RUANE CENTER BIORETENTION

DESCRIPTION

The Ruane Center bioretention is a four-cell stormwater filtration system that treats runoff from the Ruane Center roof and reduces stormwater runoff to the city storm sewers. The upper three cells store 6" of water before spilling into each successive cell. The final cell stores 9" of water, which creates a combined storage equal to the Water Quality Storm Event. The system was designed to pass large storm flows through an overflow structure that is connected to the Eaton Street storm drain. A forebay dissipates the energy of incoming water while treatment occurs by filtration through an organic surface layer (aged, shredded hardwood mulch) and soil media bed, biological activity/plant uptake of nutrients, attenuation (sediment retention), and infiltration. The plants were selected to adapt to the variable conditions of the slopes and inundated areas of the bioretention cells and to complement the surrounding landscape. An outdoor classroom, formed by an elevated peastone platform and integrated seat-wall, was created with recreation space from a network of peastone pathways and bridges around the basin cells.

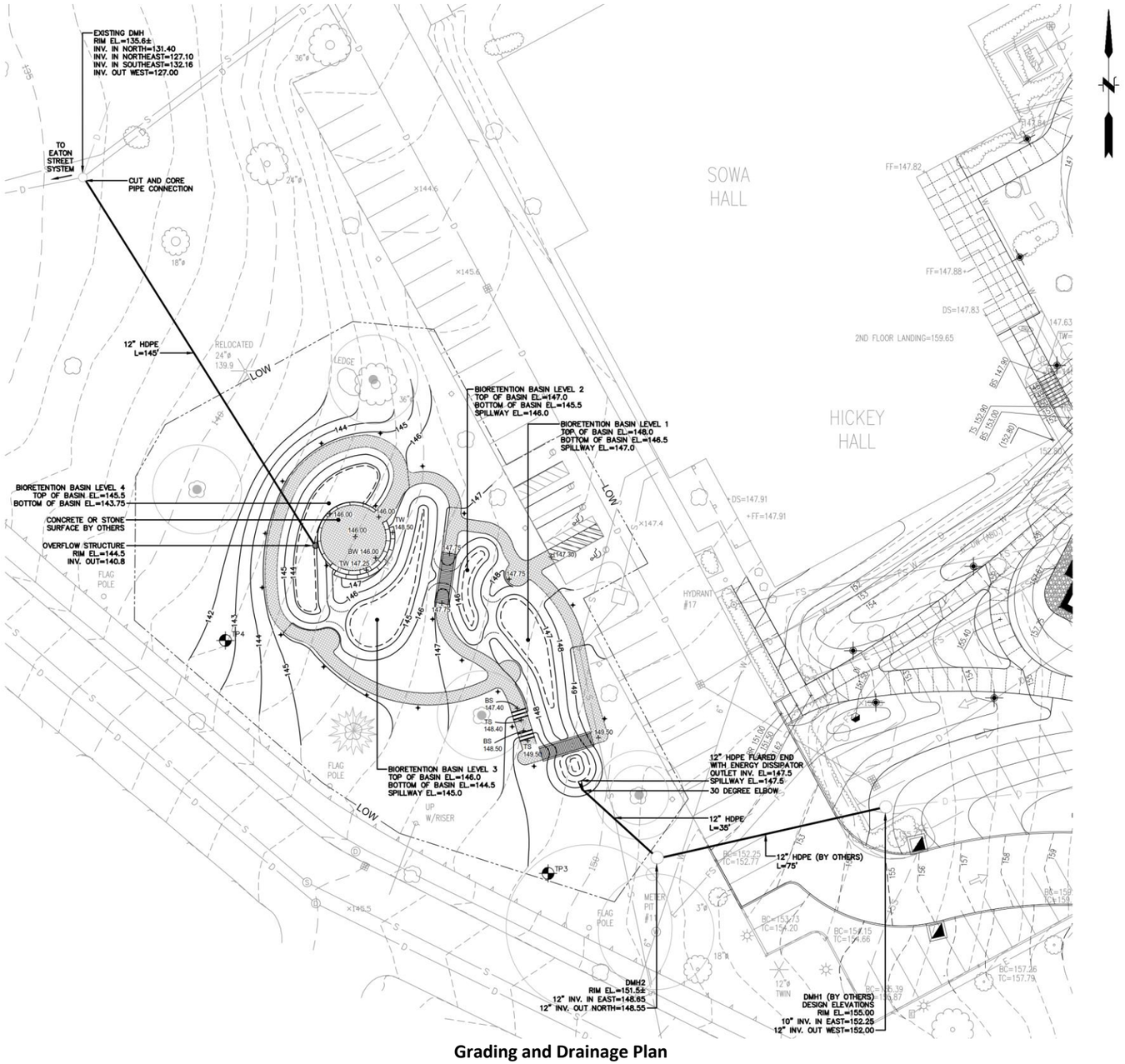
OBJECTIVES

The project's two primary objectives are to provide a hands-on educational environment for the College's life sciences programs and to treat stormwater runoff. The bioretention system gives students and faculty opportunities to scientifically evaluate and understand the physical and biological processes associated with stormwater treatment along with the pollinators, plants, and other biota specific to this habitat.

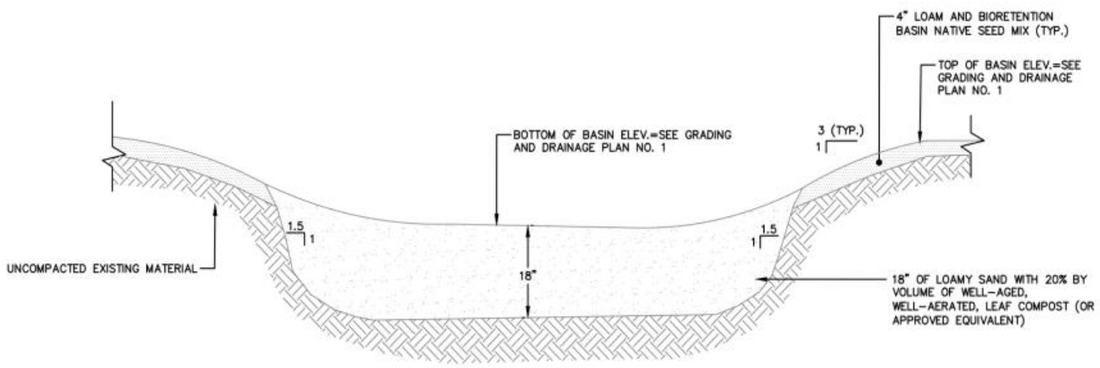
KEY DESIGN FEATURES	
Treatment Type	Filter
Drainage Area	22,000 ft^2 (0.501 ac.)
Drainage Area Imperviousness	100%
Design Storm	Water Quality
Water Quality Volume (WQv)	1,833 ft^3 (13,712 gal.)
Infiltration Volume (WQ storm)	1,845 ft^3 (13,802 gal.)
Notes: The filter bed is composed of a mixture of about 70% concrete sand (ASTM C-33), 20% well-aged leaf compost, and 10% topsoil. The sloping site dictated a multi-cell layout to meet project objectives while minimizing alterations to the existing landscape.	

WETLAND WOODY PLANT SCHEDULE				
QTY	SYM	BOTANICAL NAME	COMMON NAME	SIZE
DECIDUOUS CANOPY TREES				
1	FP	FRAXINUS PENSYLVANICA	GREEN ASH	3 1/2"– 4" CAL.
1	LT	LIRIODENDRON TULIPIFERA	TULIP TREE	3 1/2"– 4" CAL.
1	NS	NYSSA SYLVATICA	BLACK GUM	3 1/2"– 4" CAL.
1	QB	QUERCUS BICOLOR	SWAMP WHITE OAK	3 1/2"– 4" CAL.
UNDERSTORY TREES				
3	AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	8'–10' HT. MULTI–STEM
1	BPA	BETULA PAPYRIFERA	PAPER BIRCH	8'–10' HT.
1	BPO	BETULA POPULIFOLIA	GRAY BIRCH	8'–10' HT.
1	CC	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	2 1/2"– 3" CAL.
1	CPH	CRATAEGUS PHAENOPYRUM	WASHINGTON HAWTHORN	2 1/2"– 3" CAL.
1	CF	CORNUS FLORIDA	FLOWERING DOGWOOD	2 1/2"– 3" CAL.
2	SA	SASSAFRAS ALBIDUM	COMMON SASSAFRAS	8'–10' HT.
EVERGREEN TREES				
2	AB	ABIES BALSAMEA	BALSAM FIR	8'–10' HT.
2	PM	PICEA MARIANA	BLACK SPRUCE	8'–10' HT.
3	PR	PINUS RIGIDA	PITCH PINE	8'–10' HT.
SHRUBS				
3	AI	ALNUS INCANA	SPECKLED ALDER	3–4'
2	AM	ARONIA MELANOCARPA	BLACK CHOKEBERRY	3–4'
8	CAM	CEANOTHUS AMERICANUS	NEW JERSEY TEA	2–3'
2	CO	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	3–4'
4	CAL	CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	2–3'
13	CPE	COMPTONIA PEREGRINA	SWEET FERN	12–18"
6	CS	CORNUS SERICEA	RED–OSIER DOGWOOD	2–3'
8	DL	DIERVILLA LONICERA	NORTHERN BUSH HONEYSUCKLE	18–24"
3	HV	HAMAMELIS VIRGINIANA	WITCH HAZEL	3–4'
5	KL	KALMIA LATIFOLIA	MOUNTAIN LAUREL	2–3'
4	LB	LINDERA BENZOIN	COMMON SPICEBUSH	2–3'
6	MG	MYRICA GALE	SWEETGALE	12–18"
9	MP	MYRICA PENSYLVANICA	BAYBERRY	3–4'
16	PF	POTENTILLA FRUTICOSA	SRUBBY CINQUEFOIL	2–3'
5	RA	RHUS AROMATICA	FRAGRANT SUMAC	2–3'
8	SL	SPIRAEA LATIFOLIA	MEADOWSWEET	2–3'
12	ST	SPIRAEA TOMENTOSA	STEEPLEBUSH	2–3'
15	VA	VACCINIUM ANGUSTIFOLIUM	LOW–BUSH BLUEBERRY	18–24"
3	VT	VIBURNUM TRILOBUM	AMERICAN CRANBERRY BUSH	3–4'
GROUND COVER				
390	ER	EPIGEA REPENS	MAYFLOWER	#1– 18" O.C.
214	GP	GAULTHERIA PROCUMBENS	WINTERBERRY	#1– 18" O.C.
266	PD	PRUNUS DEPRESSA	SAND CHERRY	12–18"– 18" O.C.
75	VM	VACCINIUM MARCROCARPON	AMERICAN CRANBERRY	#1– 18" O.C.

Planting Plan



Grading and Drainage Plan



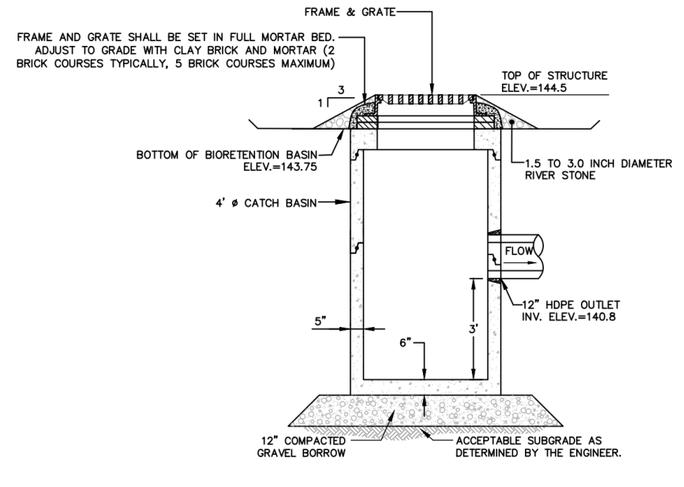
NOTES:

1. BASIN FLOOR SHALL BE FINISHED WITH 4 INCH BLEND OF A WELL AGED (6-12 MONTHS) HARDWOOD MULCH AND BIORETENTION SOIL. BLEND 2 INCHES OF MULCH WITH THE TOP 2 INCHES OF SOIL. HARDWOOD MULCH WILL BE REPLACED ANNUALLY.

2. PLANTINGS BY OTHERS.

BIORETENTION BASIN

NOT TO SCALE



NOTES:

1. FRAMES AND GRATES SHALL BE RIDOT STANDARD.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A-185.
3. 0.12 SQ.IN. / LIN.FT. CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED.
4. REFER TO ASTM C478, ITEM 8.1.2 FOR LONGITUDINAL (VERTICAL STANDING) REINFORCEMENT.
5. CONCRETE SHALL BE COMPRESSIVE STRENGTH 4000 PSI TYPE II CEMENT.
6. CATCH BASIN DESIGN SHALL CONFORM TO ASTM C-478 FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
7. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
7. ONE POUR MONOLITHIC BASE SECTION.
9. MANHOLE STEPS SHALL BE STEEL-REINFORCED COPOLYMER POLYPROPYLENE PLASTIC PER ASTM C-478, PARA. 11.
10. SHALL BE RATED FOR H-20 LOADING.
11. SUMP DEPTH SHALL BE THREE FEET.

BIORETENTION BASIN No. 4
OVERFLOW STRUCTURE

NOT TO SCALE

Bioretention Basin Details