Rails-to-Trails:

A Recreational Trail System in Southern Indiana

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Abstract:

As society continues to become more urbanized, our land resources are being lost. Agriculture land is being converted to urban uses at the rate of approximately one million acres per year. With the population growth rate of 1% each year, this trend is most likely to continue. Because of this, there is a growing need to preserve our open space.

One way we can do this is by creating greenways that link open spaces together. Greenways are important to the future land preservation because they provide economic benefit, conservation, recreational opportunities, and interconnection. One successful method of creating greenways is converting abandoned railroads into trail systems. By doing this, we are conserving the land and allowing it to continue to be an asset to the public.

The Monon corridor provides an existing link needed to connect Bloomington, Indiana to Lake Monroe. Southern Indiana’s recreational opportunities are plentiful in this area but lack the connection to allow visitors to interact within the system of open spaces without the need for vehicular transportation. Without the creation of a trail system using the abandoned Monon rail corridor, the former land mark of the Monon corridor could be lost forever.
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The Problem Statement
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**Background:**

During the last part of the nineteenth century, the United States was expanding westward at an incredible rate. Because of this, there was a great boom in the railroad industry. Thousands of miles of track were laid across the country, becoming the primary mode of cross continental travel. However, in the 1950's there was another transportation boom: the automotive industry. At this time, thousands of miles of roads and interstate highways were laid across the country and Americans turned to their cars to get from one place to another. The railroad industry was able to compete for a time by concentrating on the transportation of goods across the country.

However, once again technology led to great advancements in the airplane. Soon, air travel was a viable means of travel for millions of people, as well as an economical means of transportation of goods.

Between the two dominating transportation systems, it left thousands of miles of railroad corridors abandoned.

In 1916, at the height of the railroad industry, there were more than 250,000 miles of railroad corridors crossing the country. Today, there are less than 140,000 miles left, with an annual decrease of 3,000 to 4,000 miles per year. In the past twenty-five years, over 5,000 miles of these railroad corridors have been converted into trails; however,
this is less than 5% of the total abandoned railroad corridors.

There are several ways to create greenways, and it is seldom done from scratch because of the high cost and effort required to gain the land needed for the trail systems. More commonly, riverbeds, utility corridors, and other established linear routes are chosen. Since the 1960's, one of the fastest growing linear corridors has become the conversion of abandoned railroad corridors into linear trail systems.

There are several reasons why these former rail beds make excellent trails. As the railroad industry discontinues the use of various lines, the land is already established as a linear corridor. In addition, the rail beds contain only a gentle slope, and can easily be used by recreationalists of various abilities with little modification. Rail corridors traverse a wide variety of landscapes; connecting rural areas with nearby towns and urban centers. This makes the trails more appealing because of the variety of scenery as well as their ability to connect places together.

Figure 1: A utility corridor being used as a recreational trail.
History:

In 1865, Frederick Law Olmsted coined the term "parkway" when he designed Strawberry Creek on the campus of the University of California at Berkeley. By doing this, he was able to link the campus to the city of Oakland. This parkway was used as a pleasure drive with walks that maximized the views in the area.

When Olmsted left California, he returned to New York City where he renewed his partnership with Calvert Vaux. During his return to New York, Olmsted traveled through the Panama Isthmus, where biographer Elizabeth Stevenson believes that Olmsted coined the term "greenway" as a result of his travels, which he described as "the lush green corridors that link the Pacific to the Atlantic." With this vision, he and Vaux began an extensive effort to create linkages throughout New York City. Together, they created the Brooklyn-Queens Greenway, a six-lane carriage way that connected several parts of the city together through scenic drives. These greenways were so extensive, they became some of New York's busiest expressways. Although this was not part of their vision, it shows the extent of the greenway system. Another project by Vaux and Olmsted that has survived the test of time is the "Emerald Necklace" that links several parks throughout Boston. These parks are essential in providing recreational activities for Boston.

There are four main reasons for creating linear open spaces: economics, conservation land preservation, recreation, and interconnection (Burwell 4). Each of these could stand on their own as a reason to create a linear corridor, but together they produce a strong argument
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to support the creation of a linear trail system that links various parts of the country together.
Greenways:

Economics:

Many studies have been completed to show the economic effect that a trail can have on an area. In a study conducted by the Rivers, Trails, and Conservation Association in 1992, three trails were examined: the Heritage Trail, Iowa; St. Marks Trail, Florida; and Lafayette/Moraga Trail, California. The study looked at the effects of the trails in terms of the economic benefits on surrounding communities and adjacent properties. In each of the three trails studied, an average of $1.2 million in revenue was brought in each year as a direct result of the trail plus $130-$250 per person in durable goods related to trail activities. In addition, each trail brought in an average of $400,000 of "new money," money brought in from outside the area. Other trails, such as the Elroy-Sparta Trail in Wisconsin averages $50 per day from visitors using the trail (Rivers, Trails, and Conservation Association ii). Each of these trails provides a direct economic benefit to the nearby communities.

Along with the direct economic impact of the trail, there is also an indirect benefit with the increase in property values adjacent to the trail. In the River, Trails, and Conservation Association study, many of the land owners living adjacent to the trail were concerned about their property values with the new trail system. However, the study concluded that the trail had either no effect on the property values of the area, or it had a positive effect. On other trails such as the Burke-Gilman Trail, property located along the trail sells for approximately 6% more than that of nearby sites (Seattle Engineering
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Department 2).

Trails not only spur economic development, but they also play a role in increasing the value of surrounding areas. These economic benefits can be used to help encourage local residences to support the development of proposed trail system in their areas.

**Conservation and Preservation:**

More and more land is being dedicated to urban sprawl. Because of this, there is a great need to protect and preserve the open spaces we have left. One way this can be done is through greenways. There are several ways that greenways protect and conserve the environment. Because greenways are corridors with natural vegetation or vegetation that is more natural than surrounding areas, they are ideal for creating linear habitats and ecosystems for a variety of animals (Smith 10). Smith also believes that "given the rising concern over environmental degradation, preventing or reversing this degradation where possible should be the primary focus of all greenway projects." Greenways can protect the environment by protecting waterways from non-point pollution and decrease habitat disturbances by allowing animals to move more freely between habitats (Smith 10).

Other ways that greenways can assist in conservation is by serving as buffers. An example of this is the Pima County River Parks in Tucson, Arizona. The park was created out of response to severe flooding that was occurring in the late summer and fall. The state took action and established flood control ordinances to limit the area of construction. By doing this, a linear open space was created. By establishing these zones as areas of
conservation, they can help protect both development and natural systems (Little 50).

Conservation of the land to protect against urban sprawl is one use of a greenway; however, greenways also play a major role in the protection of wildlife. As humans change the landscape, connective links for animal habitats decline and create habitats more like islands. By creating greenway corridors, land use managers and planners can maintain or restore animal habitats in landscapes that humans have changed (Noss 62).

Noss gives guidelines to consider when designing a greenway wildlife corridor. First, he suggests that the greenways be designed and managed for native biological diversity. Second," the planning should be for the minimum area necessary to insure demographic and genetic survival of the species." The following two suggestions deal with the area around the greenway. It is suggested that greenways or other linear corridors do not substitute for large nature preserves because of the limited conservation value of the greenways due to their width. The greenway corridors should not act solely as wildlife habitats, but act as a connection from one large habitat to another.

Greenways can also be used as a means of preservation. In the early 1900's, at the boom of the railroad industry, to today, railroad tracks criss crossed the country, creating a unique landscape of connections. As the railroads continues to disband, these connections are being lost along with a significant part of our countries cultural past. By preserving these corridors, it provides a visual history of our land for future generations. These corridors can also be preserved for other linear activities such as recreation, utility corridors, and future
transportation. By preserving these corridors, they can be useful to future generations as a connection to the past and the future.

**Recreation:**

The third advantage of establishing a linear corridor is the recreational aspect. Each year, hundreds of thousands of Americans take to trails as a form of recreation. The Sugar River Trail in Wisconsin hosts an annual 60,000 visitors each year (Kidd 26). This can all be contributed to America's growing health concerns which in turn has created a new found need for exercise. It is estimated that 27% of Americans participate in day hikes, 35% in bird watching and nature study, 42% in running and jogging, 46% in bicycling, 51% in fishing, and 84% in walking for pleasure (Burwell 3). These statistics show the demand for convenient recreation space in order to take part in these activities.

**Interconnection:**

When discussing wildlife, it was stated that the trails should be used as a means of connection from one habitat to another for the use of wildlife. This idea of connection can also be applied to human recreation activity as well. One way that linear trail systems can serve as connective systems is for commuters. According to the census data from Northeast
Illinois Planning Commission, in areas where no trails existed, only 1% of the commuter trips were conducted by bicycle. In the areas where trails did exist, almost 16% of the commuting trips were by bicycle (Burwell 3). This is one way that trails can be effective on a local level; however, this can be vastly expanded on a national level. More and more, communities are realizing the potential of connectivity that can be achieved through a trail system. Oftentimes, a linear trail can be used to link several recreation sites together. One of the greatest examples of this is the "Emerald Necklace" in Boston. By connecting several recreation sites together, it makes it easier to travel from one to another.
The Importance of the Study:

There is a growing demand for recreation activities in the United States and specifically in Indiana. Southern Indiana has several excellent recreation opportunities; however, they are fragmented around the region without adequate means of connections outside of roadways. By connecting the existing recreating sites with additional links that can also be used as recreation sites, it increases the potential of the area, in turn increasing the appeal to a broader user group.

In the United States, there is a growing number of railroad corridors that have been abandoned. These corridors are excellent opportunities to establish recreation areas. The land is used in a productive manner by providing recreation activities to people as well as providing possible wildlife corridors, and preserving the corridors for future transportation and utility needs. By blending these uses, it not only provides a safe environment for animals, but also recreational and educational experience for the trail users.

Every day we hear how we need to conserve the resources that we have through recycling, reducing, and reusing. Now, we need to apply this theory to the land. This is one more way that we can preserve our environment and provide a positive service to recreation enthusiasts.
The Statement of the Problem:

It has been predicted that by the year 2000, more than 80% of the population in the United States will be living in metropolitan areas. Because of this, our cities are growing at an alarming rate; as this is happening, we are losing precious green space. Currently, there is a massive effort to try to preserve open space for various reasons such as wildlife, agriculture, and recreation.

In the past thirty years, we have seen the recreation industry boom, creating new technologies that allow people to participate in new activities such as mountain climbing, roller-blading, and wind surfing just to name a few. More people pursue recreation activities today than was predicted twenty-five years ago, and the fastest growing activities are linear recreation such as jogging, biking, and walking.

With the increase in outdoor recreation participants and the decrease in open space, a conscious effort must be taken to preserve open space. One way this is happening is in greenways; linear open spaces that establish a framework of connections from one open space to another. Greenways are not a new concept, but if ever there was a need to preserve open space, it is now.

With this need to preserve open space in mind, it is here that I began my journey. Although Southern Indiana is not plagued with the lack of open space, such as other parts of the country; now is the time to identify open spaces and prevent a continued loss of open space from happening in the future through careful master planning. Southern Indiana is rich
with state and national parks, wildlife areas, and forests; however, these treasures are fragmented and lack connection. By identifying existing amenities that can be used as connections, we are reclaiming existing opportunities to preserve open spaces. One opportunity that is being utilized across the country is the conversion of abandoned railroad corridors to trail systems. By reclaiming the Monon corridor, the link from Bloomington to Lake Monroe, the fragmented recreation areas of this region are able to be linked together through recreational means. The end result is a cohesive corridor connecting Bloomington to Monroe Reservoir, Hoosier National Forest, and Deam Wilderness by using the Monon rail corridor.
The Subproblems:

In creating this linear connective rail corridor, there are many subproblems to be considered. In addition to identifying the user group and the connective links, it is necessary to understand the needs of the user group and how their needs can be incorporated into the trail system. These decisions include trail surfaces, accessibility, and signage. In addition to this, the incorporation of visitor nodes locations is also a consideration. This will be discussed in greater detail in the Design Guidelines.

In addition to the client and user needs, there is also a role the trail plays in the environment. The final subproblem of the project is using the trail as a connective corridor for animals. The trail can be used by animals to connect habitats that are fragmented by housing developments, urban areas, or agriculture.

Assumptions:

Because of the lack of feedback from the adjacent land owners and community members, many assumptions were made. The first assumption was that there was sufficient support from the community members that the trail would be a positive amenity to the community. It was also assumed that the trail would be adequately funded by various means. In addition to the funding, it is assumed that Monroe County would be responsible for gaining the easements of the Monon railroad corridor and overseeing the construction and management of the trail system.
**Delimitations:**

Although the project examined the positive economic effects this trail system would bring due to increased tourism, it did not identify sources of funding needed for construction of the project or establish a cost estimate for the project. All efforts were made to make the trail as economically feasible as possible.

**Definition of Terms:**

*Rails-to-trails corridor:* Using abandoned railroad corridors as recreation trails.

*Greenway:* "1. A linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridge line, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route. 2. Any natural or landscape course for pedestrian or bicycle passage. 3. An open-space connector linking parks, nature reserves, cultural features, or historic sites with each other and with populated areas. 4. Locally, certain strips or linear parks designated as a parkway or greenbelt. [American neologism: green + way; origin obscure]" (Little, Charles E., 1)

*Trail:* "A deliberate man-made pathway, not as wide as a road or lane, which is largely and typically designed for foot traffic." (Ashbaugh, 7)
Goals:

The goal of the project was to create a unified trail system that connects the various recreation amenities in the area. This also was coupled with a plan to create a natural protective corridor throughout the area for wildlife habitat. The main body of the system uses the existing abandoned railroad corridor, the Limestone County Trail. This makes the connection from Bloomington, Indiana to Lake Monroe (approximately twelve miles). The other connections were made by using existing trails and roads wherever possible; however, in extreme cases, new trails were created to make the necessary connections where trails did not exist. This trail system creates a recreation corridor that connects existing recreation amenities in the area as well as creates wildlife corridors to protect the natural habitats of the plants and animals in the area.
The Design
The Design

Client and User Group:

In working with this problem, a community action group, The Bloomington Greenway Coalition, has come to the forefront in getting this project started and funded. They have been the vital component that relayed the wants and needs of the community to the design team throughout the project. This group of people consists of members of the community, city officials, and representatives from Indiana University in Bloomington. This hypothetical group of people have been gathered solely for the benefit of this project. Although some members may continue to occasionally have lunch together, the group will be disassembled as of 26 April, 1996.

By hosting several community meetings, the Bloomington Greenway Coalition (BGC) was able to establish the primary use themes of the trail system. The corridor will be used as a recreational corridor

Figure 2: The Client and User Group.
and a natural corridor. It will serve the surrounding communities as well as visiting tourists from various parts of the country.

The recreationalists will be the main user group of the trail. This group will consist of roller-bladers, walkers, joggers, and bicyclists (see figure2). In addition, this group will also consist of nature observers, bird watchers, photographers, and education groups (i.e. schools, clubs, churches, etc.). The recreation corridor will allow people a place to participate in linear activities without the distractions of traffic, noise, air pollution, or visual pollution.
Site Selection:

The client, The Bloomington Greenway Coalition, is interested in converting the abandoned Monon rail corridor that stretches from Country Club Road at the south edge of Bloomington, Indiana to west of southern portion of Lake Monroe (see figures 3 and 4). This portion of the corridor is approximately twelve miles. The Bloomington Greenway Coalition chose to use the former Monon rail bed. This was done to save the client money as well as preserve land, habitats, vegetation and cultural identity.

Figure 3: Indiana State Map

Figure 4: County Map
The Site:

The portion of the former Monon rail bed that was chosen for the site connects the southern portion of Bloomington, Indiana with Lake Monroe. The corridor is approximately eleven miles long and travels through the urban outskirts of Bloomington as well as the rural limestone rich areas of southern Indiana. Once in the rural area of the corridor, the site provides dramatic scenery that will provide a visually stimulating experience for the user. The corridor runs along Clear Creek, and at several points along the site, the corridor and the creek cross. Because this was a railway corridor, there are existing bridges at all of these junctions. This is a strong amenity because it reduces the overall construction cost of the trail.

The first two miles of the site, between Country Club Road and Clear Creek Road, is an existing trail that is owned and run by Bloomington Parks Department. The first portion of the site is somewhat urban, but because of the heavy vegetation, the surrounding area is screened. Near Gordon Pike, a trailer park and new residential development are located close to the corridor with minimal vegetation as a buffer. Between Gordon Pike and Clear Creek Road, Rogers runs parallel to the corridor as close as ten feet in some areas. Just to the north of Clear Creek Road, Rogers crosses the trail. From this point south, the corridor enters the rural section of the site.

Near Dillman Road, approximately one and one quarter miles from Clear Creek Road, there is a historical iron bridge that crosses the creek adjacent to the trail. It is from this area
south that the corridor begins to show the true beauty of the area. The corridor begins to pick up unique characteristics that are seen throughout the remainder of the site. Because of the dramatic topography of the limestone, the Monon Railroad took an unusual approach to laying out the rail corridor. In most railroad installatins, the railroad would create a straight path and cut through anything in its way. The Monon Railroad did not use this approach in this area, but rather worked with the topography to create the rail path. The limestones in this area creates severe slopes in some places. Along with this, Clear Creek cuts its own path through the site. The rail industry worked with both of these features that caused the corridor to have several bends. The longest straight section of the corridor between Dillman Road and the southern I-37 intersection is one mile. Because of all the bends in the corridor, it creates a unique experience for someone using the corridor. From the limestone rock outcropping, the creek, and the bends, a pattern is created. A one traverses south along
the corridor, he would experience a bridge over the creek, rockoutcroppings along the southern
bank of the creek, a bend in the corridor and then a straight flat stretch until the pattern
repetes itself. The bends cause the user to have a limited view of the up coming portion of
the trail, leaving the user wanting to know what is around the next bend.

The unique layout of the corridor along with the dramatic scenery along the corridor
creates a rich experience for people using the corridor as a trail system. The corridor
provides many existing amenities that make it feasible site to be converted to a trail
system.
Trail Nodes:

The trail design was based on a series of nodes that varied in size and amenities offered at each site. Four levels of nodes were established by the clients. The site was then studied and matched with the criteria required for each node to determine the size and location of each.

Level One Node: The Visitor’s Center:

The highest level of node is the Visitor’s Center. It will be the management center for the trail as well as an orientation point for visitors. The requirements and amenities of the Visitors Center are as followed:

Amenities required for the Visitor’s Center

- Building space incorporating reuse of a railway station housing the following amenities:
  - Men’s and women’s restrooms (indoor facilities with running water)
  - 600 square feet of storage space
  - Office space for Program Director and Trail Manager
  - 300 square feet of retail space
  - 300 square feet of concession area
  - Theater/orientation area with seating capacity of 60-75 people
  - Parking for 30 vehicles
  - Trail map and directional signage
  - Interpretive map distribution
  - Benches
  - Bike racks- space for 10 bikes
  - Trash receptacles
  - Picnic shelter

Requirements for the location of the Visitor’s Center

- Adjacent to an existing road
- Adequate room for required facilities
- Highest volume access point along trail
- Close proximity to existing eating and lodging establishments
Level Two Node:

This is the second highest level of node located along the trail. It is used as an entrance and orientation point for the trail as well, however it will not be as large as the Visitor’s Center. The requirements for the level two node are as followed:

Amenities for the Level Two Node
- Men’s and women’s restrooms.
- Parking for 10-12 vehicles
- Bike racks- space for 7 bikes
- Trail map and directional signage
- Interpretive map distribution
- Benches
- Disabled access to the trail
- Trash receptacles

Requirements for the location of the Level two Node
- Adjacent to existing trail/road intersection
- Trail/road intersections must be at the same grade
- Adequate room for required amenities

Level Three Nodes:

This is the third highest level of node located along the trail. It is used as a rural entry point to the trail. From this point, trail users will have the opportunity to view the trail map and collect interpretive maps to be used along the trail.

Amenities for the Level Three Node
- Off road parking for 3-5 cars
- Bike racks space for 5 bikes
- Trail map and directional signage
- Interpretive map distribution
- Benches
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- Trash receptacles

Requirements for the location of the Level Three Node
- Adjacent to trail/road intersection
- Entrance to trail
- Adequate room for required amenities

**Level Four Node:**

This is the smallest node along the trail. It is used as a resting point, interpretive area, and scenic overlook. This is the most informal and most common of the four node types.

Amenities for the Level Four Node
- Trail map and directional signage
- Benches
- Overlooks of creek (where trail crosses the creek)
- Clearing area for groups to gather
- Trash receptacles

Requirements for location of the Level Four Node
- Scenic viewshed of outstanding topography, vegetation, hydrology, etc.
- Adequate room for required amenities
**Design Principles:**

In Charles Flink and Robert Searn's Greenways: A Guide to Planning, Design and Development, they discuss the need of Universal Design, a concept that concludes that a majority of the population will suffer from some sort of temporary or permanent disability at some point in their lives. This concept suggests that all designs should be constructed barrier and obstruction free. Below is a list taken from Flink and Searn's book of various user groups and situations to be concerned with in the design of a trail.

1. Temporary but able-bodied, which include a majority of the population at some time during their lives; for example, a pregnant women or a person carrying an armload of groceries.

2. Visually impaired, ranging from someone temporarily blinded by glare or a strong light to those with a permanent medically and legally declared loss of vision.

3. Mobility impaired, which includes the elderly and individuals confined to wheelchairs.

4. Hearing impaired, which includes individuals who have lost their ability to hear and who must rely on visual information as their primary means of communication.

5. Manually impaired, for example, an elderly person who does not possess the strength and stamina of youth.

6. Learning impaired, which includes a broad range of people who, may be illiterate or have an orientation problem or difficulty navigating the natural or built environment.
In addition to the list of user groups to consider in design an accessible trail, Flink and Searns established a chart with the physical needs of the various user groups in relation to different activities.

Flink and Searns also provide resources on various topics such as trail width, surface type, distances, and accessibility issues. Below are further considerations that were dealt with concerning design principles.

**Walking Distance**

<table>
<thead>
<tr>
<th>Level of Difficulty</th>
<th>Walking Time</th>
<th>Distance Traveled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>Less than 3 hours</td>
<td>0-6 miles</td>
</tr>
<tr>
<td>Moderately strenuous</td>
<td>3-5 hours</td>
<td>6-12 miles</td>
</tr>
<tr>
<td>Strenuous</td>
<td>5-8 hours</td>
<td>12-15 miles</td>
</tr>
<tr>
<td>Very strenuous</td>
<td>8-10 hours</td>
<td>15-18 miles</td>
</tr>
<tr>
<td>Extremely strenuous</td>
<td>10-12 hours</td>
<td>18-25+ miles</td>
</tr>
</tbody>
</table>


**Trail Accessibility Guidelines**

Accessible parking

Loading and unloading zones

Trail is accessible from parking area

Appropriate signage for trailhead and paring area

All support facilities are accessible
Surface is stable, firm, and slip resistant

Running slope of trail is 1:20 to 1:12

Trail cross slopes are 1:50

Clear heights (see figure 5)

Rest areas provided every 200 ft

Recommended tread width of 10 ft for two way bicycle travel

![Diagram of vegetation clearing and trail width]

**Figure 5: Vegetation Clearing.**

The National Parks Service has also published a handbook that discusses guidelines for various design principles such as location, safety standards, and design elements. The following are some of the guidelines that they have established that I feel is relevant to the design of this specific trail.
General Criteria

Existing trails should be integrated with new construction as much as possible providing old trails were properly laid out and have good drainage.

The route should be planned for minimum maintenance while providing maximum ecological variety.

Specific Criteria

Wildlife

Areas of critical or sensitive habitat should be avoided.

A trail should avoid areas where potentially serious impact on plants or animals may occur.

Road and River crossings

Special attention should be given to the problems that traffic and traffic-related noises could create for hikers.

When roads cross at grade, adequate sign marking and viability must be provided.

Safety Hazards

Trail crossings over or under roads, underpasses, bridges, and power transmissions should be made at right angles to minimize cost if a structural installation is necessary and to avoid prolonged visual contact with those features.

Provisions for user facilities

Accesses at varying distances along the trail should be provided. The locations must be well thought-out so that users can choose trips of various lengths.
Alignment

The ideal alignment should offer visitors the best view from the trail.

The alignment should follow the contours of the land and be gently curved. Sharp angular turns over 50 degrees and long straight stretches should be avoided.
Site Inventory and Analysis:

The site inventory and analysis utilizes an icon mapping system. The icons were used to locate existing and potential resources, land formations, cultural features, land uses, problem areas, and opportunities. The icons were then placed on an aerial map of the area to gain a visual assessment of the distribution of various features and amenities.

In order to determine where the icons needed to be located, a visual inventory of the site was taken. From this inventory, assumptions and judgements were placed on the inventoried elements to analyze the existing conditions as well as potential amenities. Icons representing the inventory and analysis were placed on the aerial map in the appropriate locations.

The most predominate design criteria studied was the placement of the various nodes. The criteria for each node can be found on pages 22-24. By looking at the criteria established for the placement of the nodes, the icons were used to find the most suitable place for each node to be located (see figure 6). An icon representing the node was then placed on the map to create a conceptual master plan.
Figure 6: Icon Map
Master Plan:

By using the icons to determine a conceptual plan for the trail nodes, further criteria was used to determine the most feasible placement of the various nodes. Issues such as distance between nodes, safety concerns, and the most scenic views were considered to determine the most ideal placement of the nodes. The node placements were strongly determined by the distance between nodes. There is an average of two miles between nodes, providing stopping points for hikers that need extra rest as well as providing various entrance and exit points to allow hikes a variety of experiences on the trail. This spacing also allows emergency vehicles close access to hikes if problems occur, as well as maintenance and service vehicles. The level four nodes were places on areas of the trail where there is a long distance between access points (more than two miles). There were several locations where these nodes could be located; however, the conceptual level four nodes were analyzed, and the most scenic overlooks were chosen. These overlooks provide hikers a resting point that enhances their journey. The master plan can be found in figure 7.
The Limestone Trail

An 11 mile bicycle and pedestrian path connecting Bloomington and Lake Monroe Counties.

Master Plan

Legend:
- Level One Nodes
- Level Two Nodes
- Level Three Nodes
- Level Four Nodes
- Mile Markers
- Limestone County Trail
- Clear Creek Trail

Mileage Chart

Figure 7
**Level One Node: the Visitor’s Center Plan:**

After the conceptual plan was completed, it provided two options that were feasible for the siting of the Visitor’s Center. These sitings were based on the *Requirements for the Location of the Visitor’s Center* discussed earlier. These requirements consisted of locating the site adjacent to an existing road, providing adequate room for the required amenities (a Visitor’s Center building, parking for 30 vehicles, trail maps and directional signs, interpretive maps, benches, bike racks, trash receptacles, and a picnic shelter), located near high volume access points, and close proximity to existing eating and lodging establishments. In the Master Plan, the location of the Visitor’s Center can be seen at the north end of the trail, at the intersection of the trail and Country Club Road in Bloomington. Currently, this is the location of the trailhead of the Bloomington Trail, an existing trail that stretches approximately two miles south of Country Club Road. This location was used rather than the southern option because of the requirement that called for the Visitor’s Center to be located in close proximity to existing eating and lodging establishments. The Country Club Road entrance to the trail is located only minutes from downtown Bloomington, allowing easy access to the existing amenities.

Once the location of the Visitor’s Center was established, a detail plan was created. The plan (see figure 9 and figure 10) includes the location of the building that houses Trail Manager’s and the Program Director’s offices, the storage facilities, retail space, concession area, theater and orientation area, and restrooms; the parking lot; picnic shelter; trail
area, threatre and orientation area, and restrooms; the parking lot; picnic shelter; trail maps; seating; bike racks; and trash receptacles. From this plan, appropriate signage was designed to assist the trail users. This signage included directional signs, interpretive map distribution, and trail maps. The Level One Node: The Visitor’s Center is similar to that of the Level Two Nodes. The main differences between the Level Two node and the Level One node is the building size and amount of parking provided. In the Level Two Nodes, both of these amenities are smaller and less elaborate (see figure 8).

Figure 8: Sketch of a Level Two Node. Source: *Tails for the Twenty-first Century*, 1993.
The Limestone County Trail
Visitor's Center Level One Node Plan

Visitor's Center
Parking for 16 Cars
Play Area
Picnic Shelter

The 11 mile bicycle and pedestrian path connecting Bloomington and Lake Monroe

Figure 9
Figure 10
Level Three Node Plan:

The second node that was further developed was the Level Three node located at the Ketcham Road over pass. This site was chosen because of its unique features. At this site, the trail crosses the road relatively close to Clear Creek, sharing a common bridge. It is also unique because the trail is elevated approximately fifteen feet at this point as well. Because of the creek flowing through this area, there are rock outcroppings on the south side of the creek. These outcroppings are part of the pattern that is found throughout the trail of the creek, rock out crops, a bend in the trail, and then a flat straight away.

This location was chosen for a level three node because of the existing amenities that occurred that matched the requirements for the site location of a Level three Node. These requirements included space for off road parking of three to five cars, adjacent to a trail road intersection, access to the trail, and adequate room for the required amenities (five bike racks, trail maps and interpretive signs, benches, and trash receptacles). From the inventory and analysis, it was determined that this would be an appropriate location for a trail node because of the scenic beauty, the close proximity to the trail, and the distance between this area and the other nodes (see figure 11 and figure 12).

After the location was established, the area was designed to meet the needs of the required amenities. The main problem with the site was the steep slope leading up to the trail. This problem was solved by adding a staircase that was split in the middle to include a ramp to role bicycles up (see figure 13 on page 41). The bridge at this location only had one
chain link railing on one side and the other side was left open. This arrangement was not safe for the users of the trail, so a wooded hand rail with seating at various points along the edge was used instead. The seating was provided on the bridge to provide the trail user with a point to stop and rest while taking in the sites of the area. To the south of the trail, there are rock outcroppings that flank the creek that provide spectacular views. Ketcham Road is a rural road with minimal traffic. Because of this, it was feasible to put in parallel parking along side of the road. There is room available for four cars to be parked at this point. From this point on the trail, it is approximately five miles to Bloomington and seven miles to Lake Monroe. This is a good stopping point for trail users because it is located about halfway along the trail. From this point on the trail, the trail user will begin to see the more rural scenery of the trail system. Because of this, this may be an ideal location for those hikers that prefer to see more of the rural, scenic landscapes of the area.

Together, these nodes provide the backbone of this trail system and distinguish it from other trails. This node provides access at various points along the trail that will give the trail users a variety of experiences that will make each trip to the Limestone County Trail an unique experience.
The
An 11 mile bicycle and
Limestone pedestrian path connecting
County Bloomington and Lake Monroe
Trail

Ketcham Road Crossing Level Three Node Plan

Figure 11
Section: Limestone County Trail At Ketcham Road Crossing

Bridge Overlooking Clear Creek

Trail Guide Working With Students
South of Ketcham Road Crossing

The

An 11 mile bicycle and
pedestrian path connecting

Limestone
County
Bloomington and Lake Monroe

Ketcham Road Crossing
Detail

Figure 12
Conclusion:

The Population in the United States continues to grow at the rate of 1% each year. As this is happening, society continues to become more urbanized; approximately one million acres of agriculture land is converted each year for urban purposes. Because of this, there is a growing need to preserve our open space. Greenways are important to the future because they provide economic benefit, conservation, recreational opportunities, and interconnection. By converting abandoned railroad corridors into linear open spaces, we are conserving the land and allowing it to continue to be an asset to the public.

The Monon corridor provides the needed resource of continuous open space that connects Bloomington, Indiana to Lake Monroe. Southern Indiana’s recreational opportunities are plentiful in this area but lack the connection to allow visitors to interact within a system of open spaces without the need for motorized transportation. Without the creation of a trail system using the abandoned rail corridor, the former land mark of the Monon corridor could be lost forever.
Bibliography
Bibliography


Pritchard, Paul C. “American outdoors: as we crowd closer together, we need more urban parks, trails, greenbelts, and waterways.” National Parks. May-June, 1987: 12-14.


Rivers, Trails, and Conservation Assistance Program- National Parks Service. The


Venugopal, G. Professor of Geography, Ball State University. Personal Interview: October 30, 1995.

Appendix
Appendix 1
Icon Legend

Cultural Features:
Land Use - Urban

1. Residential Land Use

2. Commercial Land Use

3. Industrial Land Use

4. Transportation Corridor

5. Schools

6. Mobile Homes

7. Single Family Homes "Farnettes"
Land Use - Agriculture

8. Crop Land

9. Pasture Land

Land Use - Man Made Features

10. Reservoirs

11. Quarries

Natural Features:
Forest Land

12. Deciduous Wood

Water

13. Rivers and Streams
Geological Features

14. Rock Outcroppings

Physiographic Features

15. Rolling Hills

16. Flat Areas

17. Steep Slopes

Visual Features:
Transportation Elements

18. Transportation Bridges

19. Transportation Interchanges

20. Trail/Road Crossings
21. Trail Over road

22. Rail Spurs

Problems:

Sights

23. Garbage

24. Derelict Industrial Areas

Sounds

25. Heavy Traffic

26. Noise

Hazards

27. Dangerous Crossings
Opportunities:
Extra Property

28. Trailhead Parking

29. Level One Node (Visitor's Center)

30. Level Two Node

31. Level Three Node

32. Level Four Node

33. Camping Area

34. Interpretive Area
35. Potential Vehical Access

36. Potential Non-Vehical Access

Connections

37. To Schools

38. To Neighborhoods

39. To Parks

40. To Stores and Services

41. To Other Trails

42. To Hotels
Protection Required

43. Adjacent Land Owner's Visual Privacy