DRAINAGE CALCULATIONS, HYDRAULICS & HYDROLOGY REPORT

WOODSPRING SUITES

295 & 313 WILLETTS AVENUE
16 & 18 BOSTON POST ROAD

AUGUST 2023

Revised October 2, 2023

CLA Engineers, Inc

WILLETTS AVENUE & BOSTON POST ROAD
WATERFORD,CT

The site was previously developed as a sports bar with areas of previously cleared land. The site is proposed to be developed as a hotel. CLA Engineers is providing the design and calculations for the stabilization of the site.

PROPOSED HYDRAULICS

There will be three main on-site drainage areas for the proposed development, the roof drainage, which will outlet to a concrete gallery infiltration system, Drainage Area 3, which flows to the existing shopping center and then out to Willets Avenue, and Drainage Area 1 which flows directly to Willets Avenue. Please see the attached plans entitled Drainage Plan – Existing Conditions and Drainage Plan - Proposed.

Drainage Area 1 is located adjacent to Willetts Avenue and presently drains to the existing drainage system in Willetts Avenue. Proposed Drainage Area 1 will be connected to the existing drainage system in Willetts Avenue, after flowing through Stormwater Basin 1, resulting in a significant decrease in peak flows to the existing drainage system.

Drainage area 2 presently drains to the existing shopping center parking lot and drainage system, which connects to the existing drainage system in Willetts Avenue. Proposed Drainage area 2 will continue to flow to the existing shopping center parking lot drainage system, after flowing thru Sormwater Basin 2, resulting in a significant decrease in peak flows to the existing drainage system.

The roof drainage will connect to an underground infiltration system, which will contain the 100 year storm event. There also is an emergency overflow pipe which will connect to Stormwater Basin 2. A permeability test from the test hole 4, has been provided in this report. The rates are good and will allow for the galleries to empty

quickly between storm events. Infiltration was not included in the modeling program, as a conservative approach to the design.

Both the existing and the proposed conditions for the development site have been analyzed for the 2-year, 5- year, 10-year, 25-year, and 100-year design storms using the TR-55 SCS modeling program. The following is the summary table for the 2-year, 5-year, 10-year, 25-year, and 100-year design storms showing first the existing conditions and proposed conditions, after passing through the proposed roof infiltration system and the water quality basins. The calculations show that there will be a significant decrease in runoff leaving the site. The following are the results of the computer model.

Drainage Area 1

	2-year	5-year	10-year	25-year	100-year
Existing	1.680 cfs	2.462 cfs	3.125 cfs	4.055 cfs	5.503 cfs
Proposed	0.000 cfs	0.000 cfs	0.090 cfs	0.574 cfs	2.213 cfs

Drainage Area 2

	2-year	5-year	10-year	25-year	100-year
Existing	2.798 cfs	4.451 cfs	5.903 cfs	7.995 cfs	11.33 cfs
Proposed	0.000 cfs	0.000 cfs	0.000 cfs	0.000 cfs	1.054 cfs

CT GUIDELINES FOR SOIL EROSION & SEDIMENTATION CONTROL

The 2002 CT Guidelines for Soil Erosion & Sedimentation Control applies to the construction phase of the project. A detailed erosion and sediment control plan has been provided in the site development plans. The proposed Stormwater Basins have been designed to function as sedimentation traps during stabilization, and then as stormwater basins to provide permanent water quality treatment, prior to entering the existing off-site drainage systems, for the life of the facility.

Drainage Area 1, Temporary Sediment Trap 1

The first calculation required by the Guidelines is for the sediment storage volume (SSV). The sediment storage volume is the calculation for one year of predicted sediment load. The calculations for a Temporary Sediment Trap show that the sediment storage volume required is 5,066CF:

SSV = A(134CY/Acre)
A = 1.4 ACRES
SSV = 187.6 CY = 5,066 CF

The second calculation required by the Guidelines is for wet storage volume (WSV). The wet storage volume is the volume in the basin that is located below the riprap for the level spreader outlet of the basin (elevation 92.0). The volume of the wet storage is required to be half of the required SSV. The required wet storage volume is 5,066 CF/2 = 2,533 CF. The required dry storage volume, located above the bottom of the riprap of the level spreader outlet of the basin (elevation 92.0), is 2,533 CF.

The total storage volume required is the dry storage volume plus the wet storage volume, which is a total of 5,066 CF.

The combined volume required for the Temporary Sedimentation Basin as follows:

2,533 CF of Wet Storage Volume	4,700* CF Provided (Excavated to 90.0)
2,533 CF of Dry Storage Volume	8,323 CF Provided
5,066 CF of Total Volume Required	13,023 CF Total Provided

Drainage Area 2 Temporary Sediment Trap 2

The first calculation required by the Guidelines is for the sediment storage volume (SSV). The sediment storage volume is the calculation for one year of predicted sediment load. The calculations for a Temporary Sediment Trap show that the sediment storage volume required is 7,236 CF:

SSV = A(134CY/Acre)
A = 2.0 ACRES
SSV = 268 CY = 7,236 CF

The second calculation required by the Guidelines is for wet storage volume (WSV). The wet storage volume is the volume in the basin that is located below the riprap for the level spreader outlet of the basin (elevation 80.5). The volume of the wet storage is required to be half of the required SSV. The required wet storage volume is 7,236 CF/2 = 3,618 CF. The required dry storage volume, located above the bottom of the riprap of the level spreader outlet of the basin (elevation 80.5), is 3,618 CF.

The total storage volume required is the dry storage volume plus the wet storage volume, which is a total of 7,236 CF.

The combined volume required for the Temporary Sedimentation Basin as follows:

3,618 CF of Wet Storage Volume	5,488 CF Provided (Excavated to 79.0)
3,618 CF of Dry Storage Volume	8,743 CF Provided
7,236 CF of Total Volume Required	14,231 CF Total Provided

CONNECTICUT STORMWATER QUALITY MANUAL

The Stormwater Management System, consisting of two Water Quality Basins, have been designed to function as permanent water quality treatment for the life of the facility. The Connecticut 2004 Stormwater Quality Manual (Manual) applies to the post construction phase, for the operation of the facility.

Drainage Area 1, Water Quality Basin 1

The Stormwater Management System meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. The calculations show that a Water Quality Volume (WQV) of 3,202 CF is required:

WQV = (1")(R)(A)/12
A = 1.4 Acres
R = 0.05 + 0.009(I)
I = 0.9 Acres / 1.4 Acres = 0.64 (64%)
R = 0.63
WQV = 0.0735 Ac-Ft = 3,202 CF required
14,400 CF Provided in the Water Quality Basin

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 5 year storm event, the anticipated pollutant removal rate is 99-100%.

Drainage Area 2, Water Quality Basin 2

The Stormwater Management System meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. The calculations show that a Water Quality Volume (WQV) of 3,580 CF is required:

WQV = (1")(R)(A)/12

A = 1.7 Acres

R = 0.05 + 0.009(I)

I = 1.0 Acres / 1.7 Acres = 0.59 (59%)

R = 0.58

WQV = 0.0822 Ac-Ft = 3,580 CF required

23,191 CF Provided in the Water Quality Basin

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 5 year, for Stormwater Basin 1, and 25 year storm event, for Stormwater Basin 2, the anticipated pollutant removal rate is 99-100%.

(https://www.unh.edu/unhsc/sites/default/files/media/ms4_permit_nomographs_sheet_final_2020.pdf) The University of New Hampshire's research reveals that efficiency removal for typical pollutants of concern such as TSS, N, P, and zinc is directly tied to the volume of stormwater that is held and infiltrated. The research reveals that if a 2 inch depth of runoff from a site's impervious surface is held and infiltrated by a given BMP, the reduction in these pollutants is 99-100%. On this site, Stormwater Basin #1 will contain up to and including the 5 year storm event and Stormwater Basin #2 will contain up to and including the 25 year storm event. Thus, CLA believes that pollutant removal rates for pollutants of concern will be greater than 99% and there will be no increase in releases of pollutants to the wetlands system.

The proposed stormwater basins are not infiltration basins, however stormwater will slowly infiltrate into the surrounding soils between storm events.