

Site C17/C16: Chemistry Building Quad

Rooftop Disconnection with Bioretention



Parameter	C17a/b	C16
Impervious Cover Treated (acres)	0.51	0.28
Runoff Reduction Volume (cu ft per 1" rain event)	707	115
TN Removal (lb/yr)	6.23	3.46
TP Removal (lb/yr)	0.72	0.4
TSS Removal (lb/yr)	156.7	87.07
Estimated Cost	\$18,600	\$10,300



Figure 1. Drainage area (top); External roof drains and proposed retrofit locations for bioretention areas with forebays in the grassy quad area adjacent to the Chemistry Building (middle), location of C16 (bottom).

Site Description

The proposed concept is located on the UConn Campus in a quad area between the Chemistry Building and the Pharmacy/Biology Building. The quad is grassed and contains a few small trees, but otherwise lacks landscaping. Soils are extremely compacted, and several dirt and concrete pathways traverse the area. The perimeter is characterized by bare soils and sediment deposition.

Existing Conditions

Runoff from the Chemistry building rooftop is conveyed underground and into the stormdrain system via external roof drains. Yard drains located in the quad area capture surface runoff from the quad and adjacent impervious areas (paved pathways, driving lanes, and wide sidewalks). On the northwest corner of the quad, runoff from the Life Sciences parking lot is conveyed to an inlet located along the quad. Runoff from these areas is conveyed directly to Eagleville Brook, which is piped deep underneath the quad area, approximately 20-22' below grade.

Proposed Concept

Install three bioretention areas in the quad area to capture rooftop and impervious area runoff. Direct the external roof downspouts from the Chemistry Building to the proposed bioretention areas by

installing a new pipe to convey the roof runoff from a portion of the building.

Construct a forebay area at the pipe outlet to dissipate the energy and velocity of the runoff entering the bioretention areas. Runoff from the adjacent impervious areas can enter the bioretention areas via sheetflow. The bioretention areas should have a filter depth of 24 inches and provide 6-9 inches of ponding depth. Due to the compacted nature of the soils, an underdrain is needed for the design. The underdrain and overflow should tie into existing yard drains.

Preliminary Concept Designs

25% concept designs for the proposed retrofit can be found in attachments B. Preliminary plan views and project details are included. These initial plans will need to be further refined as this project proceeds towards construction.

Preliminary Hydrologic Calculations

Preliminary sizing of the bioretention area was completed based on guidance provided in the 2004 Connecticut Stormwater Quality Manual. These computations are summarized in the table below.

Sizing Calculations for Site C-17/16		
Parameter	Value	
	C17a/b*	C16
Drainage Area, A (acres)	0.55	0.32
Imperviousness, I (%)	92.8	88.7
Volumetric Runoff Coefficient, Rv	0.89	0.85
Rainfall Depth, P (in)	1	1
Water Quality Volume, WQv (cf)	1767	982
Depth of the Filter Bed, d (ft)	2.50	2.5
Hydraulic Conductivity, k (ft/day)	1	1
Max. Ponding Depth, hmax (in)	9	9
Average Ponding Depth, h (ft)	0.375	0.375
Drawdown Time, t (days)	2	2
Surface Area Required, Af (sq. ft)	768	427
Surface Area Provided (sq ft)	1145	500
Treatment Provided (% of 1")	100	29
*note two bioretention areas are combined		

Design Considerations

- There is a building below the quad which may limit the size and extent of concept.
- While utility constraints are expected to be minimal, detailed utility mapping should be obtained before completing the final project design. The main stormdrains are 20-22' below grade and may not constrain the project, however, there may be shallower connection pipes that will need to be avoided.
- This project presents an opportunity for students and faculty at Uconn to be involved in the final design and construction of this project.

Maintenance

Maintenance is important for bioretention areas, particularly in terms of ensuring that they continue to provide measurable stormwater management benefits over time. The routine maintenance activities typically associated with bioretention areas are summarized in the table below.

Maintenance Activities for Bioretention	
Activity Schedule	Frequency
<ul style="list-style-type: none"> • Water once a week during the first two months, and then as needed and depending on rainfall to promote plant growth and survival. • For the first six months following construction, the site should be inspected at least twice after storm events that exceed a half-inch. Inspectors should look for bare or eroding areas in the contributing drainage area or around the bioretention area, and immediately stabilized with grass cover. 	As Needed (following construction)
<ul style="list-style-type: none"> • Prune and weed bioretention area to maintain appearance. • Remove accumulated trash and debris. 	Regularly (Monthly)
<ul style="list-style-type: none"> • Inspect inflow area for sediment accumulation and remove any accumulated sediment or debris. • Inspect bioretention area for dead or dying vegetation. Plant replacement vegetation as needed. 	Annually
<ul style="list-style-type: none"> • Remove and replace existing mulch 	Every 2 to 3 Years