DRAINAGE CALCULATIONS, HYDRAULICS & HYDROLOGY REPORT

2227 Route 32
Montville, CT

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Green Site Design, LLC

DRAINAGE HYDRAULICS AND HYDROLOGY REPORT

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EXISTING CONDITIONS

The site is approximately 1.1 acres in area and is shown on the Existing Conditions Survey (Sheet 1 of the site plans). There are also less then 0.1 acres of wetlands on the site.

PROPOSED DEVELOPMENT

The project proposes the redevelopment of the site for a mixed-use building. The first floor will be a package store and other commercial uses and the second and third floors will be apartments. This project is a modification of the previously developed site plan, with the addition of a temporary sedimentation basin, in accordance with the 2024 CT Guidelines for Soil Erosion & Sedimentation Control, which will ultimately become a permanent water quality basin and forebay, in accordance with the Connecticut the 2024 Stormwater Quality Manual (Manual). There is presently no stormwater treatment on this site. The addition of a stormwater treatment system will be a great improvement for the adjacent wetlands.

EXISTING AND PROPOSED HYDRAULICS

The stormwater management system has been designed to provide for zero increase in peak stormwater discharge from the site. The project has been designed to actually result in a decrease in the peak stormwater rates leaving the project site. The proposed stormwater water quality basin will provide treatment of the runoff from the proposed site.

The Proposed Drainage Area contains the proposed development for the site. The stormwater runoff from the proposed development will be treated by the proposed water quality basin and forebay. Based on the tests done on the site, the basin has been modelled to assume that the basin will be a dry basin at the onset of the storm event.

The drainage area to CTDOT Route 32, pre-construction is approximately 0.12 acres. The drainage area to CTDOT Route 32 post-construction will be approximately 0.09 acres. In addition, we will be reducing the amount of pavement within the drainage area to Route 32. Therefore, there will be a reduction of stormwater runoff to Route 32 after the project is completed.

Another revision that we made to sheet 4, is adding a low elevation rain garden with a drywell, which has an overflow pipe to the new on-site drainage system, outletting to the rear of the site. Test holes done on the site show extremely well drained soils, therefore a dry well in this location will be very effective. This is especially needed, as this section of Route 32 and Leo Street are essentially flat, resulting in drainage issues every time there is a good sized storm event. Curbing has been eliminated in the area adjacent to the rain garden, in order to allow stormwater from Route 32 and Leo street to flow onto the site and into the drywell.

The drainage area to northerly wetlands, pre-construction is approximately 0.3 acres. The drainage area to the northerly wetlands post-construction will be approximately 0.08 acres. Therefore, there will be a reduction of stormwater runoff to the northerly wetlands after the project is completed.

The existing soils in the area of the proposed development are extremely well drained soils, which have a hydraulic designation of A. We have used a CN of 98 for both the existing and proposed paved areas, buildings and structures. For the existing vegetated areas, we have used a CN of 45 for existing conditions, woods-poor conditions We used poor condition, as there are a number of containers and gravel areas within the existing woodlands. For the proposed vegetated areas, we have used a CN of 39, lawns-

good conditions. How the overall CN's are calculated are shown on the hydrograph sheets for Hyd. #1 and Hyd. #2.

For 2227 Route 32, we used a permeability rate of 8.27 inches per hour for the basin bottoms. This is taken from Table 10-2 of the Connecticut Stormwater Manual and is for Hydrologic Group A soils classified as sand. This is the fastest rate in that table, however it is likely an underestimate of the actual field rate because the on site soil is very gravelly.

Both the existing and the proposed conditions for the development site have been analyzed for the 2-year, 10-year, 25-year, 50-year, and 100 year design storms using the SCS model and the NOAA Type D rainfall distribution, which is included in the calculations.

Drainage Area 1

	2 Year	10 Year	25 Year	50 Year	100 Year
Existing	0.763 cfs	1.901 cfs	2.687 cfs	3.290 cfs	3.956 cfs
Proposed	0.000 cfs	0.000 cfs	0.871 cfs	2.277 cfs	3.734 cfs

The Manual calls for 6 inches of freeboard for the 10 year storm event and 3 inches of freeboard for the 100 year storm event. We have provided 1.54 feet of freeboard for the 100 year storm event.

EROSION & SEDIMENTATION CONTROL

The 2024 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 water quality basin has been designed to function as a sedimentation trap during stabilization. However, the bottom 3 feet of the stormwater quality basin will not be excavated until after the site is stabilized and the temporary sedimentation basin is converted to the stormwater quality

basin. The basin will only be excavated down to elevation 130 for the sedimentation trap. And then the additional 3 feet will be excavated down to elevation 127 for the permanent stormwater basin. This will protect the existing infiltration rate of the native materials under the basin.

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 required SSV calculation for the temporary sediment trap is shown below.

Drainage Area

SSV = A(134CY/Acre)

A = 0.9 ACRE

SSV = 120.6 CY = **3,256 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 bottom of the riprap for the level spreader outlet of the basin. The volume of the wet storage is required to be half of the required SSV. The required wet storage volume is shown below along with the dry storage volumes (DSV).

The required and provided storage for the basins are as follows:

Drainage Area (Outlet structure inlet elevation = 131.0)

Sedimentation Trap

1,628 CF of Wet Storage Volume Required	1,697 CF Provided*
1,628 CF of Dry Storage Volume Required	6,243 CF Provided
3,256 CF of Sediment Storage Volume Required	7,940 CF Total Provided

***storage in the water quality basin between elevation 130 and 131 plus storage in the forebay between elevation 130 and elevation 131**

CONNECTICUT STORMWATER QUALITY MANUAL

The Connecticut 2024 Stormwater Quality Manual (Manual) applies to the post construction phase, for the operation of the facility. The temporary sediment trap has been designed to function as a water quality basin after the site is stabilized. The basin meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin.

The proposed stormwater water quality basin has been designed to function a sedimentation trap during stabilization. However, the bottom 3 feet of the stormwater quality basin will not be excavated until after the site is stabilized and the temporary sedimentation basin is converted to the stormwater quality basin. The basin will only be excavated down to elevation 130 for the sedimentation trap. And then the additional 3 feet will be excavated down to elevation 127 for the permanent stormwater basin. This will protect the existing infiltration rate of the native materials under the basin.

Drainage Area

WQV = (1.3")(R)(A)/12

A = 0.9 Acre

R = 0.05 + 0.009(I)

I = 0.5 Acres / 0.9 Acres = 0.56 (56%)

R = 0.55

WQV = 0.054 Ac-Ft = 2,352CF (Required)

3,506 CF (WQV Provided in Water Quality Basin between elevation 127 and 131, plus WQV provided in the forebay)

The Forebay provides 512 CF of WQV, which is 21% of the required WQV

Once development of the site is completed, there will be a decrease in volume and runoff from the site. The temporary sedimentation basin provides ample wet

and dry storage volume to meet and exceed the requirements of the 2024 CT Guidelines for Soil & Sedimentation Control, as well as the 2024 CT Guidelines for Soil & Sedimentation Control. Likewise, the Water Quality Basin meets and exceeds the post construction requirements of the Connecticut 2024 Stormwater Quality Manual.

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 10 year storm event, 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, the Stormwater basin will contain up to and including the 10 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.