Ball State University Center for the Environment

An architecture project for ARCH 401 submitted for the Honors College Thesis

By

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Abstract

In the Fall of 2008 the students of ARCH 401 were presented with a semester-long design challenge. The culmination of the semester would be a competition sponsored by Cripe Architects + Engineers, a firm from Indianapolis, in which a jury of local practitioners would evaluate the design solutions. The proposed project was a new building on campus: The Ball State University Center for the Environment. The building would be located between the existing Teachers College and Arts/Journalism buildings along McKinley Avenue. As a Center for the Environment, the implementation of sustainable practices would be a significant focus in the design. Another challenging aspect of the design was the location between two existing buildings and the opportunity to continue the interior street which weaves through other buildings along McKinley Avenue.
Acknowledgements

I would like to thank Professor Andrea Swartz for serving as my advisor for this creative project. In studio she provided help with research and inspiration as well as meaningful critique of my work. I admire that she seems to know her students' work as well as they do, which allows her feedback to reinforce ideas that her students are already developing. I have appreciated the commitment she has to her students. Finally, I am grateful that in times when I doubted myself, Andrea expressed the confidence that she had in me, and that always helped me push through the long hours in studio.

I would also like to thank Bruce Loewenthal of Silverwood Builders who visited as a guest reviewer on several occasions. Each time, his critique helped me focus my efforts by evaluating the progress I had made compared with my stated intents. I was fortunate to work with Bruce several times, and like Andrea he also became very familiar with my work, which allowed his feedback to be relevant and beneficial.
Project Proposal

The project statement identifies urban response and environmental response as primary focuses of the project. The urban response relates to the conditions of the proposed Center for the Environment being within Ball State’s campus and directly adjacent to two other buildings. The environmental response will deal with environmental conditions that must be considered in all projects as well as strategies for setting this building apart as a leader in sustainability both on campus and in the community. Environmental responses involve issues related to climate, daylight, rainwater management, wastewater management, material and resource use, and energy use. A secondary objective is to physically connect the Center for the Environment to both the Arts and Journalism building and the Teachers College building. This will allow for the continuation of the existing interior street on campus, which is a series of corridors that currently extend parallel to McKinley from the Robert Bell building at the corner of Neeley Avenue and McKinley Avenue through the Arts and Journalism building. The addition to the interior street would allow uninterrupted interior access along McKinley from Neeley Avenue to Riverside Avenue.

This new building on Ball State’s campus will contain educational facilities and resources to support environmental education and research. President JoAnn Gora has identified sustainability as an important component to future development on campus both in physical additions to campus and in the development of educational programs. The Center for the Environment would provide classroom and laboratory space for Ball State’s Clustered Minors in Environmentally Sustainable Practices. It would also supply a location for future symposia on environmental issues at Ball State. Most importantly, the Ball State University Center for the Environment is a place where individuals from a variety of academic fields can collaborate and explore the issues facing the environment, because these complex issues affect many, if not all areas of study at Ball State.
Space Allocation

The following is a list of spaces the building will contain as well as their approximate sizes in square feet, which was provided with the project statement:

I. Multi-Use Suite

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditorium</td>
<td>1200</td>
</tr>
<tr>
<td>(seating for 150 in chairs or for 64 at tables of eight for dining)</td>
<td></td>
</tr>
<tr>
<td>Stage Area</td>
<td>640</td>
</tr>
<tr>
<td>Stage Activity Prep Area/Green Room</td>
<td>240</td>
</tr>
<tr>
<td>Meals Serving Area (for catered meals)</td>
<td>320</td>
</tr>
<tr>
<td>Storage for Tables and Chairs</td>
<td>320</td>
</tr>
<tr>
<td>AV Room</td>
<td>360</td>
</tr>
<tr>
<td>Coat Room</td>
<td>120</td>
</tr>
<tr>
<td>Reception Area</td>
<td>800</td>
</tr>
</tbody>
</table>

II. Exhibit Suite

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibit Space</td>
<td>1200</td>
</tr>
<tr>
<td>Exhibit Storage</td>
<td>240</td>
</tr>
</tbody>
</table>

III. Library

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1200</td>
</tr>
</tbody>
</table>

IV. Classrooms

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four Classrooms @ 240 sf (capacity: 24 students ea.)</td>
<td>960</td>
</tr>
<tr>
<td>Four Classrooms @ 480 sf (capacity: 48 students ea.)</td>
<td>240</td>
</tr>
</tbody>
</table>

V. Laboratories

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four Laboratories @ 480 sf (capacity: 24 students ea.)</td>
<td>1920</td>
</tr>
</tbody>
</table>

VI. Model Fabrication Suite

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabrication Lab</td>
<td>480</td>
</tr>
<tr>
<td>Technician's Office</td>
<td>120</td>
</tr>
</tbody>
</table>

VII. Computer Lab

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>960</td>
</tr>
<tr>
<td>24 stations</td>
<td></td>
</tr>
</tbody>
</table>

VIII. Director’s Office Suite

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director’s Office</td>
<td>480</td>
</tr>
<tr>
<td>Director’s Secretary and waiting area</td>
<td>240</td>
</tr>
</tbody>
</table>

IX. General Office Suite

<table>
<thead>
<tr>
<th>Name</th>
<th>Size (sf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Office (one secretary, copying, storage, waiting area)</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>360</td>
</tr>
</tbody>
</table>
2. Office for Campus Sustainability Coordinator
   180 sf
3. Two-person Office for Coordinator of Clustered Minors in Environmentally Sustainable Practices and Coordinator of Green Initiatives
   180
4. Computer Technician
   120 sf
5. Laboratories Technician
   120 sf
6. Four-person Office for Graduate Assistants
   360 sf
7. Conference Room for eight w/ Kitchenette
   360 sf
8. General Storage
   120 sf
9. Unisex disabled-accessible Toilet
   80 sf

X. Visiting Scholars Office Suite
   1640 sf
   1. Four Offices for Four Visiting Scholars (4 @ 360 sf)
   1440 sf
   2. Secretary for the Visiting Scholars
   200 sf

XI. Lounge
   Seating at tables for 24, drink machines, and microwave
   600 sf

XII. “Living Machine” Suite
    1680 sf
    1. “Living Machine”
    1200 sf
    2. Controls and Monitoring
    360 sf
    3. Technician’s Office
    120 sf

XIII. Support Spaces
    800 sf
    1. Men’s Toilet (multiple may be needed)
    200 sf
    2. Women’s Toilet (multiple may be needed)
    240 sf
    3. Janitor’s Closet
    120 sf
    4. General Storage
    240 sf

Subtotal
   20,200 sf

Grossage at 50% of Subtotal
   10,100 sf
   (allowance for corridors, stairs, elevators, etc.)

Total Occupied Area
   30,300 sf

Mechanical Room at 5% of Total
   1515 sf

Total Estimated Building Area
   31,815 sf
Site Analysis

The first step I took in the project was to acquaint myself with the site. It is a space on campus that I have walked through countless times, but I needed to spend some time in and around the site to really understand the conditions there. I spent time observing the exterior space where the building would be located and the existing interior street that would extend into the new building.
Site Analysis

My time spent on the site and reexamining other spaces on campus through the lens of the project revealed several issues that would become priorities in the design of the new building. The various types of traffic in and around the site would need to be thoughtfully considered, especially since the site is currently used as a pass-through from one part of campus to another. To me, this meant that I would need to provide a way for pedestrians and bicyclists to cross through the site on the East-West axis as well as the connection of the interior street along the North-South axis.
Another issue I found is that many buildings on campus do a poor job of creating a relationship between the building and the exterior space around it. Much of the outdoor open space on campus sits empty, even on a beautiful day. Most of the pieces of lawn that are found throughout campus don’t invite students to use them. They seem untouchable and meant only for aesthetic reasons. Any new building introduced to campus should learn from this mistake and create outdoor spaces that can act as transition space between the public street and the private building interior.
Intent and Precedents

To organize my intents for the project, I investigated a variety of precedents that could demonstrate goals I had developed and inspire other goals for the building. This series of images relates to the issues I examined related to outdoor space. The selected projects seem successful in creating a relationship between building and exterior space. They also create spaces that encourage use and interaction.

Duke University, Zimmer Gunsul Frasca Architects
source: www.zgf.com

Duke University, Zimmer Gunsul Frasca Architects
source: www.zgf.com

Oregon Convention Center, Zimmer Gunsul Frasca Architects
source: www.zgf.com
Iowa State University, Zimmer Gunsul Frasca Architects
source: www.zgf.com

Artists for Humanity EpiCenter, Arrowstreet
source: www.aiatopten.org
Intents and Precedents

I also researched precedents that would help guide design decisions related to the building's construction, aesthetics, and organization. The assembled images showcase work that has a high-tech aesthetic with notions of environmental consciousness. During my early research and design work, I decided that the building would demonstrate a relationship between technology and the natural environment.

Sheffield Winter Gardens, Pringle Richards Sharratt Architects
source: www.flickr.com/photos/fuzzypurple

Horizon Serono Headquarters, Grimshaw Architects
source: www.grimshaw-architects.com

Experimental Media/Performing Arts Ctr., Grimshaw Architects
source: www.grimshaw-architects.com
Tjibaou Cultural Center, Renzo Piano
source: rpbw.rui-pro.com

Disney Ice Rink, Frank Gehry
source: anaheimice.com

source: www.flickr.com/photos/wrchen

Univ. of Washington BioEngineering Bldg., Anshen and Allen
Intent and Precedents

An important piece of the program for the Ball State University Center for the Environment is the solar aquatic system, or Living Machine. The system processes blackwater, wastewater from toilets primarily, so that it can be reused on-site as greywater. Irrigation, toilet flushing, and mechanical processes can make use of greywater. This also reduces the demand for potable water on-site. To further investigate sustainable practices and particularly the design of a Living Machine, I researched Oberlin’s Adam Joseph Lewis Center. The building was designed by William McDonough + Partners to demonstrate sustainable practices on a college campus.

source: “Energy Performance,” pg 7
Schematic Design

During Schematic Design I tried out a wide variety of approaches of arranging program elements on the site. One important observation that influenced the program layout was the large shadow that the Teachers College would cast over the site for most of the year. This informed the placement of the living machine.

An early scheme had a very literal expression of the technology and nature theme. The building looked a bit like a dumbbell in plan with one side standing for technology and the other side for nature. Eventually this developed into a more complex building that integrated nature and technology rather than separating them. The main volume of the building was simplified to a single box. Important elements break the regularity of the box with their materiality and/or form language.
Design Development

During Design Development I looked at program layout, structure, and assemblies in detail as I prepared to execute the final submission. In the program layout, the conical shape which sits in an atrium space, serves as the auditorium with the library above. The opposite side of the building is much denser with offices and classrooms. The warehouse-like steel structure is fairly regular besides the independent conical piece jutting out of it. The elevator and stair shaft serve as a concrete core.

The green roof and sun shades also needed a lot of work at this stage of design. The shades are integrated into the facade to tie into mullions of the curtain wall. I chose to incorporate a green roof that could assist with stormwater management on the site as well as serving as additional outdoor space that could be used by occupants and studied by students.
Final Submission

The design for the Ball State Center for the Environment grows from two bases of knowledge: knowledge of the natural environment and knowledge of technology. The two inform each other and are manifested in the formal language, materiality and daylight qualities. Environment and technology expressed in the architectural language relate to the activities of the building. It is a place to research, discuss and discover strategies to work toward a sustainable future.
Green Roof
Louver System
Pergola to encourage use of outdoor space
Pervious Paving
Living Machine
Covering for Bus Stop
Rain garden

SUSTAINABLE STRATEGIES

LOCATION PLAN
1" = 100'

1.

APPLIED TECH
TEACHERS COLLEGE
HARGREAVES MUSIC BLDG

ARTS AND JOURNALISM
BRACSEN LIBRARY

LETTERMAN BLDG

ROBERT BELL

RIVERSIDE AVENUE
Reflections

Each studio project brings unique challenges. This project has undoubtedly been my most comprehensive design thus far, which I believe also made it the most challenging. Such a project requires in-depth investigation of a wide variety of architectural issues, including site design, massing, program layout, building assembly, building envelope, structure, systems, and life safety. As each issue is addressed, the building starts to take shape and then become clarified as each aspect is further examined. The process was very rigorous as I continually refined the various components of the building, because a revision in one area likely had an effect on other areas as well. Self-evaluation, desk critiques with Professor Andrea Swartz, and periodic pin-ups including guest critics fueled the long process of development and revisions. This rigor seemed to produce a successful product in the end. I am proud of the proposal I presented, and I was delighted to learn that I was chosen as a finalist in the competition.

If I had more time to work on the project, I would have liked to continue my process of evaluation and revision. Particularly the areas of daylighting and mechanical systems could have used more analytical study to evaluate the multitude of possible solutions and to shape both to best fit the building's intents. Also, I would have liked to design some of the programmatic elements in more detail, such as the library and the adjacent outdoor spaces. If I've learned anything at Ball State's College of Architecture and Planning, it would be that a studio project is never complete.

As I make my way to graduate school in the fall I will carry the lessons of this project with me. My aim will be to continue to approach each project with a persistent work effort, because I know that is how I produce my best work. I also will continue to explore sustainable technologies and methods so that when I emerge from school I will be knowledgeable in integrating high-quality design with sustainable practices.
Bibliography


