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Learning Through Nature: Mount Holyoke Environmental Research and Education Center

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LEARNING THROUGH NATURE

MOUNT HOLYOKE ENVIRONMENTAL RESEARCH AND EDUCATION CENTER

Roger Williams University
School of Art, Architecture, & Historic Preservation

Independent Thesis Project
Master of Architecture

Submitted By:

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Architecture:

The profession of designing buildings, open areas, communities, and other artificial constructions and environments, usually with some regard to aesthetic effect. Architecture often includes design or selection of furnishings and decorations, supervision of construction work, and the examination, restoration, or remodeling of existing buildings.

"architecture." Dictionary.com Unabridged (v 1.1). Random House, Inc. 22 Sep. 2008. <Dictionary.com http://dictionary.reference.com/browse/architecture>

Structure:

A thing constructed; a complex entity constructed of many parts.

"structure." WordNet® 3.0. Princeton University. 22 Sep. 2008. <Dictionary.com http://dictionary.reference.com/browse/structure>.

The dictionary defines architecture as the creation of spaces with a consideration for the visual appearance. I believe that, in order to design something with value, much more must be put into the process of creating the forms. When conceiving the image in my head, I must consider all aspects of the building at once. The program, the users of the space, and the nature surroundings of the area are all extremely important in their own individual way. In order to produce something that is both useful and functional, program must be at the center of the designer's intention. Form must follow function to a certain degree; if a space is beautiful but not functional it loses its meaning and won't be utilized. The next consideration needs to be for the client and users of the space. Keeping the client's wants and desires high on the list allows for their cooperation as well as making sure the space is being designed for their correct use. The surrounding land is something to be looked at before any initial schemes are developed. In order to utilize everything given to us, we must look at the topography, sun paths, neighboring buildings, and existing vegetation. By using the surrounding nature for our benefit, not only will we be allowing our clients to save money (by doing things such as utilizing the sun and wind for heating and cooling of the spaces) but we are also giving them use of a more enjoyable space in and out of the structure. By looking at existing local buildings, we gain the ability to create something that will fit into the community and mesh into the present architecture rather then fighting and opposing it. This is something that also helps the community accept what is being built rather then be scared of it taking away the areas existing identity.

When creating a space for people, it is extremely important to consider how it is going to be structured and actually stand up. As a designer, it is irresponsible to not think of how a system that you are creating will actually work in real life. Everyone knows that a building needs certain members and pieces to stand up, so why not let them be public and seen. By allowing the structure to lead the design in the building, you can create a space that is more visually interesting, leading people to follow the structure and learn about what is built and how it is standing. Structuring the building should not be left as an afterthought; it can be a way to let a building stand out as being visually stimulating.

Educate:

The act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life.

education. Dictionary.com. Dictionary.com Unabridged (v 1.1). Random House, Inc. http://dictionary.reference.com/browse/education (accessed: November 23, 2008).

Learn:

To gain (a habit, mannerism, etc.) by experience, exposure to example, or the like; acquire.

learning. Dictionary.com. Dictionary.com Unabridged (v 1.1). Random House, Inc. http://dictionary.reference.com/browse/learning (accessed: November 23, 2008).

Teach:

To impart the knowledge of; to give intelligence concerning; to impart, as knowledge before unknown, or rules for practice; to inculcate as true or important; to exhibit impressively; as, to teach arithmetic, dancing, music, or the like; to teach morals.

teach. Dictionary.com. Webster's Revised Unabridged Dictionary. MICRA, Inc. http://dictionary.reference.com/browse/teach (accessed: November 23, 2008).

When developing the program and ultimately designing the Research and Education center, it is important to take an interest of how the children as well as the collegiate students will learn and absorb the information being presented to them at the center. For younger children there are important points of learning to remember:

- Interaction
- Observation
- Creativity
- Fun
- Inspiration
- Development

In cases of the children as well as the students, hands on experiments will be developed and conducted for their better understanding. Students from the colleges will be given the opportunity to create research in numerous fields of the environment as well as have the opportunity to help with the visiting children. Both education and environmental majors will take part in teaching, assisting, and supervising the children that come in.

By allowing the activities inside the building to be more of a playing experience than a learning session, the children are more encouraged to allow their creativity come out and engage in the subject at hand. Young Children feel more comfortable in a place where they are playing and therefore will obtain more information in this relaxed environment. Children of all different age levels need a specific amount of supervision and assistance which the students from the university will be able to provide. There is a large range of information and hands on experiments that children from different age groups will be able to understand and take part of. Differing aspects of how children learn are to be taken into account and thought of when designing and programming this building.

- Interaction - The richest play takes place when the adult or role model takes an active role and plays alongside the child, rather than just providing toys or supervision.
    - University students will continually be around to assist the children in different areas of the exhibits. Whether the student is an education or environmental major, they will have the experience and knowledge to give the children relevant information and aid in the experiments and hands-on activities.

- Observation – by a child watching activities take place such as a simple, quick experiment they become more interested in what is happening.
    - A variety of simple tests will be conducted by the University students to shown to the children how things are working/happening in nature. This will allow the children to comprehend in a 'hands-on' nature, what is being explained to them.

- Be creative – Allow the child to explore and discover the things happening around them.
    - By having small rooms contain part of exhibits, the child is allowed to roam and wondering from one end of the room to the next.

- Have Fun - Playing should be fun for everyone -- not frustrating. Do not use the time to test or stretch the child's skills beyond capabilities.
    - Creating a place where children are more encouraged to play with what is shown and provided will allow them to have more fun and have the trip be a more memorable experience.

- Inspiration - Parents or caregivers can pose age-appropriate problems and challenges to children to help them think of as many different solutions as possible.
    - University students will allow the children to think of what is being told and shown to them as well as posing simple questions in which they can figure out by completing the experiment or else looking around them.

- Development - Play activities should fit the child. They should be a bit difficult, but not so difficult as to overwhelm or frustrate the child. Not all children, even at the same age, think at the same level and not all children have the same interests.
    - Allowing the rooms to have niches and areas for different age levels can allow for a child to visit numerous times and always be able to learn something new and exciting each trip.

In my thesis I wish to explore the ways individuals interact and learn from nature.

I plan on doing this by creating an area located along a river or body of water that people will be able to interact and learn from it's ecosystem and wildlife. I would like this to be a space that allows for the public to come and learn either indoors or outdoors with a variety of tools. By creating two defined areas functioning as elementary learning and university learning it would allow the variety of participants to come into the space and even interact with each other. One goal of mine would be to explore this interaction and control it, yet allow both parties to learn from each other to a certain degree.

During this exploration I would like to challenge the use to structure as a design element for my building.

I feel by processing the structure of the building at an early stage, I can allow it to almost dictate the form of the space. This idea is something I have always been interested in investigating and fully developing. I hope this will allow the building to be more visually interesting and welcoming. This structural challenge could possible help me gain the level of interaction I desire by playing with two forms or levels of structure and how they meet each other.

I will be looking towards a few new sources and typologies for guidance.

By creating a place where people can grow and learn about nature, I am going to allow the space to be nature friendly and visually 'green'. With this challenge also comes the idea of designing on the waterfront and in nature, and the typologies of their traditional designs. A third design approach will be creating a place for the community to come together and learn. Looking in to the typologies of; community buildings, recreation buildings, waterfront buildings, and sustainable design will be helpful. By learning about these designs and what the bring into their buildings, I will be able to create a space that uses all of these functions.

Throughout this process I wish to learn how to create a space that will be successful and benefit a variety of community members as well the environment.

As this being my last project in architecture school, I hope to learn about myself as a designer while creating an area where the community can thrive and learn about their environment. I want to be able to effectively design something that shows my skills as a designer who is interested many aspects of architecture; from structures to community awareness to stainability. I hope to design a place that elementary aged children can visit and learn with their families, as well as university level students may come and learn from either their teachers, nature itself, and each other.

Introduction & Problem Statement:

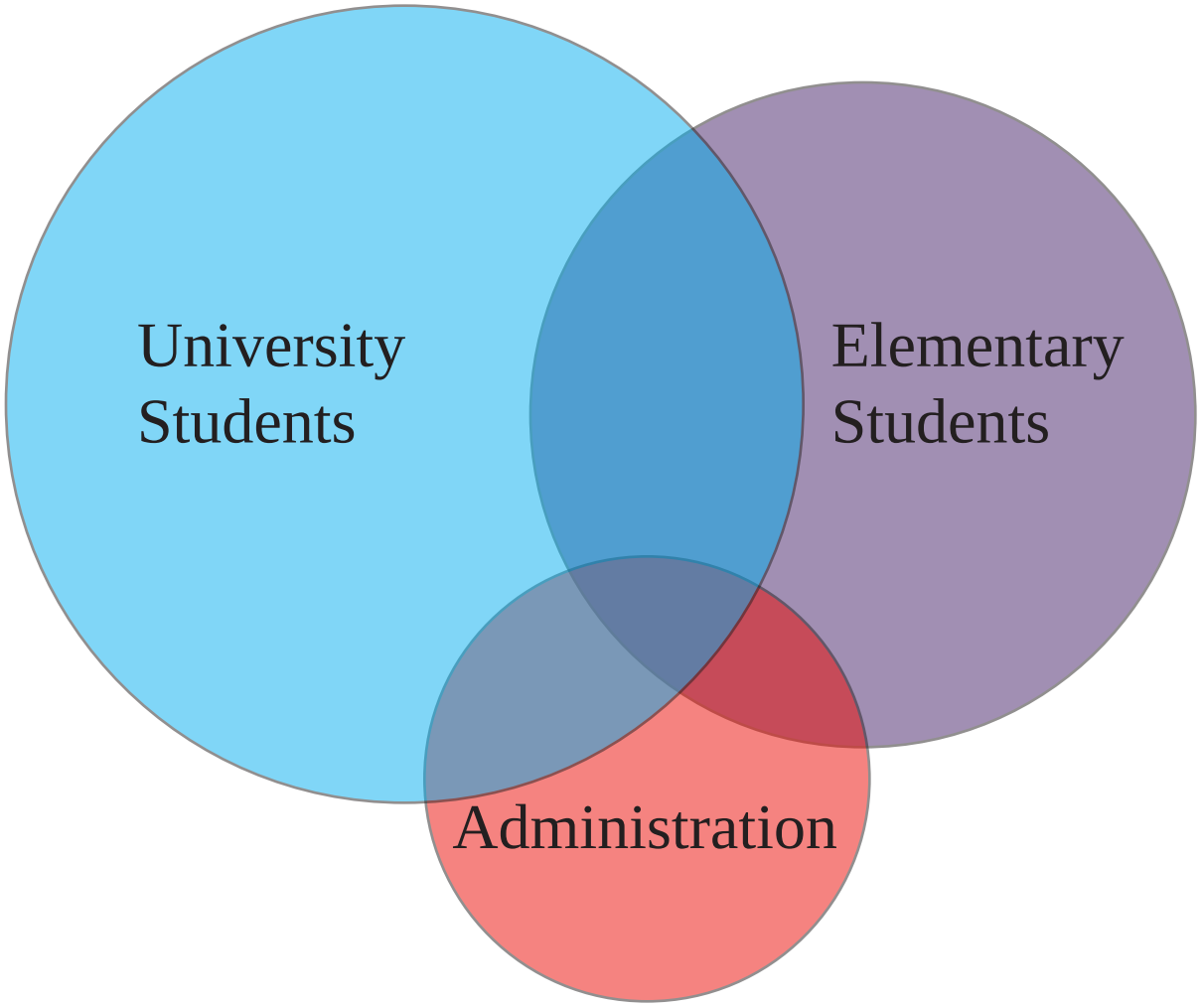
With the construction of the Education and Research Center I wish to bring the community out into nature and learn about the area while experiencing it in ways they never had before. By creating a place for both college students and children to interact and learn in their own ways, it allows a life long learning curve in one building.

Project Statement:

By designing Five College Incorporated Learning Center I wish to create a structure that will allow the public the opportunity of learning about the nature in the area, as well as experience it at a personal level. With the creation of this center the local five colleges will have the opportunity to work hand on with nature and the water system. With incorporation of different age groups, elementary level kids will have the opportunity to learn from university level students while also getting the hands on experience that children can easily learn by.

Problem Themes/ Architectural Intentions:

While design this space, I wish to create a place where elementary level children can interact and learn from university level students. I would like the learning curve be created from the university students and have them bring the information they have learned to the younger children. By creating a space that would allow the children to interact and view what the university students are doing they can learn and experience the nature in a new hands on way.


University
Students
Elementary
Students
Administration

Program Breakdown:

GALLERIES:

Wildlife		3600sq feet
Vegetation		3000sq feet
Stainability		4500sq feet
Living Machine		3000sq feet
Circulation/Mech.	15%	2115sq feet
		Total: 16215sq feet

ELEMENTARY EDUCATION

Classrooms/ Workshop areas		700sq feet
Circulation/Mech.	15%	105sq feet
		Total: 805sq feet

UNIVERSITY EDUCATION

Classrooms/ Small lab. areas (3)	600sq feet	1800sq feet
Laboratory, large		1800sq feet
Lecture Hall/ Auditorium		1600sq feet
Lounge		1000sq feet
Circulation/Mech.	15%	950sq feet
		Total: 7150sq feet

ADMINISTRATION

Educational Offices (2)	300sq feet	600sq feet
Administration Offices		1200sq feet
Conference Rooms (3)	300sq feet	900sq feet
Circulation/Mech.	15%	405sq feet
		Total: 3105sq feet

PUBLIC AREAS

Top Entrances Lobby		2000sq feet
Lower Entrance Lobby		750sq feet
Restrooms (6)	150sq feet	900sq feet
Circulation/Mech	15%	550sq feet
		Total: 4200sq feet

SERVICE AREAS

Maintenance		1500sq feet
Circulation/Mech.	15%	200sq feet
		Total: 1700sq feet

TOTAL 33175sq feet

Exterior Program:

Trails:

Existing and new connecting trails

Roof Green:

Exterior Space for the general public to sit and enjoy.
Benches will be put on the green to invite individuals to sit and stay.
Groups will be allowed to do experiments meet on the green.

getting in touch with nature

SITE

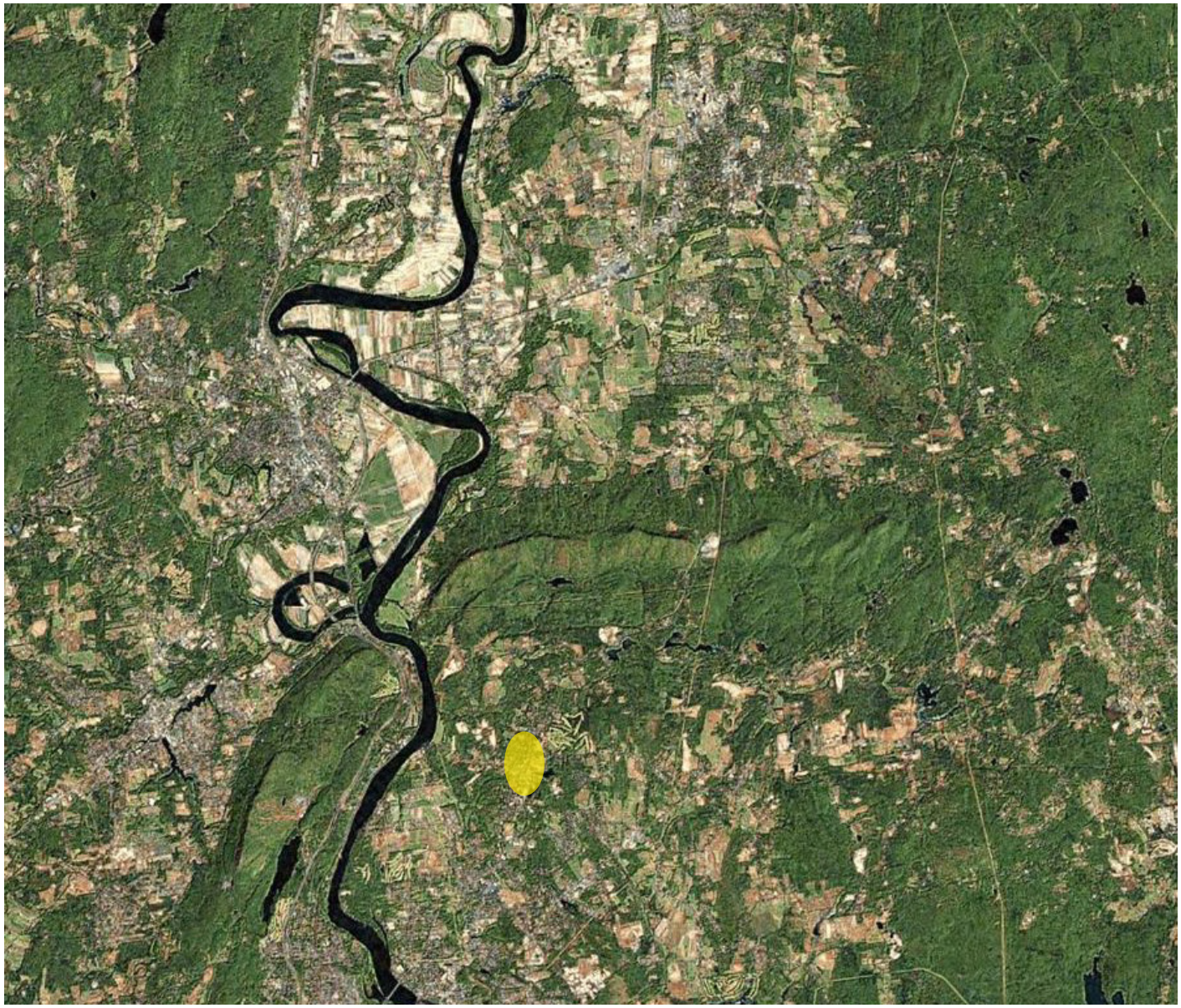
Mount Holyoke College
South Hadley, MA

Mount Holyoke College,
South Hadely Massachusettes

When siting the Research and Education Center, it was important to place it on a site where as many college students as well primary schools can benefit from it. By using 'The Five College Incorporated' system, which contains the five schools located in Amherst and South Hadely Massachusettes, the involvement of 2,200 faculty members, 5,300 courses, and 28,000 students were united and allowed to benefit from this building.

The proximity of South Hadely from Worchester and Springfield also came in mind when looking at the site. Springfield being only half-an-hour from South Hadley and Worcester being an hour, allows children from both of the major cities to in visit and become involved with the programs that this building will be housing. Primary schools located within a 2-mile radius were considered and thought to have the ability to be more involved with how the building will run.

Mount Holyoke College has developed a 'Center for the Environment' where they are consistently imagining ways to help the environment make their school more eco-friendly. This Center was founded in 1998 and has grown to a school wide force. Today the school as a whole is working diligently to lower their carbon footprint by monitoring the quality of their water run-off, developing energy conservation, participating in recycling events (such as RecyleMania).



getting in touch with nature

The Five Colleges Incorporated:

The five colleges are grouped together and act as a unit allowing students to freely register for classes which are being offered at the neighboring schools in which they wouldn't normally be able to take. Besides having the ability to learn at the other schools, there are also inter-campus programs which take place (such as a theater group), an inter-campus library, and free transportation between institutions. Below is a list of the schools as well as the programs each school has to offer the would be affected by the Research and Education Center.

Smith College:

- Geology
- Education and Child Study

Hampshire College:

- Biological/Life Sciences
- Environmental Studies/Sustainable
- Geology
- Marine Science

Amherst:

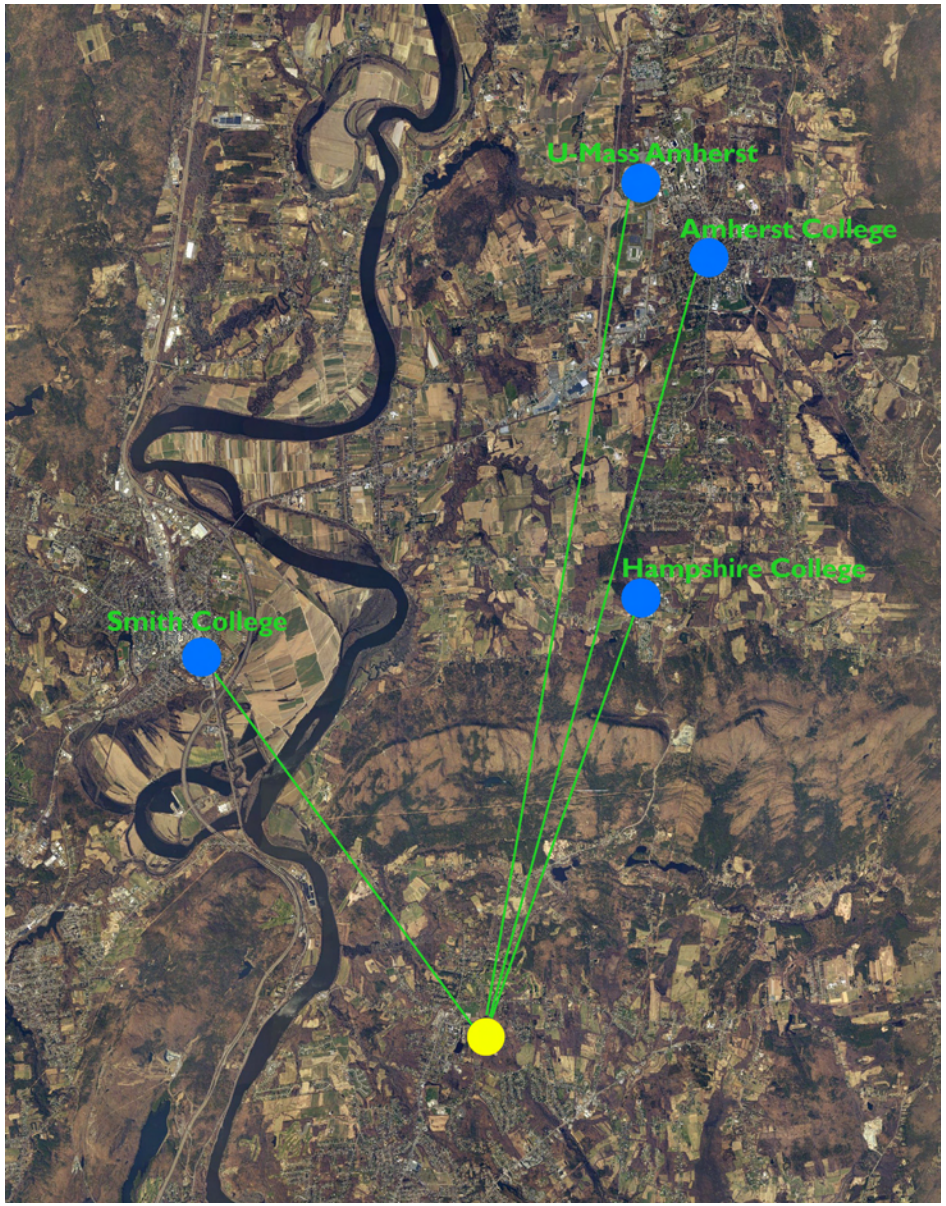
- Biology
- Geology

Mount Holyoke:

- Biochemistry
- Environmental Studies

University of Massachusetts Amherst:

- Biochemistry and Molecular Biology
- Biology
- Education
- Environmental Design
- Environmental Health Sciences
- Environmental Sciences
- Forestry
- Geology
- Microbiology
- Plant and Soil Sciences
- Wildlife & Fisheries Conservation



Distances from Mount Holyoke College:

Smith College
12 miles 25 minutes

Hampshire College
6.25 miles 12 minutes

Amherst College
9.5 miles 19 minutes

U-Mass Amherst
9.75 miles 20 minutes

BUS SCHEDULE FROM 5 LOCAL COLLEGES

For easy transit to and from the five colleges the students and faculty members are able to take Pioneer Valley Transit Authority's bus number 38 to and from all the local colleges.

MOUNT HOLYOKE COLLEGE	HAMPSHIRE COLLEGE	AMHERST COLLEGE	UMASS	AMHERST COLLEGE	HAMPSHIRE COLLEGE	MOUNT HOLYOKE COLLEGE
WEEKDAY						
—	—	—	6:45	6:55	7:05	7:20
—	—	—	7:10	7:20	7:30	7:45
6:55	7:10	7:20	7:30	7:40	7:50	8:05
7:30	7:45	7:55	8:05	8:15	8:25	8:40
7:55	8:10	8:20	8:30	8:40	9:00	9:15
8:20	8:40	8:50	9:00	9:10	9:30	9:45
8:50	9:10	9:20	9:30	9:40	10:00	10:15
Every 1/2 Hour Until						
4:20	**4:40**	**4:50**	**5:00**	**5:10**	**5:30**	**5:45**
4:55	**5:10**	**5:20**	**5:35**	**5:45**	**5:55**	**6:10**
5:25	**5:40**	**5:50**	**6:00**	**6:10**	**6:20**	**6:35**
5:55	**6:10**	**6:20**	**6:30**	**6:40**	**6:50**	**7:05**
6:20	**6:35**	**6:45**	**6:55**	**7:05**	**7:15**	**7:30**
6:45	**7:00**	**7:10**	**7:20**	—	—	—
—	—	—	**7:35**	**7:45**	**7:55**	**8:10**
7:15	**7:30**	**7:40**	**7:50**	—	—	—
7:40	**7:55**	**8:05**	**8:15**	**8:25**	**8:35**	**8:50**
8:20	**8:35**	**8:45**	**8:55**	**9:05**	**9:15**	**9:30**
9:00	**9:15**	**9:25**	**9:35**	**9:45**	**9:55**	**10:10**
9:40	**9:55**	**10:05**	**10:15**	**10:25**	**10:35**	**10:50**
10:20	**10:35**	**10:45**	**10:55**	**11:05**	**11:15**	**11:30**
11:00	**11:15**	**11:25**	**11:35**	—	—	—
11:40	**11:55**	12:05	12:15	12:25	12:35	12:50
1:00	1:15	1:25	1:35	—	—	—
Thursday Night						
—	—	—	1:35	1:45	1:55	2:10
2:20	2:35	2:45	2:55	—	—	—
Friday Night						
—	—	—	**11:35**	**11:45**	**11:55**	12:10
11:40	**11:55**	12:05	12:15	12:25	12:35	12:50
12:20	12:35	12:45	12:55	1:05	1:15	1:30
1:00	1:15	1:25	1:35	1:45	1:55	2:10
1:40	1:55	2:05	2:15	—	—	—
2:20	2:35	2:45	2:55	—	—	—
END OF DECEMBER and SPRING BREAK *						
—	—	—	7:00	7:10	7:20	7:35
7:45	8:00	8:10	8:20	8:30	8:40	8:55
9:05	9:20	9:30	9:40	—	—	—
—	—	—	**4:00**	**4:10**	**4:20**	**4:35**
4:45	**5:00**	**5:10**	**5:20**	**5:30**	**5:40**	**5:55**
6:05	**6:20**	**6:30**	**6:40**	—	—	—

MOUNT HOLYOKE COLLEGE	HAMPSHIRE COLLEGE	AMHERST COLLEGE	UMASS	AMHERST COLLEGE	HAMPSHIRE COLLEGE	MOUNT HOLYOKE COLLEGE
SATURDAY						
—	—	—	9:25	9:35	9:45	10:00
—	—	—	10:05	10:15	10:25	10:40
10:10	10:25	10:35	10:45	10:55	11:05	11:20
10:50	11:05	11:15	11:25	11:35	11:45	**12:00**
11:30	11:45	11:55	**12:05**	**12:15**	**12:25**	**12:40**
12:10	**12:25**	**12:35**	**12:45**	**12:55**	**1:05**	**1:20**
12:50	**1:05**	**1:15**	**1:25**	**1:35**	**1:45**	**2:00**
1:30	**1:45**	**1:55**	**2:05**	**2:15**	**2:25**	**2:40**
2:10	**2:25**	**2:35**	**2:45**	**2:55**	**3:05**	**3:20**
2:50	**3:05**	**3:15**	**3:25**	**3:35**	**3:45**	**4:00**
3:30	**3:45**	**3:55**	**4:05**	**4:15**	**4:25**	**4:40**
4:10	**4:25**	**4:35**	**4:45**	**4:55**	**5:05**	**5:20**
4:50	**5:05**	**5:15**	**5:25**	**5:35**	**5:45**	**6:00**
5:30	**5:45**	**5:55**	**6:05**	**6:15**	**6:25**	**6:40**
6:10	**6:25**	**6:35**	**6:45**	**6:55**	**7:05**	**7:20**
6:50	**7:05**	**7:15**	**7:25**	**7:35**	**7:45**	**8:00**
7:30	**7:45**	**7:55**	**8:05**	**8:15**	**8:25**	**8:40**
8:10	**8:25**	**8:35**	**8:45**	**8:55**	**9:05**	**9:20**
8:50	**9:05**	**9:15**	**9:25**	**9:35**	**9:45**	**10:00**
9:30	**9:45**	**9:55**	**10:05**	**10:15**	**10:25**	**10:40**
10:10	**10:25**	**10:35**	**10:45**	**10:55**	**11:10**	**11:25**
10:50	**11:05**	**11:15**	**11:25**	**11:35**	**11:45**	12:00
11:30	**11:45**	**11:55**	12:05	12:15	12:25	12:40
12:10	12:25	12:35	12:45	12:55	1:05	1:20
12:50	1:05	1:15	1:25	1:35	1:45	2:00
1:30	1:45	1:55	2:05	—	—	—
2:10	2:25	2:35	2:45	—	—	—
SUNDAY						
—	—	—	8:50	9:00	9:10	9:25
9:35	9:50	10:00	10:10	10:20	10:30	10:45
10:55	11:10	11:20	11:30	11:40	11:50	**12:05**
12:15	**12:30**	**12:40**	**12:50**	**1:00**	**1:10**	**1:25**
1:35	**1:50**	**2:00**	**2:10**	**2:20**	**2:30**	**2:45**
2:55	**3:10**	**3:20**	**3:30**	**3:40**	**3:50**	**4:05**
4:15	**4:30**	**4:40**	**4:50**	**5:00**	**5:10**	**5:25**
5:35	**5:50**	**6:00**	**6:10**	**6:20**	**6:30**	**6:45**
6:55	**7:10**	**7:20**	**7:30**	**7:40**	**7:50**	**8:05**
8:15	**8:30**	**8:40**	**8:50**	**9:00**	**9:10**	**9:25**
9:35	**9:50**	**10:00**	**10:10**	**10:20**	**10:30**	**10:45**
10:55	**11:10**	**11:20**	**11:30**	**11:40**	**11:50**	12:05
12:15	12:30	12:40	12:50	—	—	—

MOUNT HOLYOKE COLLEGE	HAMPSHIRE COLLEGE	AMHERST COLLEGE	UMASS	AMHERST COLLEGE	HAMPSHIRE COLLEGE	MOUNT HOLYOKE COLLEGE
WINTERSESSION WEEKDAY						
—	—	—	6:45	6:55	7:05	7:20
—	—	—	7:25	7:35	7:45	8:00
7:30	7:45	7:55	8:05	8:15	8:25	8:40
8:10	8:25	8:35	8:45	8:55	9:05	9:20
8:50	9:05	9:15	9:25	9:35	9:45	10:00
9:30	9:45	9:55	10:05	—	—	—
10:10	10:25	10:35	10:45	10:55	11:05	11:20
11:30	11:45	11:55	**12:05**	**12:15**	**12:25**	**12:40**
12:50	**1:05**	**1:15**	**1:25**	**1:35**	**1:45**	**2:00**
2:10	**2:25**	**2:35**	**2:45**	**2:55**	**3:05**	**3:20**
—	—	—	**3:25**	**3:35**	**3:45**	**4:00**
3:30	**3:45**	**3:55**	**4:05**	**4:15**	**4:25**	**4:40**
4:10	**4:25**	**4:35**	**4:45**	**4:55**	**5:05**	**5:20**
4:50	**5:05**	**5:15**	**5:25**	**5:35**	**5:45**	**6:00**
5:30	**5:45**	**5:55**	**6:05**	—	—	—
6:10	**6:25**	**6:35**	**6:45**	**6:55**	**7:05**	**7:20**
7:30	**7:45**	**7:55**	**8:05**	**8:15**	**8:25**	**8:40**
8:50	**9:05**	**9:15**	**9:25**	**9:35**	**9:45**	**10:00**
10:10	**10:25**	**10:35**	**10:45**	**10:55**	**11:05**	**11:20**
11:30	**11:45**	**11:55**	12:05	—	—	—
Friday Night						
—	—	—	12:05	12:15	12:25	12:40
12:50	1:05	1:15	1:25	—	—	—
WINTERSESSION WEEKEND						
—	—	—	9:25	9:35	9:45	10:00
10:10	10:25	10:35	10:45	10:55	11:05	11:20
11:30	11:45	11:55	**12:05**	**12:15**	**12:25**	**12:40**
12:50	**1:05**	**1:15**	**1:25**	**1:35**	**1:45**	**2:00**
2:10	**2:25**	**2:35**	**2:45**	**2:55**	**3:05**	**3:20**
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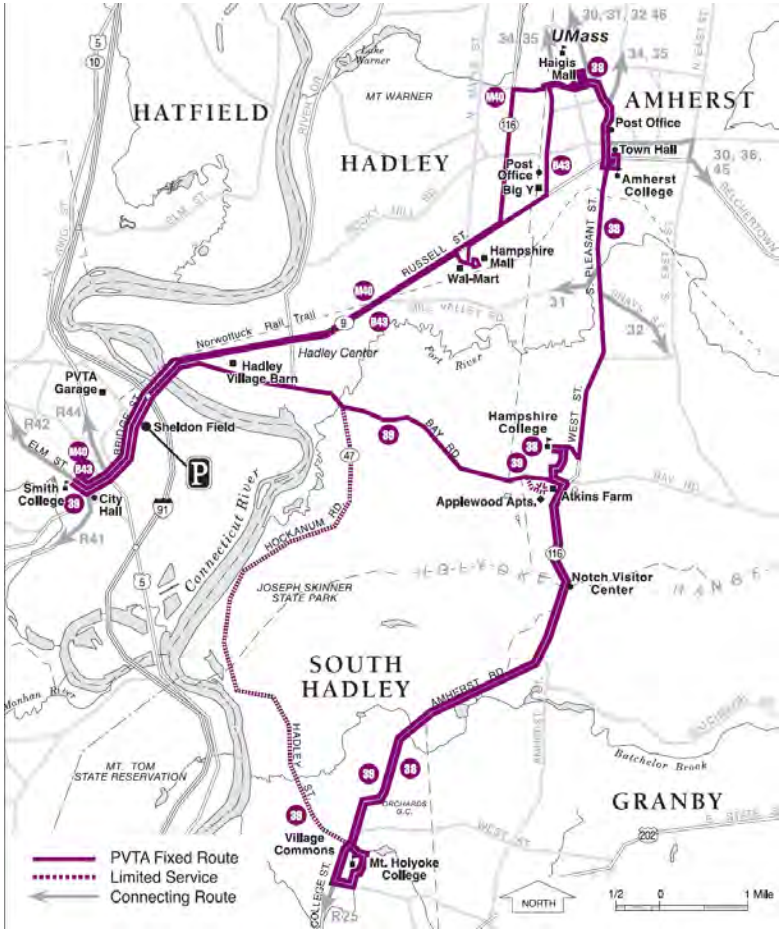
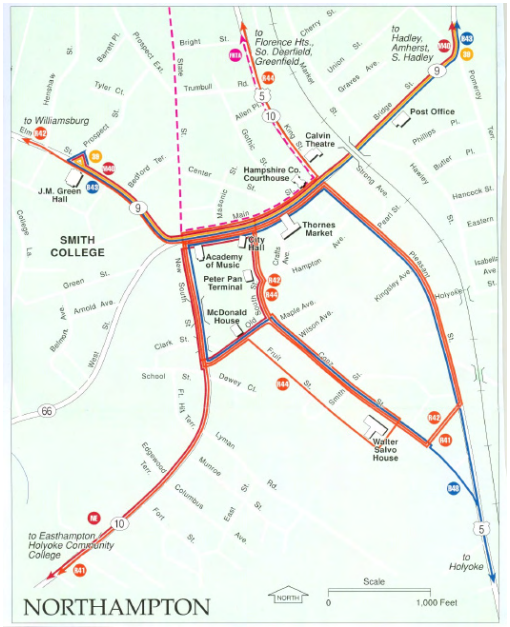
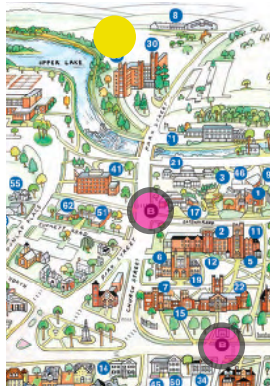
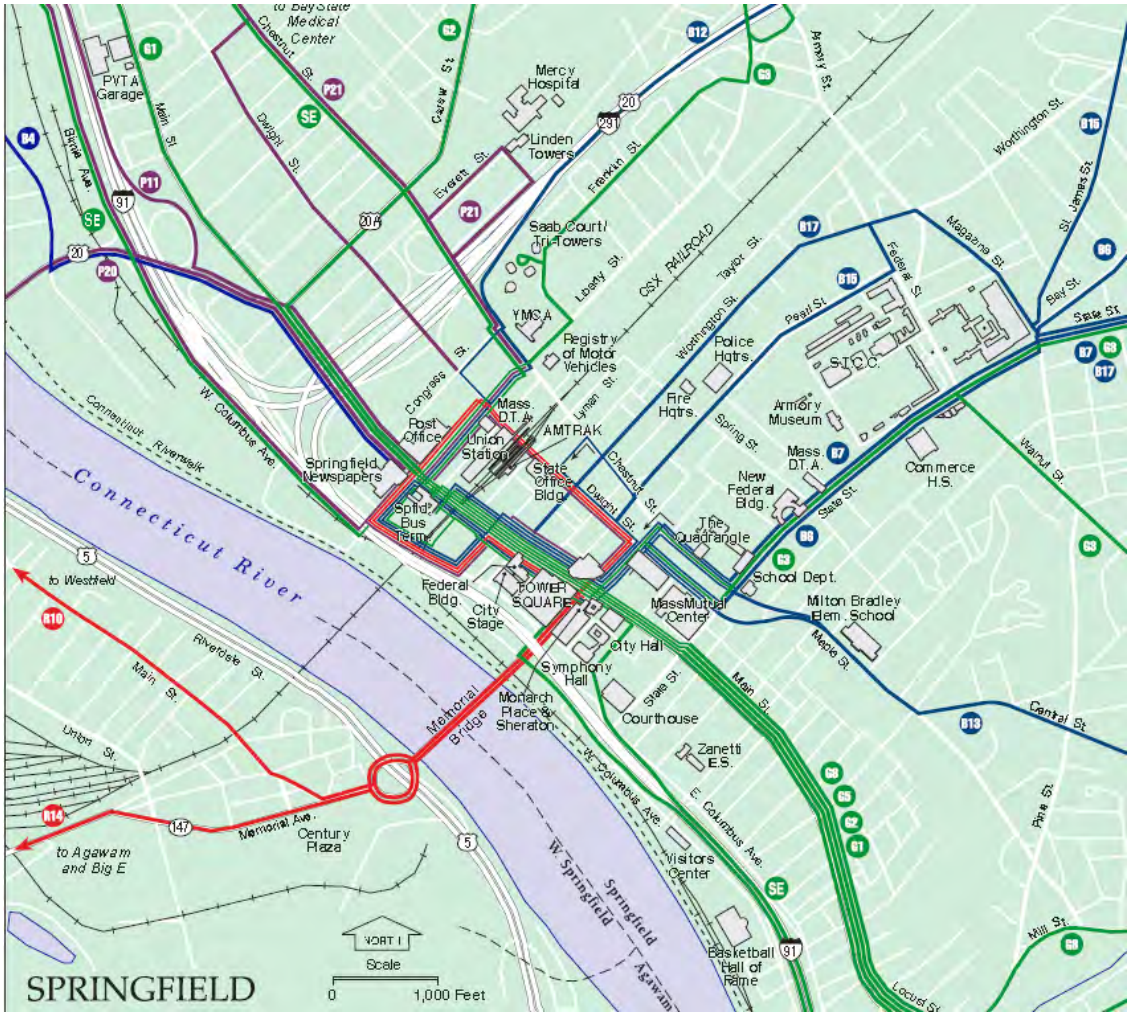
4:50	**5:05**	**5:15**	**5:25**	**5:35**	**5:45**	**6:00**
6:10	**6:25**	**6:35**	**6:45**	**6:55**	**7:05**	**7:20**
7:30	**7:45**	**7:55**	**8:05**	**8:15**	**8:25**	**8:40**
8:50	**9:05**	**9:15**	**9:25**	**9:35**	**9:45**	**10:00**
10:10	**10:25**	**10:35**	**10:45**	**10:55**	**11:05**	**11:20**
11:30	**11:45**	**11:55**	12:05	—	—	—
Saturday Night						
—	—	—	12:05	12:15	12:25	12:40
12:50	1:05	1:15	1:25	—	—	—







The Pioneer Valley Transit Authority bus route 38 connects the schools by use of their transit. During the week the bus leaves each school about every 20 to 40 minutes and conveniently allows the students to traveling from campus to campus. There is currently a bus stop directly next to my current site. This form of transportation makes it possible for students attending one school to take a class at another school.



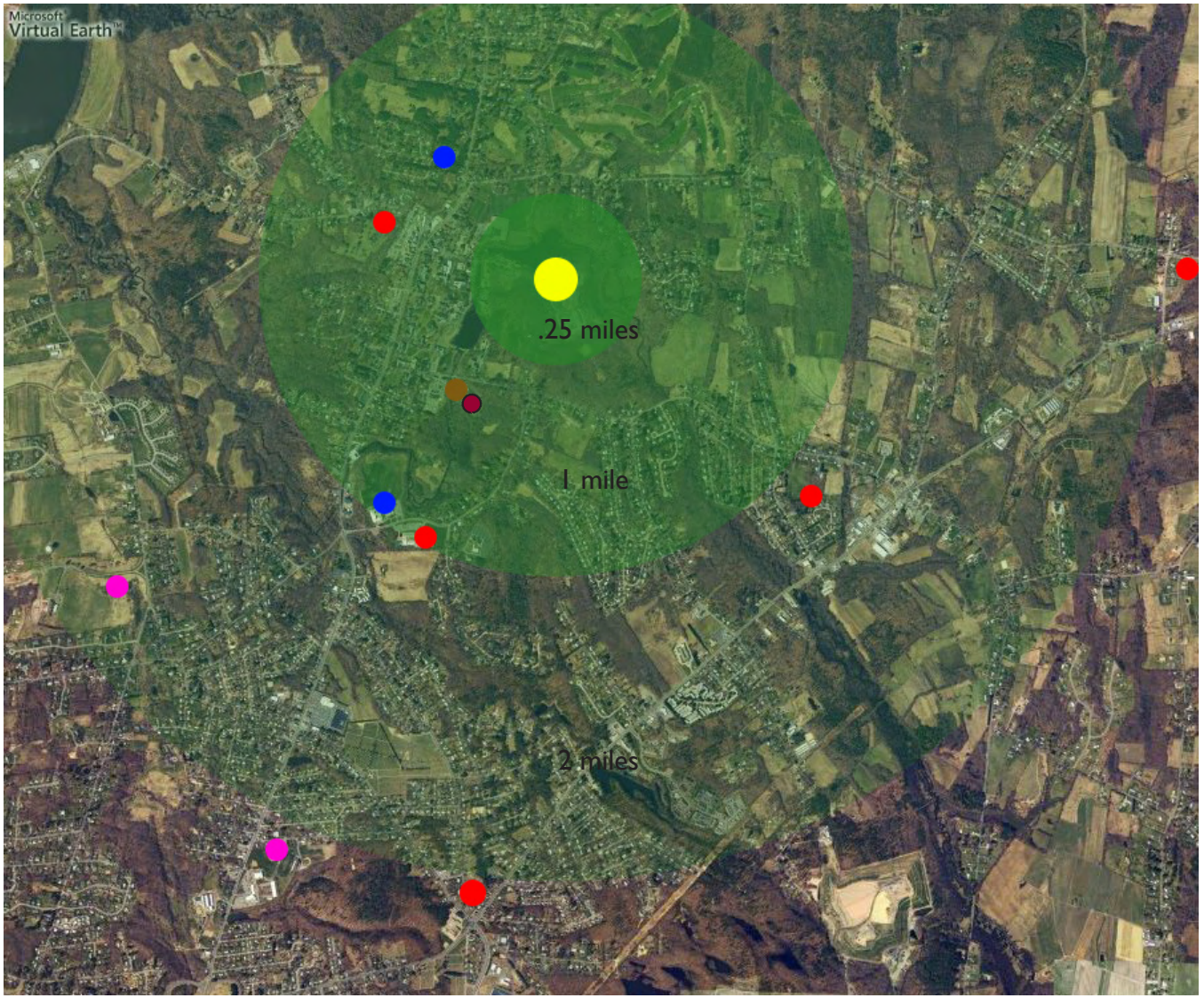
Pioneer Valley Transit Authority

Traveling as far away as Springfield Mass, the local transit authority can be used by a great number of people which will now have the availability to come and visit the Environmental Center for either a visit or a class.

Disctance to Local Schools

By looking at all the local schools in the area I was able to come to the conclusion that there are a great number of the children in the area and therefore the need to create a place where these children can meet and learn about their local environment. With the addition to these children, Springfield (13 miles) and Worcester (55 miles) are also with in a close proximity.

These schools are gaining the ability to send their students to a building were they can learn about the environment around them, as well a place were teachers can learn how to teach their students about today's latest technology and information. Everyday we are discovering and developing the newest ways to help protect our earth, and it is at high priority to teach the upcoming generation how to it is done. By creating a program for adults and teachers to learn how to show children the best ways to keep our planet safe, we will be able to instill the good ideals into their lifestyles at an early age, giving our planet some hope for the future.



High school
Middle school
Elementary school
Nursery School

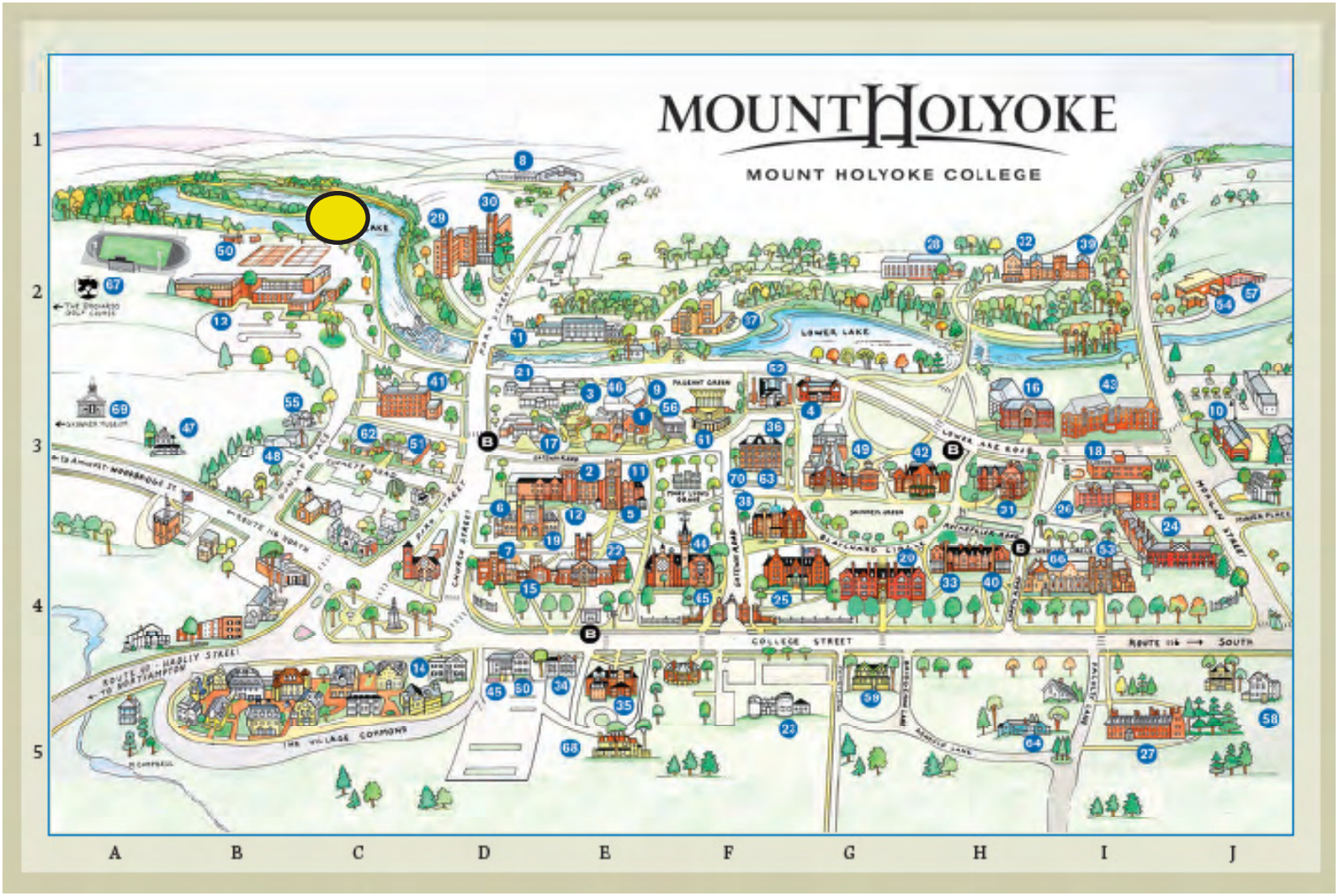
Mount Holyoke College

The college was the first of the Seven Sister Schools being an equivalent to a male Ivy League and is built on the principals of:

- Academic excellence
- Tight-knit, diverse, and international community
- Worldwide network of alumnae

Conviction that women can and should make a difference in the world

There are currently 2,200 students from 48 different states and almost 70 countries. There are almost 50 departmental and interdepartmental majors with an option to design your own major.



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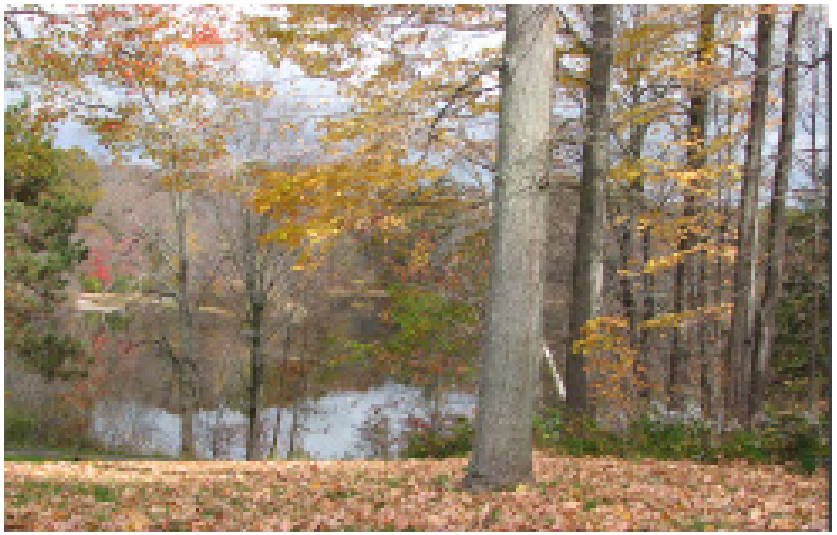
Images of Site

The plot of land between the Equestrian Center and the Upper pond would allow for views out onto the pond as well as accessibility to the stream which is located to the North of the site.



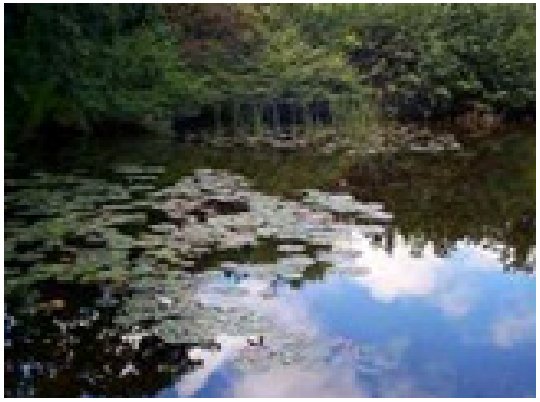
The site slopes down over 30 feet. It starts at the road which turns from the main street going through campus to the equestrian center, and ends 100 feet from the pond.

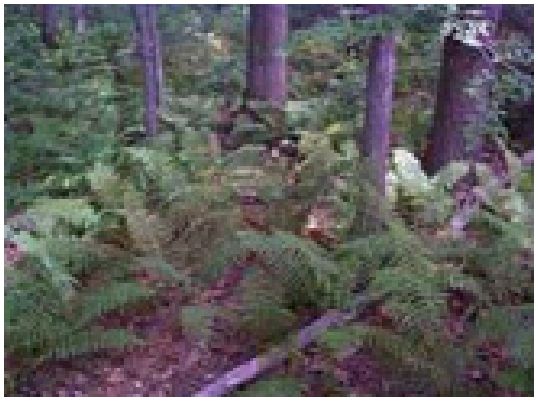
There are two rows of trees existing trees that would lead down to my site and would be an ideal axis for my main entrance.

getting in touch with nature

Flora of the Site

Mount Holyoke College is a unique locations with many special flora spotted around the college. With my site containing a sloping forested area as well as wetlands around the pond, it is an ideal location to explore and discover the many species of greenery.






Microsoft
Virtual Earth™
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Sun Diagram

Circulation Diagram

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Campus Habitats

The Mount Holyoke campus encompasses a surprising diversity of natural habitats including:

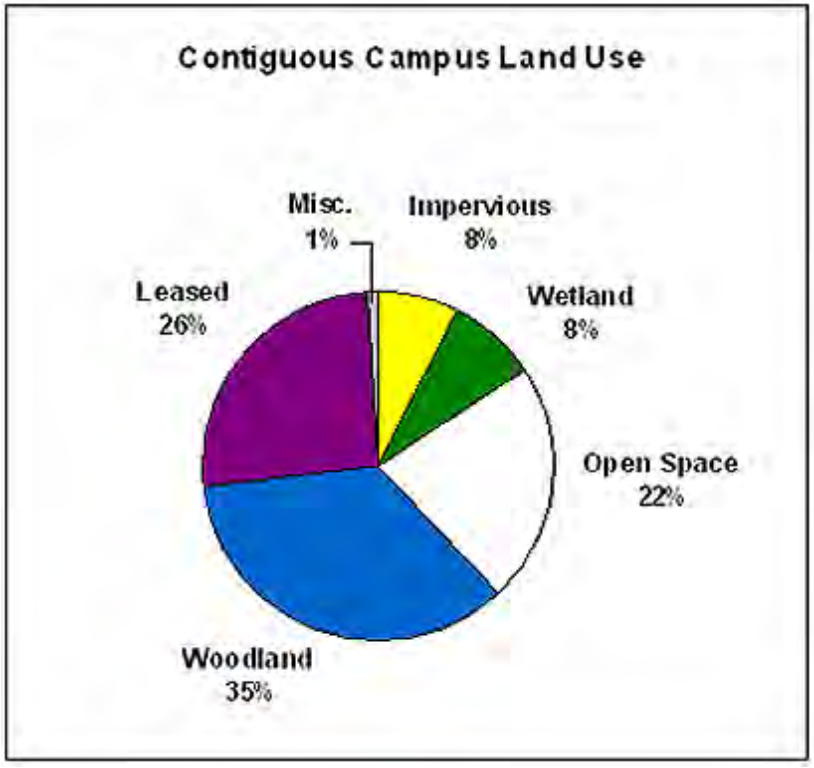
A Stream,
Two Lakes
Over a Dozen Vernal Pools
Forested Wetland
Shrub Covered Wetlands
Emergent Aquatic Plant Covered Wetlands
Upland Forests (hardwood, conifer and mixed)
Hemlock Stands
Open Fields

Due to the great diversity of habitat types, the diversity of animal and plant life on campus should also be high. However, little is known about what species are actually found.

The campus is located in the center of a mostly suburban/urban mosaic of land uses. The undeveloped part of campus is large enough to support populations of deer, several species of amphibians, and the Pileated Woodpecker. Because of the size and location of this habitat, the campus properties can be viewed as an important conservation area in an otherwise developed landscape. In addition, the diversity of habitats on the MHC campus provides an opportunity to use the campus as an outdoor environmental classroom.

http://www.mtholyoke.edu/ce/6005.shtml

With the addition to the Environmental Center on campus, the land can be surveyed and discovered to a greater extent. The preserved land is a breading ground for knowledge of land and the species that inhabit it. The inerior and exterior labs allows the university students to bring back a variety of vegetation and creatures, while respecting them and seeing what can be learned from these discoveries. At the moment the Mount Holyoke Community faculty and students are aiding the CD in conducting a more detailed survey of the wetlands on the campus.



http://www.mtholyoke.edu/ce/6005.shtml

Forest Habitat

The 328 acres of property of the Mount Holyoke Trustees contains 278 acres of forests. Hemlock stands on campus provide valuable winter habitat for several species of wildlife, as well as nesting habitat for owls.

84.8% of our campus is forested. The remaining area is made up of fields, lakes, wetlands, stream, a golf course and the built area.

Most of the forest stands are between 60 and 80 years old.

Stand Type	Acres	% of Forested
Oak and Hardwoods	78.4	28.2
Red Maple	94.5	34.0
White Pine/Mixed Hardwoods	45.4	16.3
Pine Plantations	42.6	15.2
Abandoned Fields	17.5	6.3

http://www.mtholyoke.edu/ce/6005.shtml

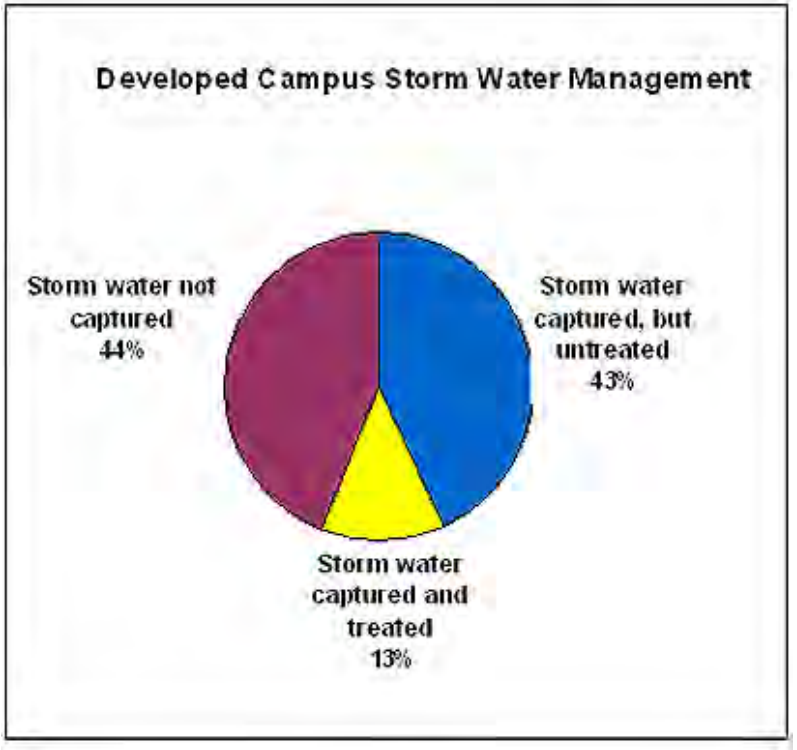
Wetland Habitats

There are several types of wetlands found on campus including:

Forested Swamps
Scrub/shrub Wetlands
Wetlands with Emergent Vegetation
Vernal pools

Wetlands are areas of high productivity and high species diversity. With the addition of a research center these areas will be able to be observed and understood at a higher level.

Wetlands are areas where the presence of water close to the surface of the ground determines the characteristics of the soils and the types of plants and animals found on the site. Wetlands sites are by definition saturated or covered with water periodically. This periodic inundation changes the characteristics of soils and tends to favor hydrophytic (adapted to wet soils) plants.



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Forested Wetland Habitat

The Mount Holyoke College campus has 95 acres of Red Maple forest. These stands are located along Stony Brook. One particularly large stand is bordered by Park St., Morgan St., Stony Brook, and the Equestrian Center. This area is the site of several vernal pools and seeps (areas where the groundwater reaches the surface and runs off in small streamlets and creates patches of soil that are saturated with water).

The mid-story of this area has many small White Pine (Pinus strobus) between 2 and 30 ft. tall. When these trees mature they will change the character of these stands—providing more evergreen cover and increasing the acidity of the soils.

The ground layer of these forested wetlands is dominated by Cinnamon Fern (Osmunda cinnamomea) and other hydropyhtic plants.

In many places, the understory has been invaded by exotic shrubs including Japanese Honeysuckle (Lonicera japonica) and Privet (Ligustrum vulgare). These invasive exotics tend to exclude native vegetation and often have a lower value to native wildlife.





http://www.mtholyoke.edu/ce/6005.shtml

Pasture /Meadow Habitat

Mount Holyoke College's property includes the 28 acres of the Long Farm Tract. This area consists of a large 23 acre field and an adjacent 5 acre field. Long Farm is currently used as a hay field and jumping course for the Equestrian Center. The field is fertilized and mowed two to three times a year. This current management regime has a negative effect on the biodiversity of the site.

Grassland Restoration

Grasslands are among the rarest habitats in the Northeast. A combination of forest reversion from pasture and modern haying schedules have reduced the acreage and ecological quality of northeastern grasslands. Fields that were hayed once in the late summer are now fertilized and mowed up to three times a season. High nutrient inputs decreases plant diversity by favoring a few species that outcompete others. Butterflies, moths, and other insects that depend on specific host plants are also lost when plant diversity decreases. In addition, by mowing during the grassland bird breeding season, species such as Grasshopper Sparrows, Savannah Sparrow, Bobolinks and Meadowlarks lose their nests and the foraging area they need to raise their young.

Restoring grasslands for biodiversity is a relatively easy task—change the mowing regime to mimic natural disturbances and in some cases seed the area with native grasses and forests. Mowing can be done in the late summer after birds have bred. The CE is currently drafting a plan for managing Long Farm as a grassland preserve.

http://www.mtholyoke.edu/ce/6005.shtml

Reservoir (Lake) Habitat

There are two lakes on the campus, the Upper and Lower Lakes, both of which are dammed reservoirs. They are characterized as shallow lakes with short retention times (water passes quickly from inlet to outlet) are also high in nutrients - eutrophic to hypertrophic. Nutrient loading occurs via inputs from Stony Brook and migrant and non-migrant waterfowl (Canada Geese and Mallard Ducks), the Golf Course and Equestrian Center may also provide nutrient inputs; however, this has not yet been assessed. Currently, the Golf Course withdraws water from Upper Lake, it has been determined that withdrawals from Stony Brook when the flowrate is low could result in further eutrophication of the lake.

Stream Habitat - Stony Brook

The heart of the Mout Holyoke College campus lies in the Stony Brook watershed. There have currently begun a program to monitor and assess the ecological condition of the stream.

Stony Brook is a warm water stream and is the largest on the property, while several smaller, intermittent streams feed into Stony Brook. The campus provides a relatively undisturbed section of the stream that runs through the forest as well as several sections that are bordered by roads and buildings.

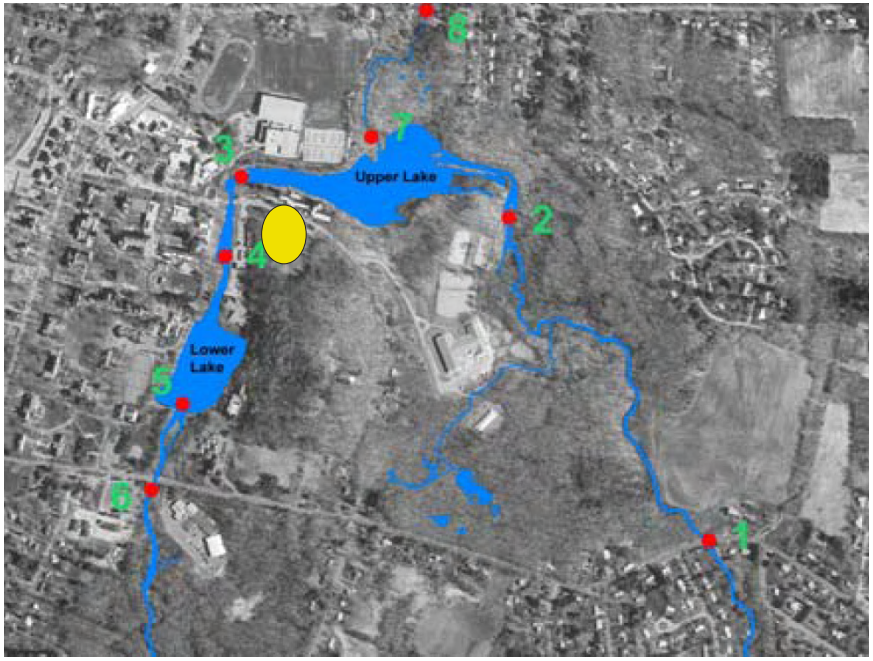
http://www.mtholyoke.edu/ce/6005.shtml

The biological character of this stream is determined both by its geomorphology (shape, gradient, stream bed characteristics) and human influences. These influences include impacts from the surrounding watershed (agricultural runoff, construction and industrial effluents) and from within campus (runoff, alteration of the stream channel, and alteration of the vegetation adjacent to the stream). The water course of a stream can be divided into three broad categories of habitat based on stream velocity and depth—runs, riffles, and pools.

Runs - deep moderately fast reaches.
Riffles- high gradient sections with high turbulence.
Pools - calm sections where sediments tend to collect.

Each type of habitat provides homes for different types of stream organisms. Deeper calmer pools may support emergent and floating aquatic vegetation.

Sections of the riparian corridor on either side of the stream have been severely modified by human activity. A riparian buffer zone provides cover for wildlife, stabilizes the bank, and can filter runoff before it reaches the stream. If the buffer is too narrow, it cannot effectively provide these functions.



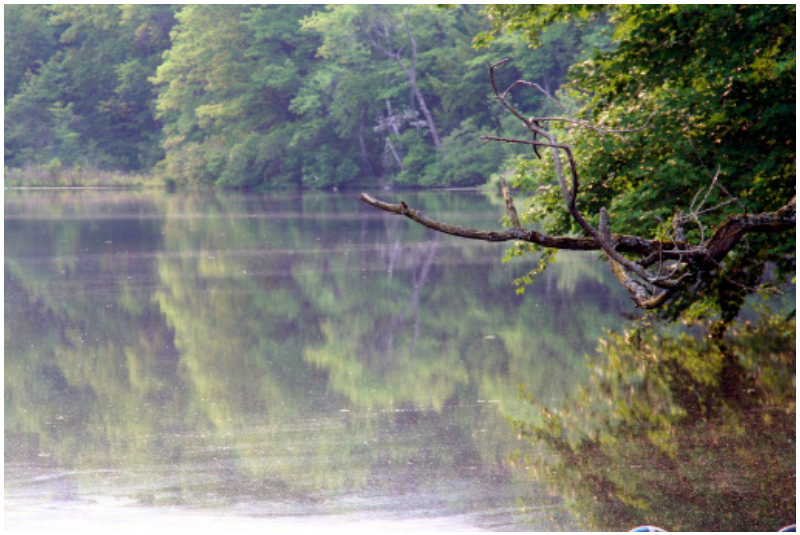
http://www.mtholyoke.edu/ce/6005.shtml

Vernal Pools

The Mount Holyoke College properties have at least a dozen vernal pools. Four of these pools have the definitive characteristics of vernal pools and have the organisms commonly found in vernal pools.

Vernal pools are a critical wetland resource for many species of animals and plants. Animals that require vernal pools for part of their life, usually breeding, are referred to as obligate vernal pool species. Obligate species include several varieties of salamanders, frogs and the fairy shrimp. These obligate species require bodies of water that are free from predators and remain wet for at least two months during the spring. Vernal pools typically dry up sometime during the summer or every few summers. This keeps fish—the obligate's natural predator—from establishing permanent populations.

http://www.mtholyoke.edu/ce/6005.shtml



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Species/ Wild Life

Green Frog* Rana clamitans
American Toad* Bufo americanus
Spring Peeper* Pseudacris crucifer
Painted Turtle Chrysemys picta

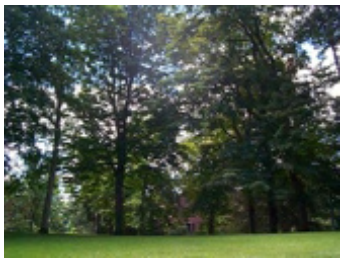
Vernal pools can be found in many types of habitats:

along stream or river corridors
in forests
in open fields

They are defined by their lack of fish populations and maintenance of water for at least two months of the year.

(Breeding Amphibians and Vernal Pools are marked with an asterisk in the tables above)

Name	Scientific Name
American Eel	Anguilla rostrata
Blacknose Dace	Rhinichthys atratulus
Creek Chub	Semotilus atromaculatus
Fallfish	Semotilus corporalis
White Sucker	Catostomus commersoni
Pumpkinseed	Lepomis gibbosus
Tessellated Darter	Etheostoma olmstedi
Brown Bullhead Catfish	Ameiurus nebulosis
Chain Pickerel	Esox niger
White Crappie	Pomoxis annularis
Yellow Perch	Perca flavescens
Largemouth Bass	Micropterus salmoides
Smallmouth Bass	Micropterus dolomieui
Yellow bullhead	Ictalurus natalis
Black Bullhead	I. Melas
Channel Catfish	I. Punctatus
White perch	Morone americana
Bridled shiner	Notropis bifrenatus
Sunfish spp.	Ictalurus spp. (several species)



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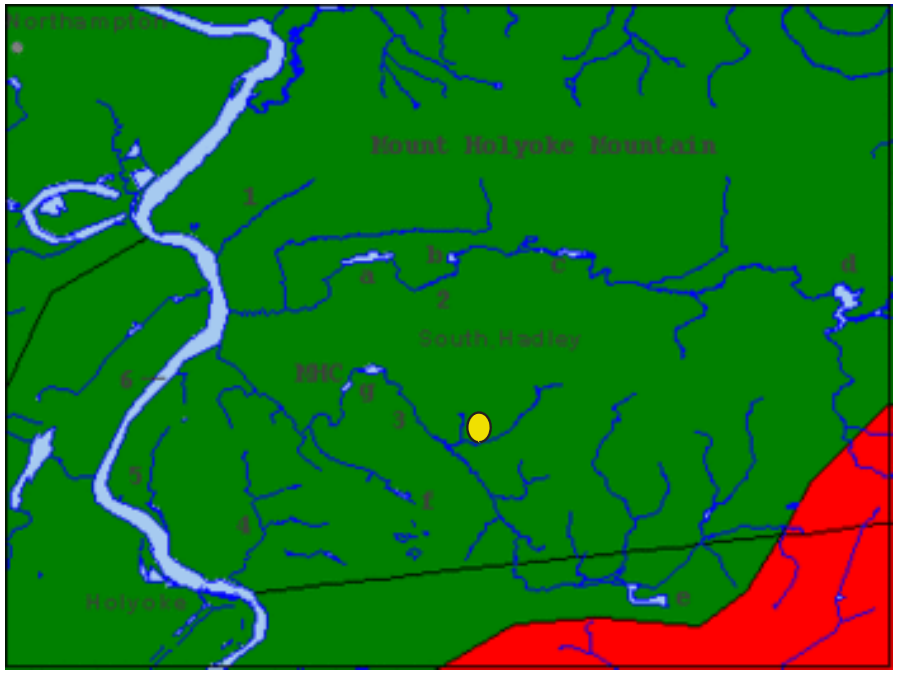
During the early spring, many species of frogs will travel to vernal pools to breed. Males attract females to the pools with loud and conspicuous calls. The first frogs to arrive at vernal pools are Wood Frogs (call sounds like a quaking duck), which are usually followed by Spring Peepers (call sounds like a high long trill). The sound of these choruses can sometimes be heard from a great distance. When the females arrive at the pools, they will pick a mate. This is where the frog eggs develop into tadpoles; until they metamorphose into frogs, they spend their time feeding in the vernal pools. Once tadpoles develop feet and absorb their tails, they leave the ponds for the uplands surrounding the pool.

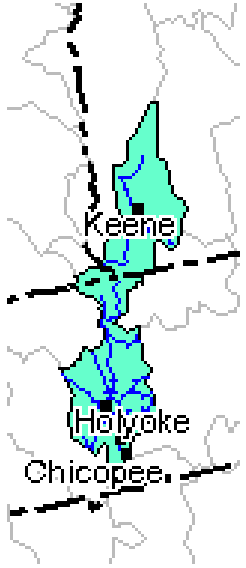
A salamander's use of vernal pools is a less conspicuous and lengthy affair. During the first warm rain in March, salamanders will move down from the uplands into vernal pools. There they will perform courtship displays. The young salamanders then leave the pool for the surrounding upland environment.

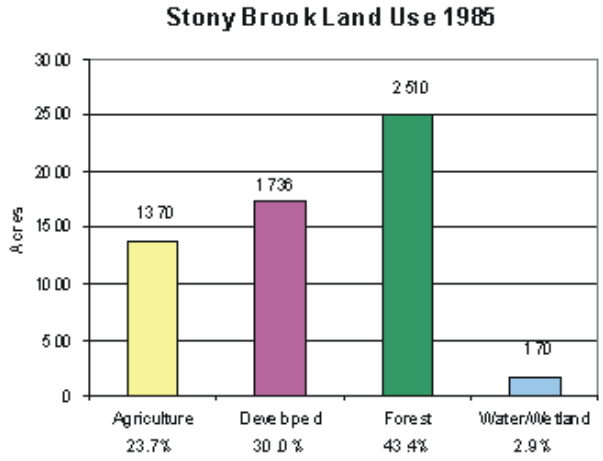
http://www.mtholyoke.edu/ce/6005.shtml

Watershed

The Pioneer Valley (in which the campus is located) is part of the Middle Connecticut watershed which disseminates into the Connecticut River. The quality of the water that ends up in the river is dependent on the use of the land and the care that is put into the illimination of containments getting mixed with this water before and after it enters the ground







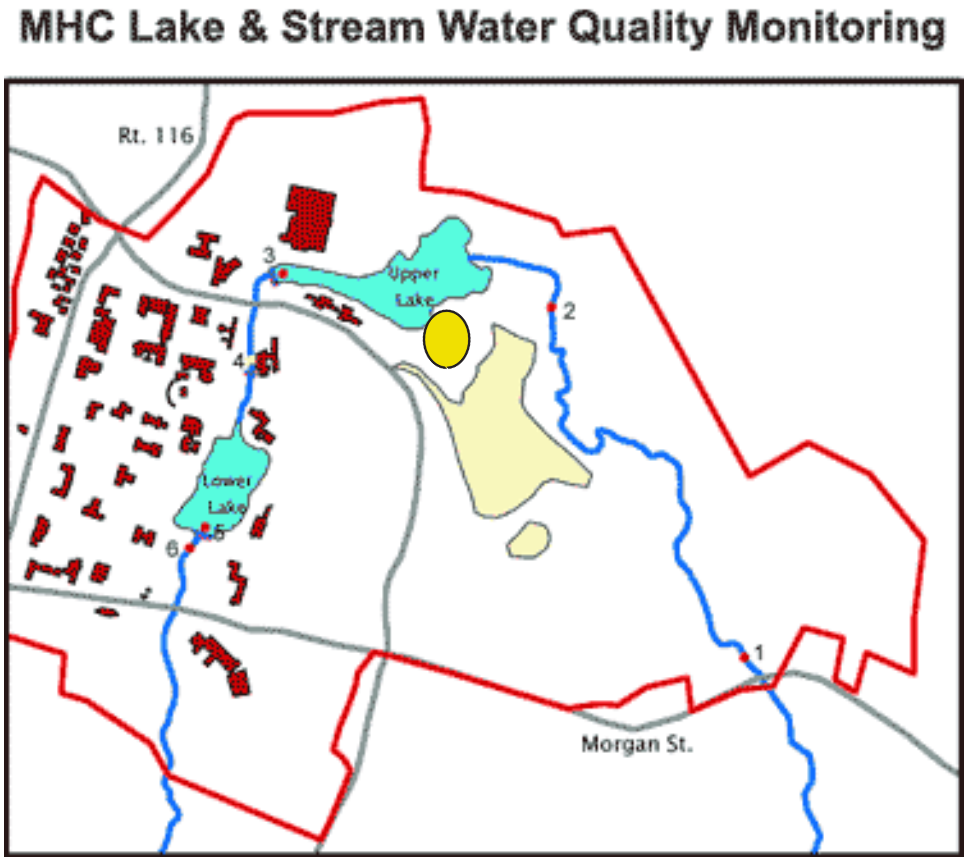
http://www.mtholyoke.edu/ce/6005.shtml

53% of the land in the Stoney Brook watershed is used for human activity. Depending on the land, impacts on the quality of the water may be impacted by

Agriculture- fertilizer, manure, and soil runoff

Human- Storm water runnoff, sewage, lawn chemical, and industrial effluents

Vegetation- type of vegetation may be determine nature of runoff

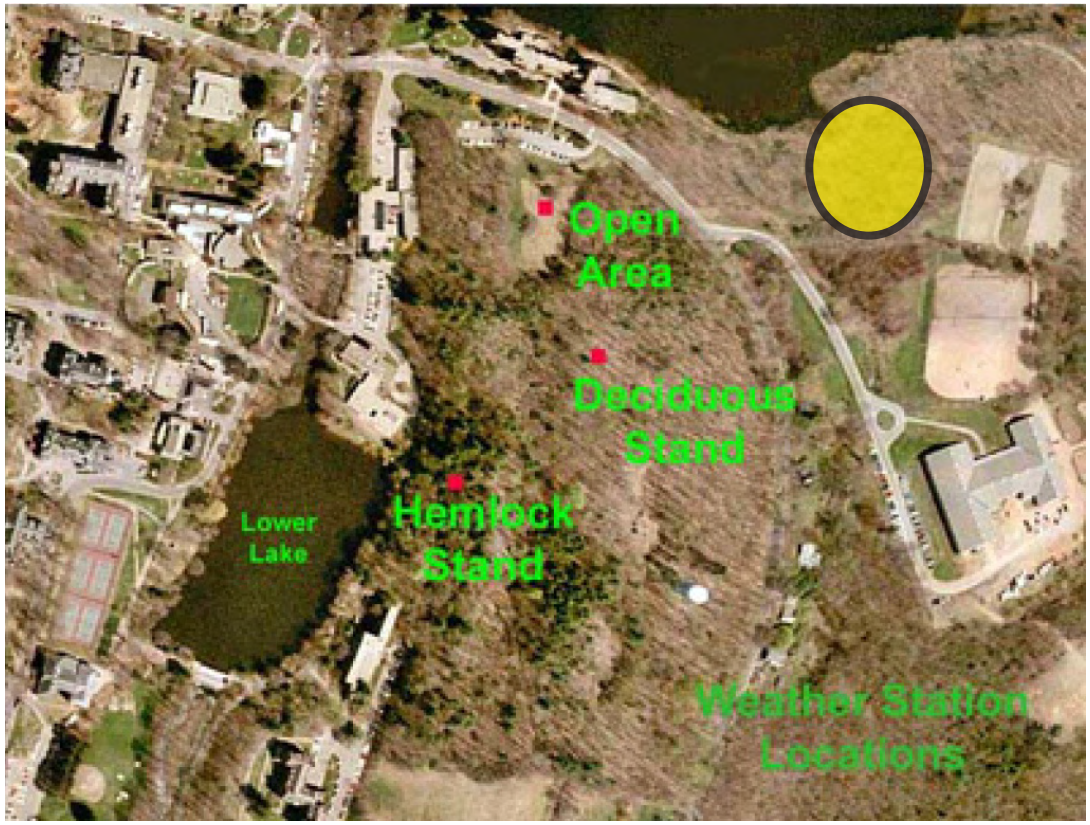


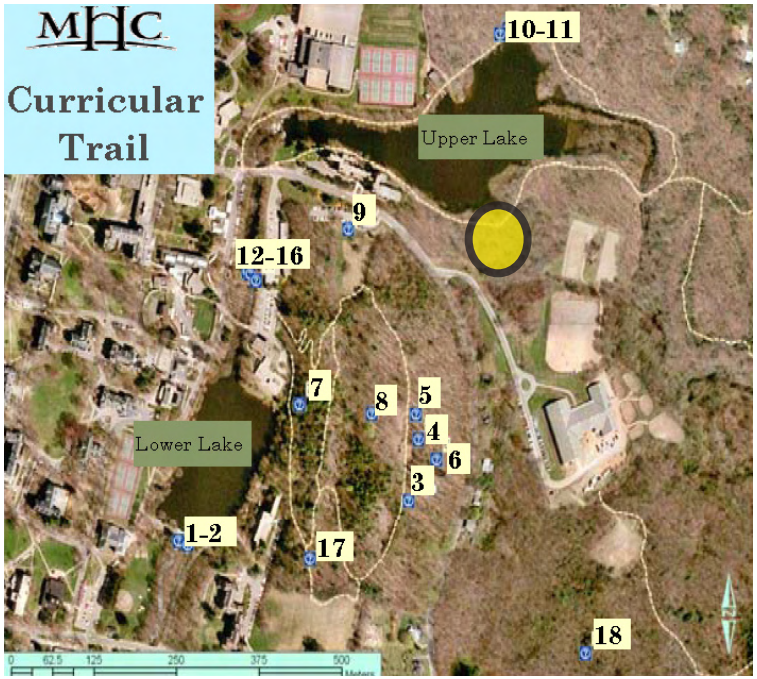
http://www.mtholyoke.edu/ce/6005.shtml

CAMPUS TRAILS

Classes that currently use the trails :

- Bio 223 (Ecology)
- Bio 331 (Conservation Biology)
- Bio 145 and Bio 150 (Intro Biology)
- ChemBio 160 (Integrated Intro to Biol and Chem)
- ES 100 (Introduction to Environmental Studies)
- ES 200 (Environmental Science)
- Geol 101 (Environmental Geology)
- Geol 203 (Surface Processes)
- Hist 283 (Environmental History of the Mount Holyoke Campus)



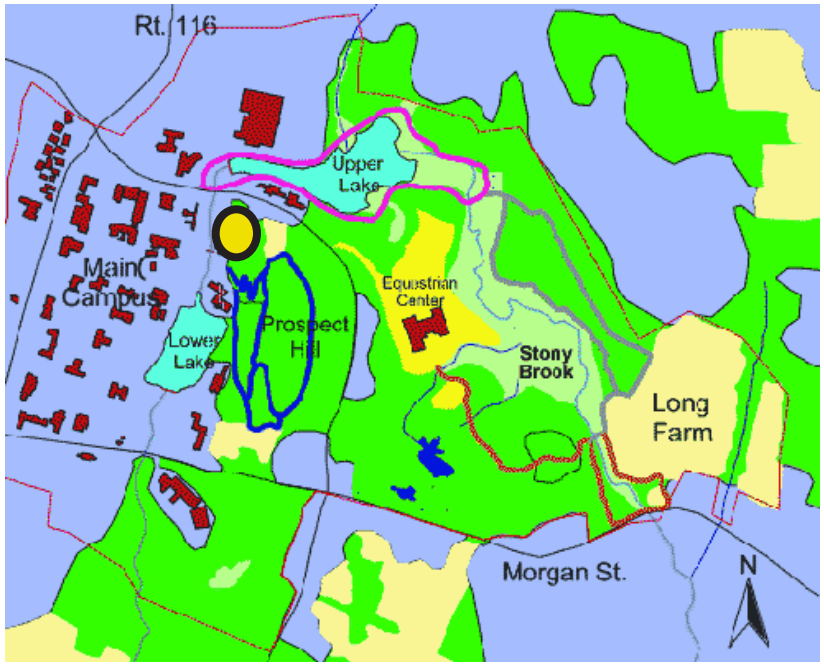


1-2 Eel Way
3-6. Prospect Hill Forest
7-9 Weather Stations
10-11 Invasive Species
12-14 Water Quality
15-16. Land Use History
17. Woolly Adelgid
18. Vernal Pools

Upper Lake Loop

(1.63 km / 1 mile)

This loop surrounds the Upper Lake and runs by Equestrain Center, Torrey Hall and Ham Hall. It crosses over Stony Brook near adjacent to the inlet of Long Lake and brings you through bordering wetlands, strands of upland hardwood forest, marshes, and scrubby wetlands.



Environmental Management Systems

An EMS creates procedures and processes to integrate environmental stewardship into daily life at Mount Holyoke College. It is an ongoing process of improving our environmental impact. There are four stages to an EMS:

Planning — Identify environmental impacts, establish objectives and benchmarks, set goals.

Implementation — Establish responsibilities, training, documentation, and communication.

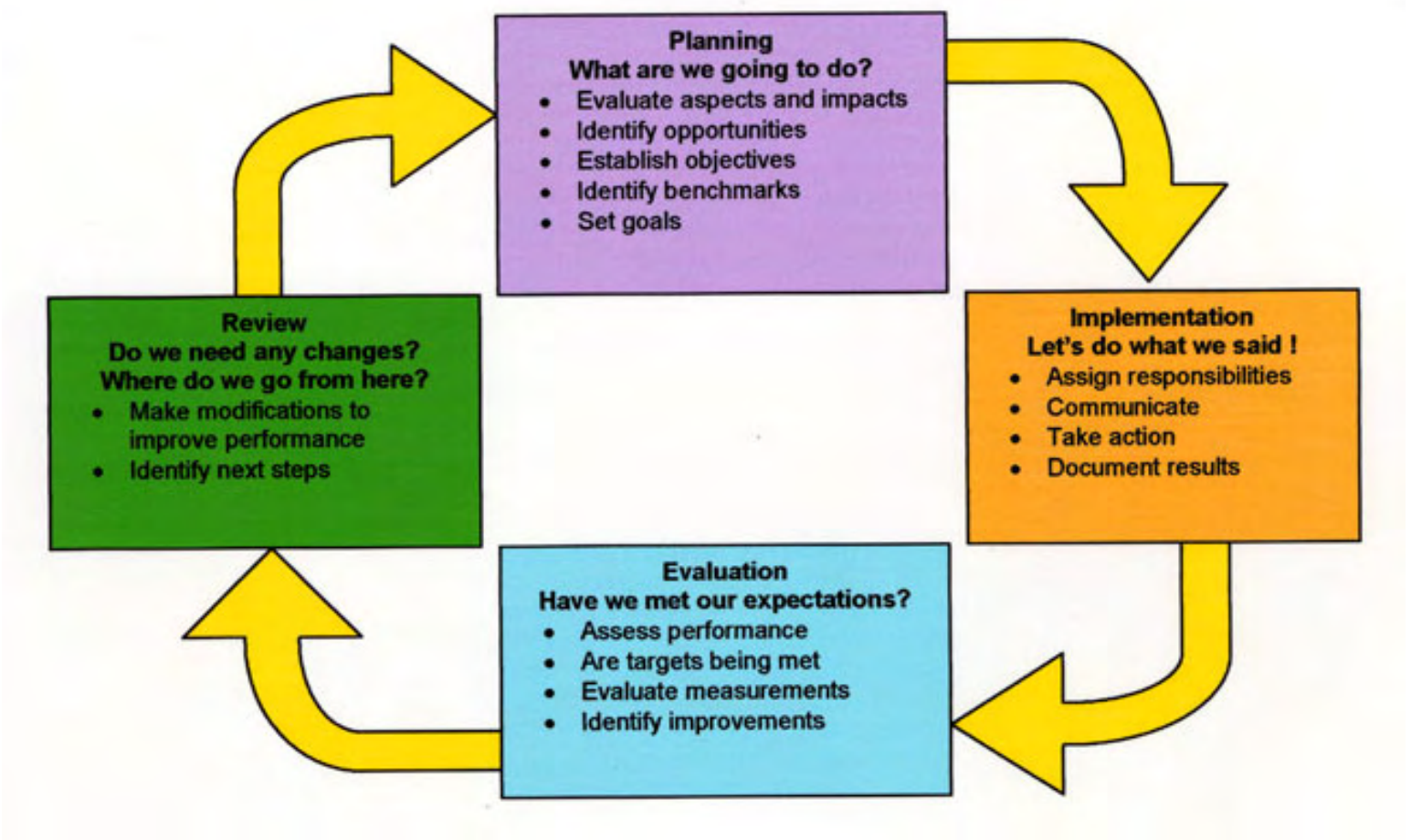
Evaluation — Are targets being met? What can be improved upon?

Review — Make modifications to improve performance.

Focus Areas:

Our EMS efforts are organized around 5 focus areas that are specifically identified in the Mount Holyoke College Plan for 2010.

Green Building Constuction and Design
Waste Reduction and Recycling
Energy Conservation
Environmentally Sensitive Grounds Practices
Hazardous Materials Management


Planning
What are we going to do?
• Evaluate aspects and impacts
• Identify opportunities
• Establish objectives
• Identify benchmarks
• Set goals
Implementation
Let's do what we said !
• Assign responsibilities
• Communicate
• Take action
• Document results
Evaluation
Have we met our expectations?
• Assess performance
• Are targets being met
• Evaluate measurements
• Identify improvements
Review
Do we need any changes?
Where do we go from here?
• Make modifications to improve performance
• Identify next steps

Designing on Campus

Mount Holyoke College has committed to environmental stewardship which includes the construction of green buildings. The following Environmentally Responsible Building Principles serve as a guide in decision making during building siting, design, construction, and operation.

- Site and design the building to minimize long-term environmental impact and operate the building to maximize the benefit of the environmental design elements.
- Design and construct the building to minimize the impact on the natural environment of the site and the campus.
- Optimize use of passive energy strategies to make the most of natural lighting, heating, cooling and shading to complement mechanical systems.
- Design mechanical lighting, heating and cooling systems to minimize energy use and emission of greenhouse gases.
- Create a comfortable and healthy indoor environment.
- Minimize potable water use by mechanical systems, building occupants, and for exterior landscaping.
- Minimize and control water runoff from the site to prevent degradation of Stony Brook and Upper and Lower Lakes.
- Use building materials that minimize the life cycle environmental impact of those materials
- Minimize waste generation during the construction process and maximize reuse and recycling.

This document serves as a set of Guidelines to be used in the design and construction phase of construction and renovation projects on campus. While it may not be feasible to achieve all of the aspirations included in the Guidelines, the project review process established will establish goals for each project and measure performance against the Guidelines and individual project goals. These Guidelines are in addition to all legal obligations under local, state and federal codes and regulations. The Guidelines will be reviewed at least annually to determine if it is an effective tool in support of Mount Holyoke's Environmentally Responsible Building Principles.

Environmentally Responsible Green Building Design Guidelines

A. Site Selection and Stewardship

Principle: Site and design the building to minimize long-term environmental impact and operate the building to maximize the benefit of the environmental design elements.

Principle: Construct the building to minimize the impact on the natural environment of the site and the campus.

Principle: Minimize and control water runoff from the site to prevent degradation of Stony Brook and Upper and Lower Lakes.

A.1.0 Site Selection

1.1 Development Area

Select sites without sensitive natural features and restricted land uses.

Give preference to sites with existing building space or in developed areas of campus.

Locate buildings and plantings so that deciduous trees block summer sun to the south and west, and evergreens block winter wind.

A.2.0 Site Analysis and Development

2.1 Resource Conservation

Map sun and shade patterns, and ground level wind patterns associated with new construction.

Conserve existing natural areas and restore degraded areas to provide habitat and maintain diversity.

Minimize impact on existing hydrological features (e.g., streams, lakes, wetlands, groundwater).

2.2 Site Access and Transportation and Parking

Promote walking and bicycling and provide safe routes, including extending sidewalks to the end of campus, and supporting landscape features (e.g., paths, seating).

Provide bicycle racks and evaluate need for changing rooms.

Encourage use of public transportation by locating buildings a convenient distance from bus stops or evaluating the need for bus route changes.

Avoid creation of additional parking spaces on campus and minimize parking lot size.

2.3 Building Footprint and Utility Placement

Minimize the building footprint and other impervious surfaces to minimize site disruption and storm water runoff.

Cluster underground utilities running in conduits using shared-trench technology where feasible.

Locate underground utilities in roadways or fire lanes, to minimize site disturbance.

2.4 Storm water Runoff Generation and Management

Minimize program needs for paved surfaces such as sidewalks and roadways.

Minimize storm water runoff from impervious surfaces through use of groundwater recharge, porous pav ing materials, garden roofs or other techniques; consider overflow areas that use turf or other low impact material.

Use natural runoff control and treatment systems such as bioswales. If natural methods are not feasible capture all runoff from impervious surfaces and treat prior to discharge.

Use greenwall technology (incorporating plantings) instead of hardscape for retaining walls.

Use planted buffers to direct grading and drainage.

2.5 Utilize Sustainable Landscape Practices

Select plants that are native or adapted to the site's microclimate. Stress plant diversity and avoid mon oculture planting. Do not use invasive or potentially invasive plants.

Avoid the use of plant species that are high maintenance and have significant pest problems.

If possible, orient plants in the same direction they grew in the nursery.

B. Building Orientation and Design Characteristics

Principle: Site and design the building to minimize long-term environmental impact and operate the building to maximize the benefit of the environmental design elements.

Principle: Optimize use of passive energy strategies to make most of natural lighting, heating, cooling and shading to complement mechanical systems.

Principle: Use building materials that minimize the life cycle environmental impact of those materials.

B.1.0 Topography

Limit cut and infill by utilizing existing site contours.

Utilize/modify existing topography to obtain the insulating effect of earth (berming and other manipula tions of the section).

B.2.0 Building Orientation

Optimize site placement and building form to reduce energy loads.

Orient buildings to protect entrances and minimize infiltration from prevailing winter winds. Take advan tage of non-winter air movement by utilizing prevailing winds for natural ventilation.

Maximize passive solar opportunities by elongating the building structure on its east-west axis. Allow use of natural daylight and winter solar gain, while minimizing summer heat gains/ cooling loads on the east and west building facades (eastern exposures are less problem atic than western in terms of heating/cooling costs). Consider north facing glazing for occupants requiring more uniform levels of diffuse daylight. Direct solar gain should be considered for all south-facing spaces where critical visual activities are not typically conducted.

B.3.0 Use of Natural Light

Optimize use of daylight in new and renovated campus facilities.

Review alternatives for reducing electric lighting use through daylight harvesting.

Strive for line of sight to vision glazing for regularly occupied spaces, creating views and connecting in doors and outdoors.

Maximize daylight through location and size of windows, skylights, and through use of glazing systems and shading devices.

B.4.0 Building Envelope

4.1 Window Frame and Glazing Performance

Consider fritted, and spectrally selective glazing tuned to use and orientation on south, east or west elevations.

Consider shading to let in natural light but exclude heat and glare and control contrast ratios. Shading strategies include vertical fins on east and west fenestration, overhangs or light shelves on south fenestration, as well as arcades, trees, "brise-soleils," and deep window insets.

4.4 Heat Island Control

Consider vegetated roofs.

4.5 Heat Loss through Stack Effect Control

Consider different design solutions for storing heat in the building structure or materials (e.g., south-facing opaque mass walls) and moderate interior temperatures where appropriate through the use of sufficient thermal mass.

C. Building Mechanical Systems

Principle: Design mechanical lighting, heating and cooling systems to minimize energy use and emission of greenhouse gases.

Principle: Create a comfortable and healthy indoor environment.

C.1.0 Alternative Energy Sources

Evaluate use of the following as a means to reduce energy use from conventional sources:

-Passive solar.

-Solar hot water.

-Ground source heat pump systems.

-Using daylight where possible as an alternative to electric lighting.

-Expanded cogeneration operations.

-Energy conserving devices like economizers and air pre-heaters to reclaim sensible heat losses in waste air streams.

C.2.0 Heating Ventilation and Air Conditioning Systems

Existing space heating on the campus is accomplished in the following ways: steam heat, hydronic heating as well as distributed air handling systems. Consideration should be given to the following:

2.1 Heating

Use of existing building energy management systems to control heating equipment.
Design for specific occupancy.
Use zoned heating distribution systems.

2.2 Equipment

Use air handling equipment with low air infiltration and high efficiency.
Use heating equipment that resets on outside air.
Use VAV (variable air volume) systems where appropriate.
Use VFD (variable frequency drives) for fans and pumps.
Use quality thermal system insulation practices.

2.3 Cooling

Connect to chilled water system when feasible.
Engineer systems to meet actual cooling loads and not theoretical loads.
Design for specific occupancy.

2.4 Ventilation

Meet or exceed the institutional rate for outdoor air ventilation.

D. Electrical Power and Lighting Systems

D.1.0 Interior and Exterior Lighting

1.1 Interior Lighting Levels

Use fluorescent lights where possible.
Use only LED exit lights.

1.2 Energy Conservation Interior Lighting

Connect lighting controls to building energy system.
Locate multi-level switching with the end user in mind.
Install occupancy sensors where appropriate while considering daylight compensation.

1.3 Exterior Lighting Levels

Use the campus standard Kim high-pressure sodium light fixtures that prevent light pollution for all pedestrian and roadway lighting.
Use the energy management system to control on/off times.

E. Water Use and Efficiency

Principle: Minimize potable water use by mechanical systems, building occupants, and for exterior landscaping.

E.1.0 Water Conservation

Consider innovative ways to reclaim ground water, gray water and storm water runoff to replace use of potable water.
Maintain an active metering practice for all potable water use on campus.
Evaluate use of composting toilets, particularly in remote locations that do not have existing infrastructure.

F. Materials and Resources

Principle: Use building materials that minimize the life cycle environmental impact of those materials.
Principle: Minimize waste generation during the construction process and maximize reuse and recycling.
Principle: Create a comfortable and healthy indoor environment.

F.1.0 Waste Prevention

1.2 Efficient Material Use and Waste Prevention

- Design spaces efficiently to meet program needs while minimizing space requirements.
- Reduce material use through structural design.
- Design to accommodate future needs.
- Design for disassembly and reuse if function is expected to change over time.

1.4 Building Operations

- Design the building to encourage the occupants to reduce waste and recycle.
- At a minimum, provide dedicated recycling areas with adequate space for recycling containers on each floor of the building.
- Provide adequate space for centralized storage of recyclables prior to pick-up and unobstructed access to this area by removal personnel.
- Clearly label recycling areas and containers.

F.2.0 Environmentally Responsible Materials

2.1 Regional Materials

- Establish project goals for regional materials manufactured or harvested within a 500-mile radius and use when feasible.

2.3 Certified Wood

- Establish project goals and specifications for use of Forest Stewardship Council (FSC) certified wood ma terials.
- Reduce the use of large timbers.

G. Indoor Environmental Quality

Principle: Create a comfortable and healthy indoor environment.

G.2.0 Indoor Air Quality Systems Performance

- Consider natural ventilation strategies in HVAC design and exterior window and wall openings to reduce reliance on mechanical ventilation.
- Consider providing operable windows with appropriate HVAC interlocks.
- Consider fan-powered night ventilation in lieu of operable windows.
- Design for maximum benefit from economizer cooling in mechanical systems.
- Identify heat sources that will be generated by the use of the area and adequately ventilate those spaces.

G.3.0 Noise Control

- Use structural design methods and appropriate surfaces to control noise transmission and achieve the acoustical performance needed for the space use.

STAINABILITY

Living Machines
Tidal Wetlands
Vertical Greens

Living Machines

A Living Machine is a system that mimics the natural process that water would go through in nature in order to become cleaned and then re-used and put back into the water cycle. This operation of cleaning water on site uses less energy than any other process and allows cleaned water to be used for numerous applications such as; irrigation, toilet flushing, and wash water. This system can be as large or small as the 'treated community' calls for it to be.

Benefits

- Allows tertiary treatment for water reuse
- Provides excellent nitrification and good nitrogen removal
- Eliminates 99% of residual biosolids
- Minimizes energy cost (10-25% of equivalent activated sludge systems)
- Offers compact footprint compared to other wetland treatment methods
- Eliminates clarifiers
- Reduces labor cost

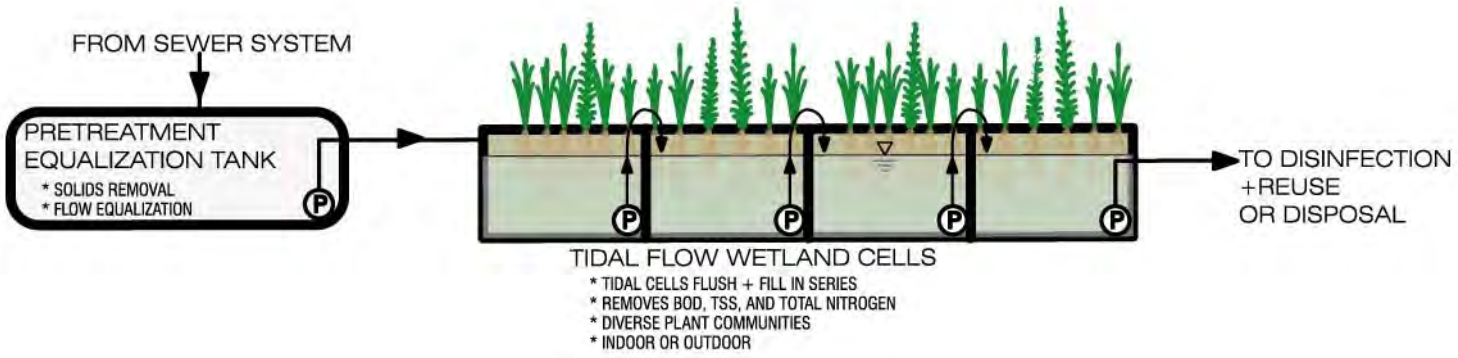
High Potential Locations

- Resorts and residential communities
- Educational institutions, campuses, military bases
- Industrial organic waste streams
- Agriculture
- Food processing or aquaculture
- Dairy production
- Feed lots

TIDAL WETLAND LIVING MACHINE SYSTEM®
SYSTEM DESCRIPTION AND SCIENTIFIC BASIS

The Tidal Wetland Living Machine system is comprised of multiple flood and drain (tidal) wetland cells (Figure 1). Tidal wetland cells flood and drain in a serial fashion. A recycle loop passes water several times through the treatment system. The Tidal Wetland Living Machine system (TW LM) achieves advanced biochemical oxygen demand (BOD), total suspended solids (TSS), and total nitrogen removal at a fraction of the energy cost of conventional technologies. This technology is protected by two US patents with other patents pending.

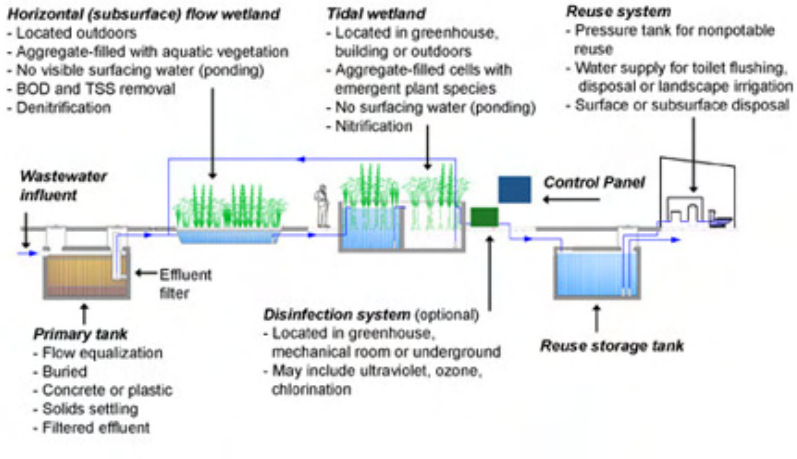
Simultaneous nitrification and denitrification is a key feature of the TW LM system. Nitrification occurs in drained wetland cells while denitrification occurs in flooded wetland cells. The mechanisms of this process differ from conventional aerated treatment processes and are therefore explained in detail below.



Westin Aquadic Center

71' x 42,5' (3017,5 sq. ft)
Serves for 30 businesses + a supermarket
Works half the capacity 16 Aqua tanks

The Westin Aquadic Center has 16 tanks that contains vegetation that is native and non-native to the Northeast. These tanks make up what is called a Living Machine. The machine is encased in a greenhouse to help keep the flora of exotic places alive and healthy.
The Center treats between 4,000 to 5,000 gallons of sewage a day through the wetland process and bring it up to a level which is suitable for irrigation.

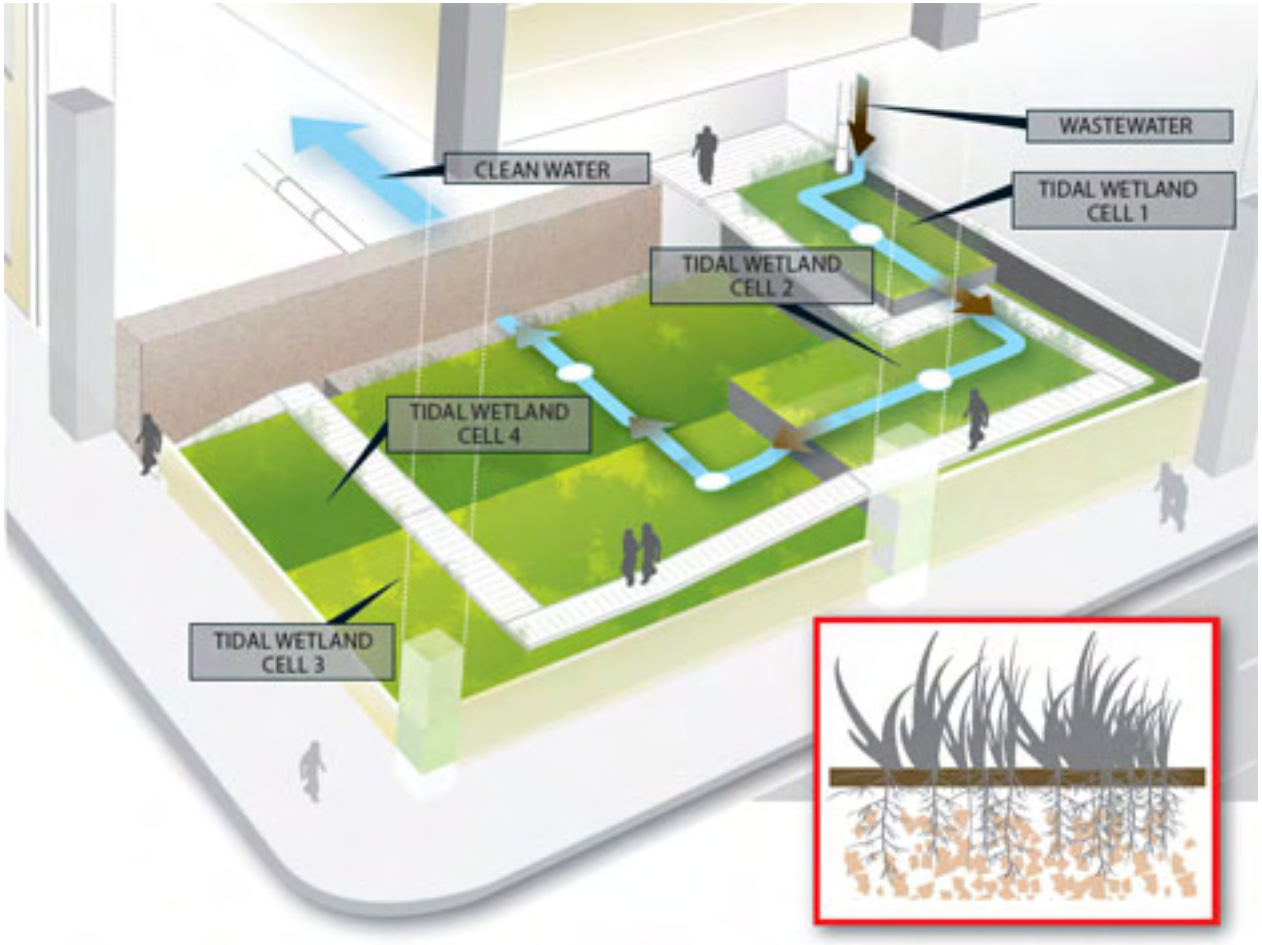

Horizontal (subsurface) flow wetland
- Located outdoors
- Aggregate-filled with aquatic vegetation
- No visible surfacing water (ponding)
- BOD and TSS removal
- Denitrification
Tidal wetland
- Located in greenhouse, building or outdoors
- Aggregate-filled cells with emergent plant species
- No surfacing water (ponding)
- Nitrification
Reuse system
- Pressure tank for nonpotable reuse
- Water supply for toilet flushing, disposal or landscape irrigation
- Surface or subsurface disposal
Wastewater influent
Control Panel
Effluent filter
Primary tank
- Flow equalization
- Buried
- Concrete or plastic
- Solids settling
- Filtered effluent
Disinfection system (optional)
- Located in greenhouse, mechanical room or underground
- May include ultraviolet, ozone, chlorination
Reuse storage tank

Treasure Island, San Fransico Bay

Treasure Island is a 400-acre piece of land that was built in 1939 for the Golden Gate International Exposition where is was later turned into a Naval base for World War II then abandoned soon after the war and turned into a small area for residents of low to middle-income.
The new development being created on this land is going to be the most ambitious new community in the United States. Being an 'urban oasis' for 13,500 people it will reclaim the site by using 'cutting-edge' technology in order to be as earth-friendly as possible. This site will be a breading ground for the newest energy efficient ideas to take form.

Ground breaking is scheduled for 2009.

"We want it to be the most ecological city in the world."
-Jean Rogers, the environmental engineer involved with the project



Treasure Island's Tidal Wetland System they will be putting in place.

Each watertight cell holds 4 to 6 ft. of gravel-like media engineered to harbor bacteria. Vegetation grows on top of it and roots create pathways in the gravel to help distribute water throughout the cells. Microorganisms living on the plant roots keep the bacteria population in check. In indoor systems, a 4- to 6-in. layer of mulch caps the gravel to help scrub odors from wastewater.

Vertical Greens

By placing vegetation on the walls of a building, the run-off water from the roof will be absorbed as it drips down the building. It will have many of the same effects that a green roofs would have, yet will be more visible and act more as a piece of art and aesthetic then a green roof in which you would rarely see the top of it. These walls need very little maintance besides being occasionally trimmed in cases where windows exist with-in the vegetation wall.

Patrick Blanc

Patrick Blanc is an artist who developed a way to create a wall of vegetation which would have the ability to be applied to any wall no matter what size. The plant life that is placed on this surface was made to grow with no soil which has made the entire system extremely light and practical. Currently over 2,500 species of plants grow without any soil on trees and other vertical surfaces in nature. One potential problem is when the vegetation is not given enough water the roots will grown deep into the wall and potentially damage it, therefore water is regularly given to the system and the roots only gown and spread on the surface of the wall.

It can be placed on an interior or exterior wall and in any climate (if placed on an interior wall than artificial lighting would be required). The plant life would need to be local to the area so it would have the ability to continue to grow. Watering and fertilization of the system is done by the natural environment and it acts as a phonic and thymic isolation system as well as a air purification device.

The system is developed with only three parts; a metal frame, PVC layer, and a layer of felt.

The frame is either hung or else is self-standing; both of which provide an air layer for better isolation. Next a 1cm thick piece of PVC sheet is riveted to the frame which creates a waterproof and structured layer. The felt is then stapled onto the PVC which is rot proof and allows homogeneous water distribution, this is the layer that the roots of the vegetation is allowed to grown onto. The plants start on the felt layer as seeds, cuttings, or already developed plants (usually contains about 30 plants per square meter).

Mount Holyoke Environmental Research and Education Center

Parti Wall, Hanging Green by Young Architects Boston Group

suspended from the newly converted loft building known as The 1850, located at 90 Wareham Street in Boston's South End. The five-story-high planted structure will face Wareham Street across from the pinkcomma gallery, where an exhibition of the installation's collaborative design process and works of these ten firms will be on display.

ZONING

South Hadley, MA

(Q) Public-Private Recreation

1. The purpose of the Public-Private Recreation use within the Industrial Garden District is to permit land uses for the development of recreational related facilities designed to serve the general public preserve and enhance areas of natural scenic beauty including mountain views, ridges, exceptional vistas, and related natural resources.

2. Public-Private Recreation Use is a use in the Industrial Garden District that may be permitted, subject to compliance with the mandatory standards, conditions and requirements for a Special Permit and Site Plan Review as well as the conditions set forth in this section. Such recreational use may include, but not be limited to the following uses and any approved combination thereof:
a. Outdoor athletic activities, including facilities for skating, skiing, sledding, swimming, and tennis and related activities.
b. A golf course as a principal recreational use and putting greens and driving ranges accessory uses to the principal recreational use.
c. Equestrian trails.
d. Outdoor picnic facilities including appropriate sheds and outdoor fireplaces.
e. Social and recreational facilities for dining and dancing, including banquets, meetings, receptions, assemblies and entertainment, provided that such activities are accessory to and a part of a principal recreational use.
f. Retail shops accessory or incidental to the principal recreational use.
g. Other publicly owned facilities or other facilities designed for the benefit of the general public.

3. Design and operating criteria governing the location and construction of improvements, buildings and facilities shall include the following
a. A landscaped buffer strip shall separate the recreational activities from any abutting property.
b. All parking shall be regulated as prescribed in Section 8, Subsection (G), and golf courses shall have an additional minimum of ten (10) parking spaces per hole of golf or parking facilities equal to sixty (60) percent of the serving facilities, whichever is greater.
c. The volume of sound from music and public address systems and recreational motor vehicles shall be so controlled as to prevent objectionable noise off the premises.
d. Banquets, meetings, stage presentations and dancing shall be held inside a structure, but this shall not prevent presentation outside a structure of athletic exhibitions or contests or theatrical performance.
e. Artificial lighting of a golf course or golf practice area is specifically prohibited.
f. The procedure for submission of an application for regional recreational use shall be consistent with the submittal requirement of Section 9, Special Permits and Section 12, Site Plan Review, and subject to the additional requirements set forth in this subsection.

(T) Outdoor Recreation Facilities

(Adopted October 28, 2003 Special Town Mtg.)

1. Purpose. The overall purpose of the Outdoor Recreation Facilities use within the Agricultural zoning district is to preserve agricultural lands through enhancing the economic viability of active farmland operations.

2. Facilities Allowed. Outdoor Recreation Facilities may be permitted, subject to compliance with the mandatory standards, conditions and requirements for a Special Permit and Site Plan Review as well as the conditions set forth in this subpart. Such Outdoor Recreation Facilities may only include miniature golf facilities (up to 36 holes) and batting cages may be permitted as Outdoor Recreation Facilities. Nothing herein is to be interpreted as precluding the use of any land for passive recreational activities such as, but not limited to, hunting, hiking, skiing, fishing, etc.

3. Minimum Area of Parcel. The Outdoor Recreation Facility Use may only be permitted on a single parcel of no less than 50 acres or contiguous parcels in common ownership of an aggregate area of no less than 50 acres.

4. Minimum Frontage. The parcel to be permitted must have at least two hundred fifty feet (250') of continuous frontage on a public way.

5. Parcel Coverage. Outdoor Recreation Facilities shall not occupy more than 2.5% of the total land area of the parcel on which the facilities are located. This area limitation includes the portion of the tract occupied by required parking facilities and any associated structures and does not apply to buildings and structures used for agricultural purposes (including accessory uses).

6. Minimum Setbacks. The Outdoor Recreation Facilities Use areas and buildings (not to include related parking areas and trails for pedestrians or non-motorized vehicles) shall be no closer than forty feet (40') of a public road right of way line, and have the following side and rear yard setbacks:

Setback Agricultural

Side Yard 20 feet

Rear Yard 25 feet

7. Maximum Height: Buildings and structures used as part of the Outdoor Recreation Facility Use shall be no higher than thirty-five feet (35') and include no more than 2 stories.

8. Maintenance of Agricultural Uses. Outdoor Recreation Facility Uses are to be incidental to the active farmland of the parcel on which they are located. Accordingly, the parcel must be maintained largely in an active agricultural usage. The applicant for the Special Permit (and owner of the property, if the applicant is not the owner) must provide demonstration that the property will be preserved in such use. If a substantial portion of the property ceases to be maintained as active farmland, the Special Permit for Outdoor Recreation Facility Use will be subject to termination by the Planning Board.

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(G) Off-Street Parking

All new structures and additions or extensions on existing structures shall be provided with off-street parking spaces in accordance with the following specifications:

1. Location. Parking facilities shall be located on the same lot with the principal use they are required to serve. In no case shall parking for a nonresidential use be permitted in a Residence or Agricultural District. In Residence C, Business and Industrial Districts, parking space and access drives shall be located no closer than ten (10) feet to any adjoining residential property or adjoining property in a Residence District, and parking space shall be arranged so that vehicles will not need to back into the street. Not more than two (2) access drives shall be permitted per lot per facing street. Any portion of any access drive shall be at least twenty (20) feet from the street line of an intersecting street.

2. Size and Surfacing. Each required parking space shall be no less than nine (9) feet in width and shall have a minimum area of one hundred eighty (180) square feet exclusive of drives or aisles. Parking areas and access drives shall be surfaced with a bituminous binder, concrete, asphalt, gravel or crushed stone. Access drives shall be twenty-four (24) feet or less in width at their intersection with the street right-of-way line.

3. Screening. Screening consisting of a woven wood or similar closed surface or wall not to exceed five (5) feet in height, or a dense evergreen hedge, shall be provided and properly maintained in order to effectively screen parking areas for five (5) or more vehicles from any adjoining property in a Residence District or any adjoining residential property in any other district.

4. Rules of Interpretation. In the case of mixed uses, the parking spaces required shall be the sum of the requirements for the various individual uses computed separately. Parking spaces for one use shall not be considered as providing the required parking for any other use. Where individual seats are not provided in an establishment, each eighteen (18) inches of benches or similar seating shall be considered as one seat for purposes of computing required parking capacity. When additions are made to an existing structure, the determination of the required parking spaces shall be based on the total increase which the structure has undergone since the effective date of this amendment, whether such total increase occurs at one time or in successive stages.

5. Schedule of Requirements. The quantity of off-street parking provided shall conform to the following schedule:
USE REQUIRED MINIMUM/ (PERMITTED MAXIMUM) PARKING SPACES
...
Public and private schools 1 for each teacher and other (grades 1-12 inclusive) staff member, or 1 for each 4 seats in the largest public assembly room, including auditorium and gymnasium, whichever is largest

USE REQUIRED MINIMUM/ (PERMITTED MAXIMUM) PARKING SPACES
Places of public assembly, 1 for each 3 seats or each including theaters, 20 sq. ft. of floor area usable auditoriums, and funeral for seating if seats are not fixed parlors

All uses shall have adequate off-street parking to accommodate customers, patrons and employees. Parking on a public or private street or way adjacent to the premises shall be considered evidence of the inadequacy of the off-street parking space provided for both new uses and conversion or expansion of existing uses.

6. Commercial Vehicles in Residence Districts. In Residence or Agricultural Districts, not more than one commercial vehicle weighing not over one and one-half (1 ½) tons gross weight may be parked on any lot, except in the case of a farm operated on a full-time basis by a resident thereon.

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SITE PLAN REVIEW

(As Amended through May 13, 2006 Annual Town Mtg.)

(A) The purpose of site plan review is to ensure that new development is designed in a manner which reasonably protects visual and environmental qualities and property values of the Town, to assure adequate drainage of surface water, and safe vehicular access, and is consistent with the Zoning By-Laws and Building Regulations.

(B) Projects Requiring Site Plan Review (As Amended May 13, 2006 Annual Town Mtg.)

1. the construction or exterior expansion of commercial structures;
2. the construction or exterior expansion of industrial structures;
3. expansion of any parking lot by 10 or more parking spaces or conversion of any use resulting in the addition of 10 or more required parking spaces;
4. construction or exterior expansion of any educational institution or religious institution;
5. any other use specified in Section 5(D), Schedule of Use Regulations, which indicates Site Plan Review is required, unless the use is locating in an existing structure and no additions to the structure is to be undertaken and the Town Planner determines no additional parking will be required to conform to the Parking Requirements outlined in Section 8 of the Zoning By-Law. No special permit or building permit shall be applied for or issued for any of the above uses unless a site plan has been endorsed by the Planning Board, after consultation with other boards, including but not limited to the following: Building Commissioner, Board of Health, Electric Light Department, Water Department, Conservation Commission, DPW Superintendent, Fire Department, Tree Warden and Police Department. Site Plan Review for any use exempt from Zoning under Chapter 40A, MGL is for the purpose of ensuring compliance with reasonable regulations as related to parking, open spaces, building height, and building setbacks requirements as provided for in Chapter 40A, MGL. Waiver Permitted. The Plan ning Board may waive any and all requirements of Site Plan Review/Approval for the following:

1.) New construction under 1,000 square feet; and,

2.) Exterior expansions provided that the expansion is less than 25% of the existing floor area of the structure. Where the structure is part of a complex consisting of multiple buildings functioning as a single facility, the sum of the total square footage of all structures comprising the complex may be used to determine the threshold for such a waiver. Finding Required. Prior to granting any waiver of Site Plan Review/Approval, the Planning Board must make a finding that the Board determines the proposed development will have a de-minimis impact relative to the criteria set forth in Part

(C) Application Each application for Site Plan Review shall be submitted to the Planning Board on the appropriate form, accompanied by ten (10) copies of the site plan. A copy of the application form shall be concurrently filed with the Town Clerk. The Planning Board shall obtain with each submission a fee, in accordance with the fee schedule, to cover any expenses connected with the public hearing and review of plans. A Special Municipal Account may be required as determined by the Planning Board. A more detailed outline of application and site plan review procedures, fees, and required site plan contents are as specified in the Planning Board Rules and Regulations and may be modified from time to time as required.

(D) Procedures for Site Plan Review a. Planning Board shall send one copy of the plan to relevant town boards, commissions, and departments (agencies) within 5 days of receipt.
b. Relevant town agencies shall review the application plan and must submit their written recommendations and comments or approval to the Planning Board within 35 days of the receipt of the application by the Planning Board. Failure to respond within 35 days shall be deemed to be lack of opposition.

c. Following the filing of an application the Planning Board shall hold a public hearing on the application within 65 days of receipt of application and issue a final decision within 90 days following the public hearing;
"Notice of the time and place of the hearing" and of the subject matter, sufficient for identification, shall be given by the Planning Board at the expense of the applicant by advertisement in a newspaper of general circulation in the Town of South Hadley once in each of two (2) successive weeks, the first publication being not less than fourteen (14) days before the day of such hearing. A copy of said notice must be sent by certified mail to all abutters.

d. If the proposed development requires a special permit, then the requirements of Massachusetts General Laws, Chapter 40A, Section 9 take precedence over this section, and any required public hearing for site plan review shall be held jointly with the special permit public hearing.

e. For the purpose of securing the performance of all proposed work including landscaping and off-site improvements, the Board may require any of the following: a performance bond, deposit of money, bank passbook, or letter of credit in an amount determined by the Board to be sufficient to cover the cost of all or any part of improvements required.

(E) Site Plan Review Criteria

The Planning Board shall review the site plan and supporting data taking into consideration the reasonable fulfillment of the following objectives:

1. Integrates the development into the existing terrain and surrounding landscape.
2. Protects abutting properties and community amenities.
3. Provides for building sites, which to the extent feasible, (a) minimize use of wetlands, steep slopes, floodplains, hilltops; (b) minimize obstruction of scenic views from publicly accessible locations; (c) preserve unique natural or historical fea tures; (d) minimize tree, vegetation and soil removal and grade changes; (e) maximize open space retention; and (f) screen objectionable features from neighboring properties and roadways.
4. Provides for the convenience and safety of vehicular and pedestrian movement within the site and in relationship to adjoin ing public ways and properties.
5. Utilizes architectural styles compatible with the character and scale of buildings in the neighborhood.
6. Provides for adequate water supply and waste disposal systems. For structures to be served by on-site waste disposal sys tems, the applicant shall submit a system design prepared by a Commonwealth of Massachusetts licensed sanitary engineer and approved by the Board of Health.
7. Provides for adequate measures to prevent pollution of surface or ground water, to minimize erosion and sedimentation, and to prevent changes in ground water levels, increased run-off and potential for flooding.
8. Mitigates adverse impacts on the town's services and infrastructure.
9. Requires that electric, telephone, cable tv, and other utilities be underground where physically and environmentally fea sible.
10. If the proposal requires a special permit, it must conform to the special permit requirements as listed in Section 9 of this By-Law. Before approval of a site plan, the Planning Board may request the applicant to make modifications in the proposed design of the project to ensure that the above objectives are fulfilled.

F) Planning Board Decision

The Planning Board shall render a decision within ninety (90) days of the public hearing and shall file its written decision with the Town Clerk's office and other appropriate parties in accordance with the provisions of Massachusetts General Laws, Chapter 40A.

The Planning Board's decision shall consist of either:

1. A written approval of the proposed project.
2. A written denial of the application stating reason for such denial; or
3. A written approval subject to any conditions, modifications, and restrictions as the Planning Board may deem necessary to satisfy this By-Law. The Planning Board's decision shall be mailed to the applicant and filed with the Town Clerk. A copy shall also be sent to the Building Commissioner.

(G) Enforcement

a. Violations of the approved site plan or any conditions of approval shall be subject to the provisions of Section 11(C) of the Zoning By-Law.

b. Site plan approval issued under this section shall lapse at the end of one(1) year after approval if work has not com menced, except where an extension of time for good cause has been granted by the Planning Bo

H) Appeal Process

If an aggrieved person wishes to appeal the decision of the Planning Board, the procedures as outlined in Massachusetts General Laws, Chapter 40A, Section 8 must be followed, except where a site plan approval is issued in conjunction with a special permit, wherein Massachusetts General Laws, Chapter 40A, Section 17 must be followed.

Mount Holyoke Environmental Research and Education Center

6(B) Dimensional Regulations Schedule for Buildings and Structures (Continued)

Zoning District - Requirement	Minimum Lot Area (Sq. Ft.)	Min. Lot Frontage (Feet)	Max. Lot Coverage (%)	Minimum Yard Setback			Maximum Height	
				Front	*Side*	*Rear*	*Stories*	*Feet*
Agricultural Zoning District								
Basic Requirements:								
Principal Uses	30,000	150/**a**	30/**f**	40/**b**	20/**c**	25	None/**e**	None/**e**
Accessory Uses	--	--	10/**f**	40/**b**	20/**c**	10/**d**	None/**e**	None/**e**
Principal Uses in Water Supply Protection Overlay District	40,000/**g**	150/**a**	30/**f**	40/**b**	20/**c**	25	None/**e**	None/**e**
Special Requirements – if Different from Above								
Flag Lot Special Permit – Principal Use	60,000	150	30	40	20	25	2	35
Flag Lot Special Permit – Accessory Use	--	--	10/**f**	40	20	25	2	35
Flag Lot Special Permit in Water Supply Protection Overlay District - Unsewered	80,000	150	30	40	20	25	2	35
Flexible Development/h/i/j								
Principal Uses	2,000	20	J	15	0 to 7	10	2/e	35/e
Accessory Uses	--	--	j	15	0 to 7	10	2/e	25/e
Other uses with Special Permit:								
Telephone exchanges, lodges, social and community center buildings							3	
Churches, schools, colleges, libraries, town buildings, and similar uses							6	60

NOTES:

a. Frontage when measured on an inside curve may be less than 150 feet. It must, however, be a minimum of 150 feet on the front setback line, and the minimum total lot area must be 30,000 square feet or according to footnote "g".
b. (Same as note "b" for Residence A-1 district.)
c. (Same as note "c" for Residence A-1 district.)
d. (Same as note "d" for Residence A-1 district.)
e. For residential buildings only, height provisions of Residence A-1 districts shall apply.
f. Total lot coverage of principal and accessory uses shall not exceed 30%.
g. Where not served by a public sewer: 10,000 square feet per bedroom or 40,000 square feet, whichever is greater.
h. The minimum frontage, front yard, side yard, and rear yard dimensional requirements for a Flexible Development shall be subject to increase by the Planning Board as a condition of the Special Permit as stated in Section 7, Subpart J.
i. The maximum height dimensional requirements for a Flexible Development shall be subject to decrease by the Planning Board as a condition of the Special Permit as stated in Section 7, Subpart J.
j. The minimum lot size shall be set as a condition of the Special Permit as stated in Section 7, Subpart J.

PRECEDENT STUDY

Oberlin College Adam Joseph Center
Tom Ridge Environmental Center
The Audubon Society of Bristol

OBERLIN COLLEGE ADAM JOSEPH CENTER

Oberlin, OH

William McDonough
and Partners

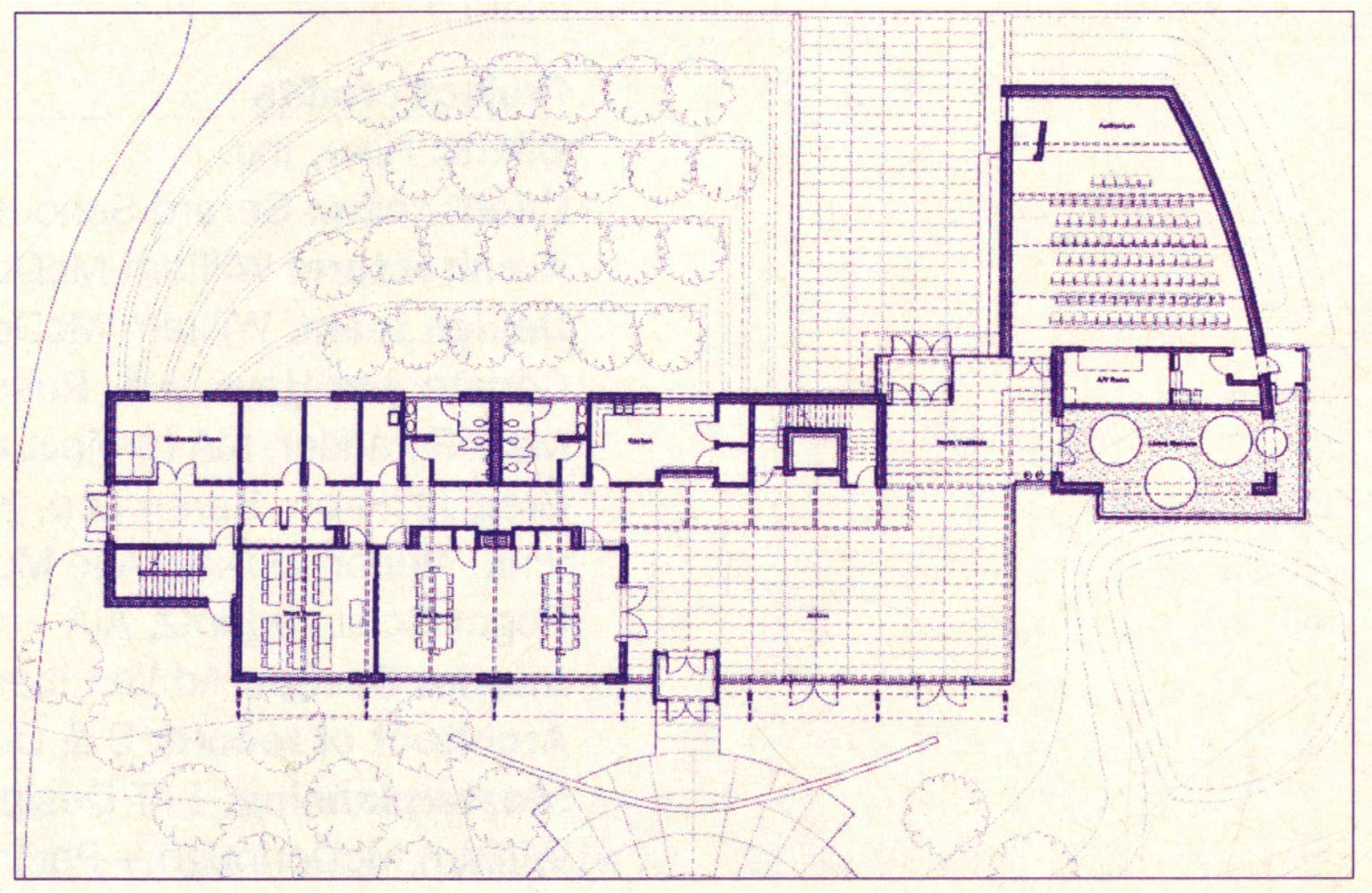
$4 million

13,500sq feet

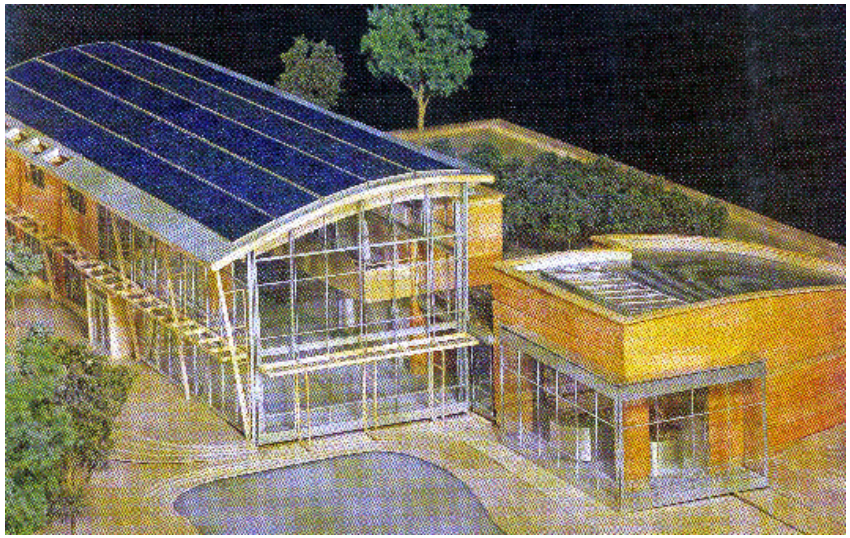
Classrooms, Auditorium

Oct. 1999 (completion)

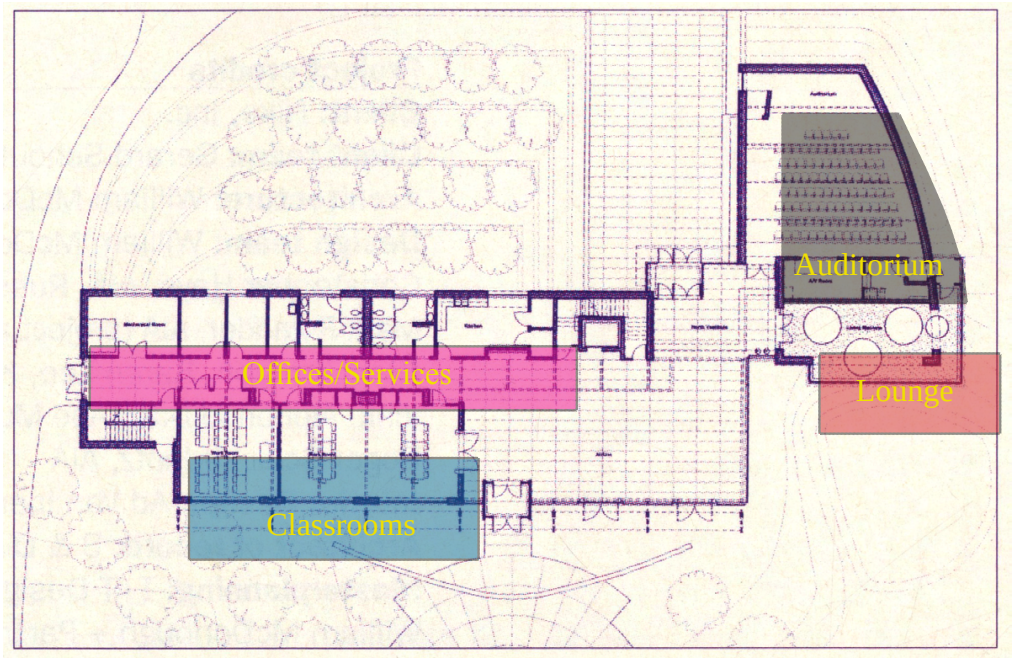
Mount Holyoke Environmental Research and Education Center

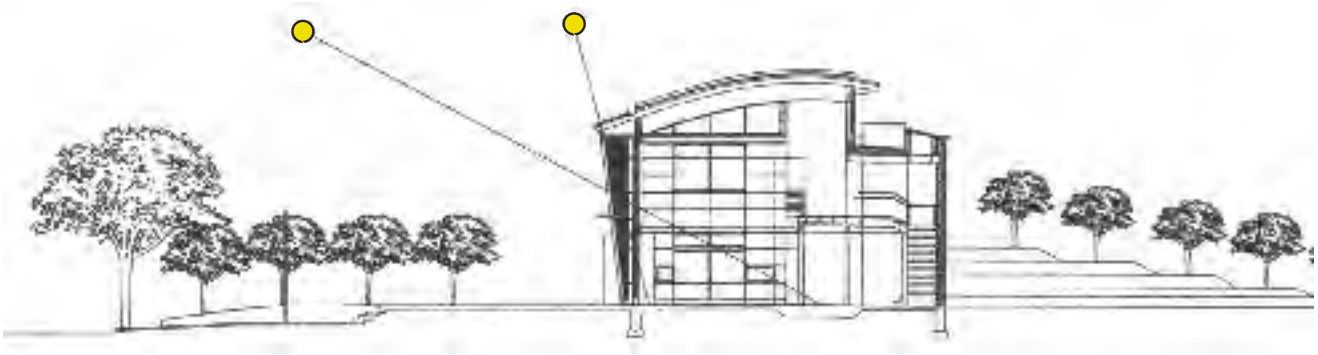


The Oberlin College AJC was designed to be a demonstration project and testing area for ecological design. Inside the building students are learning from the building's modern technology, as from the teachers. Hundreds of tours are given to local elementary schools as well as individuals in hopes that it inspires the local community to design environmentally friendly buildings such as itself.



Mount Holyoke Environmental Research and Education Center





getting in touch with nature

"A perfect building would be like a tree, providing habitat for a variety of living creatures, producing oxygen, purifying waste water, nurturing ecosystems, and turning sunlight into more usable energy than it needs." William McDonough

The sun provides day lighting and heating through a host of solar-friendly design features. A photo-voltaic array (3,700 sq. ft.) provides more electricity than the 64,000 kWh needed to power the building which allows it to contribute to the local grid. All wood used came from well managed forests under Forest Stewardship Council standards. Recycled content materials includes steel in framing, aluminum in roof, window frames and curtain walls as well as ceramic tile. A Living Machine is housed inside which processes their waste water and recirculates it back into the toilet tanks.

The classroom wing runs on an east-west axis in order to utilize the southern sunlight. An eave and trellis with deciduous ivy allows shading in the high summer sun and allows the space to heat in the winter months.

Mount Holyoke Environmental Research and Education Center

Oberlin College's AJC is one of the most advanced green building in the US which contains a long list of innovative technology. The building is projected to use only 21 percent as much energy as the national average. The mechanical heating and cooling are provided by geothermal heat pumps. All occupied spaces will enjoy 100 percent outside ventilation air, while a heat exchanger will recapture heat from outgoing stale air.

"Is it possible to design buildings so well and so carefully that they do not cast a long ecological shadow over the future that our students will inherit? We now know that such things are possible -- that buildings can be designed to give more than they take."

David W. Orr, Professor and Director of Oberlin's Environmental Studies Program

Wanting this building to be more than just a center for learning, David Orr took definite steps to make the development of the building a process for the students as well as the entire faculty. From the beginning to the design/development process till the completion, important steps were taken:

- A group of students and David Orr researched alternative technologies and design strategies and prepared an initial proposal for the building.

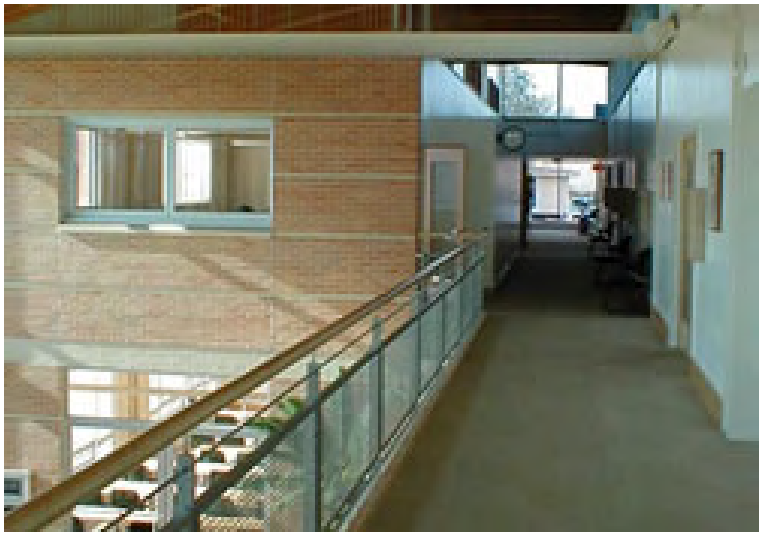
- Student and faculty input was sought to define building goals and design it to meet their needs.

- 13 public design input sessions were held to solicit community ideas.

- Students designed projects to further look into what specific systems and products the new building should incorporate. Some examples of locations visited include Living Technologies in Burlington, VT to consider John Todd's Living Machine, and forests in the Pacific Northwest for suppliers of certified sustainable managed wood.

Development for short and long-term system evolution were done in order to provide ongoing opportunities to educate a wide range of audiences. These include Oberlin College students, regional kindergarten through high school students, other university students and faculty, architecture and design professionals, as well as lay audiences.

Mount Holyoke Environmental Research and Education Center



getting in touch with nature

TOM RIDGE ENVIRONMENTAL CENTER

Erie, PA

Wallace, Roberts &
Todd Architects

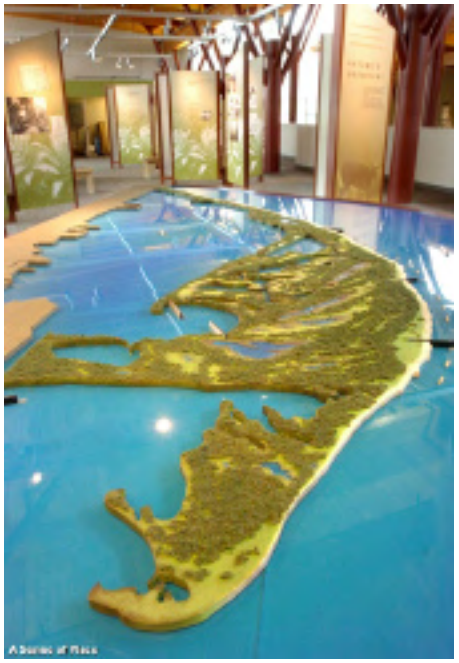
$31 million

58,000sq feet

LEED Silver

Mount Holyoke Environmental Research and Education Center

The Tom Ridge Environmental Center contains opportunities for professional research to occur at the same time as exhibitions and tours for individual families as well school groups can take place. Planned activities allows for groups to explore the interior of the building as well as the expansive nature that surrounds the building. Attached to the structure is a 70 foot observation tower which allows visitors to view the natural landscape which surrounds the center.



The Environmental Center contains space for exhibits, government and educational administration, and laboratories. The building is day-lit through clerestory windows and large expanses of transparent and translucent panels, while being modulated by exterior shading devices. Inverted roof forms collect rainwater for reuse allowing significantly reduced water consumption. The landscape design conserves the site's natural features, emphasizes the use of native plants and averts the need for irrigation. The interaction of the building with nature allows for this building to be as unobtrusive to it's surroundings as possible while allowing it to exist in order to teach children about their surroundings and researches understand it to a better degree.

Mount Holyoke Environmental Research and Education Center

getting in touch with nature

The Audubon Society of Bristol

Bristol, RI

Durkee Brown & Viveiros
Werenfels Architects

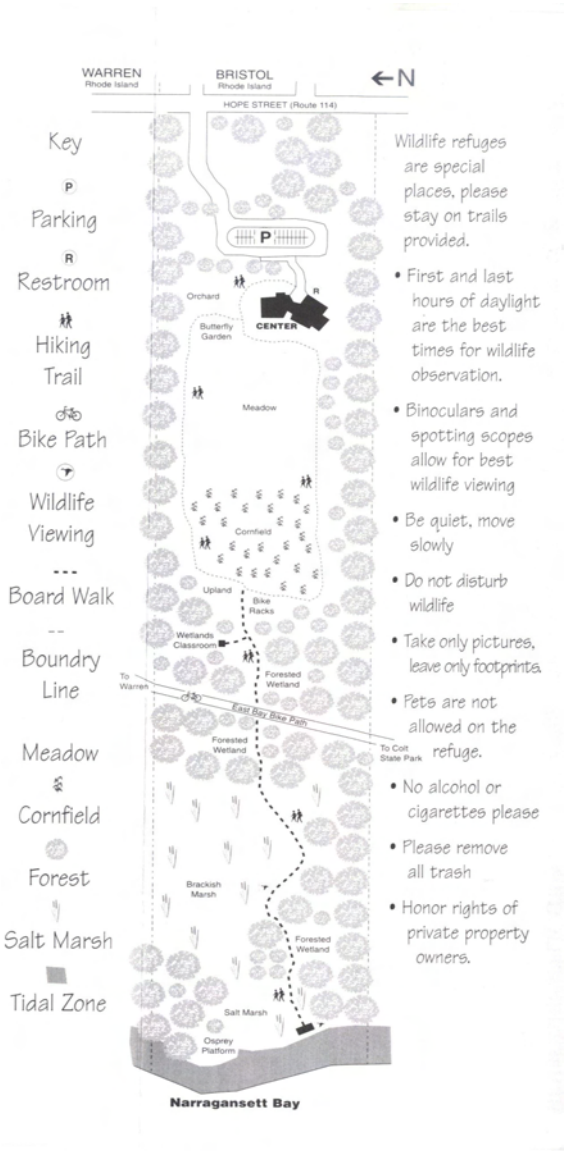
$2.7 million

10,000sq feet

Bristol, RI

Mount Holyoke Environmental Research and Education Center

The Audubon Society of Bristol contains exhibits that explain the local habitat and environment of Bristol, Rhode Island. Panels are placed on the wall which show large pictures of water, vegetation, and animals. Everything is displayed and shown to be at a childs level so the need to for a parents participation and knowledge is minimal. Elements are placed on the wall to be made interactive and act as a hands-on experience in order make the learning process easier for the children. Live fish are placed in the center of the gallery space and act as a focal point that often grabs the children's attention.



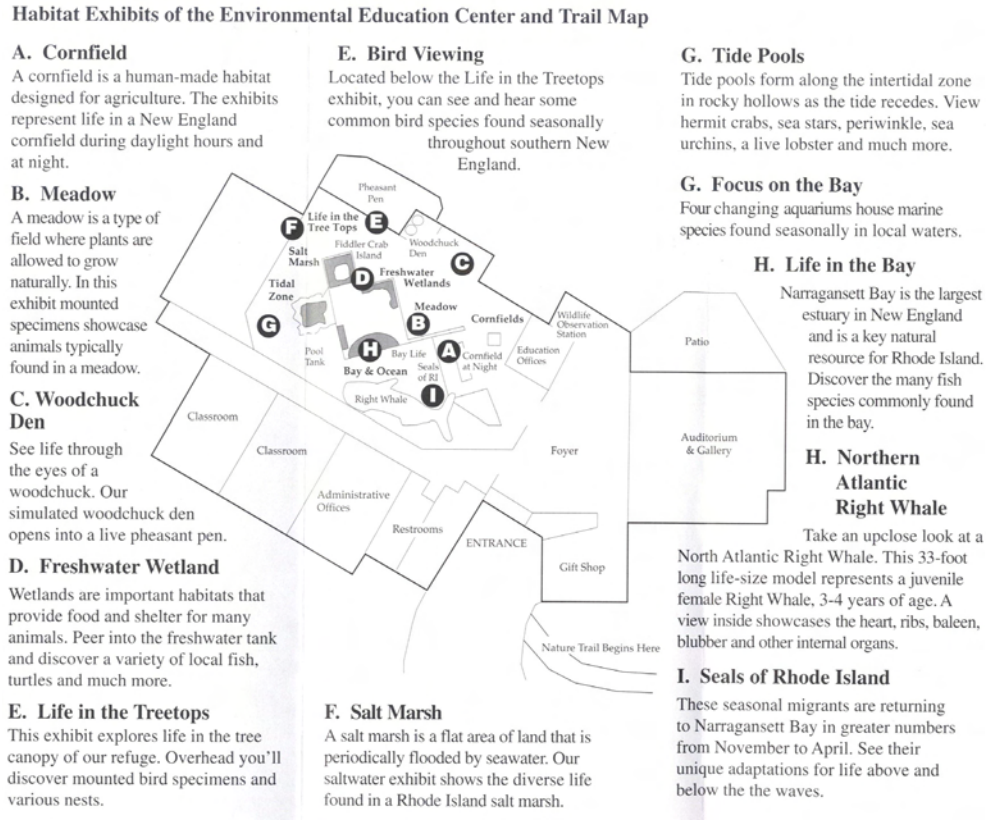
Mount Holyoke Environmental Research and Education Center

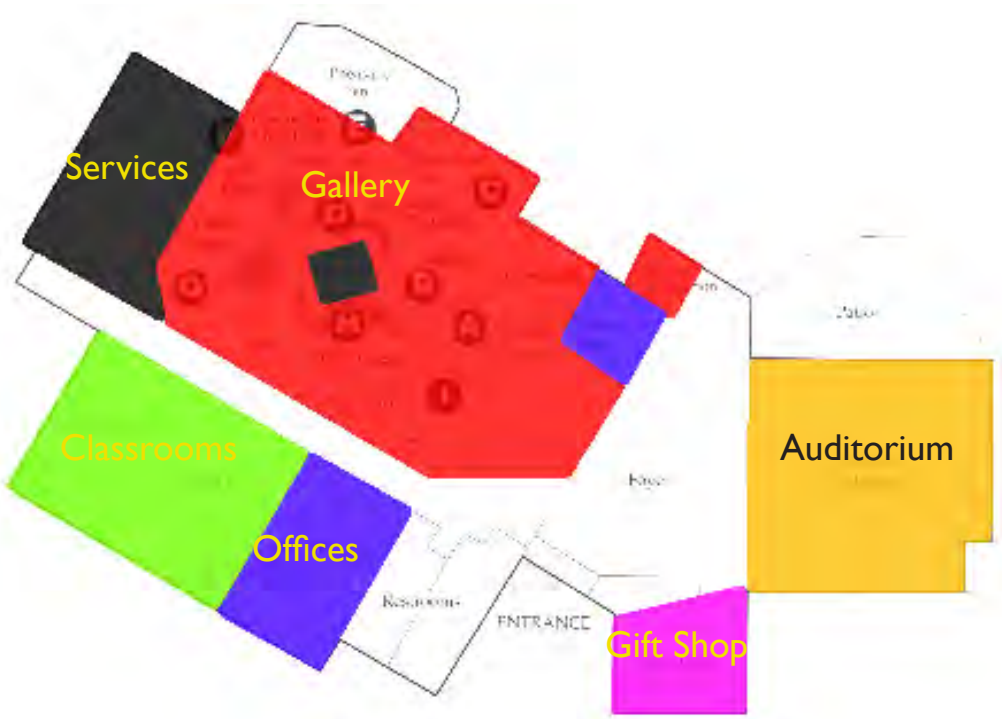
The building is located on a meadow grass land which flows into marshes. An exterior patio is attached to the back to building which allows functions to translate to the exterior easily. The grassland located directly behind the building allows local animals such as a variety of birds to create homes and develop the land as their own. The wetlands which is located a little further away has wooden bridges spanning into and the marsh creating nodes and locations for vistas around the site. As seen in the below picture, a protrusion of the wooden bridge creates a node that acts as an outdoor classroom for the building administrators to bring children for them to learn about this different type of environment.

Gallery Program

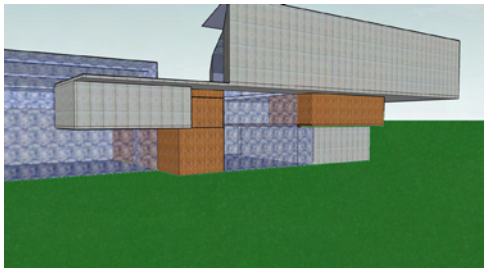
The children's gallery is designed with the circulation pattern of a circle which flows around a large fish tank and service/storage area. This allows the children to wonder around the area without the parents concern of them getting lost.

While walking around the space, there are elements which stick out into the child's line of sight to draw them from one section of the room which might be talking about one specific element of the region to the next. A few larger scale objects are used to do this a little better. A few of these are the fish tank which is placed in the center of the space and a large interactive sculptural whale.




Services
Gallery
Classrooms
Offices
Auditorium
ENTRANCE
Gift Shop

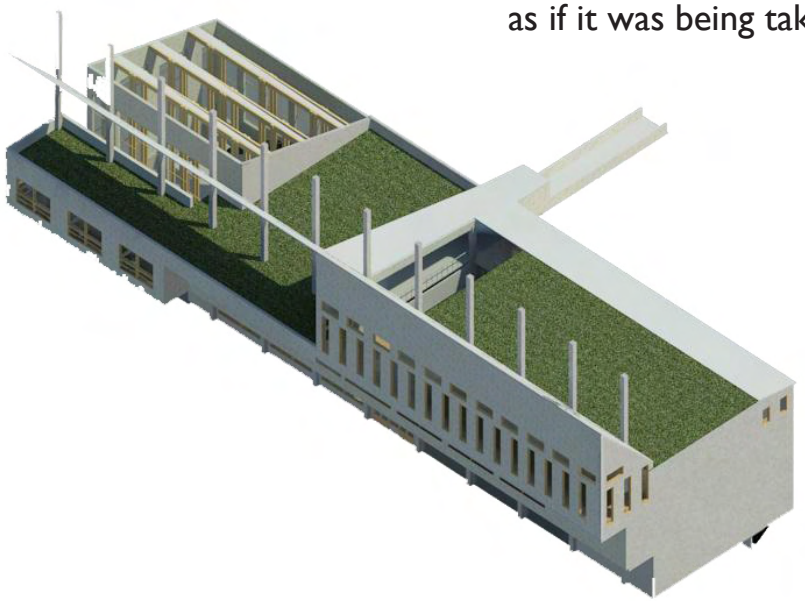
DESIGN PROCESS



Massing

In my designs I tried to create a massing that would allow the visitors approaching the building to read the two separate programs. By having the galleries stick up onto the third floor and the university classrooms and labs touched underneath, it allowed for the galleries to be highlights and seen as an occasion while the workspaces as something more regular. The Living Machine is placed along the side and again was something I tried to make special and stick out as the visitors enter the building. By working with the land, I was able to get at least two exists out on every floor and allow the land to creep up along the back of the building as if it was being taken back into the site.

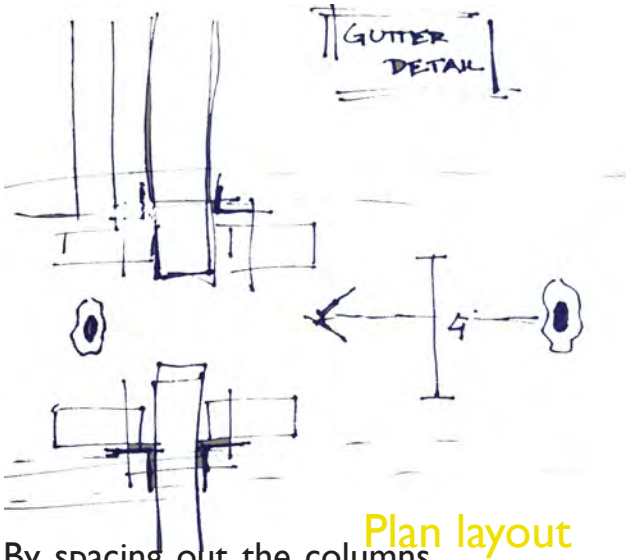
Midterm



Gate

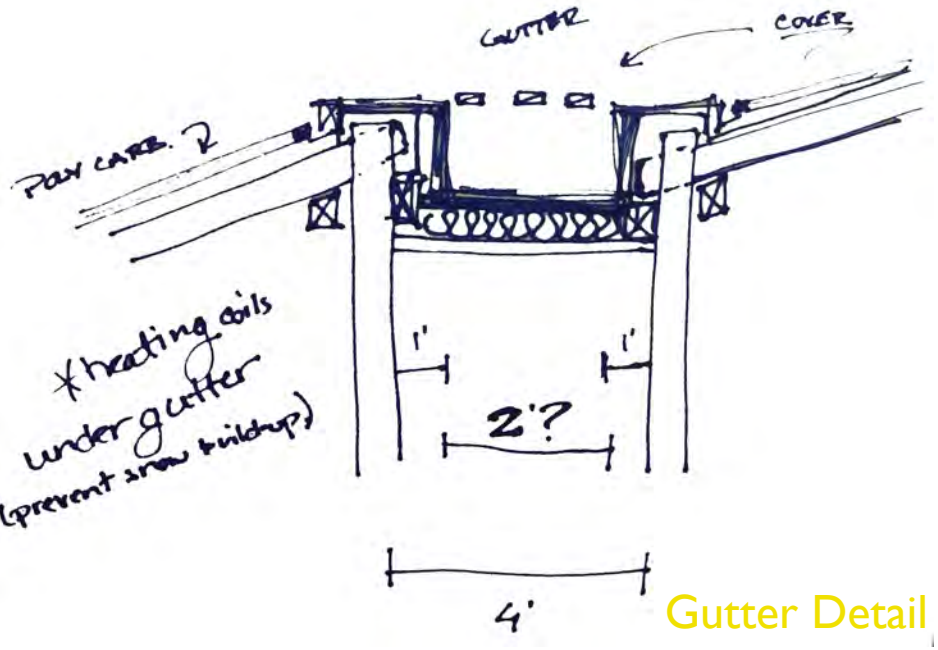
Living Machine/ Gutter Detail

By taking time to design the details of the gutters in the Living Machine, I was able to make them more interactive and important in the space.



Plan layout

By spacing out the columns, I allow the space between the structure holding up the gutter to become the main circulation in the space.

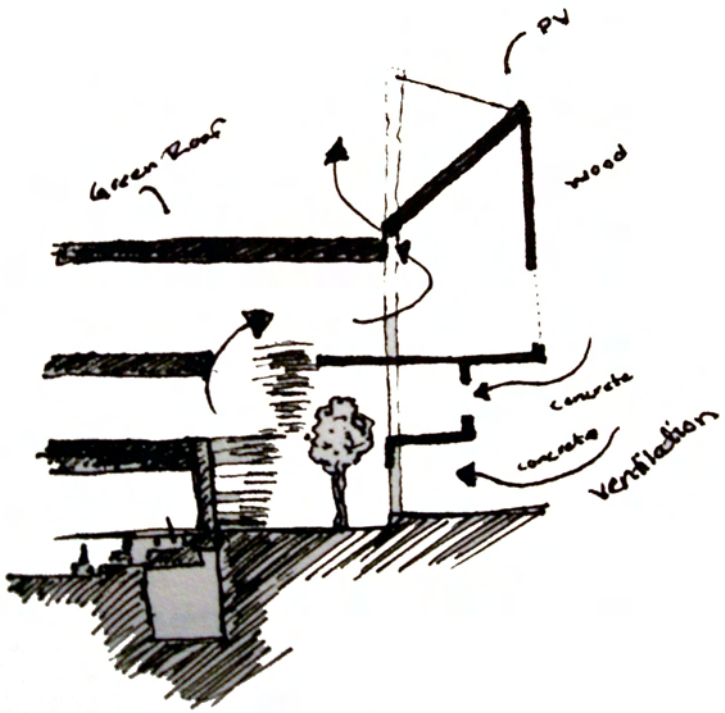


Gutter Detail

The gutters are enlarged to trap the water flowing down the roof and bring it into a cistern in the Living Machine in order to store it and use it for future use of the building.

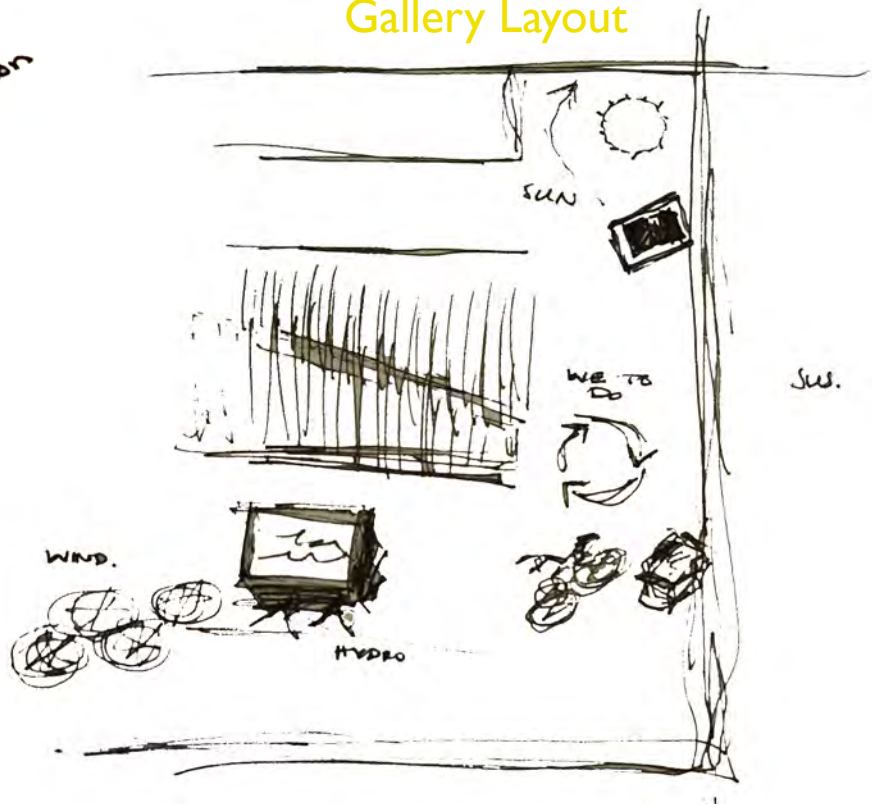
Gallery

When exploring the possibilities of the atrium inside the galleries, I looked at ideas for the layouts as well as what form of natural ventilation could take place in the space.

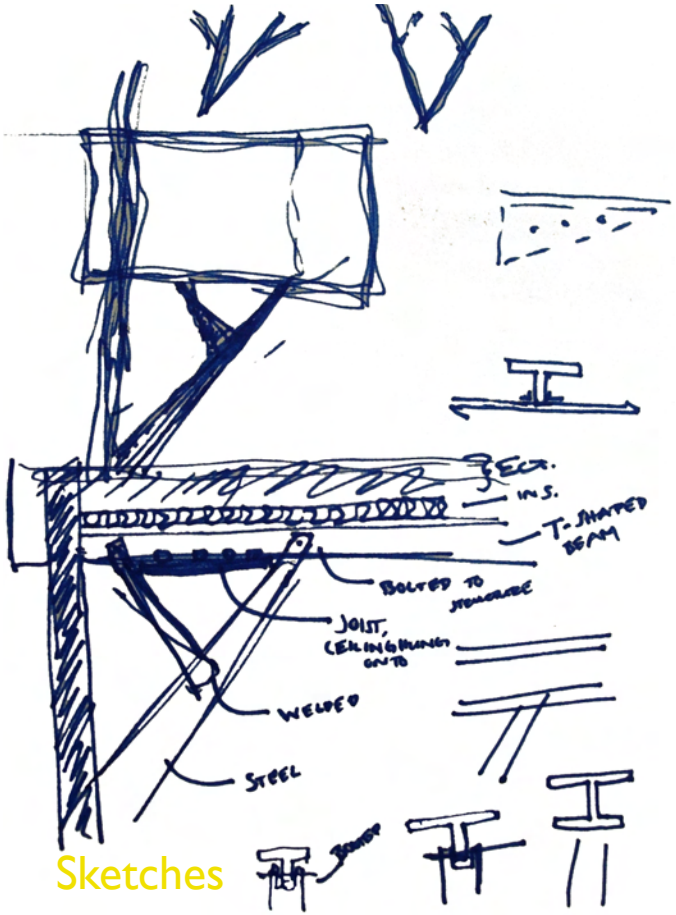


Gallery Atrrium

Gallery Layout

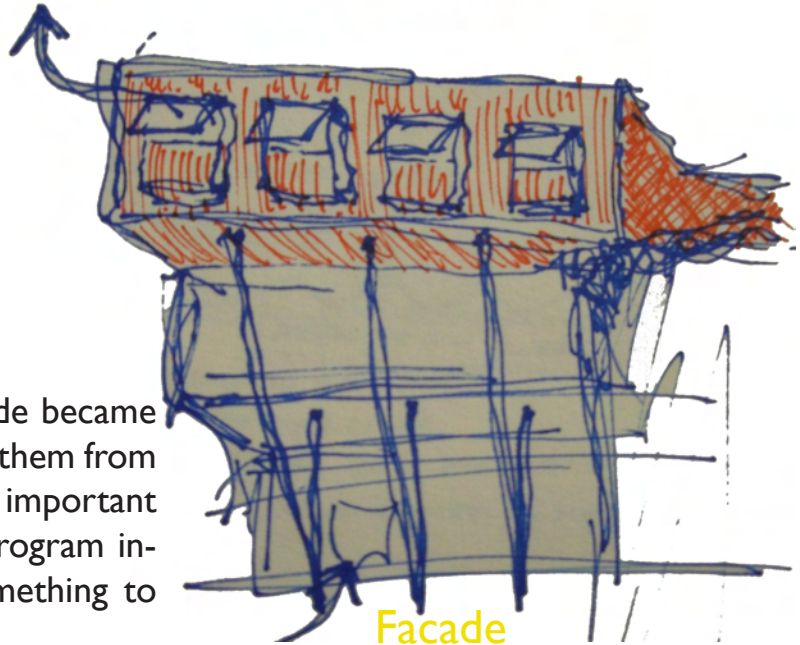


Column Design



Sketches

Load Trace


Facade

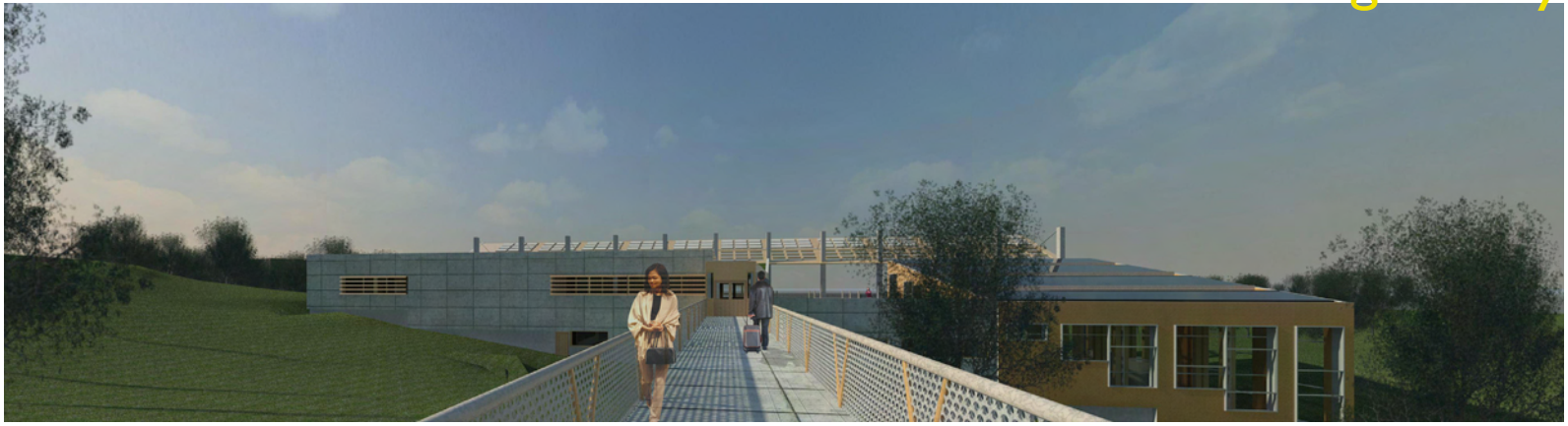
The look and feel of the columns on the water facade became an important aspect of the building. Being able to see them from the trail approach as well as across the water, it was important that gave the views a feel for the building and the program inside. The space underneath these also became something to explore.

FINAL DESIGN

Massing from Above

When approaching the building from the main entrance, you first walk between a row of trees, allowing yourself to be greeted by nature. Once the land starts sloping away you walk up to a long bridge that is floating above the land and you see the first view of the building. From here you can easily read the massing see the concrete panels as if they have come up from the earth and the wood cladding as it mimics the lightness of the trees that surround it.

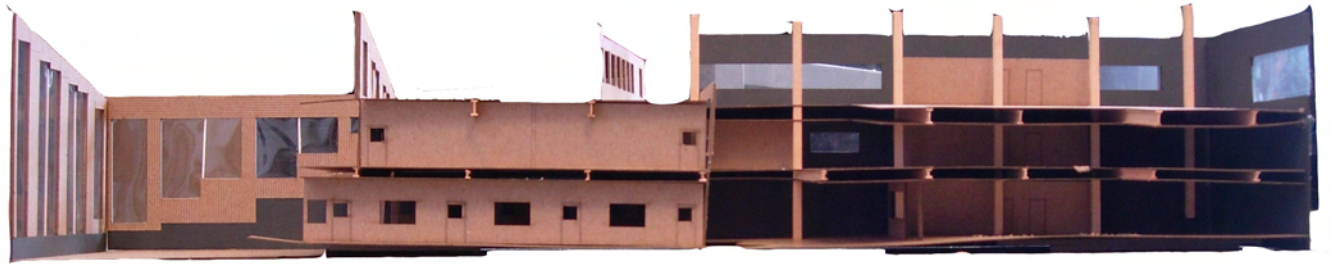
View from Bridge Entry

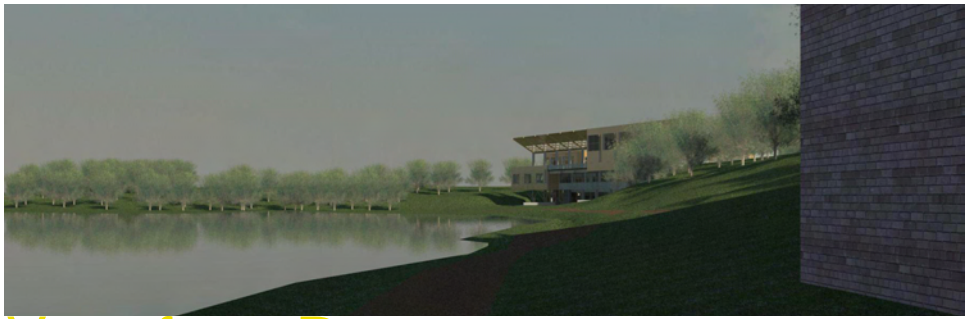


Sectional Perspective

The program is organized inside the building in it's separate parts. The galleries contain open space which allows for the children to explore and see the exhibits without loosing eyesight of their parents. The space contains two atriums which allow for ventilation flow and natural light to penetrate deep into the building as the pond facade steps back on the lower floors. The University side of the building is very organized and rigid allowing for everyday activities such as labs and classes to take place on a regular basis.

Sectional Model

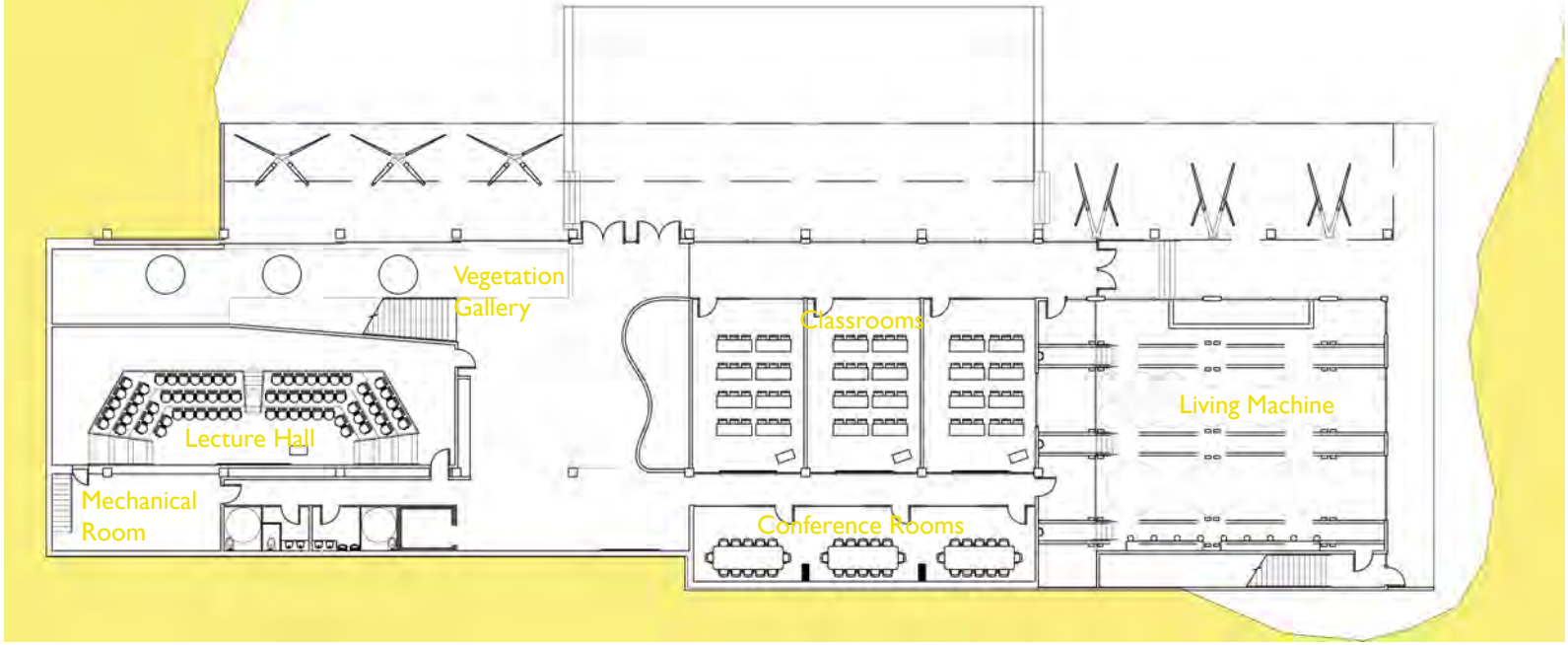




View from Dorms

Ground Floor Plan

1/32"= 1'-0" Scale



Second Floor Plan

1/64”=1’-0” Scale

Third Floor Plan

1/64”=1’-0” Scale

Top Floor Gallery

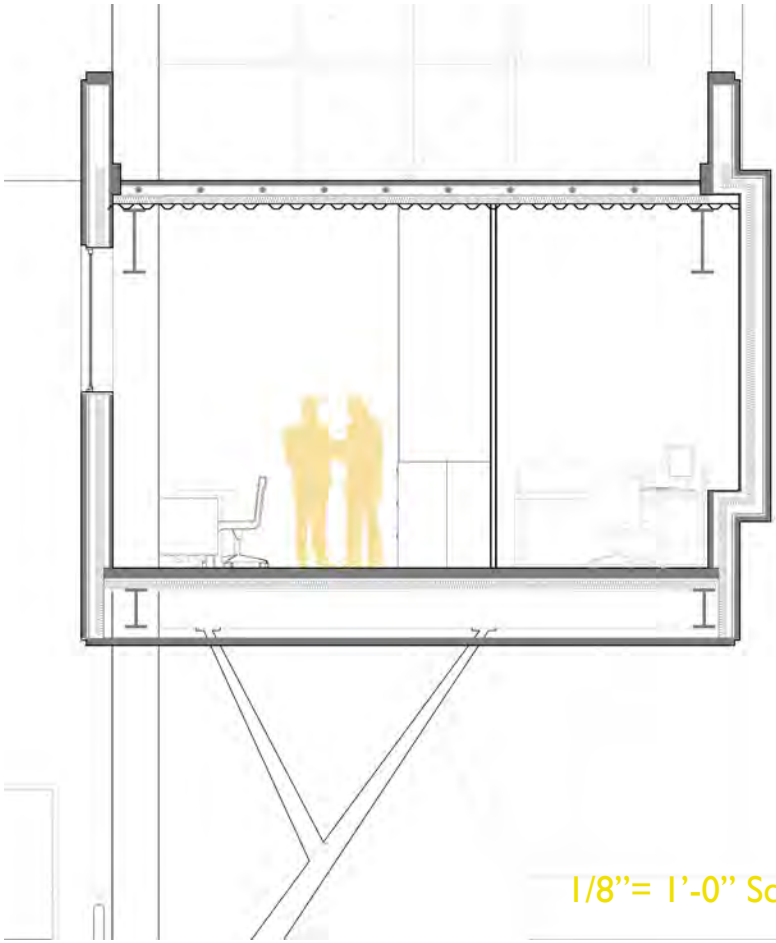
Mount Holyoke Environmental Research and Education Center

Green Roof

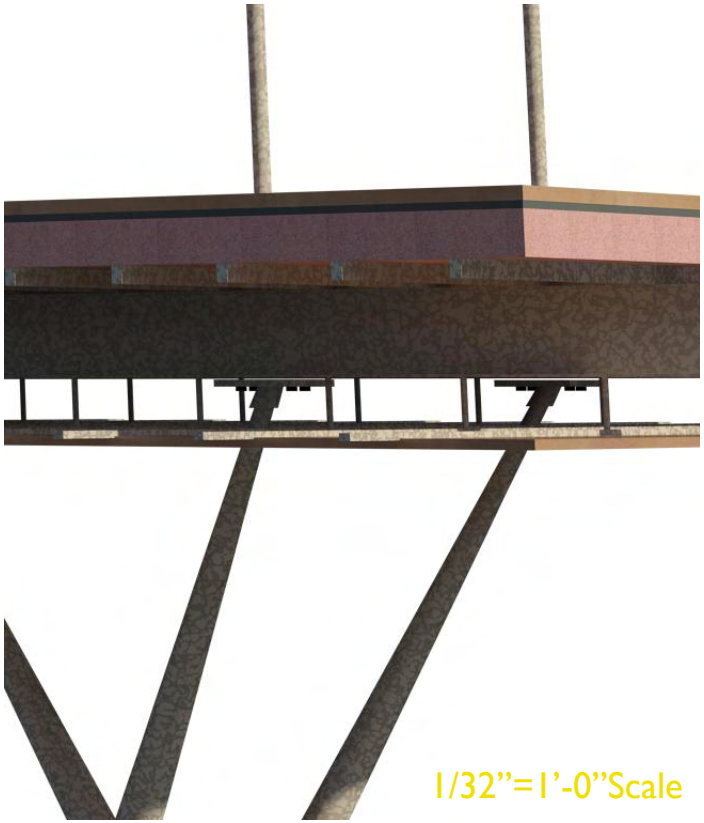
Once you enter into the building you fist see a long walk that points you to the view of the pond. You would then turn to enter the galleries and would be greeted by a reception desk. Walking in the top floor there would be an exposed ceiling with wide-flange structure and metal decking above. The ceiling would lift up as you get toward the water side of the building which would have a clear stories on either side a long space which would allow for program on either side of it (seen in image on left). This space would lead you toward a door to the green roof (seen in image above). Once outside you remain covered with a system that holds photo-voltaic panels and openings that mimic them on the opposite side. This space would be accessible and allow from programs to be held on the roof.

Section Through Office & Living Machine

1/32”=1’-0”Scale

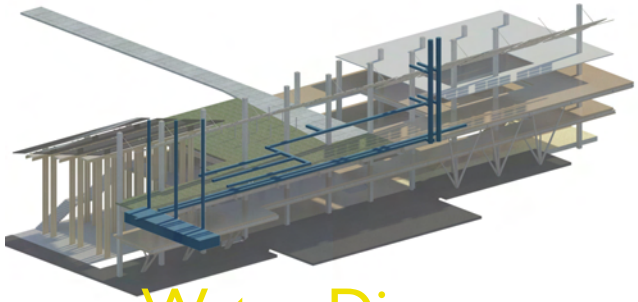


1/8”= 1’-0” Scale



1/32”=1’-0”Scale

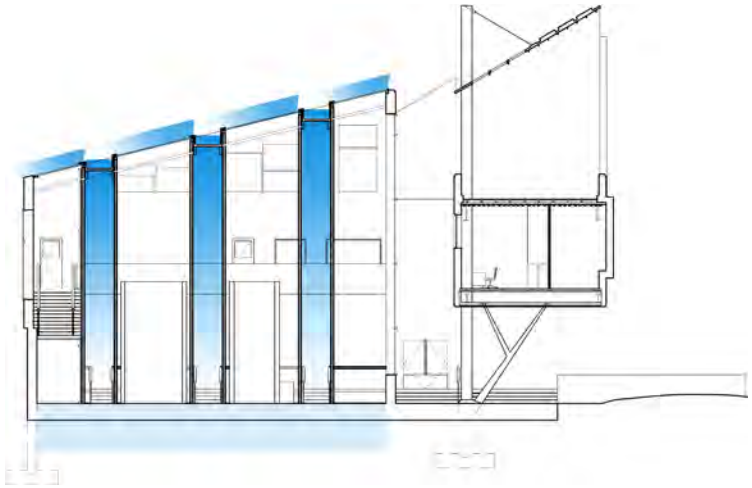
Details

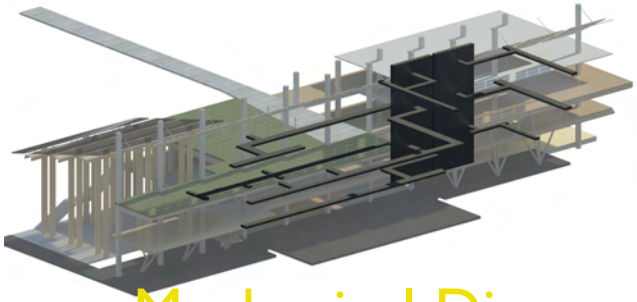


Water Diagram

Water is collected along all roofs of the building. On the green roofs it is absorbed and then drained into the building through pipes that then bring it to the cistern which is located under the Living Machine.

The Living Machine roof contains three large gutters that transport the water down and through the room till it reaches the cistern.

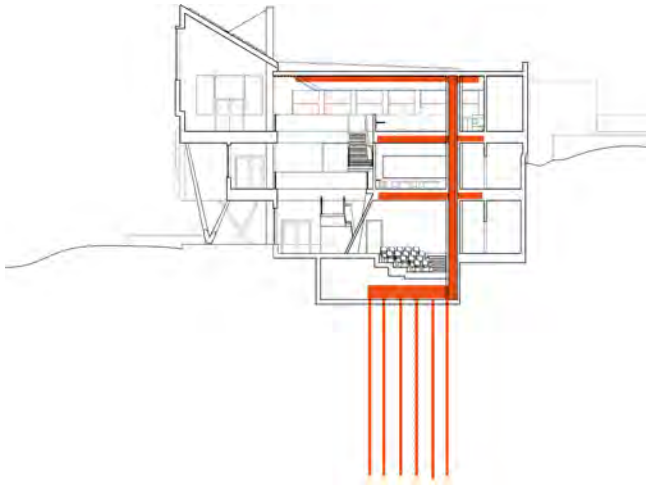


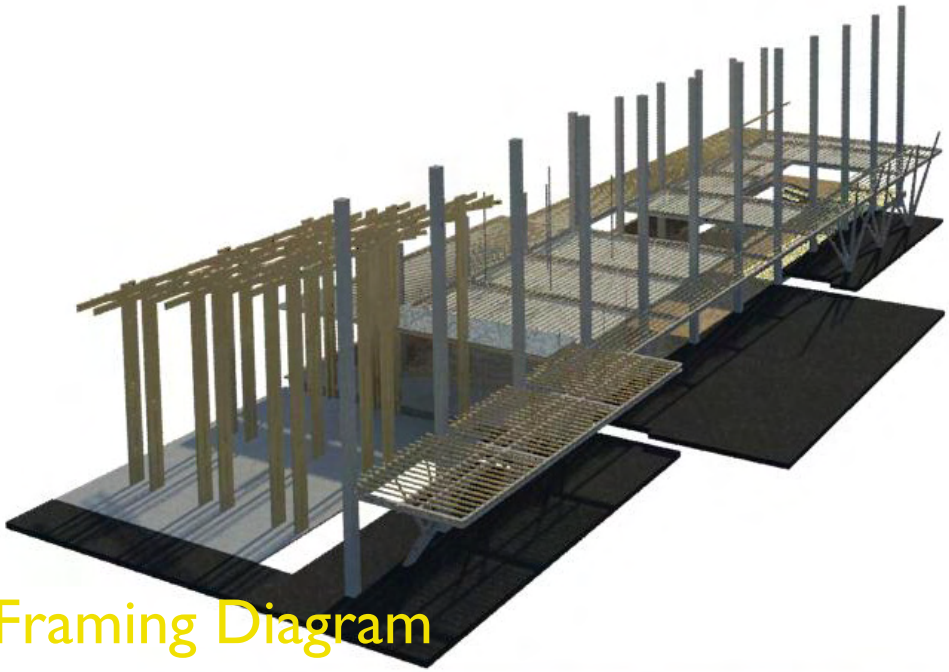


Mechanical Diagram

The mechanical system is run off a geothermal-exchange system which collects the temperature of the earth (a constant 55 degrees) and uses it to either heat or cool the building.

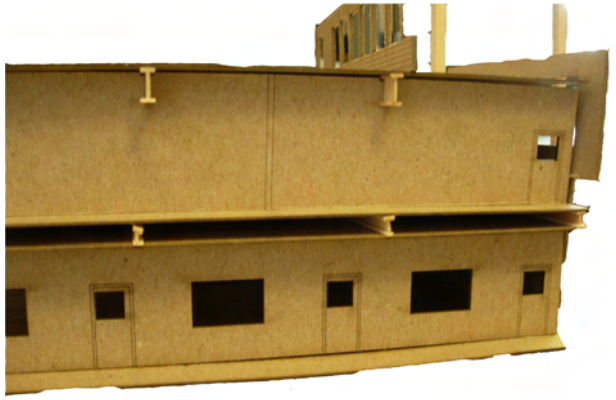
The duct work is run through a chute in the building located in the galleries. This spaces runs the entire height of the building and allows the ducts to be brought up and then distributed outwards.

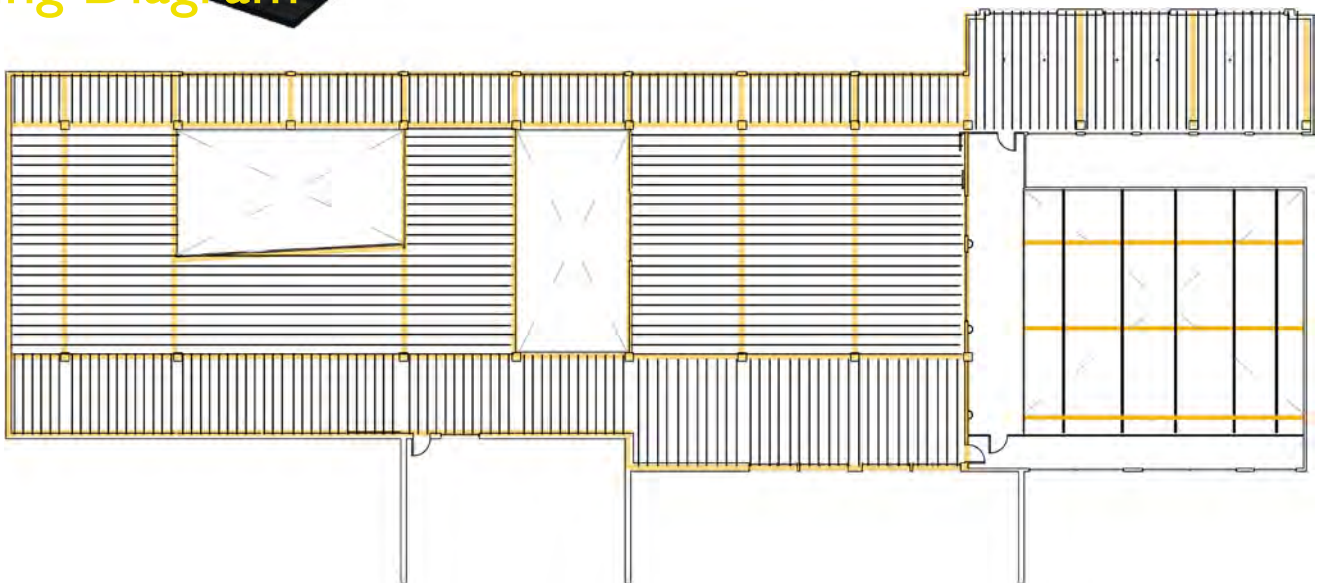




Framing Diagram

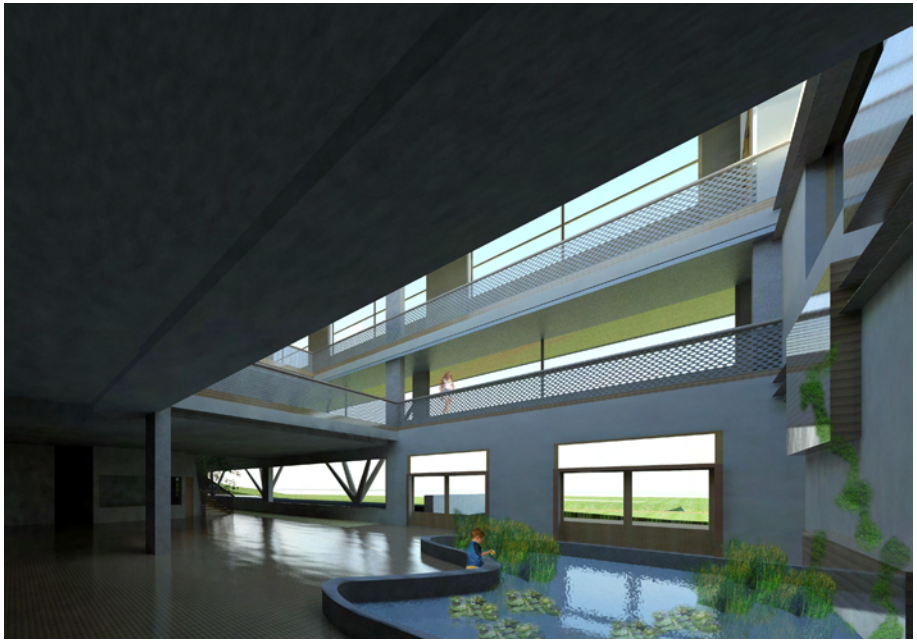
Model





Main Stairs

The stairs in the gallery space becomes a place for interaction between the visiting children and the university students. The stairs are contained in a small atrium space that allows for visual acknowledgement of all the gallery spaces on every floor.



The main atrium contains a skylight above and a small artificial pond below. The pond allows for child interaction teaching them about the vegetation that is contained in the upper pond which can be seen outside the large windows.

Atrium Space

The Living Machine is housed in a greenhouse area which contains the large tubs of vegetation which cleans that water as it cycles through one tub to the next. This process can be watched and explored as one walks through the space.

Living Machine

The office spaces are located on their on separate wing by the laboratories. They have a view out to the pond as well as into the Living Machine. The office suite allows for interaction between workers yet is a quite space away from the galleries.

Office

Exterior space Under Building Overhang

The columns which hold up the gallery overhang creates a dynamic space in which one is allowed to walk along and interact. The columns (seen in the image to the left) are mimicking the tree like sculptures inside the building which have become part of the vegetation gallery.

Visual appreciation between the university students and the children can be seen on the second floor on either side of the atrium (as seen in the image below). The children's workshop is located on the left side of the space which looks out to the university labs. Here the children can see them students working and get an understanding of the level of experimentation they do. Being inspired, they are then encouraged to do small experiments and projects themselves with the help of parents, workers, and volunteer students.

Second Floor Atrium Space

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Intro

Children

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Site

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http://www.fivecolleges.edu/about_us/index.html

Mount Holyoke College

http://www.mtholyoke.edu

http://www.mtholyoke.edu/ce/6005.shtml

Zoning

C:\Documents and Settings\Sari\Desktop\FALL08\thesis\environmental websites for mass.mht

Stainability

Living Machine

http://www.livingmachines.com/
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Tom Ridge Environmental Center

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