PROPERTY OF OSJ BERLIN LLC
FOR ENTERPRISE HOLDINGS
127 WEBSTER SQUARE ROAD
BERLIN, CONNECTICUT

DRAINAGE CALCULATIONS

JULY 2022

Prepared By:
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I. Drainage Statement

Project Location

The proposed project is located in the Webster Square Plaza on the west side of Webster Square Road, in the town of Berlin, CT.

Scope of Project

The existing site is a 15 acre retail plaza. The project site is approximately 0.4 acre consisting of an office space in the existing building and renovations to an exterior portion of the building once occupied by a part of the existing building damaged by a fire and since razed. The renovations consist of removing a portion of the existing weathered and deteriorating concrete floor slab and portions of the old foundation wall, regrading the area and paving with new bituminous concrete to create a parking area for the rental vehicles. A small storm drainage system is being added to the site to capture and treat the storm water prior to it entering the existing storm drainage system. Treatment will be by a PIG ® oil and sediment catch basin insert that fits into the new catch basin frame.

Drainage Analysis and Design Methodology

The proposed storm sewer was sized utilizing the Rational Method and NOAA Atlas 14 data for the 10-year storm event and checked against the 25-year storm event and found to be adequate for the 25-year storm. The storm sewer pipe system design calculations and inlet data are included in this report. The analysis utilized the Hydraflow Storm Sewers 2005 and Hydraflow Hydrographs 2004 from InteliSolve. The software performs analysis consistent with ConnDOT requirements.

II. REDEVELOPMENT HYDROGRAPH

Computer Software Utilized:

Hydraflow Hydrographs Program 2004

By: InteliSolve

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	2.288	-------	2.956	3.518	4.298	4.889	5.462	Enterprise

Proj. file: Enterprise site.gpw

Wednesday, Jun 15 2022, 11:54 AM

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	3.518	1	5	1,055	----	------	------	Enterprise

Enterprise site.gpw	Return Period: 10 Year	Wednesday, Jun 15 2022, 11:54 AM

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	4.298	1	5	1,290	----	------	------	Enterprise

Enterprise site.gpw	Return Period: 25 Year	Wednesday, Jun 15 2022, 11:54 AM

III. <u>Storm Sewer System Calculations</u>

Computer Software Utilized:

Hydra Flow Storm Sewers Program 2005

By: InteliSolve

<u>Design Criteria:</u>

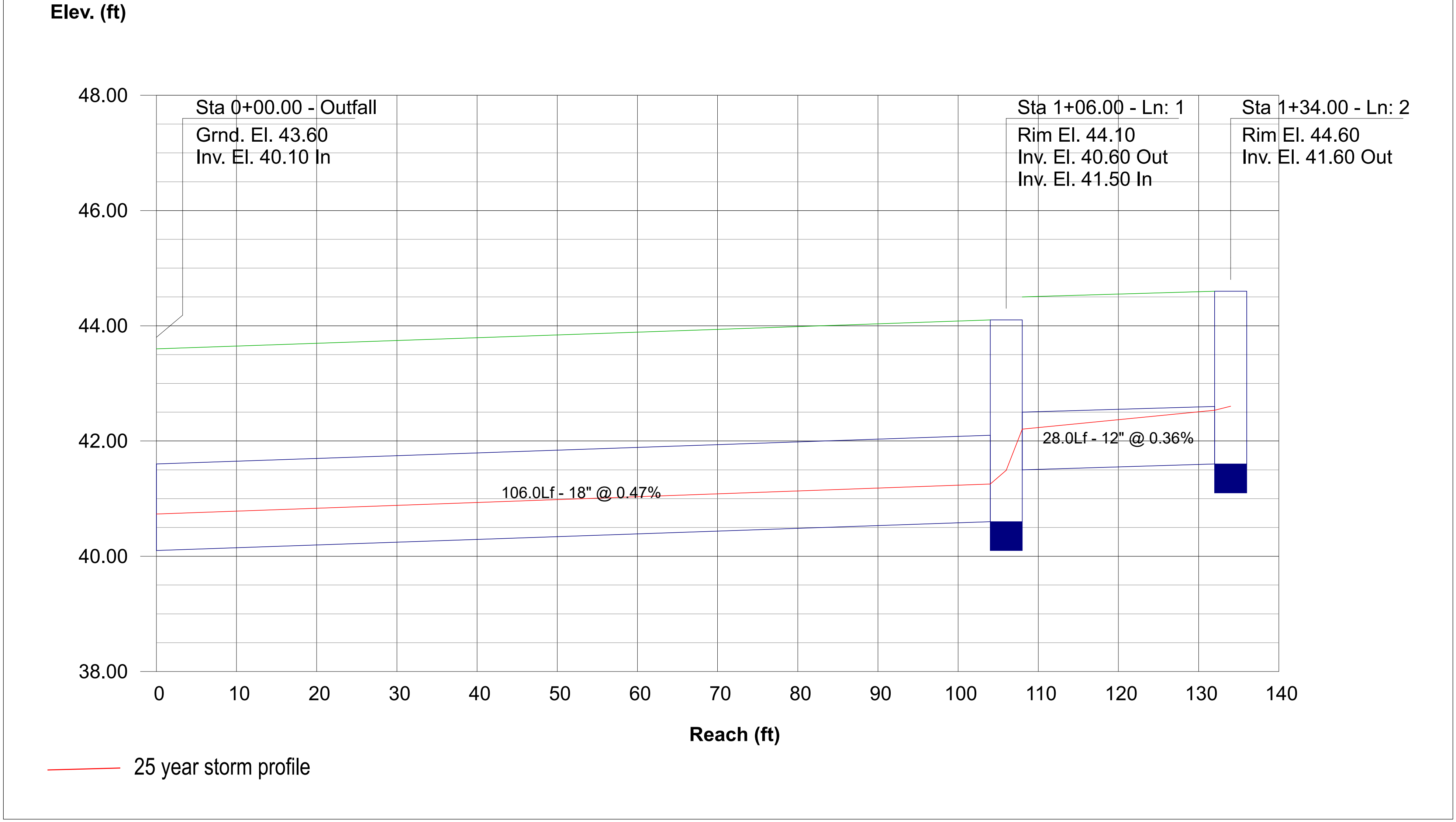
- Rational Method
- NOAA Atlas 14 - 10-and 25 Year Storm Events

Hydraflow Plan View

Enterprise - Webster Sq	No. Lines: 2	07-14-2022

Storm Sewer Profile

Proj. file: Enterprise site pipes.stm



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)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	2.76	40.10	40.73	0.63	0.71	3.88	0.23	40.97	n/a	106	40.60	41.25	0.65	0.74	3.74	0.22	41.47i	n/a	n/a	0.284	0.15	n/a
2	12	2.78	41.50	42.21	0.71*	0.59	4.68	0.34	42.55	n/a	28.0	41.60	42.53	0.93	0.76	3.64	0.21	42.74i	n/a	n/a	-0.015	1.00	n/a

Enterprise - Webster Sq	Number of lines: 2	Run Date: 07-14-2022

Notes: * Critical depth assumed.

Hydraflow HGL Computation Procedure

General Procedure: Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles. The computed HGL is checked against inlet control.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

IV. Inlet Data

Drainage Areas: 20,680 s.f.

CB2	Area Total	20,680 s.f.	Cn 0.90
CB1	Area Total	n/a s.f.	modelled as a manhole due to its location on a side slope, most runoff will by pass and be captured in CB 2

VI. Stormwater Quality

A water quality flow was calculated according to the 2004 Connecticut Stormwater Quality Manual for the proposed site. That flow is 0.5 c.f.s. The proposed site storm runoff will be captured in two catch basins that will have an oil and sediment filters install that will handle flows as high as 600 gallons per minute, far in excess of what is expected here.

Proposed Water Quality Flow

WQV = Water Quality Volume (ac-ft.)

R = Volumetric Runoff Coefficient = 0.05 + 0.009 I

I = Percent Impervious Cover = 90%

A = Site Area in Acres = 0.47 acres

I = 90 R = 0.05 + 0.009 (90) = 0.86

$$WQV = \frac{(1")\ (0.86)\ (0.47)}{12} = 0.034 \text{ ac-ft.}$$

WQF A = 0.00074 mi^2

$$Q = \frac{\text{WQV x 12 in./ft.}}{\text{Drainage Area (acres)}} = \frac{\text{0.034 ac-ft. (12)}}{\text{0.47 ac}} = 0.86 \text{ in.}$$

$$CN = \frac{1000}{(10 + 5P + 10Q - 10\ [Q^2 + 1.25\ (QP)]^{½})} =$$

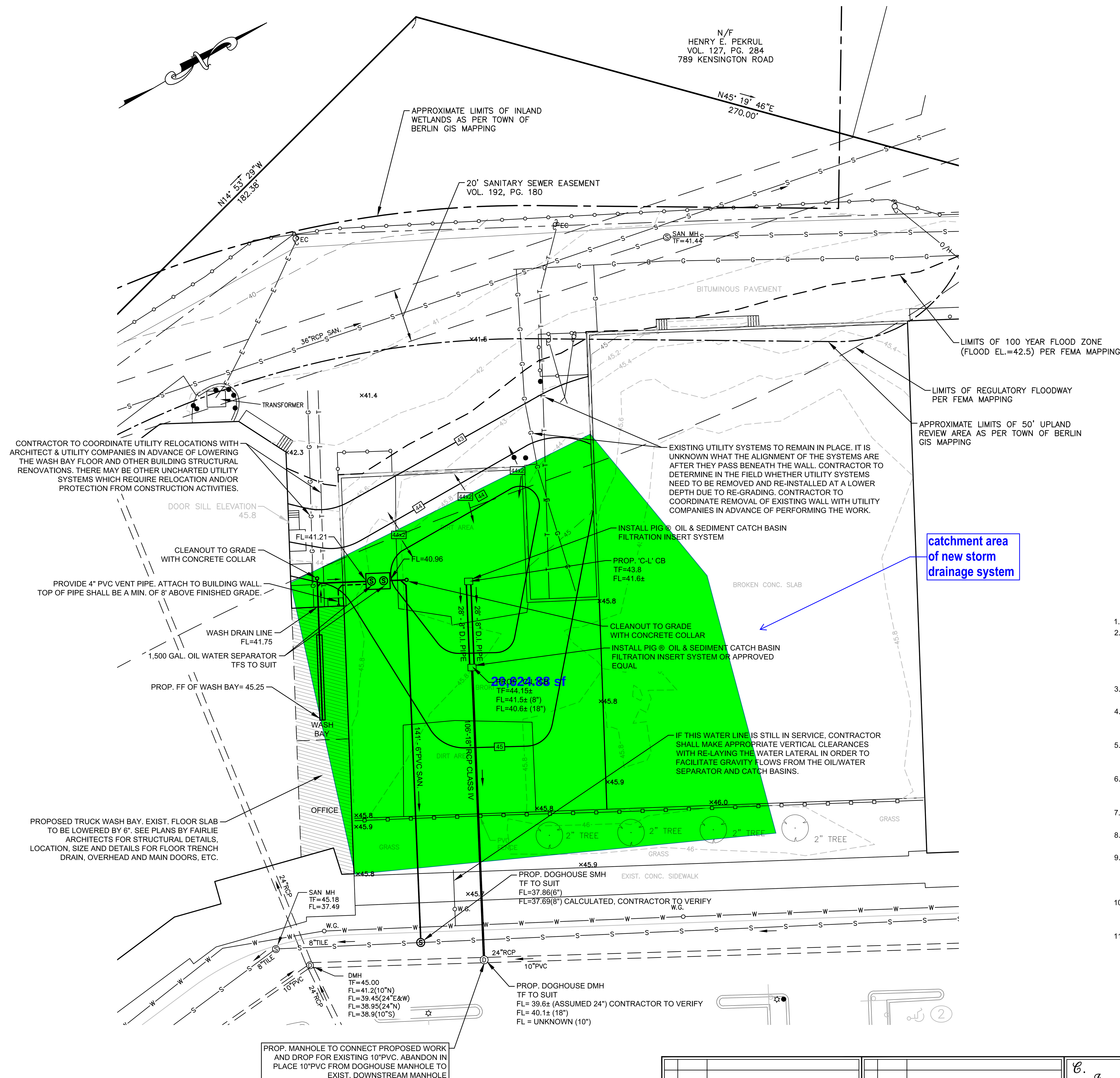
$$\frac{1000}{(10 + 5 + 10\ (0.86) - 10\ [(0.86)^2 + 1.25\ (0.86)]^{½}} = 98.7$$

CN = 99 Ia = 0.041 Ia/p = 0.041 Qu = 650

WQF = (qu) (A) (Q) = 650 (0.00074) (0.86) = 0.41 c.f.s.

Total WQF from Site, use 0.5 c.f.s.

APPENDIX



GENERAL NOTES

1. ELEVATIONS ARE BASED ON NAVD 1988.
2. THE UNDERGROUND UTILITIES ON THIS PLAN HAVE BEEN OBTAINED FROM AVAILABLE RECORDS AND HAVE BEEN LOCATED IN THE FIELD WHERE POSSIBLE. THE ACTUAL LOCATION OF THESE UTILITIES SHOULD BE VERIFIED BY THE CONTRACTOR BY CONTACTING "CALL BEFORE YOU DIG" 1-800-922-4455 OR BY EMPLOYING A SUBSURFACE CONSULTANT WHO SPECIALIZES IN SUBSURFACE UTILITY DETECTION.
3. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM WITH THE SPECIFICATIONS FOR THE TOWN OF BERLIN AND CONNDOT FORM 818, LATEST EDITION.
4. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION AND ANY DISCREPANCIES SHALL BE REPORTED TO THE DESIGN ENGINEER AND/OR ARCHITECT BEFORE PROCEEDING.
5. ALL UNSUITABLE MATERIAL DISCOVERED DURING CONSTRUCTION SHALL BE REMOVED OR DISPOSED OF IN A SUITABLE MANNER. SAID MATERIAL SHALL INCLUDE TREES, BRUSH AND OTHER ORGANIC MATERIAL, ETC.
6. ANY EXISTING SITE AMENITIES WITHIN THE PROPOSED DEVELOPMENTS LIMITS TO BE REMOVED, SUCH AS PAVEMENT, CURBING, ETC. SHALL BE REMOVED AND DISPOSED IN ACCORDANCE TO APPLICABLE REGULATIONS.
7. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS PRIOR TO CONSTRUCTION.
8. ALL EXISTING UTILITY SYSTEMS MUST REMAIN OPERATIONAL DURING ALL STAGES OF CONSTRUCTION.
9. INSTALL SILT SACK EROSION & SEDIMENTATION CONTROL FABRIC IN EXISTING DRAINAGE STRUCTURES PRIOR TO COMMENCEMENT OF CONSTRUCTION. AS NEW DRAINAGE STRUCTURES ARE INSTALLED, INSTALL EROSION & SEDIMENTATION CONTROL FABRIC AND/OR HAYBALE DAMS.
10. PROTECT EXISTING WALLS TO REMAIN DURING CONSTRUCTION. IF DAMAGED BY CONTRACTOR DURING CONSTRUCTION, CONTRACTOR SHALL REPAIR AND/OR REPLACE IN KIND.
11. EXISTING PAVEMENT MARKINGS SHALL BE RE-ESTABLISHED AT CONCLUSION OF ASPHALT PAVING WITH WHITE, 15 MIN. DRY PAINT.

LEGEND:

GUY WIRE	
ELECTRIC CONDUIT	EC
UTILITY POLE	
LIGHT POLE	
SPRINKLER VALVE	
WATER GATE	WG
HYDRANT	
WATER MANHOLE	
GAS GATE	GG
HANDHOLE	
ELECTRIC MANHOLE	
YARD DRAIN	YD
CATCH BASIN	CB
DRAINAGE MANHOLE	
SEWER MANHOLE	
TELEPHONE MANHOLE	
SIGN	
GATE	
ELECTRIC LINE	E
GAS LINE	G
TELEPHONE LINE	T
STORM PIPE	
SANITARY SEWER PIPE	S
WATER LINE	W
CHAIN LINK FENCE	

GRAPHIC SCALE
0 10 20 40
1"= 20'

No	Date	Description
		Revisions

No.	Date	Description
		Revisions

C. J. M. — Close, Jensen & Miller, P. C.
Consulting Engineers, Land Planners & Surveyors
1137 Silas Deane Highway, Wethersfield, Conn. 06109, Tel. (860)563-9375

CATCHMENT AREA OF NEW STORM DRAINAGE SYSTEM

TRUCK RENTAL
ENTERPRISE HOLDINGS
127 WEBSTER SQUARE
BERLIN, CONNECTICUT

STATE OF CONNECTICUT — CHRISTOPHER J. GIEGLER — NO. 70167 — LICENSED PROFESSIONAL ENGINEER

Compiled	E.T.J.
P.C. Check	
Designed	
Drawn	E.T.J.
Checked	
Scale	1"= 20'
Date	6/16/22
Sheet	Of
1	1
Job No.	
File No.	

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