urban renewal through responsive design
a new city hall for elkhart, indiana
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a new city hall for elkhart, indiana

Jeff Birzele
Bachelor of Architecture Thesis
College of Architecture & Planning
Ball State University
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thank you

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thanks to:
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Mom & Dad - Thank you for all the support and encouragement and for the opportunity to pursue a dream
Architecture is a reflection of ourselves. We design buildings to enrich our daily lives. These designs are molded by a certain set of values, or expectations that are developed over time. As societies change and adapt to new technologies and beliefs, so too must architecture. Over the past several decades, our urban centers have been driven by big business, and the need to produce office and retail space quickly and efficiently. More times than not, these designs are driven by the bottom line, as opposed to responsible design. Countless studies have been done showcasing the ill effects of this trend. Many buildings are inward-focused, that is, they are only concerned with what goes on inside the building, not what goes on outside of it. Architecture should enrich the environment in which it is located, both in an environmental way, and a social way. There is a shift in the trend, however, from past years. More and more, architects and clients are beginning to see the benefits of environmentally friendly design. The work of William McDonough and Partners is driven by making the buildings we live and work in more responsible with regard to the impact they have on their surroundings. They are responding to the new trend.
ever changing social landscape

This thesis is designed to explore the idea of creating urban architecture that responds to the needs and desires of a society with changing values. The project is a new city hall for the City of Elkhart, Indiana. I chose to design a city hall because of the diverse nature that exists with their design. A city hall must respond to the symbolic qualities a city is trying to convey, as well as, present itself as a civic landmark amongst the community. The function of a city hall is to allow people to let their voices be heard. The design can enable a message be sent regarding the importance of community and environmentally friendly design. Fundamental to this project is the creation of space that the community can use in a variety of ways. The site chosen for the project is rich with opportunities to do just that. The design focuses on responding to the needs of defining a prominent presence for the city hall, creating urban spaces for activities, acknowledging the new riverwalk, and responsibly addressing environmentally-friendly design. Natural ventilation & daylighting, inclusion of a living machine, and green roof are some of the ways this is done. The project is designed to respond to the needs of the community.
The site is centrally located in the heart of downtown Elkhart. It is located on main street and is adjacent to the Elkhart River which runs through the downtown area. Recently, the city initiated a riverwalk development program. This is an aggressive project designed to build up the riverfront with shops and apartments. It brings a strong pedestrian element to the downtown area. This particular site was chosen because of its central location and access to a number of events and facilities. Every year, the city of Elkhart hosts a variety of events all year long. One of the most popular is the Elkhart Jazzfest. This music festival brings in many of the world’s most renown jazz musicians. The Elco theater, located just south of the site, along with restaurants throughout the downtown area host this event. This site with its existing civic plaza and connection to the riverwalk is perfect for a festival such as this.
activate the riverwalk
provide space for the community to come together
define civic plaza
isolate to celebrate

connect plaza and riverwalk

riverwalk looking south
plaza tower & sculpture
site looking west
1. parking garage
2. 911 center
3. 1st source bank
4. city warehouse
5. sorg jewlers
6. elco theater
7. office building
8. key bank
9. plaza square
10. selfert drugs
11. borneman supply
12. city garage
13. clocktower
14. riverwalk
The site receives a great deal of sunlight throughout the day. There are very few obstructions so direct light floods the southern edge of the site. There exist currently only a handful of trees along the river. Late afternoon sun is obstructed by elevated plaza and Key Bank.

**solar diagram**

The site slopes to the east towards the Elkhart river. The topography is relatively flat and does not require extensive prepwork. A hotel used to be located on the site and is in good shape.

**site drainage**

There are several key connections that were addressed. The most important connection was between the plaza, the site and the riverwalk. The development of the site is designed to encourage a variety of use types, including the annual jazz festival.

**key connections**
<table>
<thead>
<tr>
<th><strong>Public space &amp; council facilities</strong></th>
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<tbody>
<tr>
<td>atrium</td>
<td>6,400 sq.ft</td>
</tr>
<tr>
<td>council &amp; city manager</td>
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</tr>
<tr>
<td>council chamber</td>
<td>3,000 sq.ft</td>
</tr>
<tr>
<td>committee rooms</td>
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<th><strong>Public facilities</strong></th>
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<tr>
<td>art gallery/exhibit space</td>
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<tr>
<td>business library</td>
<td>2,000 sq.ft</td>
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<tr>
<td>municipal archives</td>
<td>500 sq.ft</td>
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<td>retail facilities</td>
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<tr>
<td>coffee shop</td>
<td>2,600 sq.ft</td>
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<td>fitness center</td>
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<tr>
<th><strong>Administrative departments</strong></th>
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<tbody>
<tr>
<td>mayor’s office</td>
<td>1,200 sq.ft</td>
</tr>
<tr>
<td>information &amp; public relations</td>
<td>1,500 sq.ft</td>
</tr>
<tr>
<td>clerk</td>
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<tr>
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<td>legal</td>
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<tr>
<td>finance</td>
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<th><strong>Service facilities</strong></th>
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<tr>
<td>shipping &amp; receiving</td>
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<tr>
<td>maintenance &amp; custodial</td>
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<tr>
<td>central records &amp; storage</td>
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<tr>
<td>circulation</td>
<td>15,000 sq.ft</td>
</tr>
<tr>
<td>building systems</td>
<td>2,500 sq.ft</td>
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**TOTAL GROSS SQUARE FOOTAGE**  
63,000 sq.ft.
key spaces

mayor's office
office walls are wood paneling
floor are hard wood with area rug
furniture is classical in design

council chamber
coffered ceilings
wood paneling on walls
seating capacity of 132
naturally daylighted

exhibition spaces
located on first floor for easy access & display
very open & flexible plan
used for art & educational displays
used for main street showcase of art
artwork is hung from moveable partitions

building space distribution

<table>
<thead>
<tr>
<th>Community Services</th>
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<tr>
<td>Executive Spaces</td>
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<td></td>
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<tr>
<td>Basement Level</td>
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**Level 4 Includes:** United Way, HUD, Habitat for Humanity, etc. This will be leaseable space for community programs

**Level 3 Includes:** Mayor's Office, City Council Chamber and councilmen's offices

**Level 2 Includes:** This level will house the majority of the city departments like the treasury and clerk. The public will be able to pay bills on this level.

**Ground Floor:** Public spaces such as exhibits, art gallery, lobby, retail space, and cafeteria will be located on this floor.

**Basement Level:** This sub-level will house the mechanical spaces for the building as well as, provide parking for building tenants.
The following pages present the design process. Before reaching the final design, many steps were taken. A number of different design schemes were done in order to test out different approaches. Each design proved to be very helpful with the final concept. Design is a journey. The trip that one goes on to reach their final destination is often the most valuable part. Lessons were drawn from each scheme and is explained briefly for each study. This project was very complex in nature and required a great deal of exploration. The topics that were explored dealt with site development, building location, connection between civic plaza on main street and lower plaza by the river, access, and regenerative opportunities.

**Scheme One**
This scheme broke the building up into three sections. The southern section was the largest to maximize solar gains. The fenestration on the southern edge was set back from the edge of the building for shading reasons. An external structural grid was placed to act as light shelves to get diffused light into the interior. A main, central atrium ran through the middle of the design connecting the plaza and the riverwalk.
Scheme Two
Scheme two focused on maximizing natural daylighting. The building stepped back to allow the maximum amount of light to infiltrate the interior. The interior would be shaded from direct light via the use of screens constructed of a vine-covered trellis system. This scheme also studied trying to bring the river into the site by carving out the landscape. The stepping down of the building was also done to address the elevation change from main street to the riverwalk.

Scheme Three
Scheme three studied the building mass as it addressed solar exposure. The south side of the building was concave to receive the maximum amount of sunlight and was very transparent. The north side was more solid and rigid to protect the interior from winter winds from the NW.

Scheme Four
Scheme four was focused on studying thermal mass. The idea was that the building would be separated into individual parts, or masses, connected by circulation splines. The working areas would be heavy structures that would retain heat during the day and release the energy at night.

Scheme Five
This scheme focused on massing and placement. A central atrium connected the main street plaza and the green space below. This was one of the first studies done. The idea for the central atrium stayed constant throughout most of the different designs. The building was set back from main street to emphasize the building's purpose.
Scheme six explored the idea of isolating the building to accentuate the importance and significance of the city hall. The building was designed to be very monumental in scale and layout. The building would be perched on a podium base that would step down via terraces to the level of the riverwalk. The site was designed to provide space for people to gather for a variety of events. A connection to the east side of the river was made by carving out an amphitheater on both sides of the river. A central atrium runs through the building connecting the clock tower, plaza and the riverwalk.
Scheme seven was different on many levels from the previous schemes. The biggest difference is found in its ventilation strategy. This scheme revolved around a central atrium which allowed air to flow through creating a vacuum. Fresh air was sucked in through exterior windows and funneled through the building into the atrium, where it was exhausted out the top. All windows could be adjusted via the diagram to the left. The diagram in the top left illustrates the ventilation strategy. This scheme also focused on framing the civic plaza in order to create a more intimate and welcoming main street entry.
west elevation

main street plaza
The design journey has led to this, the final design. All of the studies discussed up to this point, have led to the culmination of attributes of each into this scheme. The design focuses on the creation of civic space, i.e., places that invite community action, and the development of environmentally responsible design.

This diagram illustrates the designed setback for the building. A city hall should be different from its surroundings. It should be isolated to call attention to itself because of the type of place it is. This is a place where people go to act on the freedoms that democracy provides. By offsetting the building from the existing street front grid, the importance of the building is easily recognizable. Another reason for the offset is to create a civic buffer around the building. By doing this, the building is isolated, yet at the same time, acts as a backdrop for the outdoor spaces surrounding the building.
The site plan to the left, shows the site development. As has been mentioned previously, a major aspect of this project was the connection between the existing civic plaza and the new riverwalk. This was achieved by carving out the landscape creating an amphitheater on both the east and west sides of the river. This space could be used for the annual Jazzfest, as well as, a number of other outdoor activities. The living machine, located in the southeast corner of the site, was located such that it acts as a node. The public would be welcome to enter the facility to see how it works and to become educated on its benefits.
final design

north elevation

south elevation

east elevation

west elevation
green roof precedents

benefits

- **cost savings** - much longer material lifespan, decreased maintenance
  increased insulation value

- **air quality** - filtration of airborne particulates
  carbon dioxide / oxygen exchange

- **temperature regulation** - good insulation values
  save money in heating & cooling costs
  decreases "urban heat island effect"

- **water** - stormwater retention & management, water taken up by plants, exchanged as O2

view looking southeast
ventilation diagram

This diagram illustrates the ventilation strategy for the building. The building is broken up into sections. The main circulation for the building also serves as a giant duct moving fresh air through the building. Acting as an "air spine", the air is sucked through the interior and released out of windows atop the atrium corridor.

daylighting diagram

This diagram illustrates the natural daylighting strategy for the building. The blue in the diagram represents diffused northern light. The atrium feeds the interior of the building, while large expanses of glass along the perimeter feed the zone along the periphery. The council chambers is provided natural light from a series of overhead skylights.
the living machine

Anaerobic Reactor
Wastewater flows into an underground receptacle. Without heating or mixing, this acts as a primary sedimentation basin. Solids settle & anaerobic bacteria feed on solids and wastes in the liquids. Located underground and covered, gases produced are passed through an activated carbon filter when necessary to control odor.

Anoxic Zone
The anoxic reactor is home to a "transition" ecology. A small amount of oxygen is introduced to the environment and the reactor is slightly mixed to enhance the growth of microorganisms that convert nitrogen to nitrogen gas. Odor is controlled by a planted biofilter. Settled biosolids from step 5 are recycled back into this stage.

Closed Aerobic Reactor
First fully aerobic reactor in the process. Aerators bubble air throughout the tank, keeping everything mixed & providing oxygen for the waste-eating microorganisms. The biofilter sits directly over a portion of the reactor and is planted with appropriate vegetation to help control moisture levels in the filter material as well as control odor.

Open Aerobic Reactor
Surfaces are covered with vegetation supported by racks. The roots provide surfaces for the growth of attached microbial populations that assist in the wastewater treatment. The plants serve as habitat for beneficial insects and organisms that graze on microbial biomass. These reactors give the space a botanic garden feel.

Clarifier
In this stage, the microbial communities, and any remaining solids, are separated from the treated water. The remaining biological solids settle, then those solids are pumped back to step three where they are broken down. To achieve zero discharge, a reed bed is added to compost the solids settled out of the wastewater.

Polishing Filters
These do the final "cleansing" of the wastewater. Water is circulated through a combination of different habitats that house diverse organisms. Up to three polishers can be used. After this stage, the water is ready for reuse or disposal. The resulting water can be used for irrigation, toilet flushing, or be released into the river.
Reflections

Thesis is a time to explore. It provides the opportunity to push the limits of one's capabilities. It provides a launching pad for future exploration. I wanted to use this thesis to explore an area I feel very strongly about, however, one that I was unfamiliar with. It is my belief that the future of architecture lies in regenerative design. Prior to this project, my knowledge of sustainability was very weak. I knew that a project of this type would push me to learn as much as possible, and I believe I did.

One of the most important lessons I learned from this project, was the limitations of sustainable design. It's going to take some time for the public to come on board entirely with the green movement, however, in time, I believe that it will become mainstream. One of the major reasons for the lack of sustainable architecture, is that the number of real-life examples are scarce. With people like William McDonough, however, that trend will change. Urban architecture is unique and vital to the sustainability of the social structure. It is our jobs, as future designers, to make sure that future generations can enjoy the urban experience, without harming the earth.
This project was done to research new methods for heating and cooling dwellings in a new apartment building. The interesting part of this project was the innovative wall system that was created. The wall consisted of semi-circle aluminum sections that were filled with PCM. Each section would be heated during the day. At night, the sections would be rotated 180 degrees allowing the heat to be transferred to the interior. They also created a “water wall.” This wall was filled with water and heated by the sunlight. Hot water at the top of the wall was tapped off the wall and used to heat the interior of the building. Excess heat is released via louvers in the roof.

This building used several different interesting sustainable techniques. The exterior of the building is composed of a double skin which contains louvers and a ventilation system. The center of the building contains an atrium. Trees and a pool are located within this open space. The trees help oxygenate the air and the pool raises the humidity. The pool also helps lower the temperature of the building via evaporation. If the interior becomes too warm, excess heat can be ventilated through the roof, similar to the project discussed above.

This is a large-scale project, however, there are elements that can be applied to other smaller projects, such as this thesis. This project uses a double skin facade like the other projects, however, it is treated differently. The outer layer is made up of slats. The slats are adjustable so that the users are able to control the amount of fresh air that enters the building. The inner layer of the facade consists of two types of tilt-and-turn windows. The facade cavity is separated per floor, therefore, thermal gains can be isolated and controlled at each floor level. The exterior of the building is completely transparent, however, by utilizing these techniques, the performance of the building is not compromised.
   
   This book was great because of its real-world examples. The book is loaded with actual projects that have been done regarding sustainable design from throughout the world by a variety of architects. The examples discussed above and on the previous page all came from this book.

   
   This book will and has been very helpful. HOK developed this book to take you through the process of sustainable design. There are sections on strategic planning, site analysis, daylighting schemes, mechanical systems, photovoltaics, material selection, and many more.

   
   This project contains various projects from nationally, and internationally acclaimed architect's. Of particular interest was the work of William McDonough. Included in the discussion was a section on the Gap corporate campus, which was designed by McDonough and Partners.

   
   One of the key lessons I learned from this publication was the idea of creating micro-climates, both externally and internally. The idea of creating micro environments is intriguing to making civic spaces.

   
   This book discusses the general and specific parameters of sustainable design. Particularly helpful are the numerous illustrations and diagrams. One particular illustration showcases the basic strategies for passive solar heating, natural ventilation and natural daylighting. The drawing is annotated and contains a lot of information. Several case studies are presented, as well as, discussions on each of the main issues.

   
   This book talks about the integration of social equity, economic prosperity, and ecological integrity. It talks about the rise in world population and the dangers this can produce to the environment. The majority of the growth in population has occurred in metropolitan areas, which places a strain on the local ecosystems.
   "...you are on the right track when your solution for one problem accidentally solves several others. You decide to minimize automobile use to conserve fossil fuels, for example, and realize that this will reduce noise, conserve land by minimizing streets and parking, multiply opportunities for social contact, safer for children.” - Michael Corbett, Developer

