An Ecological Riverfront Parkway Design in Madison, Indiana

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La 404
Comprehensive Project

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The definitive goal of this final comprehensive project in Landscape Architecture was to develop a plan for a riverfront parkway development in the town of Madison, Indiana. With an ecological emphasis, the parkway design focused on restoring river ecology while strengthening identity of place where the community and the river meet.

Madison, located in the middle of the golden triangle of Louisville, Cincinnati and Indianapolis, is a community rich in its cultural and ecological heritage. This new riverfront development accommodates various users as an integrated multiuse park system. The parkway emphasizes the natural elements of the river system that it borders, and acts as a catalyst for economic growth in the region through eco-tourism.

Through cultural and environmental analysis of both the specific riverfront site and a more general city and regional context, a program was written to guide design development.

Abstract design concepts were then synthesized to produce the final comprehensive design plan for the riverfront.

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"How could drops of water know themselves to be a river? Yet the river flows on.
-Antoine de Saint-Exupery
Madison Indiana, the county seat of Jefferson county, is situated 86 miles SSE from Indianapolis, 50 miles upstream northward from Louisville, and 100 miles downstream westward from Cincinnati. The interstate arterials and political boundaries of the Ohio river form what is known as the "Golden Triangle" around it.
The rivers of our world are magnificent arterials of life that bestow great benefits upon the lands they flow through. The importance of water bodies to life everywhere is immeasurable.

Unfortunately, the waterways of the world exist today in various levels of ecological degradation. Rivers which were once thriving, clean and abounding with life are now mostly disregarded, polluted and stripped of habitat. As a species we have been forced, through the destruction of our riparian habitats, to reevaluate our relationship to our rivers. Many large cities like Boston, Chicago, Lisbon, Toledo, Melbourne, Louisville, and Cincinnati have redesigned their water fronts to address the inherent connections that exist between the cityscape and the waters that flow past them.

Rivers exemplify the cyclical tendencies of our natural world. They act as an integral link in the overall recharge of freshwater systems across the planet. River valleys being the most attractive and hazardous environments for settlement have held a special status in virtually all agrarian and industrial societies. It was upon the banks of such great rivers that the first civilizations emerged as humankind developed through its short history on our planet. This is illustrated in history by the classical accounts of the great civilizations of the Nile, Indus, and Tigris-Euphrates valleys, which were both nurtured and plagued by their rivers. Humans historically, therefore are deeply connected to river ways.

In the modern world the balanced role between humans and natural systems has been disrupted. We exist today disassociated from the circadian rhythms of life around us. It is this disassociation that has caused widespread disenchantment over the human role in the natural processes of life on Earth.
This comprehensive project looks to reinterpret these natural connections at a local scale at the direct point where a river meets a community. The river is the Ohio river and the community is Madison, Indiana.

In order to change the general mind set about the importance of our waterbodies and rivers, we must implement major changes, not only in the large metropolitan centers but also in the smaller and middle size communities that make up a web of rural and urban water interfaces across the Earth. This project in Madison will act as an example of how smaller waterfront communities can exist in greater harmony with their natural resources.

Since its earliest beginnings, the town of Madison, Indiana has been synonymous with the river that flows before it. The Ohio river and the town of Madison reflect one another, entwined and intermeshed. Madison was first settled as a river town when Cincinnati was still acting as the gateway to the west. It was chosen for settlement due to its convenient and functional position in a northern bend of the Ohio river. The steep slopes, so prevalent along the Ohio’s shoreline, do not abut the river in Madison, but are set back from the shoreline, forming a pocket of land where the town has developed. The pocket the town rests in is located in a beautiful and picturesque valley, which with the hills on the Kentucky shore and those of Indiana, and the bold curve and broad sweep of the Ohio River, affords a panorama rarely equaled.

It is this same reason which led to the founding of the town that has preserved its integrity and rich heritage during the last century. Due to limited space between the river and the high cliffs around Madison, most of the new developments and sprawling land use trends following the Second World War have taken place away from the historic core of the town. This bubble effect has created a place where everything that is unique about the town is contained and embedded in the intimate relationship it enjoys with the Ohio river.
Madison, now the county seat of Jefferson County in Southeastern Indiana, was one of the earliest settlements on the Ohio River. The town was platted in 1810, and settlement began in 1811 with 12 families. Early settlers enjoyed the many advantages of Madison's particular location on the Ohio River. The land surrounding Madison was fertile and dry. Madison has no large nearby tributaries entering the Ohio, thus allowing the river to carry less sediment and move more slowly, making for ease of navigation. Madison, located on a northern bend of the Ohio River, was ideal for accessing the developing Indiana territories.

In the 1820's, Madison had grown to become the central link between the agriculture surpluses of Indiana and the bustling seaport of New Orleans. By the 1830's, Madison's population was nearly that of Cincinnati and Louisville, with more than 1,700 residents. Mid-century improvements in steamboat technology and the construction of the Madison-Indianapolis railroad track system, completed in 1847, brought unprecedented growth and prosperity to Madison. By mid-nineteenth century Madison was a leading Midwestern center for grain milling, pork processing, and boat and railroad car construction.

Between 1835 and 1857, 25 separate areas of Madison were platted, and commercial development was expanded to the riverfront wharves. Most of the classic structures seen today along Main Street were constructed during this era. By mid-century Madison's population had grown to over 8,000. Madison's "golden period" peaked in 1857 with several contributory factors leading to its decline. The financial "Panic of 1857", a drop in river traffic due to low water levels, and railroad competition and new railroads into Indianapolis that bypassed Madison, all led to its social and economic
leveling out. The industries of the town also declined as Indianapolis took away its major economic markets.

Madison experienced major floods in 1913, 1934, and 1937, with the flood of 1937 being the greatest and most destructive. All riverfront structures were destroyed in the flood, not to be rebuilt again. These floods, coupled with the availability of automobile transportation to climb the 300-foot incline to the plain above, shifted Madison's development from the river valley to "Hilltop", or northern Madison. Indiana Department of Transportation (INDOT) rerouted Indiana 62 to Clifty Drive on the hilltop to serve as a bypass around downtown Madison. The new route became highly congested as the suburban sprawl grew to include new industries, shopping centers, schools and fast food restaurants.

The interstate highway system bypassed the Madison area and Jefferson County entirely as it linked the three outlying cities of Indianapolis, Cincinnati, and Louisville. In an attempt to capitalize on its isolated plight, the Madison Area Chamber of Commerce proclaimed the region bounded by the interstate highways as the "Golden Triangle" because of its unique combination of economic potential and attractive life-style. Madison is the central hub of this eight county region.
"Total water on earth, 1.4 billion cubic kilometers, enough to cover the United States to a depth of 150 km or 150,000 m. Total renewable water provided by precipitation on continents and islands each year: 41,000 cubic kilometers (10,000 cubic miles) enough to cover the United States to a depth of 4.4 meters. Stream channels make up .0001 percent of the total water on the earth."

-LUNA B. LEOPOLD

The River

Value

A river is an influential system of water, energy, soil and minerals controlled through solar energy, gravity and water. A river is much more than waters moving in a channel cutting its way into the land. A river corridor includes the floodplain through which it moves, the underlying water table and aquifer system, associated wetlands and the riparian zones that are rich in plant and animal life. Natural drainage systems and the wetlands, that they include, are very important in the role of supporting the planet’s fauna and flora. Rivers carry nutrients that sustain wetlands, and coastal areas, which in turn support the rest of the food chain.

Watersheds, Water Tables and Aquifers

The Watershed is the area of land from which water drains to a given point, usually a body of water such as a stream. Several watersheds together make up a drainage basin, which covers several counties or states. The size, geology, shape, gradient, climate, and vegetation of the watershed determine the character of the stream. Deforestation, construction, or agriculture in a watershed, for example, can result in excess eroded sediment, which can clog a river and kill aquatic life far away. Landfills and industries can add toxic pollution to a watershed, paved areas may cause excess surface runoff, which can erode streams and farms may leach pesticides, fertilizers or sediment.
Floodplain

The floodplain is the area along the stream corridor subject to regular inundation. One of the several classes of floodplains is the one hundred-year floodplain in which there is a one-percent chance of flooding every year. Certain types of structures and improvements are restricted by the demarcation of the floodplain. Properly functioning floodplains are vital to the survival of stream corridors and wetland species and, thus, play a major role in open space planning. Due to the building restrictions placed upon floodplains they are ideal locations for parks.

Wetlands

Wetlands are generally associated with surface waters like rivers, streams and lakes. River wetlands act as a natural recharge and cleaning system for water, as well as providing habitat for an abundant plethora of plant and animal life. The diversity of species is often higher in wetlands than in nearby upland landscapes. The Biomass (The total weight of living matter per square meter of surface) is usually greater in wetlands than in adjacent deep-water habitat or upland areas, and the production of wetland vegetation, measured by the amount of new organic material produced each year, is greater than that of any other habitat. The local water table, temperature, rainfall, season, and water level of nearby streams and rivers influence these riparian vegetative communities. Shrubs, trees and herbaceous plant material dominate river wetlands. Riverine open stream wetlands are saturated or covered with surface water at least part of the year.

Riparian Forests

Riparian forests are highly productive riverside vegetative communities, which offer important benefits to the river ecosystem. As corridors, they connect habitats along streams and rivers from the mountains to the seas and provide migration routes, food, and shelter for a varied pool of life forms. Various specialized plant and animal life thrive in this area due to the available food or habitat. Temporary pools provide breeding areas for frogs, toads, and
salamanders. Trees and shrubs shade the river edges; resulting in cooler temperatures that are important for healthier populations of fish and other aquatic life that use the vegetation for sustenance and shelter. Natural leaf litter and humus act as a catchment system for rainwater as it falls allowing it to percolate into the soil, which gradually releases the water to the stream. Riparian forests and floodplain vegetation can stabilize the riverbank, preventing erosion. Vegetation is also a highly effective means of reducing nonpoint pollution in the stream by filtering eroded sediments and contaminants in the overland and subterranean flows. Excess nutrients, which cause algae to grow and reduce light and oxygen needed by aquatic life, are also filtered out of the stream.

Shoreline Edge

The concept of roughness is important when conceptualizing the interface between the water and land. A smooth edge free of plants and debris may look attractive but it is not suited for aquatic wildlife. Aquatic fauna require a rough streambank with high levels of structure. This high level of structure consists of roots, logs, shrubs, boulders and other vegetation. A rough streambank also slows floodwaters thus reducing damage downstream. Concrete or channeled stream banks offer poor wildlife habitats and they increase the speed of floodwaters, increasing the potential for downstream flooding, property damage and erosion.

Site and Context

inventory of site conditions and surroundings

Video

Visual media is the most powerful means of communication to humankind. Video technology is the most familiar means of intercourse with the general public. Such comfortable means of public communication are the most effective. Videography was a primary inventory tool when site data was collected for this project. The traditional two-dimensional means of still image photography was used only as a secondary supplement to the video work. Three-dimensional real time video allows for the further sensorial understanding of place. Since we as humans understand and interpret our everyday environs three dimensionally we can
better relate spatially to video than we can photography. One frame or one picture holds limited data and must often be used with sets of other images to convey an idea or concept. A five-minute video running at twenty-two frames per second offers 6,600 image frames to the viewer, or about 183 rolls of 36-exposure film. At the end of the twentieth century the average 18 year-old has witnessed 20 million video-related advertisements. Video creates a better-understood icon of identity with the multi-dimensional bits of information, leaving longer lasting impressions to the viewer. The five-minute video, which accompanies this report, acts as a visual walkthrough of the project site. It visually, auditorily, and spatially introduces the viewer to the issues discussed in this Site and Context section of the report.

Conditions and Surroundings

The valley in which Madison is situated spans close to 3 miles in length. It is enclosed to the north by steep and rugged hills, some reaching 400 ft. high. To the south runs the Ohio River at a depth of 26 ft. and a width of 2,000 ft. The project site covers the 2.12 miles of shoreline most directly laid before the town. The development site between the water and the town varies between 10 and 200 ft. This variance depends on the level of built encroachment upon the flood plain. The linear site can be divided into three western, central, and eastern sections. Each of the three zones has specialized features that distinguish it from the other two.

The western section begins where the waters of Clifty creek meet the Ohio. Clifty creek is a great natural resource both scenic and reflective of the greater region. It flows only a short stretch from Clifty Falls State Park before emptying itself into the second largest river in the Midwestern United States. Looming nearby on western end of the site is the Marble Hill coal burning Power Plant. Its two large smokestacks can be viewed virtually from anywhere within the river valley. The city’s wastewater treatment facilities are also located on the shores of the western zone. Between the wastewater treatment facility and the central section of the site lies a small riparian forest. The historical railroad right of way enters the forest from the northwest and dead ends at Vaughn Drive. North of the forest is an automobile junkyard and scattered low income residential housing. Dividing the western and central sections is a small boat ramp. Vaughn drive, which is the town’s southern border of
development, also enters the site in this transition zone and runs through the eastern section.

The historic central section of the site is the most visible and developed. Illuminated brick pathways, benches and overlooks characterize this zone where eight city streets dead end to the river. Across from Vaughn Drive are a number of public and civic activity centers. The James Lanier Estate is the primary showcase of the many mid nineteenth and early twentieth century residential and clerical architectural types in Madison. A gymnasium, pool and various athletic fields represent the public interests. The central section is built up 30-40 ft. above the water in some places, this provides for a majestic vista over the river, to the hills of Kentucky. Extensive large mass industrial riprap acts as a medium between the river and the park in some zones of the central section shoreline. (see figure 14.) Permanent stands and an expansive boat ramp sit at the end of the central section. (see figure 16.) This area is where thousands of fans come to see the Governors cup Regatta boat races annually.

The Eastern Section is characterized by illuminated brick walks along Vaughn Drive that look down upon an open floodplain that gently descends to the water. At the very eastern end of the site is the 421 bridge spanning the length of the Ohio. Near the bridge is Jaycees Park, large tracts of open space and a campground. Beyond the bridge a riparian forest grows along the shore. Vaughn Drive also veers from the river as it leaves the site to join highway 56. Part of the longest scenic byway system in the country, S.R. 56 follows the majestic flow of the Ohio River.

Soils

One soil type exists on the linear 2.1-mile site, Hu—Huntington silt loam, occasionally flooded. The soil is a nearly level, deep, well drained soil located on bottom land along the Ohio River and its larger tributaries. It is occasionally flooded in winter and early in spring. The narrow, elongated deposition areas located along the Ohio River are adjacent to the river channel. Available water capacity is very high and permeability is moderate. Surface runoff is medium. A seasonal high water table is at a depth of 4 to 6 feet. The soil is well suited for grasses and trees. Over wear or trampling when the soil is wet damages sod, reduces plant
 density and forage yields, and causes surface compaction and poor till. Proper seeding and restricted use during wet periods help to keep the plant material and soil in good condition. Because the occasional flooding is a severe hazard, this soil generally is unsuitable as a site for dwellings. Constructing roads on raised, well compacted fill and providing adequate side culverts helps prevent the damage caused by floodwater and frost action.

Goals and Objectives

1. Improve the ecological quality, at a site specific level, of the riparian system of the Ohio River.
   - Inventory the river bank systems operative on site for opportunities and constraints.
   - Identify all existing wetlands and beneficial ecological systems on site.
   - Construct wetlands in appropriate locations.

2. Promote human interaction with the natural landscape.
   - Provide a sensitively designed pedestrian pathway in the riparian zone.
   - Provide an aesthetically pleasing waterfront in order to attract visitors.
   - Inventory/research the flora and fauna on the site.
   - Create a favorable environment for the reintroduction of native species of flora and fauna.
   - Introduce interpretive signage that communicates the reintroduction processes.

3. Enhance quality of life for residents.
   - Provide a richer and more diverse ecological system bordering the town.
   - Create additional opportunities for interaction between the river and the downtown.
   - Build links between local and state park systems to enhance their accessibility and usefulness to the public.

4. Maximize the potential for economic development related to recreational opportunities.
   - Create a greenway riparian system that is regional in vision so that it will draw the attention of the nearby cities of Cincinnati and Louisville.
   - Create attractions that will draw visitors from outside of the immediate site of Madison.
Users

The main users for this project are the citizens of Madison, Indiana. It will become a highly interactive part of their community. The secondary users are the visitors and tourists that make their way to the town by the thousands every year. Interacting with the site only briefly, this group is mainly from within the greater "Golden Triangle" region. A large percentage of the second user group stems from the annual Regatta boat race, and Chautauqua fall festival. The tertiary group, consists primarily of transients who experience the site only in passing or by happenstance. This group may experience the site from a distance, or by nontraditional means, yet they may have a desire for some degree of interaction.

These three groups include individuals of all ages and backgrounds. The primary users of the site when looked at demographically, are a very diverse group. Individuals under the age of 21 account for 26% of the population. The city's largest percentage of population lies between the ages of 25 and 44. This age bracket consists of 30% of the population supporting the need for family oriented amenities. Citizens over the age of 65 represent 17% of the population, drawing attention to the specialized needs of the retired and elderly. Individually, the largest proportionate age category in the community was newborns ranging from 0-5 years old. This group represented 8% of the community. The smallest representative age category in Madison was the 80-84 year old group representing a mere 2% of the populace.
Assumptions

This project is long term may its vision change and/or expand in the future.

There is no proposed budget.

The needs of all major demographic groups will be considered.

The needs of permanent residents will take priority.

The land needed for the project is available for ecologically oriented development.

All built, hard and soft, landscapes would not have final engineering and implementation data.

National, state, county, and local legislatures would allow such development.

Relocation of existing structures and the building of new structures would be permitted.

Design and planning issues that do not directly impact the site will be dealt with in suggestive theory.

General recommendation/implementation plan will be finished in detail at a future phase.

All copyrighted materials video-recorded, photographed, and tape-recorded will be used solely for educational purposes.
Program

Create/restore a more naturalistic interface between the river and the town, including

- New wetland additions
- Riverbank restablization
- Indigenous riverbank plantings
- New storm water catchment routes to the river
- Connection(s) between the river and the community (both functional and aesthetic)

Redesign active and passive portions of the park, including

- Expanded/renovated river overlooks
- Natural observation/interpretation areas
- Extended walkways/boardwalks/trail systems
- Fishing/birdwatching opportunities

Improved spatial (parkway) connections

- Historic interpretation areas
- Boating opportunities
- Picnicking areas
- Volleyball courts
- Open space

Considerations

- Scenic easements to protect viewsheds and riparian development
- Eco-tourism strategies to attract nature oriented traveller(s)
- Amenities package (receptacles, benches, lighting, etc..)
"It is no easy matter, describing a river. It is more difficult than describing a stone, a tree, or a mountain, for example. While these, too, exist both in space and time (the multiple dimensions that make the task so difficult), at least their relation to them is fairly stable and simple. However, the river itself seems to be continually changing-between historical, linear time, and future, cyclical time; between a definite spatial context, and one which is continuous. The more one meditates on the river, the more completely the subject erodes the distinctions between and definition of time and space, until finally these basic concepts by which we set the world in order are flooded by a chaotic sea of confusion in which all things seem one, and in which there is no time and there are no spaces, only space unfolding."

-WYTHEN H. HERENDEEN

Time and Space

The complexities of a river's relationship with time and space lie at the heart of the design problem. In order to design upon its edge one must understand its spatial language. The river's soul is its water, an infinitesimal collection of droplets formed from hundreds of tributaries and led by gravitation. The water acts as a life blood to various ecological communities existing both within the river and upon its shores. As an entity it exists in perpetual motion, made up of a collection of droplets acting as a collective force. Watching a specific point on the river, one can see the passage of its life as a living entity. The water not yet to the specific observed point is the future, water at the specific point is the present, and the water which has already passed through it is the past. A different collection of water passes through the specific
observed point every second. The river's unique existence in time allows for humans the rare observance of witnessing such relationships. A river is the observance of a continual physically occupied space by a moving, changing substance. A river acts as a datum, much like that on the musical staff. Serving as a continual visual reference point the lines on the staff give hierarchical structure to the series of notes in the musical composition. The river in the same way provides a continual visual reference point to which all other elements upon it and its shores are oriented.

A Sense of Place

A sense of place is the unique physical, cultural and ecological aspect of a particular place that makes it regionally different than all other places. Madison was built on the floodplain of the Ohio River for the ease of transportation and trading, which its waters offered. Oriented to the automobile today, Madison, like most of the United States, is no longer linked to its transportation origins, which include the rail and the river. Not prevalent currently they are still important in defining the sense of place in Madison. The steep slopes, that formed the valley and prevented its post World War Two strip development are also integral in making the town unique. Most important in preserving the waterfront and the community's sense of place is to disassociate from the homogenization trends of the average American town. These trends are affecting communities' north, south, east and west across the country. The homogenization entails the introduction of national chains and corporations into every town regardless of their individuality. Madison has made great efforts to date in avoiding this dilemma and should continue to do so in years to come.
Environmental treatments
River care

Streambank protection

Problem: excessive shoreline erosion, limited wildlife habitat, limited aesthetic quality

Protective streambank measures reduce erosion, increase habitat, prevent land losses and sediment damages. Two methods were used together to provide optimal results in protecting the riverbank, they were: vegetative plantings and soil bioengineering systems.

An increase in riverside vegetation planting assists in bank stabilization by trapping sediment, reducing tractive stresses acting on the bank, redirecting flow, and holding soil.

Soil bioengineering is a system of living plant materials used as structural components. Adapted types of woody vegetation (trees and shrubs) are installed first in specified configurations that offer immediate soil protection and reinforcement. In addition, soil bioengineering systems create resistance to sliding or shear displacement in a streambank as they develop roots or fibrous inclusions.

The three types of soil bioengineering techniques used in this project were live stake (Fig. 6.1), live fascine (Fig. 6.2), and joint plantings (Fig. 6.3).

Live stakes are living, woody plant cuttings capable of rooting with relative ease. The cuttings are large enough to be tamped into the ground as stakes. They are intended to root and grow into mature shrubs that, over time, will act to stabilize the soils, enrich the riparian zone for habitat restoration, and improve water quality. They are primarily applicable to small earth slips, slumps that are often wet, and to stabilize intervening areas between other soil bioengineering techniques. Live fascine structures are sausage-like cylindrical bundles of live cut branches. They are tied together securely with twine and set into trenches along the riverbank. They are shallowly placed and create little site disturbance.
compared with more complicated soil bioengineering
techniques like live cribwalls, which call for
construction under the water. They are primarily
applicable to areas where minimal site disturbance
is needed. Joint planting systems involve
installation of live stakes between previously placed
riprap rock. Riprap is the rock or other heavy
material placed along a stream bank, a steep hillside,
or shoreline to control erosion or washout. Joint
planting systems are most effective in areas already
treated with riprap treatment.

Stormwater runoff

Problem: water pollution, increased down stream
flooding and sedimentation

Historically, the focus of storm water management
was to remove water from roads, bridges and urban
areas and discharge it as quickly as possible into
the nearest natural watercourse—a creek, stream river
or lake. Currently storm-water discharge is
recognized by the Environmental Protection Agency
(EPA) as the United States number one water
pollution problem. Urban storm-water runoff from
developed areas, especially streets, parking lots,
industrial and residential areas, is normally rich in
a diverse array of contaminants. Massive loads of
these contaminants are transported to our waterways and groundwater zones during every
rainstorm. The contaminant list is long, including
metals (e.g. lead, zinc and iron) and organic
compounds (many insecticides diazinon and
malathion), petroleum residues, nitrates and road
salt. The EPA acknowledges that improper and
outdated storm-water management techniques have
resulted in severe flooding of downstream properties,
and the sedimentation of some of the countries
greatest watercourses.

Madison has numerous pipes and culverts of
different age, shape, color and material jutting from
its waterfront and culverts. These numerous pipes
drain more than half of Madison and drop storm-
water directly or within a few feet of the Ohio River.
The largest single factor in preventing the problems
of pollution and sedimentation are storm-water
retention and detention strategies. Water quality
mitigation on the site was addressed with three
detention strategies; filter berms, filtration flumes,
and vegetative buffers.
Filter berms are elongated earth mounds constructed along slopes that use soil as a medium to filtrate contaminants and slow storm-water. They are constructed of soil containing different grades of sand and a filter fabric and are designed to function in the same fashion as soil infiltration trenches. Filter berms are best suited for the treatment of individual parking lots or groups of small lots.

Filtration flumes are concrete bedded channels lined with sand and stone that sometimes use bioengineered joint planting systems. These systems are best used for higher density land uses. They are designed to filter the first 0.5 inch of runoff, the first flush, which is the heaviest in contaminants during the life of a storm. The basins can also be designed to double as a retention basin, holding a set level of storm-water permanently for vegetation or to evaporate.

Vegetation buffers use plant material exclusively over set areas of land and are highly effective in sedimentation removal. These systems can remove up to 90% of sedimentation if they: (1) are a continuous grass/turf surface cover, (2) buffer areas greater than 50 to 100 feet, (3) have gentle gradients, generally less than 10% and (4) contain shallow runoff depths, generally no higher than the ground cover. This naturalized treatment is best used for low density land uses and scenic ecological areas.
Habitat

Problem: fragmentation and edge effect, lack of linkage between habitats, lack of wildlife diversity

The natural environment is a complex web of landscape elements that change and evolve over time. This structure includes a dominant background matrix such as suburbs, forests, farmlands and prairie. Corridors whether, rivers, streams, trails, roads or ditches, run through that matrix and weave together several landscape elements and the system as a whole in a way that is vital to each element.

Fragmentation of open space into increasingly small and isolated pockets is a result of urbanization, road construction, agriculture, and a variety of other causes. Biologically, fragmentation can lead to increasingly limited habitat and the extinction of indigenous species. Many animals, particularly those that are wide-ranging, cannot meet their food, breeding and habitat requirements. A lack of natural connections between suitable habitats is a leading cause for the decline in wildlife diversity in small or isolated natural areas.

Natural corridors help species escape danger, competition, famine or humans. Corridors also aid wildlife in locating hunting, shelter and breeding grounds. Pollen seeds, nutrients, and other material are transported by animals during their travels along the corridor or by water in river or wetland corridors. The edge of a corridor is where it meets adjacent landscape or land-use zones. In nature, edges are dynamic areas. There are numerous types of edges. There are stream edges, forest/meadow edges and various other types. Each represents a transition zone, where soil, vegetation, light and land uses change from one type to another. The edge-to-interior ratio of a corridor is an important factor in determining the wildlife value of a corridor. (Fig. 6.9)

Because corridors usually have a high ratio of edge to interior habitat, which limits the interior habitat spaces of wildlife.
to interior, certain wildlife species (e.g. goshawk, marten, hooded warbler), which require large tracts of closed canopy forest, can be vulnerable to edge effects. Light wind and predators can effect wildlife as deeply as 1000 feet into the forest. (Fig. 6.10)

Wildlife diversity is also kept minimal due to a lack of diverse habitats. The increased sterilization of land use has lead to the elimination of many wildlife habitat and food resources. Pollution is another factor in keeping sensitive species from returning to areas they once inhabited.

Three strategies were used to combat the habitat problems of the project site. They were; reforestation and reintroduction, habitat linkage and trail design.

Major reforestation was conducted on the project site. Areas that were reforested were former DNR classified brownfields (contaminated soil), residential and industrial areas and open space. Madison has two large riparian forests at the eastern and western ends of the site. They act as bookends with the developed waterfront between them. It was these two forests that received the largest treatment of reforestation. The goal was not to recreate the pre-Colombian riparian forests but rather to meet the needs of existing wildlife and increase the natural experiences of users. Wetlands and other naturalized pockets along the waterfront were also planted with native trees. The reforestation process called for the removal of invasive exotic and noxious vegetation that had choked out the original native species. Systematically after extensive soil testing and treatment, indigenous plant material was reintroduced. The long term reintroduction and reforestation programming was organized and supervised by a professional forester. Urban forestry was also included in the reforestation program. It was initiated along the towns southern edge of development in open spaces, parking lots, parks and along the major arterials that linked Main Street to the waterfront.

The second strategy focused on the linking of different habitats with naturalized corridors. A wide variety of habitats exist in and around the Madison project site. The Ohio River is the dominant southern habitat in the region from most vantage points. It’s underwater and shoreline vegetative habitats provide home, food, and breeding areas for many species. (Fig. 6.11) Clifty creek and the other non-channelized watercourses located to the eastern and western ends of the site provide stream corridor habitat. The expansive Clifty Falls State Park lies to the northwest of the site and contains a diverse plethora of flora and fauna, but it
is cut off from the floodplain ecosystems by S.R. 56. The two bookend riparian forests also offer a wide variety of habitats, yet like all the previously mentioned; they are poorly linked to one another. Two methods were used to link these different habitats. The design of a greenway trail, built upon the historic railroad right of way, connected the waterfront to the State Park. It traveled under 56 protecting both people and animals. The greenway trail served as a spur, connecting other habitats and corridors to those of the waterfront. The riverbank bioengineering techniques offered new shoreline vegetation and cover, that was used as a natural connection corridor for wildlife travelling from one end of the site to the other.

The third strategy, trail design, stressed minimal ecological impact while maximizing recreational opportunities. The trail was designed as a linear system to preserve interior habitats and reduce edge effect. Vegetation was brought directly to the side of the trail and the tree canopy was continuous over the trail in most forested areas. A riverfront cleanup program was implemented with the opening of the trail in order to help reinforce ideals of stewardship in the users. The voluntary based monthly cleanup rallies behind the existing community pride and their willingness to be active in the beautification of their riverfront. With the elimination of industrial waste barrels, tires and plastics (e.g. oil, beverage, bags, and food containers) from the riparian zone, wildlife sensitive to pollution will be able to return.

Problem: lack of understanding for historical, architectural and natural elements of significance

Cultural resources are defined by the United States National Park Service (NPS) as the “Sites, structures, districts, and objects significantly associated with or representative of earlier people, cultures, and human activities and events.” Cultural heritage in the U.S. goes back thousands of years and is revealed in travel ways, settlement patterns and the adopted land uses of former cultures and societies. River valleys and rail lines are significant examples of our cultural heritage as they were early routes of travel in North America.

The landscape of today and the landscape of tomorrow are much different than what our ancestors saw fifty, two hundred or a thousand years ago. Almost all of North America’s landscapes have undergone some type of settlement, development,
alteration and redevelopment. When considering culture and historic interpretation of a region the natural features and resources should be examined first.

Three types of significance define cultural resources including historic, architectural, and natural.

Historic significance defines the people and events of the past that have molded local, state, national or international history. Social, religious, and ethnic definitions of the landscape contribute to its significance. NPS states that a historic landscape as “a geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads, waterways, and natural features.”

Architectural significance relates to the specific change over time of architectural style. Architectural significance is defined by the local, state, national or international importance of structures in the landscape. Landscape architecture and engineering of significant importance is also included in this grouping.

Natural significance is defined by how natural systems influenced human habitation in a region. Natural significance is defined as landscapes that are ecologically, geologically, or hydrologically unique. Dominating natural features or features that facilitated human development or activities are also classed as naturally significant.

Madison's cultural resources are evident in all three areas of significance including historic, architectural, and natural. Each of these significant areas was addressed through a program of signage interpretation and development. Signage programming was implemented to identify the riverfront parkway as a specific place, with its own identity, while preserving the integrity of the community's existing signage. Informational signage directed users to facilities, oriented position, and provided trail function data. Interpretive ecological signage communicated habitation, reforestation, soil bioengineering and storm-water mitigation programs. It also included interpretive information on the historic significance and cyclical systems of the Ohio River. Interpretive architectural signage primarily communicated the former land use of the floodplain. It directed users from the waterfront to specific architectural sites in the
Recreational treatments

Recreation

Problem: lack of active and passive facilities to meet recreational needs

Outdoor recreation is at an all time high in the United States and growing larger each year. With the increase in recreation there comes a demand for more facilities for both the passive and active recreational user. Passive recreation includes walking, bird watching, shell collecting, observing and fishing. Active recreation includes jogging, biking, swimming, rollerblading, basketball, tennis and volleyball. The 1990's saw a rising trend in eco-sports or activities focused on interaction in the natural environment. The contemporary outdoors-recreational user demands high quality facilities and unique scenic landscapes. If these elements are not present users will go where they can be found. Active and passive recreation can be used side by side on the same site if care is taken to provide adequate transition, spillover and buffering space.

The Madison riverfront parkway offers a wide variety of passive and active recreational uses. The design of recreational spaces in and along the project site maximized the demand for facilities while preserving open space historic integrity. The existing facilities were improved and added upon in an attempt to meet a wide spectrum of user needs and wants.

On the site one tennis facility, one softball facility, two basketball courts and two volleyball courts existed before the master plan was completed. The development of active recreational opportunities within the historically developed area of the waterfront would have caused a conflict of interests. Bright lights, loud noise, loitering, and facility wear and tear would not merge well with historic buildings
and culturally preserved landscapes. This theory was applied in the master plan by moving new active facilities to the eastern and western ends of the site, north of Vaughn Drive. A new tennis facility was added to the parkway system along with five basketball courts and six volleyball courts. Horseshoe courts were installed beside the shelters in the park system north of Vaughn Drive.

The West street boat ramp and adjacent permanent race stands represent the active and passive aspects of the Regatta festival. The week-long festival fills the waterfront area to capacity with mixed recreational users. A grassy overlook hill designed in the master plan adds naturalized seating for observing river activities. Passive recreation was focused south of Vaughn Drive primarily along the lower trail. Travel oriented biking, jogging, and blading were also focused to the upper and lower systems of the trail. Passive, picnicking, fishing, birding, and shell collecting were mainly installed at the naturalized bookends of the site.

Amenity treatments

Problem: lack of needed facilities, lack of high quality and well designed amenity elements.

Design projects always have an accompanying amenity package which address the functional day to day needs of the project. Lighting, signage, trash receptacles, parking, and the maintenance associated with them represent the elements included in an amenity package.

The program package for the amenities was simple. It identified a need and then met it. The amenity needs were categorized into three subgroups (1) automobile, (2) biker, boaters, wheelchair, skater and (3) pedestrian.

The automobile with all its detrimental social, economical and environmental effects must still be provided and designed for. The primary amenity needed for an automobile is parking. The amount of space allotted for automobiles was based upon existing lot capacity and the projected spatial needs of new facilities and users. On-street angled parking was used where possible to maximize street space and preserve natural open space. This design treatment mirrored the existing parking designs used along Vaughn Drive. Three existing gravel lots, found in the central section, were converted to park space with street parking alongside them. A 32-space car lot was built at the Jaycees Park, on the eastern end of the site. It was built upon a former gravel lot and served the needs of the basketball,
volleyball, picnic, and tennis users in the park. Individuals accessing the larger parkway system from the east also used the easternmost lot. Three lots were built in the western section of the site. The first was constructed on the edge of the reforested riparian forest. The 49-space lot served trail users who were entering the riverfront from the west or who were using the rails to trails links. Fishing, picnicking, and natural observation were also activities of the western most parking lot's users. The second western lot was built to primarily service the users of the basketball and volleyball courts clustered in the area. Seasonal overflow parking was designated in the open park space of the western section. The third built lot, with 33 spaces, was designed to meet the needs of the new visitor and interpretation center. All parking installations were coupled with urban forestry tree plantings and vegetative island buffering in order to curb the negative effects of the automobile.

The second subgroup of bikers, boaters, wheelchairs and skaters was designed on a more intimate scale. Resting nodes on the trail, located approximately every 200-300', offered trash receptacles, benches, bike racks and sometimes tables. Boat ties and docks were constructed in each of the three sections to service smaller localized watercraft. Trail markers were used to identify how far users had traveled and for emergency service orientation. The signage program addressed the needs of its various users by meeting American Disability Act (ADA) codes and providing Braille text on markers and signage.

Pedestrian needs are much like those of the second subgroup. Three focus areas of the pedestrian amenity service were shelters, restrooms, and maintenance programming. Park shelters offer cover from the elements and seating for larger groups and gatherings. Four new shelters were spaced throughout the three sections of the waterfront. An overlook tower located in the western riparian forest also served as a shelter and destination attraction for pedestrians. Madison had a need for more public restroom facilities before the project began. After the addition of more active and passive recreational spaces the need was increased. One new seasonal restroom facility was designed in each of the three waterfront sections. The one existing facility on Broadway Avenue was modified for year-round use. High quality maintenance is the most critically scrutinized by the slow moving pedestrian. The volunteer based riverfront cleanup program was supplemented with a year-round maintenance crew assigned to repairs and weekly upkeep of the parkway.
Western Section-Map 1

The western portion of the site, identified by its natural character, was designed to improve and build upon the existing conditions. The large riparian forest anchored there was expanded upon through a program of reforestation and reintroduction. The forest was expanded into former brownfields, residential, industrial and openspace areas. Wildlife corridors expand out westerly toward Clifty creek, northerly toward Clifty Falls State Park and easterly across the project site to the second riparian forest.

An all weather surface trail hugs the shoreline, extends past the treatment plant and then loops back to Vaughn Drive. It loops back to Vaughn Drive via a rail to trails greenway along the historic railroad right of way. This corridor links the riverfront to the scenic byway, town and Clifty Falls State Park. The trail winds through bottomland forest and wetland habitats. It carries users to picnic areas, fishing docks, the greenway and a wooden overlook tower. The picnic areas are small so as not to disrupt the sensitive habitats of the riparian forest. The small boat docks offer an isolated place to fish or launch a canoe, kayak or rowboat. The tower, centrally located, allows users a majestic view to the northern bend of the river. These features are easily accessed from a parking area located at the terminus of Pearl Street. A trail spur leads users from the lot to the greenway, which links to the Vaughn Drive riverwalk, or to the other previously mentioned areas. The trails and all their associated accessories are permanent flood proof structures. Beside the foremost natural and recreational draws to the western section, important cultural elements also exist. A cultural transit plaza was designed at the intersection of the greenway (former railroad), Vermont Street and Vaughn Drive. It communicates the historical impacts of the boat, railroad, and automobile upon Madison both symbolically and through interpretive signage. (Fig. 10.2)
Western Section-Map 2

Map two of the western portion of the site, which transitions into the central section, begins at Vermont Street and ends at Elm Street. A park and open space system north of Vaughn Drive begins in this area. It mirrors a green strip of naturalized flood plain south of Vaughn Drive and reflects the river’s character of sinuosity. This open space system used the urban forestry program to mold its large green spaces into outdoor rooms with the use of street trees, buffering, planter islands and dense tree plantings. High-density active recreation was clustered in this area so that it would not conflict with historical sensitive areas. Four basketball courts, two volleyball courts, three horseshoe courts and a shelter house were serenely tucked within and around dense tree plantings. Parking access to these attractions was located either as adjacent angled street parking or in a 36-space lot located off of Plum Street. A three-block east-west allee was created in this section to reinforce the ecological presence of nature on the waterfront.

The new visitor center and interpretive museum was linked to the open space system through a loop trail that also connected to the lower river trail. Parking for the visitor center was also buffered with trees and plantings. Street access to the parking lot was only provided off of Vaughn drive in order to preserve the historic stone culverts that abut Vine Street. Filtration flumes and detention pools were used throughout the entire site. They filter the stormwater of thirteen city streets beginning with Plum and ending with the 421 bridge. The existing Riverwalk Park connects to the new parkway trails and developments at the Vine Street terminus. Soil bioengineering techniques were used along portions of the shoreline where erosion was an evident hazard. The historical view from the Lanier State Memorial down to the river was preserved by not planting trees in the floodplain directly south of the estate.

Fig. 10.4 Strolling ladies enjoy the naturally refurbished shoreline.

Fig. 10.5 Bicycle enthusiasts ride along the lower riverwalk trail.

Fig. 10.6 Grandmother and granddaughter take in the riverfront park.
Central Section: Map 3

Map three of the central section is the historical core of the waterfront. The park and open space system seen in map 2 continues on in this five-block section. Special street pavers and crosswalks at the terminus of Broadway Avenue and West Street help to emphasize the sinuosity of the shoreline and park open space system. A tree-lined median down the center of Broadway Avenue connects the natural features of the waterfront to the central business district of the community. (Fig. 10.7) Parking between Broadway and Poplar was eliminated to create more green space. The waterfront's main overlook had its land area between the former user zone and the water extended. Before it existed as a 20' drop-off at 60% slope. Now it exists as a 70' hill at 15% slope. The hill doubles its use with the formalized seating of the old overlook meeting with the naturalized character of the new dale rolling to the water. A temporary connecting dock was designed just east of the overlook to accommodate large river craft, like the Mississippi Queen, in coming to shore in Madison.

Between the new fill of the overlook and the boat ramp a unique successional sculpture installation was placed. The piece uses a man-made groin, jutting out into the river, to expedite the natural processes of sandbar development, jetty formation and erosion and deposition. Interactive signage explains the natural and educational art installation.

Cherokee Park, north of the boat ramp, uses dense tree plantings and filtration berms to encompass a large circular open space, available for multiple uses. At the northern end of this open space an amphitheater stage is built for open-air performances. A second set of judge stands was installed east of the existing stands. Between the two sets of stands a large filtration berm penetrates the boat ramp minimizing the expansive asphalt surface area.
Eastern Section-Map 4

Map four of the eastern section represents the area between Jefferson Street and Jaycees Park. This section is characterized by its expansive open spaces along the waterfront. The open landscape character has caused severe erosion problems in several areas of this section. The worst areas were dealt with by implementing soil bioengineering techniques, vegetative buffering, filtration berms and flumes.

Just to the north of the boat ramp and to the east of Cherokee Park sits Hendricks and Firemans Park. These Parks mark the end of the Park and open space system north of Vaughn Drive until map five. The two interior focused parks are buffered from the street with both ground vegetation and tree plantings. A public restroom, accessible from the boat ramp and a shelter are located within the park boundaries. Paver patterns in the street, at the intersection of Jefferson Street and Vaughn Drive, symbolize the cyclical nature of the river and the character of sinuosity that it exemplifies. Jefferson Street, which leads to the historic Jefferson County courthouse, was fitted with an ornamental street tree median.

The rolling character of the floodplain is unique in this area of the riverfront and therefore was primarily left intact. Storm-water retention pools and filtration flumes juxtapose the upper and lower riverwalks. Flood-proof and fully accessible bridges cross the seven flumes in this section of the site. At the "T" of Michaels Avenue, the upper riverwalk takes on a serpentine quality that mirrors that of the lower trail. The experiential qualities of the trails vary greatly in this section as they depart from the urban setting and take on a more naturalistic feeling. Increased wetland development along the shoreline and increased forest development along Vaughn Drive created interesting room-like pockets of natural space.

Fig. 11.1 Permanent race stands overlook the successional sculpture.

Fig. 11.2 This section of the waterfront is the best for collecting shells.
Eastern Section-Map 5

Map five, of the eastern section, represents both the terminus and gateway of the Madison riverfront. The large riparian forest anchored there was expanded upon through a program of reforestation and reintroduction. The overall character of the section is very open and expansive, it is visually influenced by the large riparian forest, the 421 bridge, and the river. The forest was expanded through the reforestation program. Land that was primarily open space before was added to the ecology of the riparian system. Wildlife corridors expanded out easterly away from the developed town and westerly across the project site to the second riparian forest. The 421 bridge acted as a gateway from both the south and the east. When crossing from Kentucky it acted as the means to the destination. When approaching from the east it was where the first Madison views were experienced out across the river. The Forest was expanded westward to control these first specialized views. The Serpentine Park and open space system reemerges north of Vaughn Drive in this section and terminates in the Jaycees Park. High-density active recreation was clustered in this area to give balance across the project site. Two basketball courts, four volleyball courts, a tennis facility, shelter and public restroom are located within the park.

Vaughn Drive veers from the shore in this section and one trail follows the river and the other follows the road. The upper riverwalk leads to the Madison campgrounds, which was expanded to double its occupancy potential. The lower trail follows the river and eventually loops back to the upper Vaughn Drive leg. The most extensive wetland and riparian developments were conducted in this section. The linear feet of shoreline was increased by 25% creating numerous habitats in the vertical structure of the landscape. One of the most intriguing qualities of the section is the large flume that snakes and curves under the bridge. The flume runs below the bridge and filters its storm-water runoff. Like a shadow below it, the flume contrasts the rigid architectonic lines of the steel structure.
icher for those memorable places where man has planned his life and its structures in full accord with nature's forms and forces."

- John Ormsbee Simonds, Earthscape
Words or not?

In the tangible sense this project achieved its stated definitive goal. "to develop a plan for a riverfront parkway development" and to "focus on restoring river ecology while strengthening identity of place where the community and the river meet". The resolve of conflict, which is manifested in every problem, is often the point at which the bigger picture is noticed. Solving a design problem and offering a solution is not the achievement or the goal of the individual, but rather the incentive and will to do so. To tackle the unattainable or to attempt to change the unchangeable is the drive and seed of greatness. To merely settle for what is given or to work with no passion is the root of collective thought. This project was conducted on a small scale in a small community but what the heart of the design addressed was large. How people look upon and act upon their environs reflects the values that a society chooses to adopt. It is easier to accept standardization, to address the environment the same as the next community. What is challenging and what is noble is to educate one's self and one's community in order that all people can better understand the natural world and how beneficial and giving it is. In conclusion the final comprehensive project in landscape architecture looks not at a design problem but rather at the designer. It looks to define personal ideals, values, and aspirations that are evident in every aspect of the project that is chosen. I feel that this project was long and hard and fulfilling.

Jason Grimes May 7, 1999 6:43 A.M.


PERIODICALS & JOURNALS

"Ipaesaggi ri-fatti = Re-made Landscapes" Lotus international, 1987. no.87, p.82-107.


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