the proposed storm drainage system. Illustrative watershed maps for both existing and proposed conditions are also attached to this report.

Attachments

Appendix A – United States Geological Survey Location Map
Appendix B – Federal Emergency Management Agency Flood Insurance Rate Map
Appendix C – Natural Resources Conservation Service Hydrologic Soil Group Map
Appendix D – Storm Drainage Computations
Appendix E – Water Quality Computations
Appendix F – Hydrologic Analysis – Input Computations
Appendix G – Hydrologic Analysis – Computer Model Results
Appendix H – Watershed Maps

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APPENDIX A

UNITED STATES GEOLOGICAL SURVEY LOCATION MAP

Drainage Report

Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

October 3, 2022

(Revised May 25, 2023)

SLR
99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
SLRCONSULTING.COM

USGS QUADRANGLE MAP, QUAD NO. 33

SELF STORAGE FACILITY

895 MIGEON AVENUE
TORRINGTON, CT 06790

PROJECT PHASE:

REV: ---

DATE	OCTOBER 3, 2022
SCALE	1"=2,400'
PROJ. NO.	6708-01

DESIGNED	DRAWN	CHECKED
---	MCB	---

DRAWING NAME:

LOC

APPENDIX B

FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP

Drainage Report

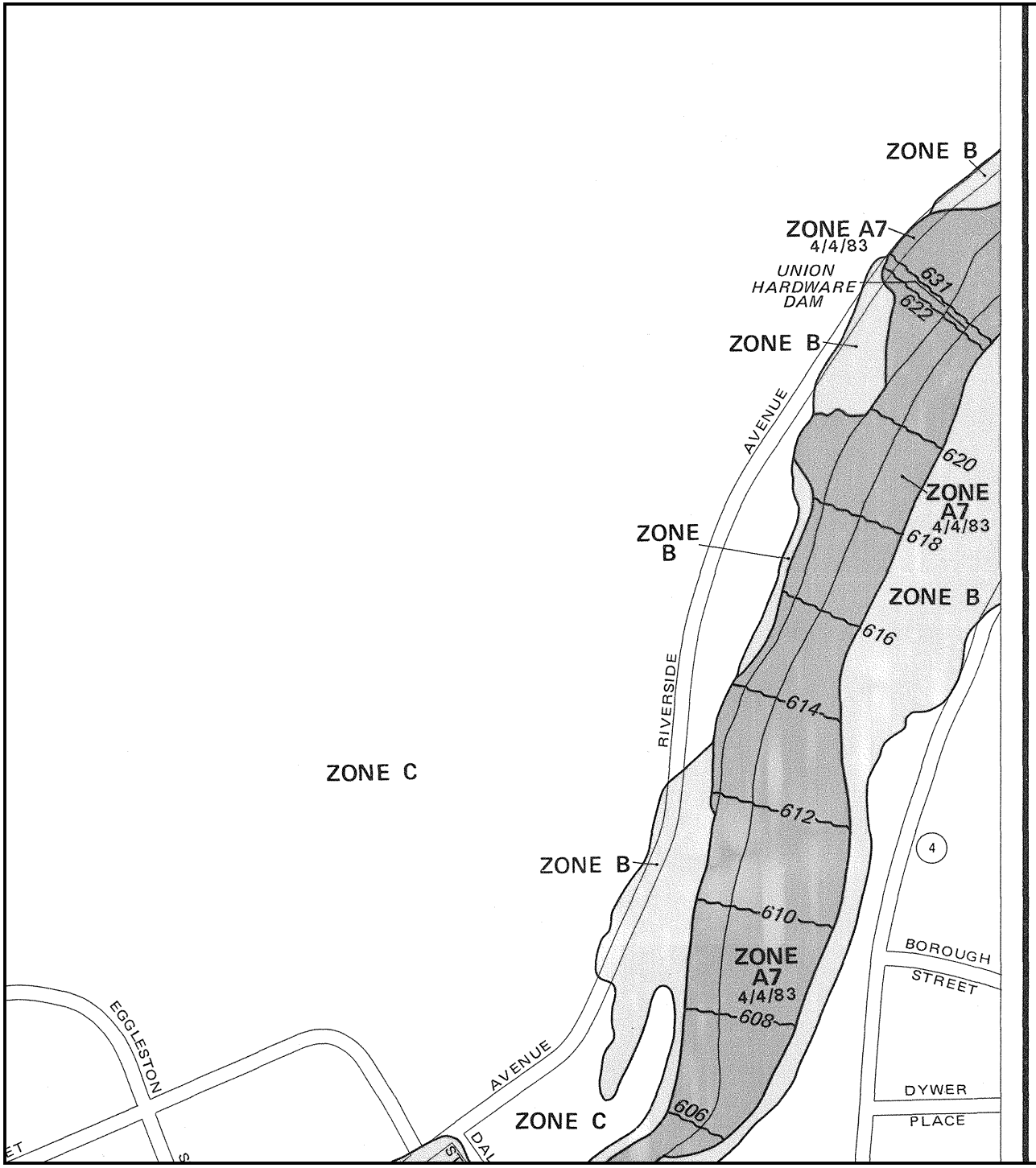
Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

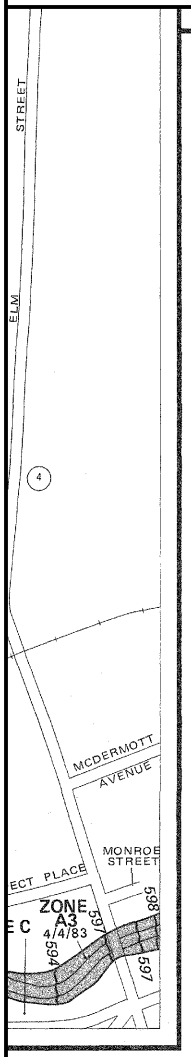
October 3, 2022

(Revised May 25, 2023)



APPROXIMATE SCALE

400 0 400 FEET



NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

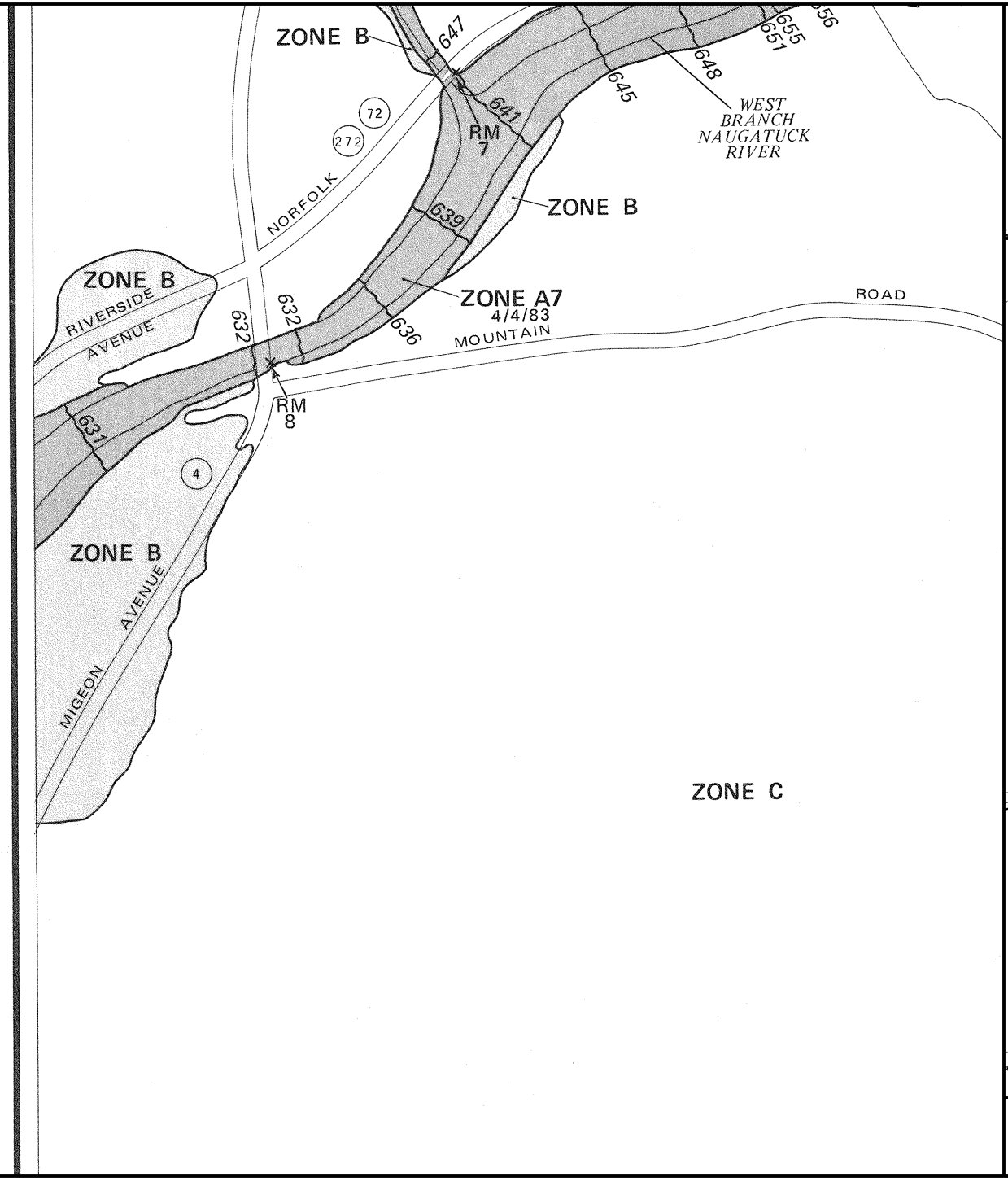
CITY OF
TORRINGTON,
CONNECTICUT
LITCHFIELD COUNTY

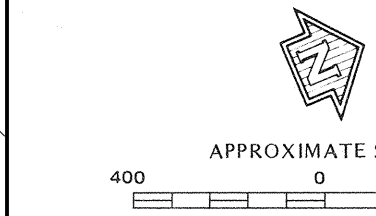
PANEL 4 OF 14
(SEE MAP INDEX FOR PANELS NOT PRINTED)

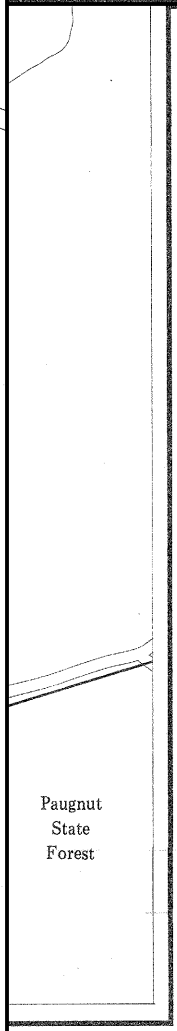
COMMUNITY-PANEL NUMBER
095081 0004 B

MAP REVISED:
APRIL 4, 1983

Federal Emergency Management Agency







NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
TORRINGTON,
CONNECTICUT
LITCHFIELD COUNTY

PANEL 5 OF 14
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
095081 0005 B

MAP REVISED:
APRIL 4, 1983

Federal Emergency Management Agency

APPENDIX C

NATURAL RESOURCES CONSERVATION SERVICE HYDROLOGIC SOIL GROUP MAP

Drainage Report

Proposed Self Storage Units

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October 3, 2022

(Revised May 25, 2023)

Map Scale: 1:1,330 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Jun 12, 2020—Sep 15, 2020

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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
38C	Hinckley loamy sand, 3 to 15 percent slopes	A	0.0	0.6%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	B	0.5	8.8%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	B	0.0	0.5%
306	Udorthents-Urban land complex	B	5.2	85.0%
W	Water		0.3	5.1%
Totals for Area of Interest			**6.2**	**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

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX D

STORM DRAINAGE COMPUTATIONS

Drainage Report

Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

October 3, 2022

(Revised May 25, 2023)

Rational Method Individual Basin Calculations

Project: Proposed Self Storage Units By: MCB Date: Rev. 5/24/23
Location: Torrington, CT Checked: Date:

Basin Name	Impervious Area C=0.9 (sf)	Grassed Area C=0.3 (sf)	Wooded Area C=0.2 (sf)	Total Area (sf)	Total Area (ac)	Weighted C	Tc (min)
System 110							
CLCB 2	5130	0	0	5130	0.12	0.90	5.0
CLCB 3	6460	0	0	6460	0.15	0.90	5.0
AD 4	7485	2523	0	10008	0.23	0.75	5.0
CLCB 5	1317	627	0	1944	0.04	0.71	5.0
CLCB 6	4028	0	0	4028	0.09	0.90	5.0
AD 7	23596	9527	607	33730	0.77	0.72	5.0
AD 8	177	69	0	246	0.01	0.73	5.0
AD 9	223	82	0	305	0.01	0.74	5.0
STONE TRENCH	28689	46024	14713	89426	2.05	0.48	5.0

Rational Method Roof Drain System Calculations

Project: Proposed Self Storage Units By: MCB Date: Rev. 5/24/23
Location: Torrington, CT Checked: Date:

Total Runoff to Proposed Storm Drainage System (In Hydraflow Model)

	STONE TRENCH						
C	0.48						
I	9.05						
A	2.05						
Q	8.91						

NOAA Atlas 14, Volume 10, Version 3
Location name: Torrington, Connecticut, USA*
Latitude: 41.8167°, Longitude: -73.142°
Elevation: 627.03 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.27** (3.24-5.59)	**5.09** (3.85-6.67)	**6.42** (4.85-8.44)	**7.52** (5.65-9.95)	**9.05** (6.60-12.4)	**10.2** (7.30-14.3)	**11.4** (7.93-16.5)	**12.6** (8.45-18.9)	**14.3** (9.28-22.2)	**15.7** (9.91-24.8)
10-min	**3.03** (2.30-3.96)	**3.61** (2.73-4.72)	**4.55** (3.43-5.98)	**5.33** (4.00-7.04)	**6.41** (4.67-8.81)	**7.23** (5.17-10.1)	**8.07** (5.62-11.7)	**8.95** (5.99-13.4)	**10.2** (6.57-15.7)	**11.1** (7.03-17.5)
15-min	**2.38** (1.80-3.11)	**2.83** (2.14-3.70)	**3.57** (2.69-4.69)	**4.18** (3.14-5.53)	**5.03** (3.66-6.91)	**5.67** (4.06-7.96)	**6.33** (4.41-9.18)	**7.02** (4.70-10.5)	**7.96** (5.15-12.3)	**8.70** (5.51-13.8)
30-min	**1.62** (1.23-2.12)	**1.93** (1.46-2.53)	**2.44** (1.84-3.20)	**2.86** (2.14-3.77)	**3.43** (2.50-4.72)	**3.87** (2.77-5.43)	**4.32** (3.01-6.27)	**4.80** (3.21-7.17)	**5.44** (3.52-8.42)	**5.95** (3.76-9.40)
60-min	**1.03** (0.780-1.35)	**1.23** (0.927-1.60)	**1.55** (1.17-2.03)	**1.81** (1.36-2.39)	**2.18** (1.59-3.00)	**2.46** (1.76-3.45)	**2.74** (1.91-3.98)	**3.04** (2.04-4.55)	**3.45** (2.23-5.34)	**3.77** (2.39-5.96)
2-hr	**0.680** (0.518-0.884)	**0.796** (0.606-1.03)	**0.984** (0.747-1.29)	**1.14** (0.862-1.50)	**1.36** (0.998-1.86)	**1.52** (1.10-2.13)	**1.69** (1.19-2.46)	**1.88** (1.26-2.80)	**2.15** (1.40-3.32)	**2.37** (1.51-3.74)
3-hr	**0.525** (0.402-0.680)	**0.614** (0.469-0.796)	**0.760** (0.578-0.988)	**0.880** (0.667-1.15)	**1.05** (0.772-1.43)	**1.17** (0.848-1.64)	**1.30** (0.922-1.90)	**1.46** (0.978-2.16)	**1.68** (1.09-2.59)	**1.87** (1.19-2.94)
6-hr	**0.330** (0.254-0.424)	**0.392** (0.301-0.505)	**0.494** (0.378-0.638)	**0.578** (0.441-0.752)	**0.695** (0.517-0.949)	**0.780** (0.571-1.09)	**0.874** (0.627-1.28)	**0.989** (0.666-1.47)	**1.17** (0.759-1.79)	**1.32** (0.842-2.07)
12-hr	**0.198** (0.153-0.253)	**0.243** (0.188-0.311)	**0.317** (0.244-0.407)	**0.379** (0.290-0.489)	**0.463** (0.347-0.632)	**0.525** (0.387-0.736)	**0.593** (0.430-0.873)	**0.681** (0.460-1.01)	**0.819** (0.535-1.25)	**0.941** (0.602-1.47)
24-hr	**0.115** (0.090-0.146)	**0.146** (0.113-0.185)	**0.196** (0.152-0.250)	**0.237** (0.183-0.304)	**0.294** (0.222-0.401)	**0.336** (0.250-0.471)	**0.382** (0.280-0.564)	**0.443** (0.301-0.653)	**0.543** (0.355-0.830)	**0.632** (0.405-0.984)
2-day	**0.065** (0.051-0.082)	**0.084** (0.065-0.105)	**0.114** (0.089-0.144)	**0.139** (0.108-0.177)	**0.174** (0.132-0.236)	**0.199** (0.149-0.278)	**0.227** (0.168-0.336)	**0.266** (0.181-0.390)	**0.330** (0.217-0.503)	**0.388** (0.250-0.603)
3-day	**0.047** (0.037-0.059)	**0.061** (0.048-0.077)	**0.083** (0.065-0.105)	**0.102** (0.079-0.129)	**0.127** (0.097-0.172)	**0.145** (0.109-0.203)	**0.166** (0.123-0.246)	**0.194** (0.132-0.285)	**0.243** (0.160-0.369)	**0.286** (0.185-0.444)
4-day	**0.038** (0.030-0.048)	**0.049** (0.039-0.061)	**0.067** (0.052-0.084)	**0.082** (0.064-0.103)	**0.102** (0.078-0.138)	**0.116** (0.088-0.163)	**0.133** (0.099-0.197)	**0.156** (0.106-0.228)	**0.195** (0.128-0.295)	**0.229** (0.148-0.355)
7-day	**0.026** (0.021-0.032)	**0.033** (0.026-0.041)	**0.045** (0.035-0.056)	**0.054** (0.042-0.068)	**0.067** (0.051-0.090)	**0.077** (0.058-0.106)	**0.087** (0.065-0.128)	**0.102** (0.070-0.148)	**0.126** (0.083-0.191)	**0.148** (0.096-0.228)
10-day	**0.021** (0.017-0.026)	**0.026** (0.021-0.033)	**0.035** (0.028-0.044)	**0.042** (0.033-0.053)	**0.052** (0.040-0.069)	**0.059** (0.044-0.081)	**0.067** (0.050-0.097)	**0.077** (0.053-0.112)	**0.094** (0.062-0.143)	**0.110** (0.071-0.170)
20-day	**0.016** (0.012-0.019)	**0.018** (0.014-0.022)	**0.023** (0.018-0.028)	**0.026** (0.021-0.033)	**0.031** (0.024-0.041)	**0.035** (0.026-0.047)	**0.039** (0.029-0.056)	**0.044** (0.030-0.064)	**0.052** (0.035-0.079)	**0.060** (0.039-0.092)
30-day	**0.013** (0.010-0.016)	**0.015** (0.012-0.018)	**0.018** (0.014-0.022)	**0.020** (0.016-0.025)	**0.024** (0.018-0.031)	**0.026** (0.020-0.035)	**0.029** (0.021-0.041)	**0.032** (0.022-0.046)	**0.037** (0.025-0.056)	**0.041** (0.027-0.064)
45-day	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.014** (0.011-0.017)	**0.016** (0.013-0.020)	**0.018** (0.014-0.023)	**0.020** (0.015-0.026)	**0.022** (0.016-0.030)	**0.024** (0.016-0.034)	**0.027** (0.018-0.040)	**0.029** (0.019-0.044)
60-day	**0.009** (0.008-0.012)	**0.010** (0.008-0.013)	**0.012** (0.010-0.015)	**0.013** (0.011-0.016)	**0.015** (0.012-0.019)	**0.017** (0.012-0.022)	**0.018** (0.013-0.025)	**0.019** (0.013-0.028)	**0.021** (0.014-0.032)	**0.023** (0.015-0.035)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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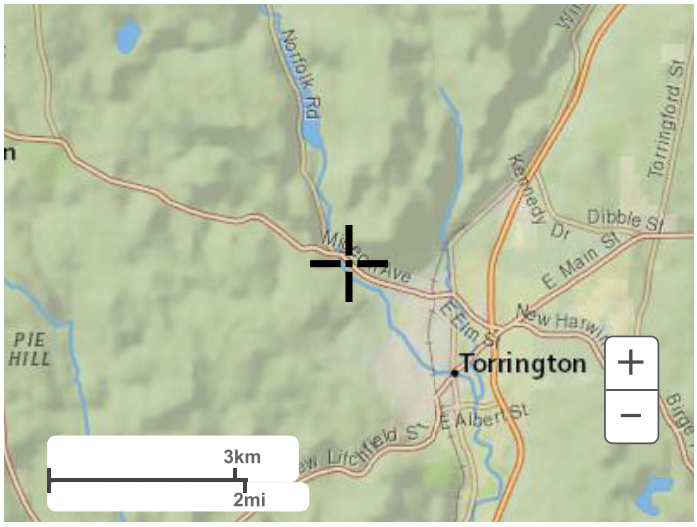
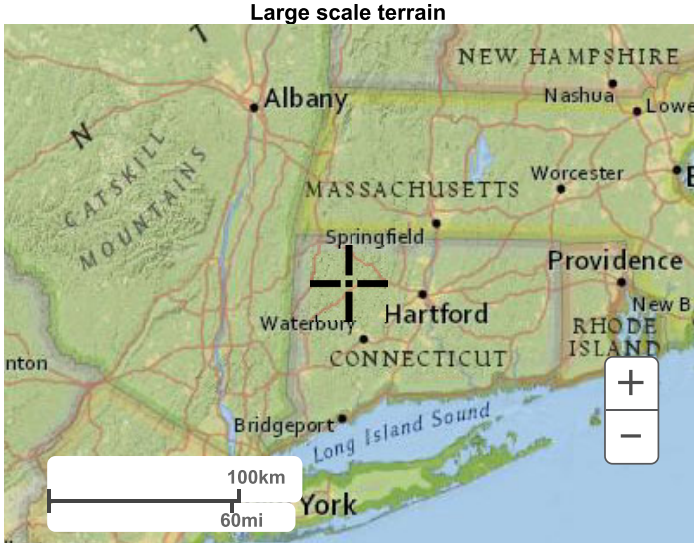
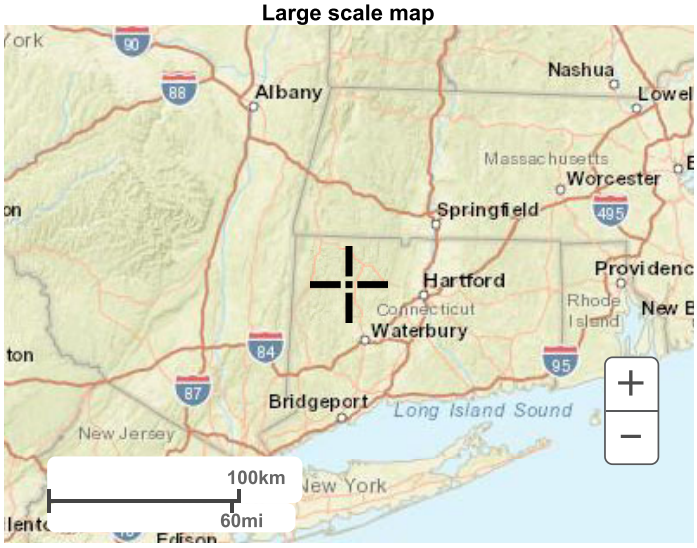
PF graphical



Large scale terrain



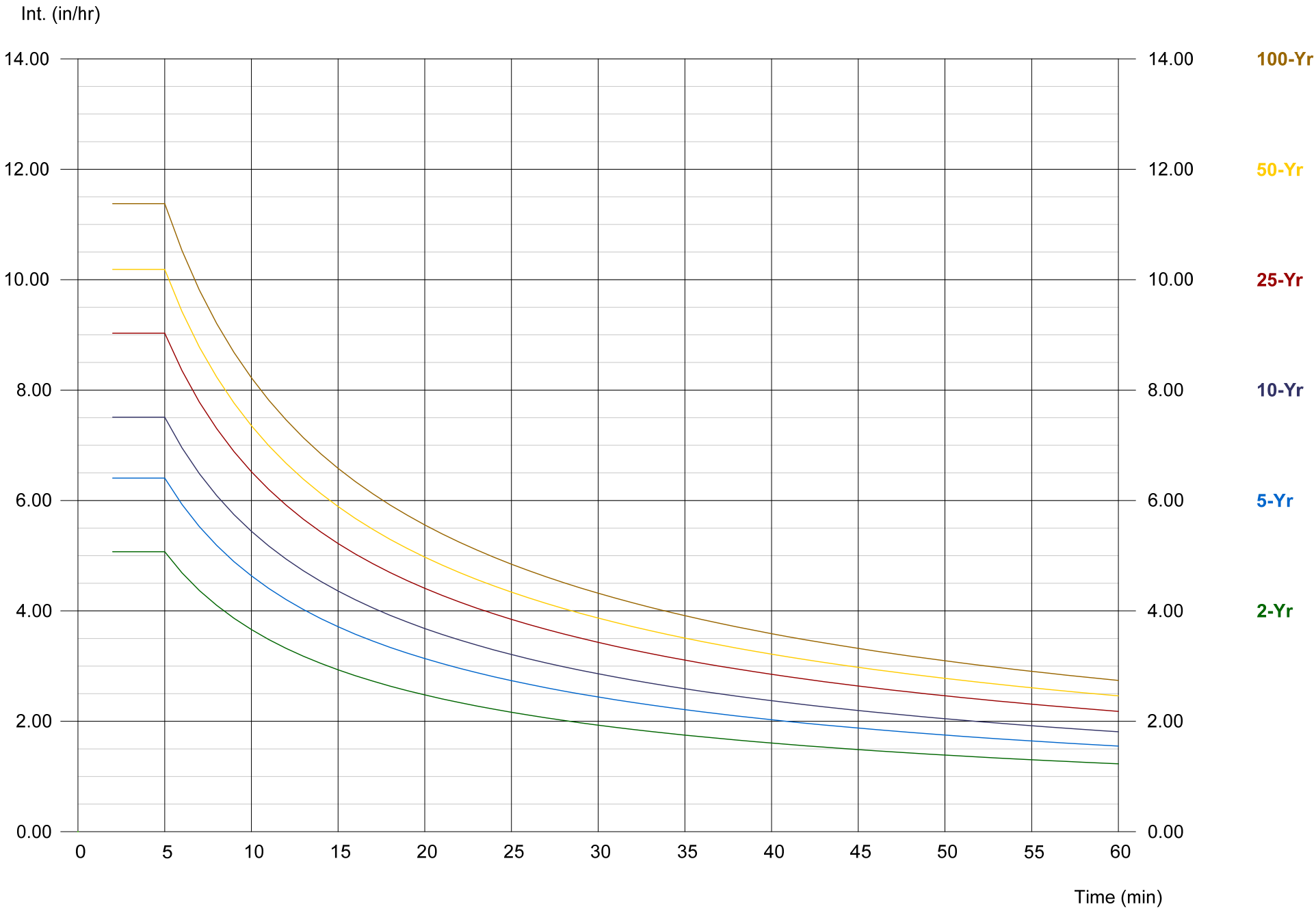
Large scale map



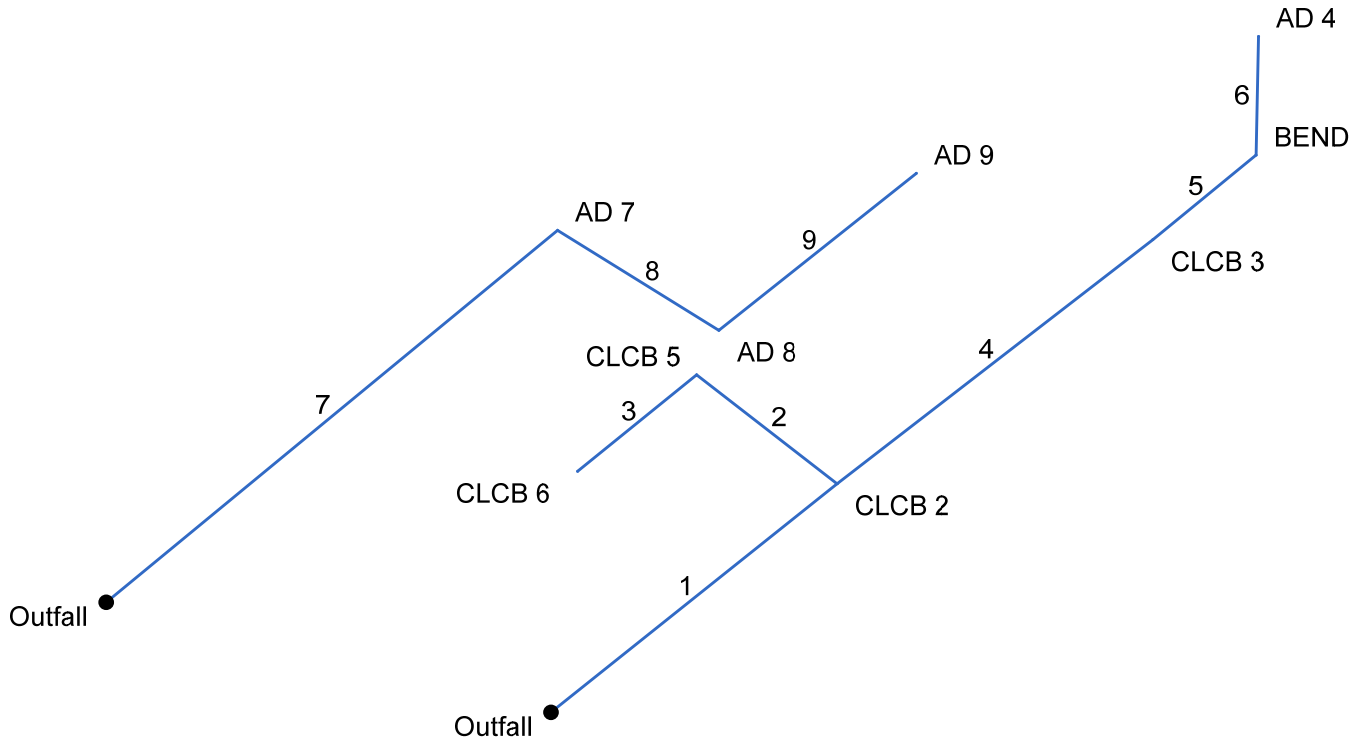
Large scale aerial

Storm Sewer IDF Curves

IDF file: Torrington.IDF



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: System 100-02.stm	Number of lines: 9	Date: 5/24/2023

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	93.000	-44.727	None	0.00	0.12	0.90	5.0	620.00	1.08	621.00	18	Cir	0.012	1.00	625.50	FES 1 - CLCB 2
2	1	45.000	-91.413	None	0.00	0.04	0.71	5.0	621.00	2.22	622.00	12	Cir	0.012	1.00	625.70	CLCB 2 - CLCB 5
3	2	39.000	-88.941	None	0.00	0.09	0.90	5.0	622.20	1.03	622.60	12	Cir	0.012	1.00	625.60	CLCB 5 - CLCB 6
4	1	101.000	0.933	None	0.00	0.15	0.90	5.0	621.00	0.89	621.90	15	Cir	0.012	0.15	625.60	CLCB 2 - CLCB 3
5	4	34.000	-1.602	None	0.00	0.00	0.00	0.0	621.90	0.59	622.10	15	Cir	0.012	0.74	625.90	CLCB 3 - BEND
6	5	34.000	-43.690	None	0.00	0.23	0.75	5.0	622.10	0.59	622.30	15	Cir	0.012	1.00	624.80	BEND - AD 4
7	End	149.000	-45.605	None	8.91	0.77	0.72	5.0	619.00	1.01	620.50	18	Cir	0.012	0.99	625.00	DRYWELL - AD 7
8	7	47.000	83.120	None	0.00	0.01	0.73	5.0	620.50	1.06	621.00	12	Cir	0.012	0.99	625.90	AD 7 - AD 8
9	8	64.000	-82.093	None	0.00	0.01	0.74	5.0	621.00	1.56	622.00	12	Cir	0.012	1.00	625.90	AD 8 - AD 9

Project File: System 100-02.stm | Number of lines: 9 | Date: 5/24/2023

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	93.000	0.12	0.63	0.90	0.11	0.52	5.0	6.7	7.9	4.17	11.80	2.36	18	1.08	620.00	621.00	624.30	624.42	622.40	625.50	FES 1 - CLCB 2
2	1	45.000	0.04	0.13	0.71	0.03	0.11	5.0	5.7	8.5	0.93	5.75	1.19	12	2.22	621.00	622.00	624.51	624.54	625.50	625.70	CLCB 2 - CLCB 5
3	2	39.000	0.09	0.09	0.90	0.08	0.08	5.0	5.0	9.0	0.73	3.91	0.93	12	1.03	622.20	622.60	624.56	624.57	625.70	625.60	CLCB 5 - CLCB 6
4	1	101.000	0.15	0.38	0.90	0.14	0.31	5.0	5.9	8.4	2.59	6.60	2.11	15	0.89	621.00	621.90	624.51	624.65	625.50	625.60	CLCB 2 - CLCB 3
5	4	34.000	0.00	0.23	0.00	0.00	0.17	0.0	5.4	8.7	1.50	5.36	1.22	15	0.59	621.90	622.10	624.66	624.68	625.60	625.90	CLCB 3 - BEND
6	5	34.000	0.23	0.23	0.75	0.17	0.17	5.0	5.0	9.0	1.56	5.37	1.27	15	0.59	622.10	622.30	624.69	624.71	625.90	624.80	BEND - AD 4
7	End	149.000	0.77	0.79	0.72	0.55	0.57	5.0	26.3	3.7	11.03	11.41	6.24	18	1.01	619.00	620.50	620.90	622.30	625.00	625.00	DRYWELL - AD 7
8	7	47.000	0.01	0.02	0.73	0.01	0.01	5.0	17.5	4.8	0.07	3.98	0.09	12	1.06	620.50	621.00	622.90	622.90	625.00	625.90	AD 7 - AD 8
9	8	64.000	0.01	0.01	0.74	0.01	0.01	5.0	5.0	9.0	0.07	4.82	0.09	12	1.56	621.00	622.00	622.90	622.90	625.90	625.90	AD 8 - AD 9

Project File: System 100-02.stm

Number of lines: 9

Run Date: 5/24/2023

NOTES:Intensity = 41.63 / (Inlet time + 3.60) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	18	4.17	620.00	624.30	1.50	1.77	2.36	0.09	624.39	0.134	93.000	621.00	624.42	1.50	1.77	2.36	0.09	624.51	0.134	0.134	0.125	1.00	0.09
2	12	0.93	621.00	624.51	1.00	0.79	1.19	0.02	624.53	0.059	45.000	622.00	624.54	1.00	0.79	1.19	0.02	624.56	0.059	0.059	0.026	1.00	0.02
3	12	0.73	622.20	624.56	1.00	0.79	0.93	0.01	624.57	0.036	39.000	622.60	624.57	1.00	0.79	0.93	0.01	624.59	0.036	0.036	0.014	1.00	0.01
4	15	2.59	621.00	624.51	1.25	1.23	2.11	0.07	624.58	0.137	101.000	621.90	624.65	1.25	1.23	2.11	0.07	624.72	0.137	0.137	0.138	0.15	0.01
5	15	1.50	621.90	624.66	1.25	1.23	1.22	0.02	624.68	0.046	34.000	622.10	624.68	1.25	1.23	1.22	0.02	624.70	0.046	0.046	0.016	0.74	0.02
6	15	1.56	622.10	624.69	1.25	1.23	1.27	0.03	624.72	0.050	34.000	622.30	624.71	1.25	1.23	1.27	0.03	624.73	0.050	0.050	0.017	1.00	0.03
7	18	11.03	619.00	620.90	1.50	1.77	6.24	0.61	621.51	0.941	149.000	620.50	622.30	1.50	1.77	6.24	0.61	622.91	0.940	0.940	1.401	0.99	0.60
8	12	0.07	620.50	622.90	1.00	0.79	0.09	0.00	622.90	0.000	47.000	621.00	622.90	1.00	0.79	0.09	0.00	622.90	0.000	0.000	0.000	0.99	0.00
9	12	0.07	621.00	622.90	1.00	0.79	0.09	0.00	622.90	0.000	64.000	622.00	622.90	0.90	0.75	0.09	0.00	622.90	0.000	0.000	0.000	1.00	0.00

Project File: System 100-02.stm | Number of lines: 9 | Run Date: 5/24/2023

; c = cir e = ellip b = box

Outlet Protection Calculations

Project:	Proposed Self Storage Units	By:	Date:
Location:	Torrington, CT	Checked:	Date:
Outlet I.D.	**FES 1**		

*Based on Connecticut DOT Drainage Manual, Section 11.13

Description:

FES 1

Design Criteria (25-yr Storm Event):

Q (cfs) =	4.17	R_p (ft)=	1.5
D (in) =	18	S_p (ft) =	1.5
V (fps) =	2.36	Tw (ft)=	4.3

Q= Flow rate at discharge point in cubic feet per second (cfs)
D= Outlet pipe diameter (in)
V= Flow velocity at discharge point (ft/s)
R_p= Maximum inside pipe rise (ft)
S_p= inside diametere for circular sections of maximum inside pipe span for non-circular sections (ft)
T_w= Tailwater depth (ft)

Based on **Table 11-13.1** use Type 'B' ---> TW≥ 0.5 Rp

Rip Rap Stone Size:

Velocity	Rip Rap Specification	D_{50} Stone Size
0-8 fps	Modified	5 inches

Preformed Scour Hole Dimensions:

F(ft)=0.5(R_p)	=	n/a
C(ft)=3.0(S_p)+6.0(F)	=	n/a
B(ft)=2.0(S_p)+6.0(F)	=	n/a

Rip Rap Splash Pad Dimensions:

L_a	=	12	ft
W1 = 3.0(S_p) min.	=	5	ft
W2 = 3.0(Sp)+0.4(La) min.	=	9	ft
d (Depth of Stone)	=	12	inches

LEGEND

DRAINAGE AREA BOUNDARY

CCB 10 DRAINAGE AREA LABEL

AD 7

STONE TRENCH

AD 4

AD 9

AD 8

CLCB 3

CLCB 2

CLCB 5

CLCB 6

MIGEON AVENUE (CT ROUTE 4)

UPLAND REVIEW AREA 100'

FLOODPLAIN

CCB T.F.=625.61 INV.=622.1(SE) INV.=622.1(NW)

SAN. MH T.F.=625.86 INV.=616.2(SE) INV.=616.2(NW)

CCB T.F.=624.46 INV.=622.2(N) INV.=620.5(SE) INV.=620.6(NW)

Encroachment Easement (See Note 5A & Ref. Map 4H)

Benchmark Benchtie in Utility Pole Elev.=626.22

FES INV.=624.1

TF 624.80

625.70

625.13

624.89

625.92

625.98

625.30

625.60

HP 625.80

625.90

625.75

625.66

625.20

625.77

625.95

SLR

99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
SLRCONSULTING.COM

DESCRIPTION	DATE	BY
REVISIONS	05/24/2023	MCB

DRAINAGE AREA MAP - STORM DRAINAGE SYSTEM

SELF STORAGE FACILITY

895 MIGEON AVENUE
TORRINGTON, CONNECTICUT

AES	AES	RJM
DESIGNED	DRAWN	CHECKED

SCALE	1"=20'
DATE	OCTOBER 3, 2022
PROJECT NO.	6708-01
SHEET NO.	1 OF 1
SHEET NAME	CB

APPENDIX E

WATER QUALITY COMPUTATIONS

Drainage Report

Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

October 3, 2022

(Revised May 25, 2023)

	SLR Consulting						Project	**6708-01**
	COMPUTATION SHEET - WATER QUALITY FLOW (WQF)						Made By:	AES
Subject:	**Self Storage Facility**						Date:	9/15/2022
							Chkd by:	
							Date:	
CDS Unit - CLCB 1								
Contributing Basins			Imperv. Area (acres)	Total Area (acres)				
Total			0.60	0.62				
Table 4.1: WQV = (P)(R_v)(A)/12 =				0.048	acre-feet			
Where:								
I = % of Impervious Cover =				97%				
R_v = volumetric runoff coeff. 0.05 + 0.009(I) =				0.921				
P = design precipitation (1.0" for water quality storm) =					1	inch		
A = site area (acres) =				0.62	acres =	0.0010	$miles^2$	
Q = runoff depth (in watershed inches) = [WQV(acrefeet)]*[12(inches/foot)]/drainage area (acres)								
			Q =	0.921				
CN = 1000 / [10+ 5P + 10Q -10(Q^2 + 1.25QP)$^{0.5}$] =					98			
Where:								
Q = runoff depth (in watershed inches)								
			t_c =	0.1	hours			
Type III Rainfall Distribution:								
From Table 4-1, Ia =	0.041			Ia/P =	0.041			
(TR-55)								
From Exhibit 4-III, q_u =	700	csm/in.						
(TR-55)								
WQF = (qu)(A)(Q) =	0.62	cfs		**CDS 2015-4-C Flow = 1.4 cfs -> OK**				

2. Compute the time of concentration (t_c) based on the methods described in Chapter 3 of TR-55. A minimum value of 0.167 hours (10 minutes) should be used. For sheet flow, the flow path should not be longer than 300 feet.

3. Using the computed CN, t_c, and drainage area (A) in acres, compute the peak discharge for the water quality storm (i.e., the water quality flow [WQF]), based on the procedures described in Chapter 4 of TR-55.

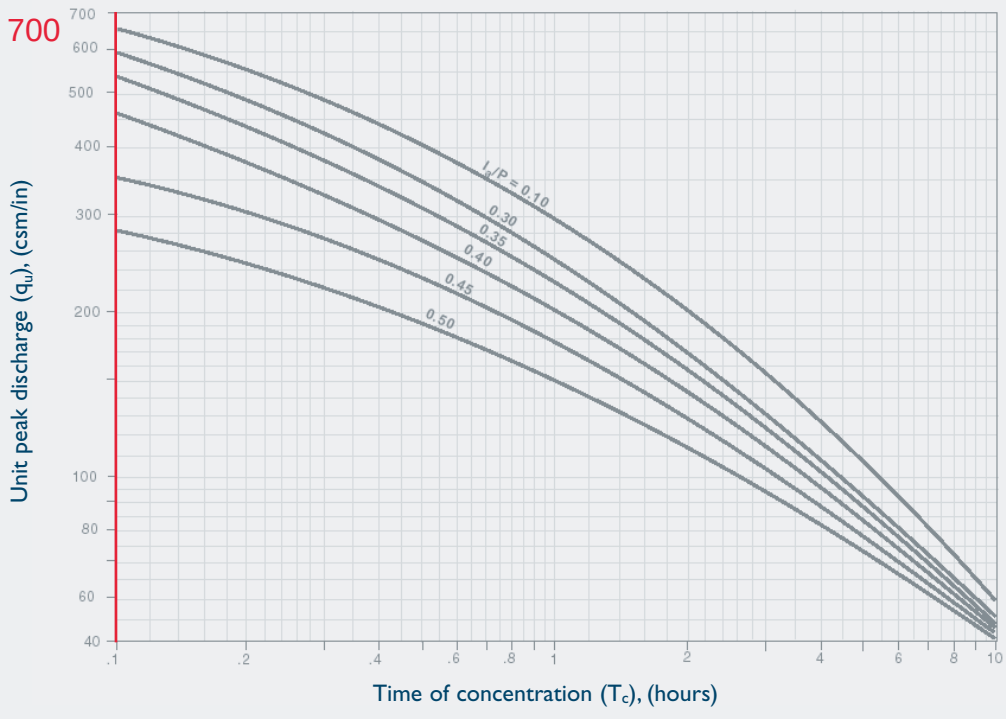
   ❍ *Read initial abstraction (I_a) from Table 4-1 in Chapter 4 of TR-55 (reproduced below); compute I_a/P*

Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)	Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	55	1.636	70	0.857	85	0.353
41	2.878	56	1.571	71	0.817	86	0.326
42	2.762	57	1.509	72	0.778	87	0.299
43	2.651	58	1.448	73	0.740	88	0.273
44	2.545	59	1.390	74	0.703	89	0.247
45	2.444	60	1.333	75	0.667	90	0.222
46	2.348	61	1.279	76	0.632	91	0.198
47	2.255	62	1.226	77	0.597	92	0.174
48	2.167	63	1.175	78	0.564	93	0.151
49	2.082	64	1.125	79	0.532	94	0.128
50	2.000	65	1.077	80	0.500	95	0.105
51	1.922	66	1.030	81	0.469	96	0.083
52	1.846	67	0.985	82	0.439	97	0.062
53	1.774	68	0.941	83	0.410	98	0.041
54	1.704	69	0.899	84	0.381		

   ❍ *Read the unit peak discharge (q_u) from Exhibit 4-III in Chapter 4 of TR-55 (reproduced below) for appropriate t_c*

Exhibit 4-111 Unit peak discharge (q_u) for NRCS (SCS) type III rainfall distribution



Product Flow Rates

CASCADE

Model	Treatment Rate (cfs)	Sediment Capacity[1] (CF)
CS-4	2.00	19
CS-5	3.50	29
CS-6	5.60	42
CS-8	12.00	75
CS-10	18.00	118

CDS

Model	Treatment Rate[2] (cfs)	Sediment Capacity[1] (CF)
1515-3	1.00	14
2015-4	1.40	25
2015-5	1.40	39
2015-6	1.40	57
2020-5	2.20	39
2020-6	2.20	57
2025-5	3.20	39
2025-6	3.20	57
3020-6	3.90	57
3025-6	5.00	57
3030-6	5.70	57
3035-6	6.50	57
4030-8	7.50	151
4040-8	9.50	151

VORTECHS

Model	Treatment Rate (cfs)	Sediment Capacity[3] (CF)
1000	1.60	16
2000	2.80	32
3000	4.50	49
4000	6.00	65
5000	8.50	86
7000	11.00	108
9000	14.00	130
11000	17.5	151
16000	25	192

STORMCEPTOR STC

Model	Treatment Rate (cfs)	Sediment Capacity[1] (CF)
STC 450i	0.40	46
STC 900	0.89	89
STC 2400	1.58	205
STC 4800	2.47	543
STC 7200	3.56	839
STC 11000	4.94	1086
STC 16000	7.12	1677

1 Additional sediment storage capacity available – Check with your local representative for information.

2 Treatment Capacity is based on laboratory testing using OK-110 (average D50 particle size of approximately 100 microns) and a 2400 micron screen.

3 Maintenance recommended when sediment depth has accumulated to within 12-18 inches of the dry weather water surface elevation.

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STRUCTURES SOLUTIONS

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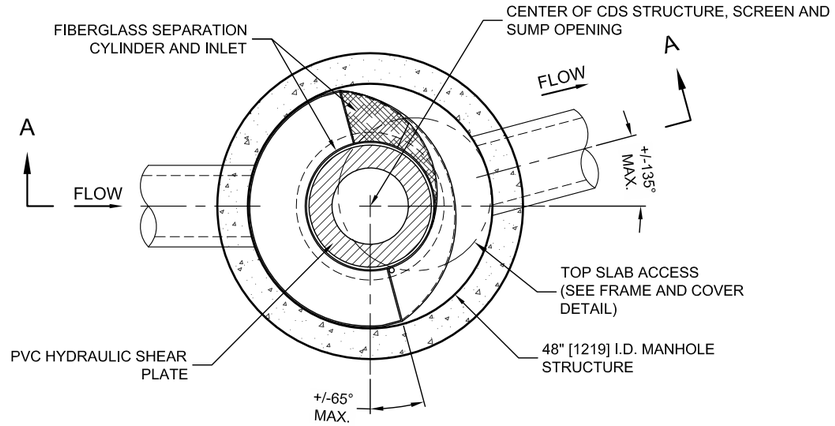
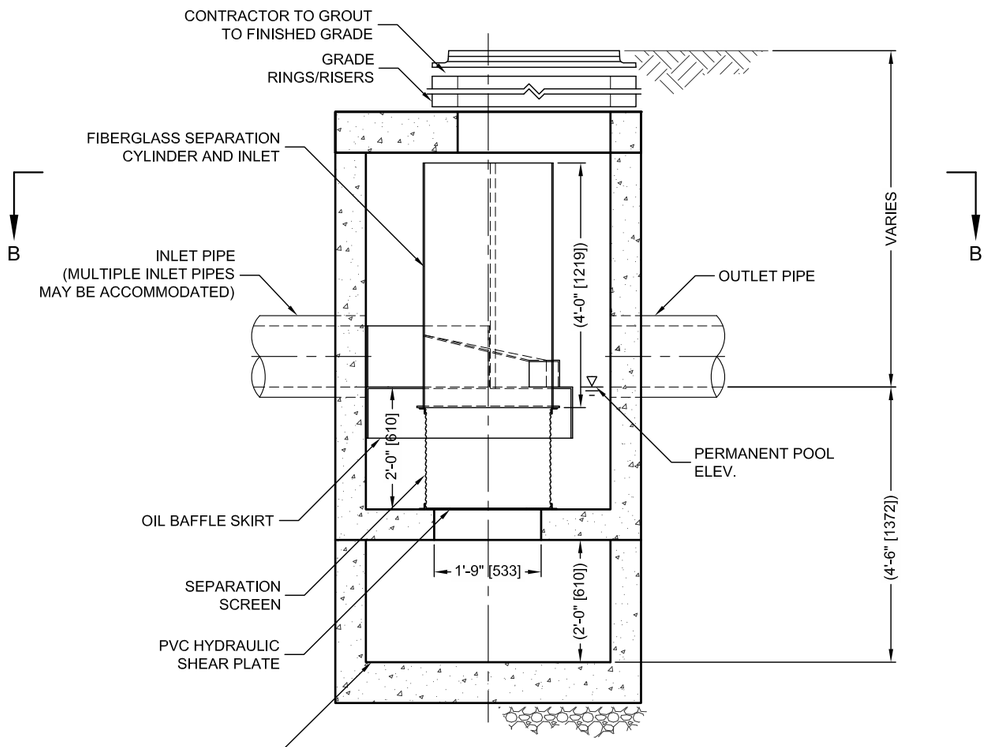
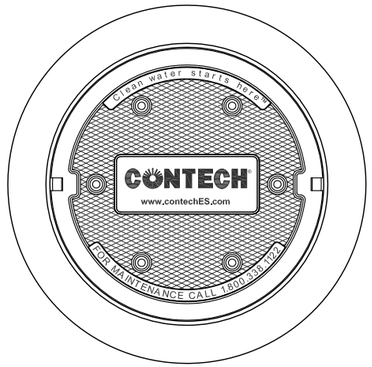


PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

CDS2015-4-C DESIGN NOTES

THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

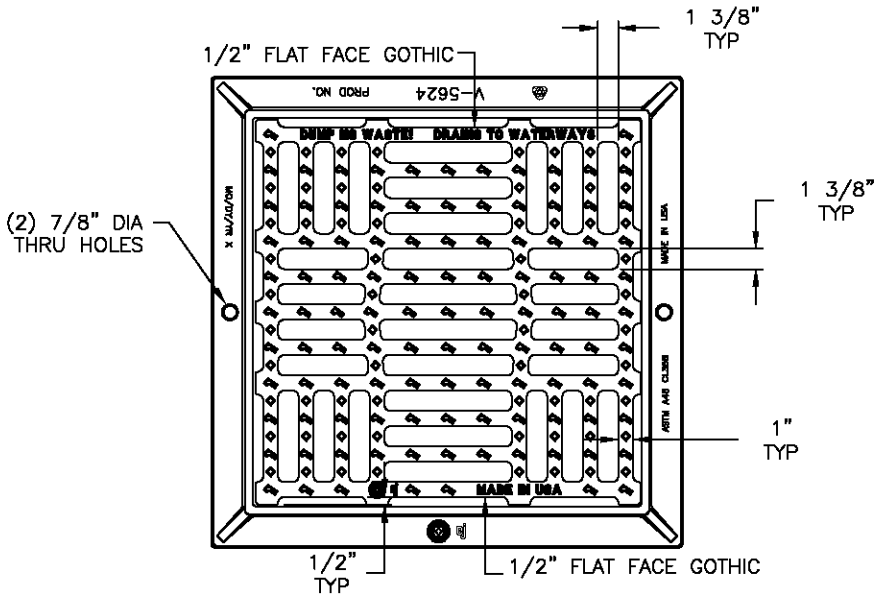
GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

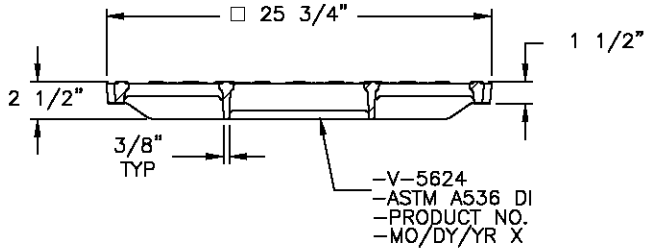
CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

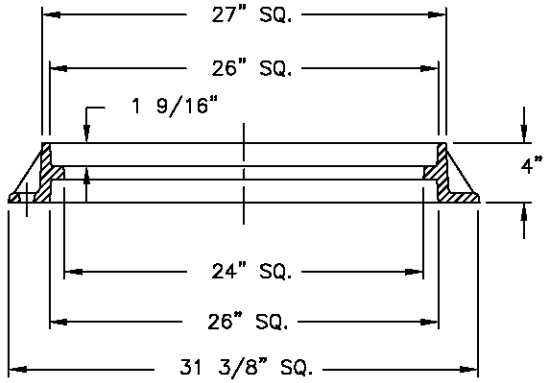
CDS2015-4-C
INLINE CDS
STANDARD DETAIL

V5624 Assembly



PLAN VIEW





SECTION VIEW

Product Number
45624050A01

Design Features
-Materials
Frame
Gray Iron (CL35B)
Grate
Ductile Iron (70-50-05)
88 lbs

-Design Load
Heavy Duty
-Open Area
318 SQ.IN.
-Coating
Undipped
-√ Designates Machined Surface

Certification
-
-ASTM A536
-ASTM A48
-Country of Origin: USA

Major Components
45624010
45624050

Drawing Revision
09/01/2017 Designer: MAH
9/5/2017 Revised By: MAH

Disclaimer
Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact
800 626 4653
ejco.com

CONTECH®
ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance

CDS®

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, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

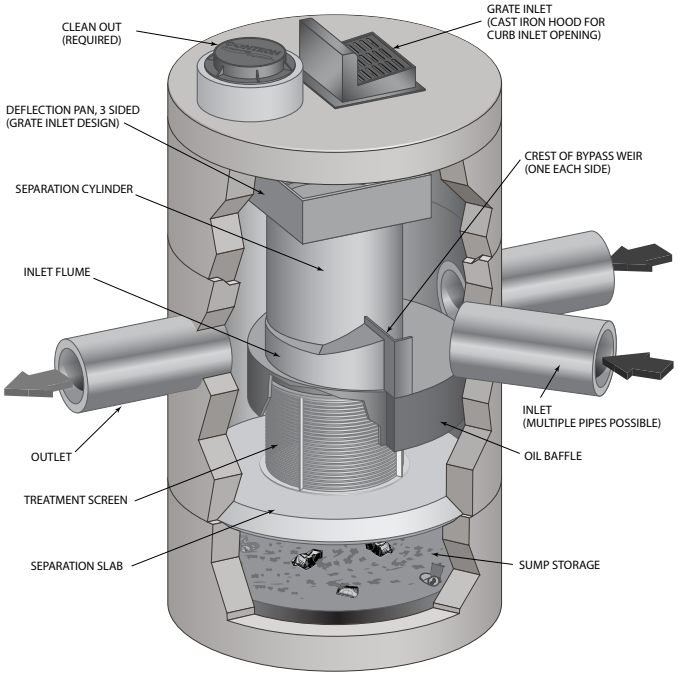
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

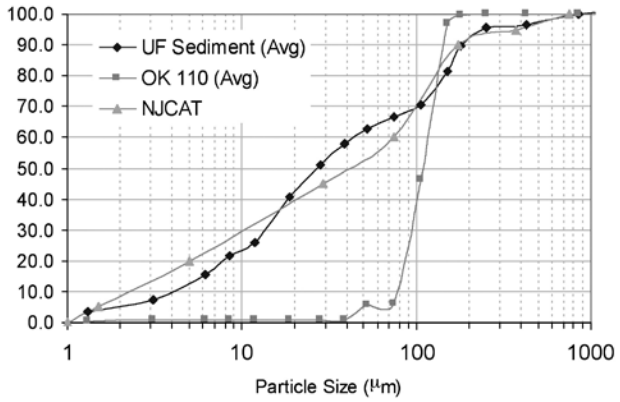


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

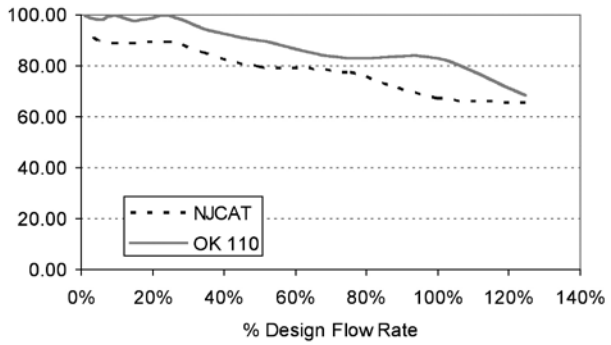


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

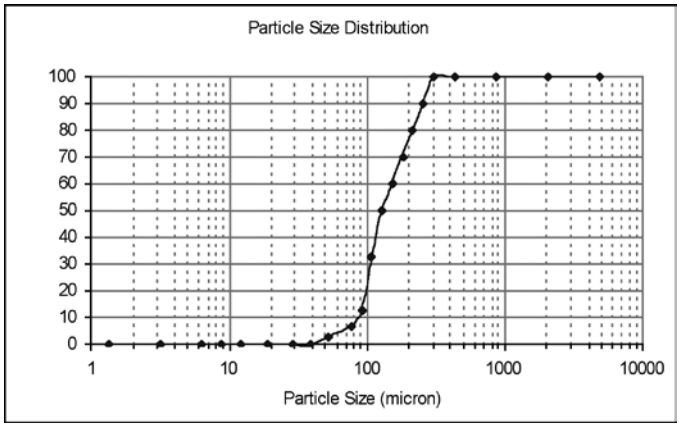


Figure 3. WASDOE PSD

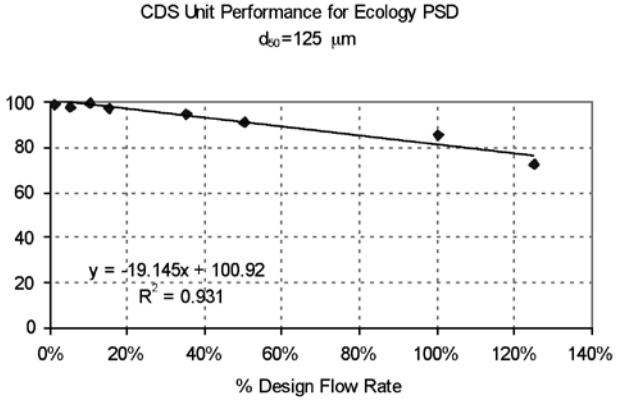


Figure 4. Modeled performance for WASDOE PSD.

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified

during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

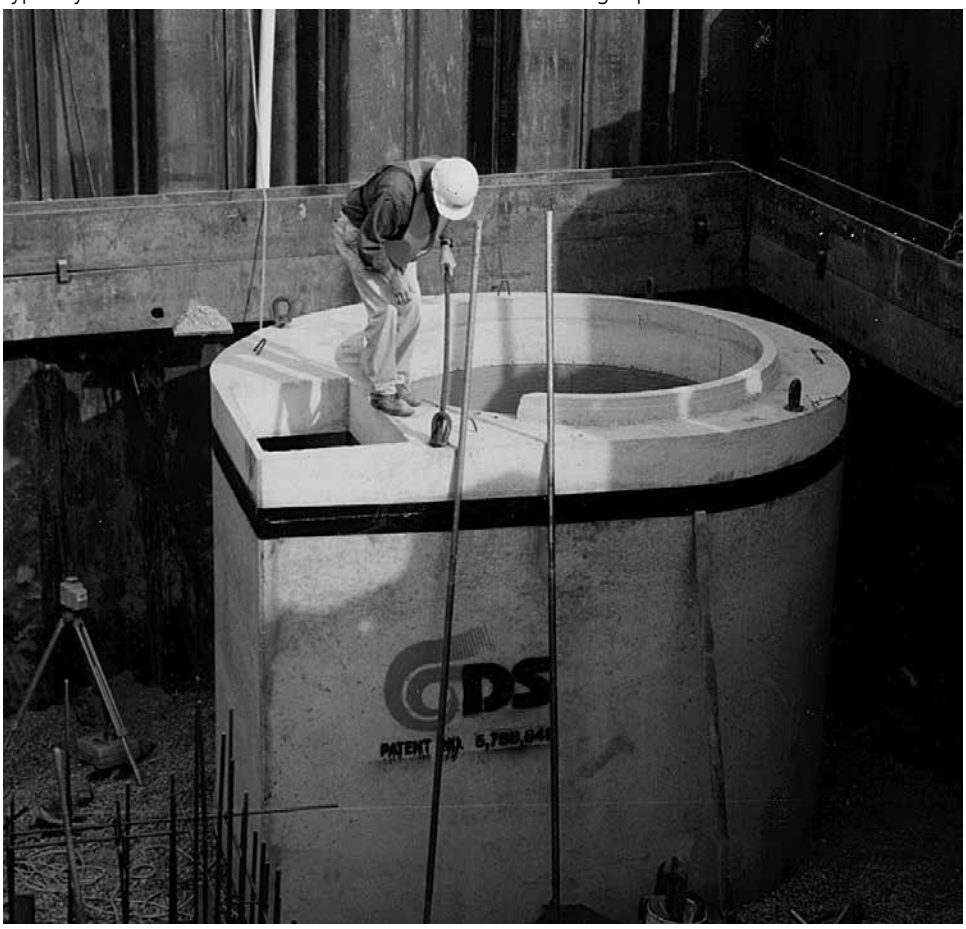
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile**.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

cds_manual 3/17 PDF

APPENDIX F

HYDROLOGIC ANALYSIS – INPUT COMPUTATIONS

Drainage Report

Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

October 3, 2022

(Revised May 25, 2023)

Curve Number Calculations

Project: Self Storage Facility
Location: 895 Migeon Avenue
Torrington, Connecticut
By: MCB Date: Rev. 5/24/23 Checked: Date:
Circle one: ***Present*** Developed Watershed: EXWS-10

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
B Soil	Woods - Good condition	55			0.01	0.31
B Soil	Open Space - Good condition	61			0.04	2.20
	Totals =				0.04	2.51
					(0.00007	sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{2.51}{0.04}$ Use CN = **60**

Curve Number Calculations

Project: Self Storage Facility
Location: 895 Migeon Avenue
Torrington, Connecticut
By: MCB Date: Rev. 5/24/23 Checked: _____ Date: _____
Circle one: ***Present*** Developed Watershed: EXWS-12

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
B Soil	Woods - Good condition	55			0.22	12.03
B Soil	Open Space - Good condition	61			0.60	36.57
B Soil	Gravel	85			0.04	3.32
NA	Paved/ Impervious	98			0.04	4.10
NA	Existing Building	98			0.03	3.02
				Totals =	0.93	59.03
					(0.00145	sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{59.03}{0.93}$ Use CN = **63**

Curve Number Calculations

Project: Self Storage Facility
Location: 895 Migeon Avenue
Torrington, Connecticut
By: MCB Date: Rev. 5/24/23 Checked: _____ Date: _____
Circle one: Present ***Developed*** Watershed: PRWS-10

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
B Soil	Open Space - Good condition	61			0.04	2.41
N/A	Paved/ Impervious	98			0.00	0.22
Totals =					0.04	2.63
					(0.00007	sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{2.63}{0.04}$ Use CN = **63**

Curve Number Calculations

Project: Self Storage Facility
Location: 895 Migeon Avenue
Torrington, Connecticut
By: MCB Date: Rev. 5/24/23 Checked: _____ Date: _____
Circle one: Present ***Developed*** Watershed: PRWS-12

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value [1.] Table 2-2	Figure 2-3	Figure 2-4	Area Acres Sq. Ft. %	Product of CN x Area
B Soil	Woods - Good condition	55			0.016	0.86
B Soil	Open Space - Good condition	61			0.19	11.89
N/A	Paved/ Impervious	98			0.40	38.84
N/A	Existing Building	98			0.03	3.02
N/A	Proposed Building	98			0.29	28.62
				Totals =	0.93	83.24
					(0.00145	sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{83.24}{0.93}$ Use CN = **90**

NOAA Atlas 14, Volume 10, Version 3
Location name: Torrington, Connecticut, USA*
Latitude: 41.8167°, Longitude: -73.142°
Elevation: 627.03 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.356** (0.270-0.466)	**0.424** (0.321-0.556)	**0.535** (0.404-0.703)	**0.627** (0.471-0.829)	**0.754** (0.550-1.04)	**0.851** (0.608-1.19)	**0.949** (0.661-1.38)	**1.05** (0.704-1.57)	**1.20** (0.773-1.85)	**1.31** (0.826-2.06)
10-min	**0.505** (0.383-0.660)	**0.601** (0.455-0.787)	**0.758** (0.572-0.996)	**0.888** (0.667-1.17)	**1.07** (0.779-1.47)	**1.21** (0.862-1.69)	**1.35** (0.936-1.95)	**1.49** (0.998-2.23)	**1.69** (1.10-2.62)	**1.85** (1.17-2.92)
15-min	**0.594** (0.450-0.777)	**0.707** (0.535-0.926)	**0.892** (0.673-1.17)	**1.05** (0.786-1.38)	**1.26** (0.916-1.73)	**1.42** (1.01-1.99)	**1.58** (1.10-2.29)	**1.76** (1.17-2.62)	**1.99** (1.29-3.08)	**2.18** (1.38-3.44)
30-min	**0.812** (0.615-1.06)	**0.966** (0.731-1.26)	**1.22** (0.920-1.60)	**1.43** (1.07-1.89)	**1.72** (1.25-2.36)	**1.94** (1.39-2.72)	**2.16** (1.51-3.14)	**2.40** (1.60-3.59)	**2.72** (1.76-4.21)	**2.97** (1.88-4.70)
60-min	**1.03** (0.780-1.35)	**1.23** (0.927-1.60)	**1.55** (1.17-2.03)	**1.81** (1.36-2.39)	**2.18** (1.59-3.00)	**2.46** (1.76-3.45)	**2.74** (1.91-3.98)	**3.04** (2.04-4.55)	**3.45** (2.23-5.34)	**3.77** (2.39-5.96)
2-hr	**1.36** (1.04-1.77)	**1.59** (1.21-2.07)	**1.97** (1.49-2.57)	**2.28** (1.73-3.00)	**2.72** (2.00-3.72)	**3.04** (2.19-4.26)	**3.38** (2.38-4.92)	**3.76** (2.52-5.60)	**4.31** (2.79-6.64)	**4.75** (3.01-7.48)
3-hr	**1.58** (1.21-2.04)	**1.84** (1.41-2.39)	**2.28** (1.74-2.97)	**2.64** (2.00-3.46)	**3.14** (2.32-4.30)	**3.51** (2.55-4.92)	**3.91** (2.77-5.70)	**4.37** (2.94-6.49)	**5.05** (3.28-7.78)	**5.62** (3.57-8.83)
6-hr	**1.98** (1.52-2.54)	**2.35** (1.80-3.02)	**2.96** (2.27-3.82)	**3.46** (2.64-4.50)	**4.16** (3.09-5.69)	**4.67** (3.42-6.55)	**5.23** (3.75-7.66)	**5.92** (3.99-8.78)	**6.99** (4.55-10.7)	**7.90** (5.04-12.4)
12-hr	**2.39** (1.85-3.05)	**2.93** (2.27-3.75)	**3.82** (2.95-4.91)	**4.56** (3.50-5.89)	**5.58** (4.18-7.62)	**6.33** (4.67-8.87)	**7.15** (5.18-10.5)	**8.20** (5.54-12.1)	**9.87** (6.44-15.1)	**11.3** (7.26-17.7)
24-hr	**2.77** (2.15-3.51)	**3.50** (2.72-4.45)	**4.70** (3.64-5.99)	**5.69** (4.39-7.30)	**7.06** (5.33-9.63)	**8.06** (5.99-11.3)	**9.17** (6.72-13.5)	**10.6** (7.21-15.7)	**13.0** (8.53-19.9)	**15.2** (9.73-23.6)
2-day	**3.12** (2.44-3.94)	**4.01** (3.14-5.06)	**5.47** (4.26-6.93)	**6.68** (5.17-8.51)	**8.34** (6.33-11.3)	**9.54** (7.15-13.4)	**10.9** (8.07-16.1)	**12.7** (8.67-18.7)	**15.8** (10.4-24.1)	**18.6** (12.0-28.9)
3-day	**3.41** (2.68-4.28)	**4.39** (3.44-5.51)	**5.98** (4.68-7.55)	**7.31** (5.68-9.28)	**9.13** (6.97-12.4)	**10.4** (7.87-14.6)	**11.9** (8.88-17.7)	**14.0** (9.54-20.5)	**17.5** (11.5-26.6)	**20.6** (13.3-31.9)
4-day	**3.67** (2.89-4.59)	**4.71** (3.70-5.90)	**6.42** (5.03-8.07)	**7.83** (6.10-9.91)	**9.78** (7.47-13.2)	**11.2** (8.44-15.6)	**12.8** (9.52-18.9)	**15.0** (10.2-21.9)	**18.7** (12.3-28.4)	**22.0** (14.2-34.1)
7-day	**4.39** (3.47-5.46)	**5.56** (4.39-6.93)	**7.48** (5.89-9.37)	**9.08** (7.11-11.4)	**11.3** (8.65-15.2)	**12.9** (9.73-17.8)	**14.7** (10.9-21.5)	**17.1** (11.7-24.9)	**21.2** (14.0-32.0)	**24.8** (16.1-38.3)
10-day	**5.12** (4.06-6.35)	**6.36** (5.04-7.90)	**8.39** (6.62-10.5)	**10.1** (7.91-12.6)	**12.4** (9.51-16.6)	**14.1** (10.6-19.4)	**16.0** (11.9-23.2)	**18.5** (12.7-26.9)	**22.7** (15.0-34.2)	**26.4** (17.1-40.7)
20-day	**7.44** (5.94-9.17)	**8.73** (6.96-10.8)	**10.8** (8.60-13.4)	**12.6** (9.94-15.7)	**15.0** (11.5-19.8)	**16.7** (12.7-22.7)	**18.7** (13.8-26.7)	**21.2** (14.6-30.6)	**25.2** (16.7-37.8)	**28.7** (18.6-44.0)
30-day	**9.38** (7.51-11.5)	**10.7** (8.54-13.1)	**12.8** (10.2-15.8)	**14.6** (11.5-18.1)	**17.0** (13.1-22.2)	**18.8** (14.2-25.3)	**20.7** (15.3-29.2)	**23.1** (16.0-33.2)	**26.7** (17.8-40.1)	**29.8** (19.4-45.8)
45-day	**11.7** (9.43-14.3)	**13.1** (10.5-16.0)	**15.3** (12.2-18.7)	**17.1** (13.6-21.1)	**19.6** (15.1-25.3)	**21.4** (16.2-28.5)	**23.4** (17.1-32.4)	**25.6** (17.8-36.7)	**28.7** (19.2-42.9)	**31.2** (20.4-47.8)
60-day	**13.7** (11.0-16.7)	**15.1** (12.1-18.4)	**17.3** (13.9-21.2)	**19.2** (15.3-23.7)	**21.8** (16.8-28.1)	**23.8** (17.9-31.4)	**25.8** (18.8-35.3)	**27.8** (19.4-39.7)	**30.5** (20.4-45.4)	**32.5** (21.2-49.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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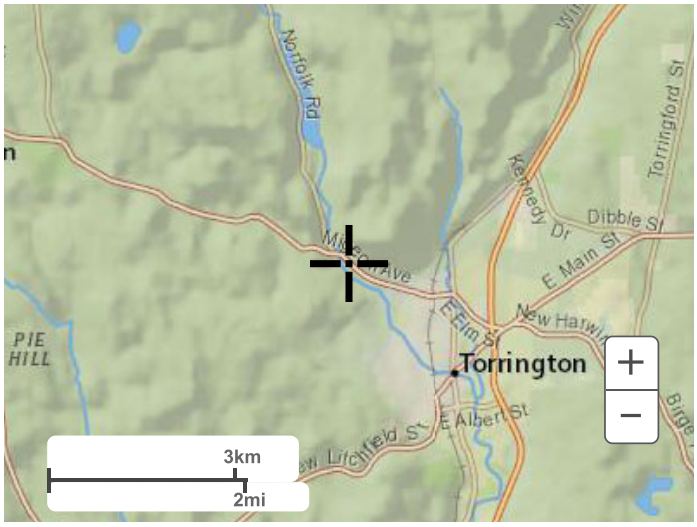
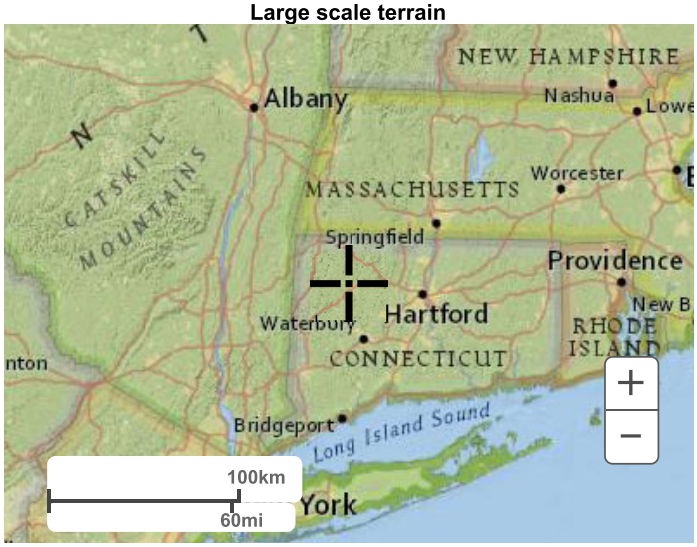
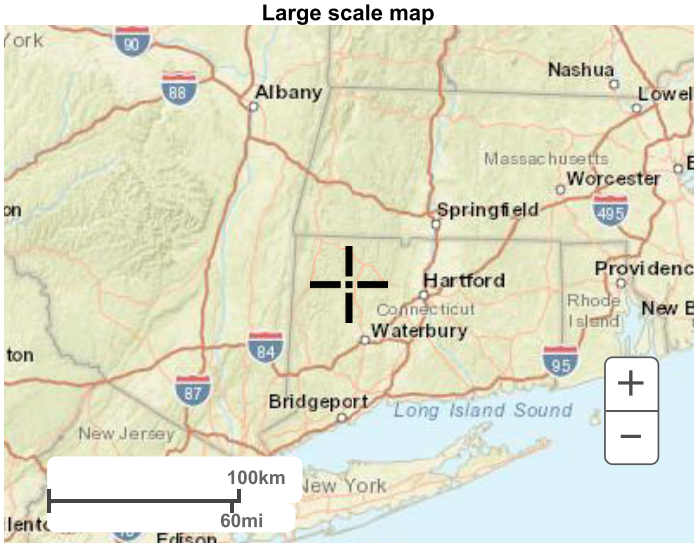
PF graphical



Large scale terrain



Large scale map



Large scale aerial

APPENDIX G

HYDROLOGIC ANALYSIS – COMPUTER MODEL RESULTS

Drainage Report

Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

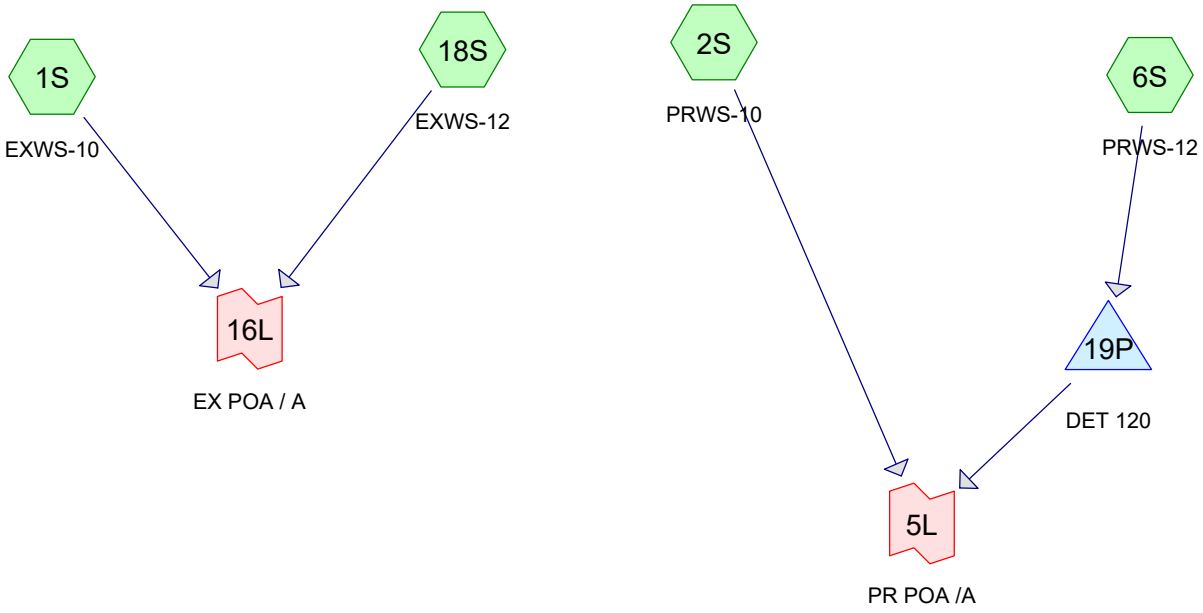
October 3, 2022

(Revised May 25, 2023)

Hydrographs Peak Flowrate Summary (cfs)
Existing vs. Proposed

Storm Event	2yr		10yr		25yr		50yr		100yr	
	Exist	Prop	Exist	Prop	Exist	Prop	Exist	Prop	Exist	Prop
Point of Analysis A	0.8	0.0	2.7	0.1	4.2	0.2	5.3	0.3	6.5	5.3
DET 120 W.S. Elev. (ft.) Overflow Elevation = 625.2	-	621.7	-	623.5	-	624.3	-	624.8	-	625.5

Study Area	**Description**
A	Eastern Property Boundary



Subcat Reach Pond Link

Routing Diagram for SS-Model03
Prepared by SLR International Corporation, Printed 5/24/2023

Summary for Subcatchment 1S: EXWS-10

Runoff = 0.03 cfs @ 11.98 hrs, Volume= 0.002 af, Depth> 0.46"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.040	60	
0.040		100.00% Pervious Area

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

Summary for Subcatchment 2S: PRWS-10

Runoff = 0.04 cfs @ 11.98 hrs, Volume= 0.002 af, Depth> 0.58"
Routed to Link 5L : PR POA /A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.040	63	
0.040		100.00% Pervious Area

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

Summary for Subcatchment 6S: PRWS-12

Runoff = 3.94 cfs @ 11.95 hrs, Volume= 0.177 af, Depth> 2.29"
Routed to Pond 19P : DET 120

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.50"

Area (ac)	CN	Description
* 0.930	90	
0.930		100.00% Pervious Area

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

Summary for Subcatchment 18S: EXWS-12

Runoff = 0.77 cfs @ 12.04 hrs, Volume= 0.043 af, Depth> 0.58"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.50"

	Area (ac)	CN	Description
*	0.900	63	EX WS 12 Composite CN
	0.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, EX WS 12 Tc**

Summary for Pond 19P: DET 120

Inflow Area = 0.930 ac, 0.00% Impervious, Inflow Depth > 2.29" for 2-yr event
Inflow = 3.94 cfs @ 11.95 hrs, Volume= 0.177 af
Outflow = 0.37 cfs @ 12.40 hrs, Volume= 0.171 af, Atten= 91%, Lag= 26.8 min
Discarded = 0.37 cfs @ 12.40 hrs, Volume= 0.171 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 5L : PR POA /A

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 621.73' @ 12.40 hrs Surf.Area= 1,669 sf Storage= 3,710 cf

Plug-Flow detention time= 119.2 min calculated for 0.170 af (96% of inflow)
Center-of-Mass det. time= 104.0 min (867.3 - 763.3)

Volume	Invert	Avail.Storage	Storage Description
#1	617.00'	12,027 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
617.00	153	0	0
618.00	340	247	247
619.00	600	470	717
620.00	931	766	1,482
621.00	1,333	1,132	2,614
622.00	1,794	1,564	4,178
623.00	2,311	2,053	6,230
624.00	2,884	2,598	8,828
625.00	3,514	3,199	12,027

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**9.670 in/hr Exfiltration over Surface area**
#2	Primary	625.20'	**16.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64
2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.37 cfs @ 12.40 hrs HW=621.73' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=617.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 5L: PR POA /A

Inflow Area = 0.970 ac, 0.00% Impervious, Inflow Depth > 0.02" for 2-yr event
Inflow = 0.04 cfs @ 11.98 hrs, Volume= 0.002 af
Primary = 0.04 cfs @ 11.98 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 17L

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 16L: EX POA / A

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth > 0.57" for 2-yr event
Inflow = 0.79 cfs @ 12.04 hrs, Volume= 0.045 af
Primary = 0.79 cfs @ 12.04 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: EXWS-10

Runoff = 0.12 cfs @ 11.97 hrs, Volume= 0.005 af, Depth> 1.55"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.69"

	Area (ac)	CN	Description
*	0.040	60	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 2S: PRWS-10

Runoff = 0.14 cfs @ 11.96 hrs, Volume= 0.006 af, Depth> 1.78"
Routed to Link 5L : PR POA /A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.69"

	Area (ac)	CN	Description
*	0.040	63	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 6S: PRWS-12

Runoff = 7.03 cfs @ 11.95 hrs, Volume= 0.330 af, Depth> 4.26"
Routed to Pond 19P : DET 120

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.69"

	Area (ac)	CN	Description
*	0.930	90	
	0.930		100.00% Pervious Area

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

Summary for Subcatchment 18S: EXWS-12

Runoff = 2.63 cfs @ 12.02 hrs, Volume= 0.133 af, Depth> 1.77"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.69"

	Area (ac)	CN	Description
*	0.900	63	EX WS 12 Composite CN
	0.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, EX WS 12 Tc**

Summary for Pond 19P: DET 120

Inflow Area = 0.930 ac, 0.00% Impervious, Inflow Depth > 4.26" for 10-yr event
Inflow = 7.03 cfs @ 11.95 hrs, Volume= 0.330 af
Outflow = 0.58 cfs @ 12.46 hrs, Volume= 0.302 af, Atten= 92%, Lag= 30.6 min
Discarded = 0.58 cfs @ 12.46 hrs, Volume= 0.302 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 5L : PR POA /A

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 623.45' @ 12.46 hrs Surf.Area= 2,571 sf Storage= 7,338 cf

Plug-Flow detention time= 151.4 min calculated for 0.302 af (91% of inflow)
Center-of-Mass det. time= 120.4 min (870.3 - 749.9)

Volume	Invert	Avail.Storage	Storage Description
#1	617.00'	12,027 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
617.00	153	0	0
618.00	340	247	247
619.00	600	470	717
620.00	931	766	1,482
621.00	1,333	1,132	2,614
622.00	1,794	1,564	4,178
623.00	2,311	2,053	6,230
624.00	2,884	2,598	8,828
625.00	3,514	3,199	12,027

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**9.670 in/hr Exfiltration over Surface area**
#2	Primary	625.20'	**16.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64
2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.58 cfs @ 12.46 hrs HW=623.45' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=617.01' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link 5L: PR POA /A

Inflow Area = 0.970 ac, 0.00% Impervious, Inflow Depth > 0.07" for 10-yr event
Inflow = 0.14 cfs @ 11.96 hrs, Volume= 0.006 af
Primary = 0.14 cfs @ 11.96 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 17L

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 16L: EX POA / A

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth > 1.76" for 10-yr event
Inflow = 2.72 cfs @ 12.02 hrs, Volume= 0.138 af
Primary = 2.72 cfs @ 12.02 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: EXWS-10

Runoff = 0.19 cfs @ 11.96 hrs, Volume= 0.008 af, Depth> 2.40"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.06"

	Area (ac)	CN	Description
*	0.040	60	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 2S: PRWS-10

Runoff = 0.21 cfs @ 11.96 hrs, Volume= 0.009 af, Depth> 2.69"
Routed to Link 5L : PR POA /A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.06"

	Area (ac)	CN	Description
*	0.040	63	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 6S: PRWS-12

Runoff = 8.95 cfs @ 11.95 hrs, Volume= 0.427 af, Depth> 5.51"
Routed to Pond 19P : DET 120

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.06"

	Area (ac)	CN	Description
*	0.930	90	
	0.930		100.00% Pervious Area

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

Summary for Subcatchment 18S: EXWS-12

Runoff = 4.00 cfs @ 12.02 hrs, Volume= 0.201 af, Depth> 2.69"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.06"

	Area (ac)	CN	Description
*	0.900	63	EX WS 12 Composite CN
	0.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, EX WS 12 Tc**

Summary for Pond 19P: DET 120

Inflow Area = 0.930 ac, 0.00% Impervious, Inflow Depth > 5.51" for 25-yr event
Inflow = 8.95 cfs @ 11.95 hrs, Volume= 0.427 af
Outflow = 0.69 cfs @ 12.49 hrs, Volume= 0.380 af, Atten= 92%, Lag= 32.2 min
Discarded = 0.69 cfs @ 12.49 hrs, Volume= 0.380 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 5L : PR POA /A

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 624.29' @ 12.49 hrs Surf.Area= 3,070 sf Storage= 9,704 cf

Plug-Flow detention time= 164.0 min calculated for 0.379 af (89% of inflow)
Center-of-Mass det. time= 126.8 min (872.0 - 745.2)

Volume	Invert	Avail.Storage	Storage Description
#1	617.00'	12,027 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
617.00	153	0	0
618.00	340	247	247
619.00	600	470	717
620.00	931	766	1,482
621.00	1,333	1,132	2,614
622.00	1,794	1,564	4,178
623.00	2,311	2,053	6,230
624.00	2,884	2,598	8,828
625.00	3,514	3,199	12,027

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**9.670 in/hr Exfiltration over Surface area**
#2	Primary	625.20'	**16.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64
2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.69 cfs @ 12.49 hrs HW=624.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=617.01' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link 5L: PR POA /A

Inflow Area = 0.970 ac, 0.00% Impervious, Inflow Depth > 0.11" for 25-yr event
Inflow = 0.21 cfs @ 11.96 hrs, Volume= 0.009 af
Primary = 0.21 cfs @ 11.96 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 17L

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 16L: EX POA / A

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth > 2.67" for 25-yr event
Inflow = 4.15 cfs @ 12.02 hrs, Volume= 0.209 af
Primary = 4.15 cfs @ 12.02 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: EXWS-10

Runoff = 0.24 cfs @ 11.96 hrs, Volume= 0.010 af, Depth> 3.09"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=8.06"

	Area (ac)	CN	Description
*	0.040	60	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 2S: PRWS-10

Runoff = 0.27 cfs @ 11.96 hrs, Volume= 0.011 af, Depth> 3.41"
Routed to Link 5L : PR POA /A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=8.06"

	Area (ac)	CN	Description
*	0.040	63	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 6S: PRWS-12

Runoff = 10.34 cfs @ 11.95 hrs, Volume= 0.498 af, Depth> 6.42"
Routed to Pond 19P : DET 120

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=8.06"

	Area (ac)	CN	Description
*	0.930	90	
	0.930		100.00% Pervious Area

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

Summary for Subcatchment 18S: EXWS-12

Runoff = 5.06 cfs @ 12.02 hrs, Volume= 0.255 af, Depth> 3.40"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=8.06"

	Area (ac)	CN	Description
*	0.900	63	EX WS 12 Composite CN
	0.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, EX WS 12 Tc**

Summary for Pond 19P: DET 120

Inflow Area = 0.930 ac, 0.00% Impervious, Inflow Depth > 6.42" for 50-yr event
Inflow = 10.34 cfs @ 11.95 hrs, Volume= 0.498 af
Outflow = 0.76 cfs @ 12.50 hrs, Volume= 0.435 af, Atten= 93%, Lag= 33.2 min
Discarded = 0.76 cfs @ 12.50 hrs, Volume= 0.435 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 5L : PR POA /A

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 624.84' @ 12.50 hrs Surf.Area= 3,411 sf Storage= 11,459 cf

Plug-Flow detention time= 171.3 min calculated for 0.433 af (87% of inflow)
Center-of-Mass det. time= 130.3 min (873.0 - 742.7)

Volume	Invert	Avail.Storage	Storage Description
#1	617.00'	12,027 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
617.00	153	0	0
618.00	340	247	247
619.00	600	470	717
620.00	931	766	1,482
621.00	1,333	1,132	2,614
622.00	1,794	1,564	4,178
623.00	2,311	2,053	6,230
624.00	2,884	2,598	8,828
625.00	3,514	3,199	12,027

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**9.670 in/hr Exfiltration over Surface area**
#2	Primary	625.20'	**16.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64
2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.76 cfs @ 12.50 hrs HW=624.84' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.76 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=617.02' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 5L: PR POA /A

Inflow Area = 0.970 ac, 0.00% Impervious, Inflow Depth > 0.14" for 50-yr event
Inflow = 0.27 cfs @ 11.96 hrs, Volume= 0.011 af
Primary = 0.27 cfs @ 11.96 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 17L

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 16L: EX POA / A

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth > 3.39" for 50-yr event
Inflow = 5.26 cfs @ 12.01 hrs, Volume= 0.266 af
Primary = 5.26 cfs @ 12.01 hrs, Volume= 0.266 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: EXWS-10

Runoff = 0.31 cfs @ 11.96 hrs, Volume= 0.013 af, Depth> 3.89"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=9.17"

	Area (ac)	CN	Description
*	0.040	60	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 2S: PRWS-10

Runoff = 0.33 cfs @ 11.96 hrs, Volume= 0.014 af, Depth> 4.25"
Routed to Link 5L : PR POA /A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=9.17"

	Area (ac)	CN	Description
*	0.040	63	
	0.040		100.00% Pervious Area

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

Summary for Subcatchment 6S: PRWS-12

Runoff = 11.87 cfs @ 11.95 hrs, Volume= 0.577 af, Depth> 7.44"
Routed to Pond 19P : DET 120

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=9.17"

	Area (ac)	CN	Description
*	0.930	90	
	0.930		100.00% Pervious Area

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

Summary for Subcatchment 18S: EXWS-12

Runoff = 6.29 cfs @ 12.02 hrs, Volume= 0.318 af, Depth> 4.24"
Routed to Link 16L : EX POA / A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=9.17"

	Area (ac)	CN	Description
*	0.900	63	EX WS 12 Composite CN
	0.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry, EX WS 12 Tc**

Summary for Pond 19P: DET 120

Inflow Area = 0.930 ac, 0.00% Impervious, Inflow Depth > 7.44" for 100-yr event
Inflow = 11.87 cfs @ 11.95 hrs, Volume= 0.577 af
Outflow = 5.92 cfs @ 12.10 hrs, Volume= 0.502 af, Atten= 50%, Lag= 8.8 min
Discarded = 0.79 cfs @ 12.08 hrs, Volume= 0.468 af
Primary = 5.14 cfs @ 12.10 hrs, Volume= 0.034 af
Routed to Link 5L : PR POA /A

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 625.48' @ 12.09 hrs Surf.Area= 3,514 sf Storage= 12,027 cf

Plug-Flow detention time= 162.8 min calculated for 0.502 af (87% of inflow)
Center-of-Mass det. time= 120.7 min (861.2 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	617.00'	12,027 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
617.00	153	0	0
618.00	340	247	247
619.00	600	470	717
620.00	931	766	1,482
621.00	1,333	1,132	2,614
622.00	1,794	1,564	4,178
623.00	2,311	2,053	6,230
624.00	2,884	2,598	8,828
625.00	3,514	3,199	12,027

Device	Routing	Invert	Outlet Devices
#1	Discarded	617.00'	**9.670 in/hr Exfiltration over Surface area**
#2	Primary	625.20'	**16.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64
2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.79 cfs @ 12.08 hrs HW=625.37' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.79 cfs)

Primary OutFlow Max=4.78 cfs @ 12.10 hrs HW=625.45' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 4.78 cfs @ 1.22 fps)

Summary for Link 5L: PR POA /A

Inflow Area = 0.970 ac, 0.00% Impervious, Inflow Depth > 0.60" for 100-yr event
Inflow = 5.22 cfs @ 12.10 hrs, Volume= 0.048 af
Primary = 5.22 cfs @ 12.10 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 17L

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 16L: EX POA / A

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth > 4.22" for 100-yr event
Inflow = 6.53 cfs @ 12.01 hrs, Volume= 0.331 af
Primary = 6.53 cfs @ 12.01 hrs, Volume= 0.331 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

APPENDIX H

WATERSHED MAPS

Drainage Report

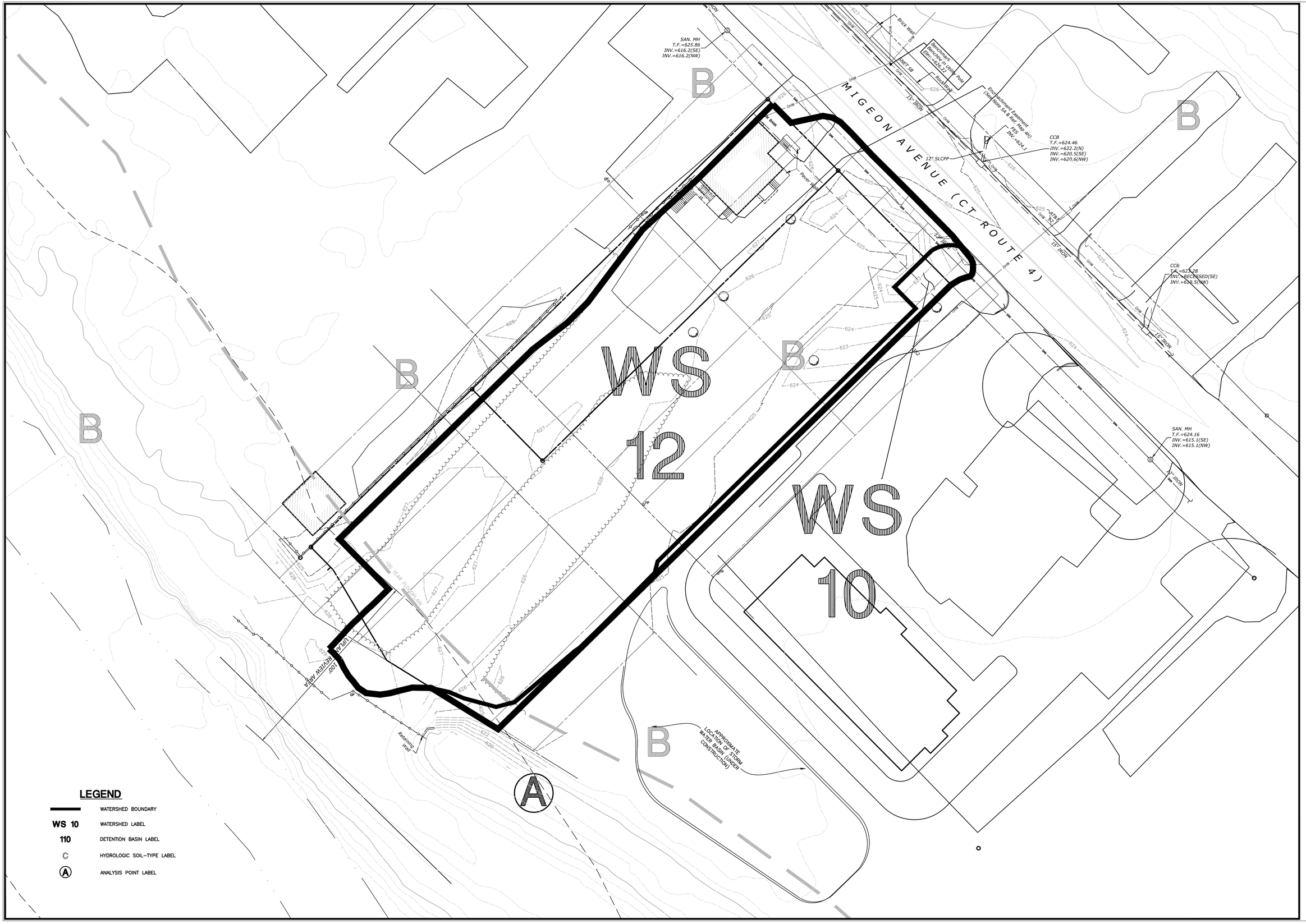
Proposed Self Storage Units

895 Migeon Avenue

Torrington, Connecticut 06032

October 3, 2022

(Revised May 25, 2023)



LEGEND

———	WATERSHED BOUNDARY
WS 10	WATERSHED LABEL
110	DETENTION BASIN LABEL
C	HYDROLOGIC SOIL–TYPE LABEL
Ⓐ	ANALYSIS POINT LABEL

N
W E
S

0 10' 20'
0 1/2" 1"

SLR

99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
SLRCONSULTING.COM

DESCRIPTION	DATE	BY
REVISIONS	05/24/2023	MCB

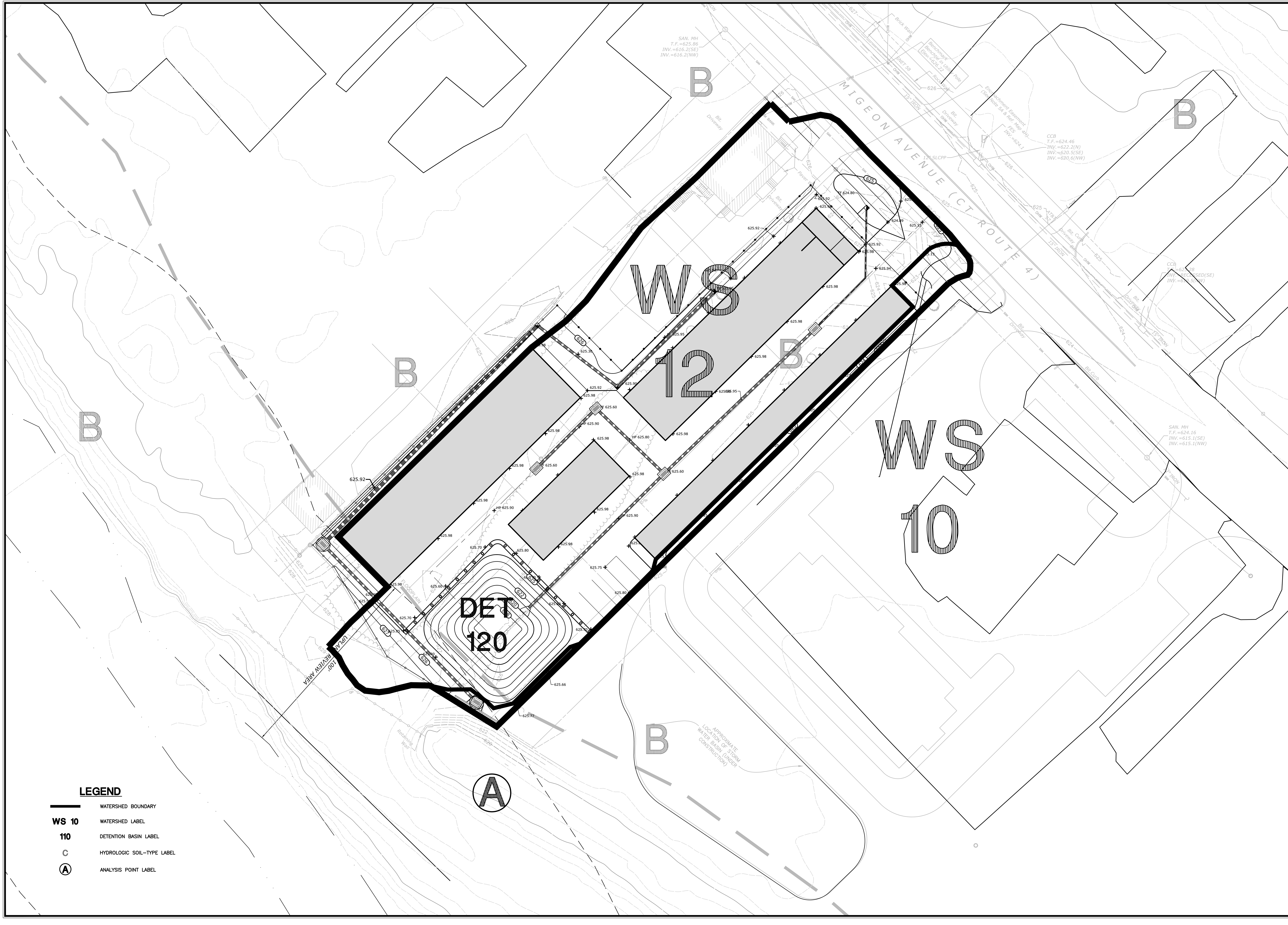
WATERSHED MAP - EXISTING CONDITIONS

SELF STORAGE FACILITY

895 MIGEON AVENUE
TORRINGTON, CONNECTICUT

AES	AES	RJM
DESIGNED	DRAWN	CHECKED

SCALE	1"=30'
DATE	OCTOBER 3, 2022
PROJECT NO.	6708-01
SHEET NO.	1 OF 2
SHEET NAME	EXWS



DESCRIPTION	DATE	BY
REVISIONS	05/24/2023	MCB

SLR
99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
SLRCONSULTING.COM

WATERSHED MAP - PROPOSED CONDITIONS

SELF STORAGE FACILITY

895 MIGEON AVENUE
TORRINGTON, CONNECTICUT

DESIGNED	DRAWN	CHECKED
AES	AES	RJM

SCALE: 1"=30'
DATE: OCTOBER 3, 2022
PROJECT NO.: 6708-01
SHEET NO.: 2 OF 2
SHEET NAME: PRWS