A Wetland
Residential Community
in LaPorte, Indiana

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LA 404 Comprehensive Project
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A WETLAND RESIDENTIAL COMMUNITY
IN LAPORTE, INDIANA

Final Report For
The Comprehensive Project

ABSTRACT

In this project a balance was achieved between wetland ecosystem tendencies and the needs and wants of the surrounding residential community. In so doing I explored the ecological functions of the natural systems and the principles of community and housing design. Viable economic programs were incorporated into the planning process to assure the survival of the wetland ecosystem. These programs were included to increase the economic value of the wetland in the eyes of the public. Through the development of guidelines and a master plan for the site chosen in northwest Indiana’s LaPorte County I hope to have achieved this balance.
INTRODUCTION

The struggle between human nature and mother nature is evident in northwest Indiana. In the early 1800's this area of the state was a continuous wetland when the settlers began to drain millions of acres for farming. These farms are still functioning today but with the ever increasing popularity of the area, because of its proximity to Chicago, housing developments are popping up in all directions. In June, 1993 the area received more than 14 inches of rain. Thus, most of the crops were lost and people lost millions of dollars in property because the wetland tendencies were still present. Since housing developments are inevitable in this region of the state, it is the role of the landscape architect to merge the needs of developers (profit/market viability), residents (comfort/convenience), and the land (sensitivity/resilience) together into a cohesive living environment that ensures the survival of all aspects.

The site chosen to achieve this balance consisted of 700 acres with a naturally occurring and partially excavated wetland surrounded by farmland, a scrub forest, and the beginnings of a subdivision. The end result of this comprehensive design project was a housing community intertwined and integrated with the processes of natural and constructed wetlands.
My interest in the natural processes of our world began a few years ago when, as a member of the third year design studio, I was introduced to wetland design through correspondence with Mr. Vic Hescher, from the Department of Natural Resources. Our studio was given the opportunity to design and restore an historically known wetland system complete with mesic prairies and woodlands. I expanded my knowledge of more natural and ecologically viable environments in the Sustainable Landscapes elective offered in the Spring of 1993. That following summer I attended a professional development workshop at Harvard University entitled Wetland Restoration, Construction, and Enhancement. The two day workshop focused on design and construction of wetland ecosystems in salt water and fresh water environments.

I chose the town of LaPorte, Indiana as the site of my project because of its history as a lake town. Being raised in this city located in northwest Indiana(fig. 3), I was familiar with the hydrology of the area as well as the attitudes that the people from this part of the state have towards wetlands. The terrain is glacial and dictated by the Valparaiso moraine just to the north. Currently there are at least six major lakes located within the city limits of LaPorte. This
indicates a strong tendency towards flooding which in turn explains the great amount of effort on the part of the people of LaPorte to control the natural hydrology of the area. Flooding is a common occurrence because of a lack of understanding and a lack of respect for the original land use, wetlands.

The proximity of LaPorte to the city of Chicago (75 minutes to the Loop) demonstrates the need for further development within the city. LaPorte is one of the few small towns left that still has a thriving downtown with virtually no highway commercial development. There is room for gentrification within the city and new, well planned, sensitive development as well. However, I am concerned about the type of development and the rate of development that takes place in the name of progress.
The demand for developable land in this country continues to increase. This need has evolved from the days when humankind was shifting from a hunter/gatherer society to an agrarian society. Prior to this shift in the social paradigm our society recognized the value of natural areas, such as wetlands, because they served a specific function in the everyday lives of humankind. As our society became more dependent on agriculture as a way of life, more land was needed to grow more food to support more people.

I believe that it is possible to stop this land crunch and bring the values of wetlands back as a societal priority. This can be accomplished by increasing the economic importance of a wetland because our societal values regarding land of any kind are based on economics. Several economic systems for evaluating wetland benefits have been developed. For example, the area of wastewater treatment using wetlands, both constructed and natural, is an exciting and cost effective way to maintain natural areas, process wastewater, heighten people's awareness of the functions of wetland ecosystems, and restore lost habitat for wildlife as well as restore our lost heritage. According to Thomas Andrews of the Southwest Wetlands Group, a community can save substantially by implementing wetland
wastewater treatment systems(3).

Wastewater treatment is just one way to incorporate community and nature. With further exploration and education of the public, wetland uses and their ecological functions will be incorporated into future developments instead of sacrificed by the development and ultimately destroyed by the development. Landscape Architects can combine their expertise and understanding of site analysis, contextual analysis, design, and thorough problem solving with their knowledge of biological and ecological systems to create a balanced living environment by maintaining the integrity of the wetland without compromising the residents quality of life. A balance between human nature and Mother Nature will emerge.
The magnitude of this design project warrants a few assumptions to be made on the part of the designer. Assumptions allow for the designer to concentrate on the problems that may be solved through his or her design efforts.

The first assumption that I made was that most people of this world have two choices with regard to wetlands: 1) fill them in or 2) drain them. To gain full economic advantage of a wetland these are the only viable choices as seen by today’s society. The second assumption is that preserving wetlands does not benefit people directly. By saving wetlands and leaving them alone the knowledge that people used to possess of why wetlands are good is lost. Isolation of a resource does not allow its benefits to be discovered because no one is using it enough to understand its benefits.

I also assumed that people in general are looking for a more sustainable way to live and specifically, the people who live in my community will want to use the wetlands without degrading them and will want to reconstruct lost ones.
ACKNOWLEDGING THE LIMITATIONS OF ONE'S ABILITIES OR THE LIMITATIONS OF THE PROJECT IS JUST AS IMPORTANT AS MAKING ASSUMPTIONS. THE LIMITATIONS RECOGNIZED FOR THIS PROJECT INCLUDED THE GENERAL ATTITUDES CONCERNING WETLANDS. A LOT OF PEOPLE FEEL THAT ALTHOUGH LESS THAN 10% OF THE ORIGINAL WETLANDS ARE IN EXISTENCE THERE ARE STILL TOO MANY 'SWAMPS'. ALSO THE ATTITUDE IN THIS PART OF THE STATE IS THAT A LANDOWNER SHOULD BE ABLE TO DO WHATEVER IS DESIRED WITH HIS OR HER LAND NO MATTER THE OUTCOME. ANOTHER LIMITATION IS THE NIMBY SYNDROME. NOT IN MY BACKYARD IS A PREDOMINANT ATTITUDE ABOUT MANY THINGS INCLUDING WASTEWATER TREATMENT FACILITIES. SINCE WASTEWATER TREATMENT USING CONSTRUCTED WETLANDS WAS A MAIN FOCUS FOR THIS PROJECT IT MAY BE DIFFICULT TO CONVINCE PEOPLE THAT IT IS ALRIGHT THAT THEIR WASTEWATER TREATMENT FACILITY IS THE WETLAND IN THEIR BACKYARD.

THE SCOPE OF THIS PROJECT WAS A BIG LIMITATION. THE AMOUNT OF INFORMATION THAT WAS NEEDED TO DESIGN CONSTRUCTED WETLANDS FOR WASTEWATER TREATMENT, DESIGN A RESIDENTIAL COMMUNITY, AND RESTORE OR ENHANCE EXISTING WETLANDS WAS FAR TOO VAST FOR ONE PERSON TO MANAGE IN JUST TWELVE WEEKS. I WAS NOT ABLE TO COVER FULLY THE THREE ASPECTS OF THE PROJECT. THUS, THE FOCUS OF MY PROJECT, THE TRANSITIONAL ZONES, EMERGED.
Project Goals-- The wetland community developed in this project achieved several goals.

1) The project had three components: community design, wetland design, and wastewater treatment system design. However, this project showcased the integration between community and the natural ecosystems rather than developing fully the three components. This was accomplished through the design of the transitions between land uses. The way in which the residences met the wetland, the way that the residences interacted with one another, the manipulation of the lots to fully connect with the constructed wetlands for wastewater treatment, and the access points of the educational facilities and recreational amenities were all designed to completely integrate the community into the wetland ecosystem.

2) The design demonstrated the aspects, both functional and aesthetic, of a wetland without degrading the ecology or compromising the residents quality of life. This was done by integrating within the fabric of the homes the dependence upon wetlands to satisfy a need. That need being the cleansing of the homes wastewater. Constructed wetlands were used to recycle the water for the residences,
thus demonstrating the functions of wetlands. Through naturalistic design and vegetative buffers an appreciation for this ecosystems aesthetics was also achieved.

3) The design was to be cost effective and profitable. This was accomplished through the implementation of the natural systems for wastewater treatment. A significant amount of savings for the community was associated with the building and maintenance of the wetlands for wastewater treatment.

4) This community served as a model for future developments in the area of northwest Indiana by providing obtainable guidelines for the design and construction of a development on a wetland site. The guidelines determined the most appropriate route to take throughout the planning, design, and building of the project.

**Personal Goals**—In pursuing the knowledge to accomplish the project goals I gained a greater understanding of the natural processes by which this world is controlled. I became a more competent researcher and writer. I also now have a better grasp of the skills needed to organize and develop a project of this size and scope.
"I am convinced that the natural processes that support life on Earth are in serious jeopardy and that by acting now -or not acting- our country is choosing between two radically different futures." This is a call for a more sustainable way of life from the former head of the Environmental Protection Agency, Russell E. Train(7). Our country has chosen to act on the issue of water. With the passage of the Clean Water Act the government allowed for the protection of wetlands, but historically waterways were treated as limitless resources. They were dumped in, drained, and manipulated beyond recognition. The Swamp Land Acts of 1849, 1850, and 1860 gave swamp land rights back to eleven states for agriculture use. The Acts stated that this was to be accomplished by draining and filling in the wetlands. Indiana was included as one of those states(Dept. of the Interior 12). Today, the primary source of wetland loss is still agricultural conversion but this practice has been significantly reduced in part through policy actions intended to decrease the economic return on wetland clearing and drainage(King 9). For example, since 1989 over 1,000,000 acres of wetlands throughout the U.S. have been restored through government programs(King 10).
Despite positive action on the part of our governmental policy makers regulations are still rarely enforced. This can be attributed to the agencies lack of time, money, and personnel to enforce the regulations they mandate. Also, people in general still possess negative attitudes towards 'swamps' (Kirby 1). In a personal interview with Jonah Harkleroad, a resident of LaPorte County, this attitude was evident. Mr. Harkleroad, who has several wetland areas on his 15 acre property, feels that if it is his land he should be able to do what he pleases with it. He does think that the government is justified in protecting wetlands in the arid portions of the country but "here in this part we have plenty, enough is enough..." People lack an understanding of the ecological importance of these complex systems. They also do not realize the extent of wetland loss. Indiana has destroyed 87% of its original wetlands and only 47% of the country's original wetlands still exist (Kirby 2). SEE FIGURE--10.

When the government or environmentalists preserve wetlands or restore a lost wetland, the general public believes it is being done for the benefit of wildlife. This perception can be attributed to the removal of day to day contact with wetlands. By regulating a wetland and setting
it aside for the 'public good' our understanding and sensitivity to it is sterilized. We can overcome this by integrating the uses of the wetland with the needs of people. The contact between the natural system and the people would increase along with our understanding and respect for its processes.

The perception that a wetland only benefits wildlife can also be attributed to the lack of an economic market for wetlands. To displace this attitude it is necessary to determine how much that wetland will cost or does cost. There are several methods for determining costs. Cost/Benefit analysis, popularized during the Reagan years, says that if the benefits outweigh the costs than the project is justified. However, this system, while providing for the majority well being, ignores the ultimate loss: it only measures short term gain(Kirby 6).

A more complicated concept for valuing wetlands economically is to set up a mitigation credit market. This system benefits the land developer, the mitigation design and construction firm, and the short- handed regulatory agencies. Simply put, credits are made available to design firms by the agencies to sell to land developers. The land
developers have to have the accredited firm design an acceptable wetland response in order for the agency to speed up the permit process. The agency is released of the responsibility of reviewing and monitoring the construction and maintenance of the wetland development: that responsibility is taken over by the firm (King 10).

Using a variety of methods to determine the economic value of their wetlands, Michigan and Florida have put a price tag on their resources. Michigan valued wetlands as a valuable drinking water resource at $550.00 per acre. Florida determined that on the east coast wetlands were worth $8703.00 per acre in recreation revenue. However, on the west coast, they were only worth $1222.00 per acre (Kirby 8-9).

The idea of using wetlands as wastewater treatment also adds economic value to a project. The Los Padillas school in Albuquerque, New Mexico constructed a wetland to serve their wastewater needs. With the completion of the project, the school acquired a botanic garden, an outdoor classroom, and a wildlife sanctuary. The school saved money and received more for their money than if they had built a temporary leach field (Kimball 1).
In a residential setting the use of constructed wetlands for wastewater treatment is recommended because when you add any effluent to a natural wetland you are automatically caught up in the regulatory process. Constructed wetlands can be designed to treat wastewater more efficiently (Crites 165). An outdoor wetland system can provide added amenities in the form of wildlife habitat and can add to the landscape design. According to Carol Franklin of Andropogon Associates in Philadelphia, "Water is a living system, an essential element, we should celebrate water in the landscape, not put it in a pipe..." (McCormick 89). What better way to celebrate water than in a residential community of people who understand and recognize the power of nature and water?

The residential community is made up of people and the people can not be forgotten in the face of ecological significance. The theories and concepts that provide a base knowledge of community planning help to determine what is needed to provide for the improved quality of life for the residents. The overwhelming majority of the experts on the subject of community planning agree that it is important to maintain or provide a sense of place. This, simply stated, suggests that a community should have some sort of
uniqueness and character. It also may mean that a person would feel comfortable in the surroundings. A sense of place can be accomplished in a design by incorporating specific design details or through the development of the concept that the design is based. For example, by providing porches, backyards, and frontyards in the design the richness of the small town feeling is enhanced (Mays 92). A sense of place may be accomplished through the overall design scheme of an element or series of elements such as a street scape. The concept of the design could be to build on the existing history of the site. This approach ties the new development to the old and the residents become intertwined with their new home and with each other (Dunlop 111).

As referred to in the article "A Suburban Harvest" by Kevin Powell, a good community design expands upon the history of the region or the site itself (52). The new town of Lee's Orchard in Santa Clara Valley, California took advantage of its history to change the direction in which the development of the valley was heading. Historically the hillsides of the valley were apricot orchards but as priorities shifted from apricots to computers so to did its landscape (Powell 52). Suburban developments were not a new sight in the valley but development was unplanned and void of any contextual
Lee's Orchard is a development that exploited its rich history and rerouted the direction of the development by changing the face of the suburban landscape (Powell 54).

A clear integration between buildings and landscape design is also a component necessary for a successful residential design (Woodbridge 56). This is accomplished through the collaboration of architects, landscape architects, and town planners. A true collaboration and understanding by all parties involved will have a better chance of producing a unique and innovative plan than if only one discipline is involved. This collaboration is also the key ingredient needed to handle the task of integrating a residential community with the wetland ecosystem.

An obvious effort on the part of the designer to understand and make a connection with the users of the space will add another layer of quality to the design. For example, when architect Tito Patri realized that the residents of his new apartment building were mostly going to be elderly Asian women he incorporated in his design of the courtyard a ting. A ting is a raised pavilion found in most Chinese gardens (Woodbridge 61). This connection can be made
ecologically as well. When a connection is made between
the residents and the land on which they live everyone
benefits. By recognizing the natural processes of the site
and using those processes to an advantage then the quality
of the natural environment is not sacrificed by the residents
need to live comfortably (Woodbridge 62).

CONSTRUCTED
WETLANDS FOR
WASTEWATER
TREATMENT

The concept of using wetlands to clean the effluent from
homes was incorporated to provide economic incentive as to
why wetlands were useful and offered first hand experience
for the residents with the workings of a wetland.

It is important to clarify how the system would work so as to
calm any doubts about the efficiency, safety, or cleanliness
of the wetlands. Constructed wetlands for wastewater
treatment as built in the state of Indiana are subsurface wetlands made of pea gravel, rock, and a self contained liner to prevent seepage. There is no documented ecological danger from the seepage of the wetland but the science is very new and not fully trusted by the regulatory agencies, thus a liner is mandated.

Upon calculating the amount of effluent discharged from the house on a daily basis the appropriate sizes and depths can be determined using the formulas provided by J.F. New & Associates in Walkerton, Indiana. However, for the purposes of this report a simple explanation is all that is needed to provide an understanding of the system.

As the water leaves the house it enters a septic tank where primary treatment occurs. The next step is to allow the water to be cleansed by the natural workings of the wetland. The effluent remains in the subsurface wetland for a number of days. As the water leaves the wetland about 60% of it is pumped back into the house and used in the toilets, thus only 40% of the original water remains and is filtered through a leach field where it reenters the water table. Technically, the water is clean enough to swim in and clean enough for animals to drink after going through the
wetland but since the regulatory agencies do not yet trust the system the State Board of Health mandates that the leach field be the final step in the cleaning of the water. Since the water is additionally cleansed by the wetland the regulatory agencies allow the size of the leach field to be cut by 76% and since only 40% of the original effluent ever reaches the leach field the size is further cut by 60%. Thus the impact of the leach field is almost nonexistent.
CONSTRUCTED WETLAND FUNCTION DIAGRAM

1. **House**
   - The state board of health determines the amount of water usage by a house, which depends on the number of bedrooms, the size of the dwelling, etc. House generates 150 gallons per day and excess is disposed after that by an additional 150 gallons.

2. **Septic Tank**
   - The effluent leaves the house and enters a standard septic system where primary treatment occurs.

3. **Subsurface Wetland**
   - Next, the partially treated water enters a subsurface wetland that consists of gravel, pebbles, and a perforated pipe. This layer is then planted with grass, shrubs, and other vegetation.

4. **Leach Field**
   - After leaving the subsurface wetland, the effluent is clean enough to be reused in a field or as irrigation. The Department of Health requires that the water undergoes further treatment in a leach field before infiltration back into the water supply.

WETLAND RESIDENTIAL COMMUNITY
The extensive nature of this project indicated that there was a need to define the scope of my project, the focus of this design problem. I was dealing with three very separate entities that by themselves could each have evolved into full blown comprehensive projects. I looked at the elements of residential design, wetland preservation, and the design of constructed wetlands for wastewater treatment. However, the focus of this project was the transitional zones between these three elements. I studied and designed the ways in which these zones interacted and came together. To demonstrate the results of my study I showed in the final presentation of the project a series of detailed vignettes and perspectives drawn at different scales showing the integration that took place between the design elements and the transitional zones.
INVENTORY

Hydrology

The wetland was naturally occurring, had a relatively small watershed, was isolated in the hydrological cycle, and had a stable water level with a minimum fluctuation of about 1.5 feet per year. All of these factors combined with the fact that the water level of the wetland was at the same level as rivers and streams in the area helped me to determine that the wetland was groundwater fed and probably could not withstand additional inflow.

Soils

The soils on the site are generally well drained upland soils that are good for woodlands, crops, buildings, and roads. However, the areas directly adjacent to the existing wetland are hydric soils that are susceptible to ponding and flooding. This makes them perfect wetland soils and perfect for that sort of vegetation as well.
HYDROLOGY

INVENTORY

- PRIMARY SOURCE
- BORDERS
- WATER LEVEL
- PARTIALLY WET

ANALYSIS

- Hydrologic features and characteristics are outlined in the context of the landscape. Most of the hydrologic features are not the primary focus, but they indicate a trend and context.
- The hydrology is complex, and the features are interconnected. The analysis is based on the hydrologic data and the context.

WATER LEVEL FLUCTUATION

- A fluctuating water level is no more than 2 feet above.
- The water level fluctuates on average 1 foot per year.
Infrastructure and Immediate Context

Directly within the boundaries of the site in the south west corner were three farm buildings. However, in all of the 750 acres there were no other existing buildings or roads. Surrounding the site to the east and south were farmfields and various farmsteads with several outbuildings apiece. To the north across 150 North was an emerging subdivisions of about 25 homes. The homes are large, averaging 2000 square feet and did not acknowledge the presence of the unique surroundings. The new homes were built on a steeper than usual topography pattern and on the other side of this hill was another wetland area that is harvested for peat.

Vegetation

The vegetation on the site was sparse. This was because most of the 750 acres were being used for farming. This land use helped to shape what little vegetation was present on the site. Fence rows were the predominant theme. These fence rows were in a grid pattern that broke the site up into several smaller areas.

The small area of woodlands that occurred on the site were mainly on the steeper slopes that surrounded the wetland and could not be farmed easily. However, these woodlands were manipulated into the form of a rectilinear box.
Existing Wetland

The site, consisting of about 750 acres, contained approximately 8 acres of open water with emergent vegetation and was a beautiful example of a palustrine wetland in Northwest Indiana (National Inventory). A palustrine wetland is a wetland that is no more than 1.5 to 2.0 feet deep with areas of emergent vegetation in the interior and scrub shrub vegetation along its perimeter. More than 95% of the wetlands in the United States are palustrine wetlands (Dept. of Interior 9).

Roads and Access

The site is bordered on three sides by county roads. Fail Rd. to the west is a well known north/south access that extends several miles north into Michigan. Division Rd. on the southern boundary is the exact middle of the county, thus it is a landmark with high recognition value. To the north as stated above was 150 N. This county road is winding, narrow, and in bad condition. I would not recommend this road for every day travel. However, 150 N does dead end into Route 2 just west of the site. Route 2 extends from New Durham about 10 miles west of the LaPorte City limits all the way to South Bend in the east. It is the main thoroughfare through downtown LaPorte and has the highest accessibility of all the surrounding roads.
Located in northwest Indiana, the area has a rich history of farming but has an even richer history as a wetland. At one time all of northwest Indiana and Chicago were all one wetland. Then the settlers began to drain them to use for farming. Flooding is still a problem in this part of the state. Specifically, the location of this site, east of La Porte, Indiana in Kankakee Township just south of State Road 2 on 150N demonstrated the need for this type of community. Located only 6 miles from the heart of LaPorte's downtown, the surrounding farmland has proven to be prime real estate. Two miles from the site a large farm plot containing a marginal wetland had recently sold to Wal-Mart and would be lost to construction within the next year. An integration between development and natural systems needed to be formed and used as the norm when developing land.
The city context of the site was important to study so as to not neglect the regional character and precedence. The town of LaPorte had three unique characteristics that were worth mentioning in this inventory.

First was the street layout, the streets were laid out in a system of two different grid patterns that seemingly crashed into one another. This created an interesting experience from the street level for two reasons. It broke up the monotony of driving on an endless road by shifting that road, thus shifting the sight lines. It also began to create triangular blocks within the square block system. These islands were too small for buildings to exist, therefore they forced open space to occur in an otherwise dense city environment. SEE FIGURE-- 22

The concept of tree lawns was also quite unique to LaPorte because of the fact that tree lawns were required on all residential streets. The size of these lawns varied from four foot to twelve foot. The city of LaPorte had an ordinance that required only maple trees to be planted on the tree lawns and if a tree needed to be removed from the tree lawn then a special permit had to be acquired by the home owner. SEE FIGURE-- 23
The final characteristic of the town is the use of alley ways. Alleys are used as backdoor drive ways, if an individual home has access to an alley then more than likely the garage faces the alley instead of the street. However, the alleys do not simply split the block in two they splice the block into fourths by having alleys go in both directions. SEE FIGURE-- 24

*The hydrological factors of the existing wetland indicated that the wetland did not receive a significant amount of runoff from the surrounding farm fields, thus the water quality and fauna were not in any danger of pollutants. The hydrology study also indicated that development around the wetland in the watershed would not impede its stability since it was not dependant upon runoff for maintaining the water level. However, the increase in development from nothing to something would increase the runoff no matter how sensitive the design may be, thus transitional buffer zones and native vegetation would be integrated with the community layout to minimize impact.

*The roads and access points surrounding the site were key factors in determining the visibility of the entrances and
accessibility of the entrances. 150 N was not considered as a prime entrance road due to its poor condition and narrow lanes, however the intersection at 150 N and Rt. 2 was a good visible area with a straight shot into the site and could be used as such. Divison Rd. has good connection with the town of LaPorte and could be a prime entrance and connection with the town. Fail Rd. was a well known road with a good north/south access and could serve as the main access for the rest of the county.

*The soils study indicated where specific land uses could and could not be developed. For example, buildings can not be built on the areas adjacent to the existing wetland because of the severe ponding tendencies of that soil. It also suggested plant species which would grow in related soils without dictating a specific plant pallette.

*As deducted from the Regional Context and the study of LaPorte grid patterns were prevalent in the street patterns, county road patterns, and surrounding farm fields. This should have an impact and may be reflected in my final community layout. The use of alley ways, either vehicular or pedestrian oriented, in my design could also be a way to reflect the character of the adjacent community.
I produced within the scope of my comprehensive project a conceptual master plan depicting street layout, housing configurations and patterns, constructed wetland zones and layout, educational facilities, and recreational access. I then concentrated on the way the different elements impacted one another. The focus area was a combination of housing, wastewater treatment wetlands, natural wetlands, and accessibility to the public facilities. The most important aspect of this project was the design of the transition zones and how the land uses connected and impacted each other.

THE SITE CONSIST OF:
Total Acreage: 750 acres with 8 acres of water and 2 acres of woodland

Land Uses
*Residential: actual houses will be chosen by the owner

Housing
-1500 units maximum
-8 units per acre (cluster)
-8 units per CW
-2 acres per CW
-3 acres per housing cluster

Setbacks
-Houses setback 15’ minimum from sidewalk edge
Roads
- 50' wide/parking on one side
- 50' wide/parking on two sides
- 35' wide/parking one side

Sidewalks
- 5' wide in residential areas
- Width in other land uses vary

Tree Lawns
- 8' wide planted with shade trees

Alleys
- 12' wide connect clusters and act as pedestrian greenways

*Educational Facilities:
--need to be accessible from main
perimeter road easy to follow
directional signage.

Buildings
- Main access
- Satellite outbuildings for specialized teaching and storage
- Final destination

Paths
- Asphalt main walks for accessibility
- Compact gravel nature paths
- Wood boardwalks for wetland and habitat accessibility

Parking
- 35 spaces for cars
- 4 spaces for buses

*Recreational Facilities

Active
- Softball fields: 3 - 1.5 acres each
- Baseball fields: 1 - 3.5 acres each
- Basketball courts: 4 - 2.0 acres each
- Multi-purpose fields: 2 - 1.5 acres each
- Playgrounds (tot lots): 5 - 2.0 acres each
- Tennis Courts: 2 - 2.0 acres each

Passive
- Picnic shelters: 3
- Native vegetation non-manicured fields: act as buffer around existing natural wetland and around habitat areas.
- Boardwalks
- Nature interpretive activities

Buildings
- Restrooms: 2
- Concession stands: 1
- Storage: 2

Paths
- Asphalt main walkways
- Compacted gravel for intercirculation and natural settings
Conceptual Master Plan

The beginning concepts that were conceived simply dealt with the layout of the community and the positioning of the various land uses prescribed in the Program. Both land use concepts used the intersection at Rt. 2 and 150 N as a main access point and the intersection of Division Rd. and Fail Rd. as a main access point. All other intersections adjacent to the site were used as secondary access.

Land Use #1 -- Conceptual Master Plan

The first concept had the educational facilities on the north east bank of the existing wetland and the recreational facilities broken into two main areas on either side of the wetland so as to allow access from both sides. The housing filled in the remaining developable land. Undevelopable land was occupied by passive recreational areas, but also served as transitional buffer zones between developed land and the fragile ecosystems of wetland and habitats.

This plan worked well because the educational facilities had direct access to all parts of the community including the existing wetland and the habitat areas. The splitting up of the recreational areas allowed for both halves of the community to enjoy them easily. The plan did not work
because the only access to the educational facilities was from 150 N. This was important because the main users of the center would be coming from outside the community and would be traveling almost exclusively on the peripheral roads. Also, the recreational facilities were too centralized and vast and would have made a huge, almost detrimental, impact on the surrounding land uses.

**Land Use #2 -- Conceptual Master Plan**

This plan emphasized decentralizing the recreational play fields and focused on the experience of the non resident. By having the educational facilities within the core of the community, south of the main wetland, the outside visitor was forced to drive through the residential areas to get to the parking lot, thus experiencing more directly the character of the community. The recreational fields were intimate and accessible because they were broken up into even smaller areas. This was desirable because the smaller sites tended to integrate better with the surrounding land uses and they did not over power any one area.

The constraints of this concept were that because there were more active recreational areas then more acres have to be devoted to passive recreation(buffer zones) to ensure that the
more fragile ecosystems were not harmed. Care would also need to be taken to provide adequate, clear directional signage to the educational facilities to avoid confusion. SEE FIGURE -- 27

**Transitional Zones**

The focus of this project was to demonstrate how certain land uses could be integrated and combined to form a cohesive, sustainable living environment. The concepts for these zones are simple: take two or more land uses and determine how those areas would come together without compromising the success of any of them.

**Residential/Constructed Wetlands (CW)**--The constructed wetlands served the residences as wastewater treatment facilities so these two items were linked functionally from the very beginning. Specifically, one CW served every twelve homes and occupied approximately .08 acres while the twelve homes combined occupied three to four acres. Therefore, each cluster of homes took up a total of four to five acres. Aesthetically, the CW were designed to blend into the landscape quality of the community which consisted of native plantings and unmanicured buffers.
Residential/Natural Wetlands (NW)/Recreation -- The residential areas were, for this project, considered high impact areas due to the level of density that was achieved to support a marketable density. Therefore, any residential area next to a NW will have an impact on the workings of that natural system. To minimize this effect a native vegetative buffer will be used to filter and absorb additional runoff and pollutants. This buffer was incorporated into the recreational system and used as passive recreation with trails and look out points.

Recreation/Natural Wetlands (NW)-- The active recreational zones were highly maintained and manicured, thus increasing runoff and herbicides. These actions were considered hazardous to the survival of the NW. To absorb these impacts a native and hardy vegetative buffer with a denser underbrush was utilized and provided further opportunities for trails and passive activities. Also, within the confines of the parks areas were kept natural to gather the communities stormwater runoff.

Education/Natural Wetlands (NW)/Habitat-- The educational center needed to be the most sensitively designed because it had the most direct contact with the
fragile ecosystems of NW and habitat. The facilities themselves were decentralized and lushly landscaped with native plants to lessen the impact of the built forms. The paths and boardwalks linked the ecosystems with the buildings and were made of easy to install natural-like materials such as wood and gravel. The main, heavily used paths were asphalt so that they would last longer, thus minimizing the amount of construction disruption. The parking lot was removed from the impact area but was buffered by native vegetation to maintain aesthetic theme.

**Constructed Wetlands(CW)/Natural Wetlands(NW)**— The uncertainty of the ability of the NW to process wastewater deems it necessary to keep the functions of both types of wetlands separate. It is simply easier and safer to design a wetland to the proper specifications to treat wastewater. Utilizing CW for wastewater treatment bypasses the regulatory process associated with development of NW. The use of the CW allows for daily contact between the residents and wetland functions, thus restoring an understanding of what wetlands are used for and why they are important in nature. Also, an aesthetic and psychological connection was made between the CW and NW reinforcing that this was a wetland community.
**Master Plan**

The final design, as it pertains to the layout of the community, incorporated a bit of both the original concepts. However, concept #2 was largely used. From concept #1 the idea of using the transitional vegetative zones as passive recreation was utilized to buffer the new development from the existing wetland area. This was best because the transitional zone was able to serve a variety of users. These users included the wildlife as well as the people.

All of concept #2 was used for a variety of reasons. The idea of locating the educational facilities in the core of the community proved to be the best alternative because this enabled the person to begin the education process before he or she ever arrived at the center. By forcing the visitor to drive through the community they were able to experience how the people lived and were actually able to see what this community looked like. Also borrowed from concept #2 was the decentralization of the active recreation zones. This was done to minimize concentrated runoff and to allow for easier access by all of the residents of the community. The active recreational areas also gathered storm water runoff in detention areas located within the bounds of the parks.

SEE FIGURE -- 28
SECTION A

SECTION A DESCRIPTION: Depicting the transition that occurs between active recreation areas that consist of well-manicured turf and private recreation areas that are covered native buffer zones.

SECTION B

SECTION B DESCRIPTION: Shaping experience of the drive through an area that goes through two buffer zones. The experience is a feeling of isolation and solitude, the views are diminished by the tall grasses.

SECTION C

SECTION C DESCRIPTION: Transition from the high-use zone of residential to the low-use zone of the woodland habitat.

WETLAND RESIDENTIAL COMMUNITY
Typical Neighborhood Development

After completing the schematic master plan a focus area was chosen to further explore the way that the land uses would fit together and be integrated. The area shown by the black box to the left indicates the focus area. SEE FIGURE -- 28. This area was chosen because all land uses are represented: the educational facilities, the active recreational area, the passive recreation-buffer zone, and the residential area.

The blow up plan, drawn at 1"=100', shows how the recreational park was typically laid out. Also shown within the park was how stormwater was handled on site. That area was simply maintained as a natural-looking passive space and a small portion of the area would have been wet all of the time. In times of greater runoff more land would have been dedicated to the detention of that runoff.

The focus area demonstrates how the educational facilities took advantage of the existing wetland and buffer zone without degrading the ecology of the areas. Along the path that weaved in, around, and through the different ecological zones were lookout points and interpretive activities to explain what was seen and involved a variety of visitors.
The design took advantage of the precedent set by the surrounding town of LaPorte, the farm fields, and the county roads by using a grid pattern for the street layout. Also borrowed from LaPorte, was the use of alleyways. However, instead of using the alleys for vehicular transportation, the corridors were used to connect the CW cores to form a pedestrian greenway system. This also connected the smaller green cores to the larger green areas of the active recreation parks and the passive recreation buffers; thus creating a hierarchy of circulation patterns.

Also depicted in the focus area were the property lines of each individual lot. The lot sizes averaged between 1/3 of an acre to 1/4 of an acre. The sizes of the houses averaged about 2000 SF. SEE FIGURE -- 29
DEVELOPMENT OF TYPICAL NEIGHBORHOOD
**Typical Housing Cluster**

As the focus area got smaller, more detail emerged. The typical housing cluster resembled a typical city block on the outside with some modifications. The goal of this blow-up area was to show how the layers of vegetation from the CW core combined to create a hierarchy of spaces within the cluster. The overhead plane of tree cover combined with the turf grass, buffalo grass, and tall prairie grasses to create a variety of use zones. SEE FIGURE -- 30

Also, the vegetation from the core began to create an even more interesting dynamic. The grasses actually reached out to engulf the houses and provided a glimpse to the passerby of what was on the inside of the core. A feeling of intrusion was no longer the norm in this setting. One had the sense that it was meant to be this way. Integration, the ultimate goal, was achieved. SEE FIGURE -- 31
WETLAND RESIDENTIAL COMMUNITY

TYPICAL HOUSING CLUSTER

KEY
- SWAMP GRASS
- CYPRESS GRASS
- BUFFALO GRASS
- TALL PRAIRIE GRASSES

SCALE 1"=30'

ENCLOSED SPACES FORMED BY TREES AND VARIOUS UNDER-GROWTH PROVIDE PRIVACY & INTIMACY WITHIN THE CORE.

AREAS OF OPEN SPACE WITHIN THE CORE ENHANCE THE PASSIVE RECREATION EXPERIENCE.

TYPICAL SECTION DENOTING SPATIAL RELATIONSHIPS

SCALE 1"=30'
Educational Facilities
The use of an educational center as stated in the program allowed for non-residents of the community to learn about and enjoy this new way of living. The facilities included interpretive activities, boardwalks through the wetland areas, paths through the native buffer zones, an actual educational center where exhibits took place, lookout points, and an educational outpost where the tours concluded and specialized activities occurred.

The site chosen for the facilities had direct access to all of the different ecological zones. Along the path of the tour a visitor would have wandered through the native vegetative buffer zones which were intermixed with woodland areas. The tour would then have gone on a winding boardwalk that weaved in and out of the emergent vegetation and the open water of the wetland itself. Along the way would have been several stopping points that told a story about the wetland and the community of wildlife that lived there. Next would have been a look at the upland areas that had been restored as midwestern prairies. Several lookouts and interpretive activities would have helped the visitor to understand the very special ecosystem.
PEDESTRIAN CROSSINGS

As stated in the program of this project the greenway alleys allowed for areas throughout the community where pedestrians were crossed the streets in the middle of the blocks instead of at the intersections. This condition was considered to be a potential hazard because vehicles might not have been able to tell where a pedestrian crossing was therefore they would not have known when to slow down.

SEE FIGURE --34

To account for this non-traditional system of pedestrian circulation, a series of crosswalks were designed to warn the drivers when and where pedestrians might be crossing and to let the pedestrian be aware of his or her surroundings.

The design included paving patterns, over-sized speed bumps, and signage. From the pedestrian point of view the 'warning' was rather subtle. As the person approached the street crossing the paving underfoot changed from gravel or asphalt to a more urban, hardscape pattern of pavers. Also street signs would be strategically placed to let the pedestrian know exactly where they were along the corridor. As the person crossed the street, the crosswalk would be a more formal paving pattern. This progression
then reversed as the person reached the other side of the street. SEE FIGURE -- 35

For the motorist the warning needed to be bold enough to attract attention at higher speeds without overpowering the aesthetic of the community. To accomplish this task the crossing was both visual and physical. Visually, the car saw signage that stated a crosswalk was coming up. The driver then saw the actual crosswalk. To avoid the chance that a driver might have ignored the visual signs something physical made sure they slowed down. The actual crosswalk itself was raised and served as a huge speed bump. The vehicle had no choice but to slow down at every crosswalk. This may have been considered an inconvenience but the streets were not built to be expressways, they were simply ways to get around. SEE FIGURE -- 36
CONCLUSIONS

The time has come for our society to develop new and more sustainable ways to build and live. At the same time our society needs to realize that the world is not going to end by the year 2000 if we do not start living like the Amish. This project does not possess a new, world-saving concept. What it does possess are the building blocks needed to further develop the ideas and concepts of a more sustainable way to design, which may in turn save the world. Also contained within the scope of this project were new and innovative ways to deal with the use and preservation of wetlands and endangered ecosystems. My hope for the future of this conceptual endeavor is that someone will be able to use these ideas as a starting point to further explore new avenues and ways of thinking that will broaden today's concept of wetland use and development.

Personally, I believe that I achieved my goals of integration, economic viability, and quality of living by using the concepts set forth in the Review of the Literature section. I truly gained an understanding of what sustainable living is and how those concepts are implemented into the real life scenarios of money and material possessions. The ideas spelled out in this document are obtainable and, I think, desireable.
BIBLIOGRAPHY

Books


**Articles**


**Maps**


**Interviews**


