

# **RIVERSCAPES I**

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## Abstract

Riverscapes is a project aimed at addressing the concerns of what the function of the White river is moving toward. Namely, public use and recreation. This has come about from the restoration of the river itself over the past twenty years. The purpose of this project is the exploration of various ways to safely exploit this community amenity. However, the primary goal is in developing a sense of unity and connection along the entire riverfront in Muncie, Indiana. After providing a solution toward this end this project will address various ways in which to successfully experience the river in a variety of ways such as, experiencing the movement and water itself at river level to an experience looking down into the river and river channel. These experiences and sense of continuous movement along the river edge are intended to create a greater sense of awareness and appreciation for the history and presence of the White river in the Muncie community.

# Riverscapes I

## Introduction

For the past several decades the White River throughout Central Indiana had been plagued with pollution and general neglect that went unchecked until the early 1970's. By 1970 the pollution in the White river had reached dangerous proportions that not only threatened the surrounding wildlife but, the consumers in the city of Muncie, as well. Since that time the river has been undergoing restoration and a appearance "face lift." This improvement of the river corridor has been the catalyst or encouraging factor for people to begin to utilize this environment in numbers for the first time in years. The question that comes to the surface of this issue is how to continue to encourage public use safely and successfully.

## Background-History

During the early 1970's the White river was in such a state of neglect and abuse the current mayor of Muncie and an interested water works employee walked the length of the river throughout Muncie and began to assess the damage. Along this walk they began to discuss not only what and where the sources of the pollution were coming from but, what could be done about it. Many ideas were put forth that day as well as the beginnings of some solutions to the problem. One of the first steps was contacting all the local industries based along the White river in Muncie that were the prime sources of pollution and working with them in a straightforward way to put an end to the industrial effluent being dumped

into the river. This particular form of persuasion was in the form of property tax analysis based upon and in proportion to what many of these industries were getting away with at the time in regard to industrial disposal. However, one of the most important changes to come about was the foundation of the water quality bureau in Muncie. This agency was set up to monitor the levels of pollution in the White river, document changes taking place in the river, and enforce new industrial restrictions passed by the legislature. This practice involved frequent testing of the river and all of the subsidiary streams (appendix A). Since that time the White river has been undergoing a dramatic comeback and restoration. This has been possible due to the yearly increase of federal funding for clean-up programs and the operation of agencies such as, the Water Quality Bureau. The federal legislature has also played a dramatic role by passing annual laws requiring industries to invest more and more money into treatment and disposal facilities on the industry premises (Appendix A).

The Improvement of the White river has also been the main cause for the increase and growth of the fish population. 10 years ago people would not eat the fish caught in the white river. Many still will not. At this time the river supports a wide diversity of fish species that include Large mouth Bass, Bluegill, Crappie, ect. (appendix A). The restoration of the river is also the reason for the return of numbers in wildlife. For example, Beaver colonies have appeared along the white river, Blue Herrons, ducks, Geese, and so forth. All of these species are dependant upon the stability and cleanliness of the environment to survive.

Even the appearance of the White river has made a dramatic change. Throughout the seventies anybody could drive their vehicle down to the river's edge. In fact it was even encouraged with gravel roads all along the

levee and the banks. The river banks and levees were overgrown and never maintained either. The only real danger in this was the destruction of the levee throughout muncie and erosion problems. Eventually, this type of use was outlawed and all the vehicle access roads down to the river were subsequently taken out or blocked. Unfortunately, it was years before all of the vehicle encroachment was stopped. It was also years before the city began maintaining the river corridor itself. But, all of the river banks and levee's are now meticulously maintained to encourage recreation along the river corridor.

Recreation is exactly what has happened with the improvement of the river environment. People can be frequently seen fishing, jogging, riding their bikes, or just walking along the riverfront at any given time of the day, now. The parks department and Water Quality Bureau has encouraged as much as possible with the construction of park facilities and trails along the river's edge throughout Muncie. The city of Muncie even has an annual fireworks display along the white river that has turned into a very successful attraction.

## Problem

The problem that becomes apparent as the public sees the improvement along the white river and they begin to exploit it more and more is how to make this safe and successful. As the river exists now there are several places throughout Muncie that simply are not and can not be successful under the current conditions. Over the years as the city of Muncie developed so did the river environment. However, the riverfront through Muncie is approximately 8-9 miles in length. Given the available man power and the municipal budget it has never been possible to implement an

entire masterplan for the riverfront. As a result, what has happened is sporadic or episodic development. For instance, the section of river across from Central High School along Wheeling avenue was developed with street trees and a paverlock sidewalk to exist with an existing concrete wall along the levee. Unfortunately, neither end of this development made any connection to the rest of the river's edge and the most unsuccessful thing about it was the extremely narrow width of the sidewalk. Narrow sidewalks are not always unsuccessful but, they most certainly are when next to 4 lanes of high volume traffic. This is just one example of an unsuccessful area along the river corridor but, the reasons that make it unsuccessful are the main reasons for all the other areas along the river being unsuccessful in that there are no coherent connections from one diverse area to another, there is no sense of continuous unity or common elements, and there is no consistent development in each area to encourage public use. However, it is unwise, unnecessary, and completely unrealistic to develop the entire river corridor in the same manner. Not to mention boring.

The problem with developing the river corridor in a consistent, coherent, manner is simply the high level of diversity along the corridor and the diversity of the river itself. There are areas where the banks are steep, areas where they are flat, areas where the river is narrow and fast, or wide and slow (appendix B). This is only but a very brief example of the complexity of the river environment. This type of analysis does begin to address some of the considerations that have to be taken into account before any type of comprehensive development can take place along this river corridor or any other.

Another piece of the problem manifests in the relationship of the

surrounding city context to the river (appendix C). Historically, Muncie developed and was founded in the bend of the river characterized by the Ball Brothers homes and the historic neighborhoods that still exist in broken segments along the river front. Sadly enough, very few of these historic neighborhoods have any connection to the River other than their close proximity. They have been cut off by man made levies, walls, schools, and the municipal development of the downtown area. However, in 1990 an interesting development began to take shape in the relationship of the city government and local businesses to the river. If you are making an approach to the downtown along Wheeling avenue, just before you cross the High street bridge, the sight that faces you is the new city hall building and it has been oriented in such a way that it appears as you cross the bridge that you drive straight through the front entrance were it not for the bend in the road. The point is that this particular bridge over the river has become, whether by accident or not, the new gateway into the downtown. I have a very strong hunch that the development on and around the river in this area will follow in the next few years as a result of this relationship. This is the type of relationships that must be considered before an successful kind of activity or development can take place along any given point of the river.

### Questions and Reasons

Before the subject of development gets too involved the fundamental question that has to be asked is "why." Why should the riverfront throughout Muncie be developed at all? Why not just leave it as it is? More specifically, why should it be developed for public use? It is not entirely justifiable to do so on the grounds that the river is in the process of



restoration and active again. However, it does begin to become justified when we realize that, other than the Muncie reservoir, it is the only natural, public, water, amenity in Muncie. It is a reasonable to assume that people are inevitably going to use it to some degree for their recreational needs whether it is encouraged or not. Based upon this assumption it then becomes necessary to protect this environment or to develop it in such a way that it will support a high volume of people without destroying the beauty and integrity of the space or making it hostile to the returning wildlife population. Another question to ask is how can the White river corridor be developed in a consistent manner without having to remodel or destroy the existing diversity throughout the river's edge.

## Program Requirements

Based upon the previous problem and the historic significance of the river I making the assumption that the White river will continue to be developed in various stages for the next several decades. With this in mind I have chosen the White river corridor throughout most of Muncie as the site to prepare a master plan along the banks of the river. The specific project goal is to connect approximately 7-8 miles of the river corridor in Muncie that will provide a sense of unity and movement with several diverse experiences throughout this development.

The existing problem in this regard is the sense of disjointedness and episodic development. This is particularly noticeable in areas of topographical change and bridge intersections. The best example of this is the intersection of the high street bridge. This area marks two very distinctive and different areas that have no sense of connection to one another in that one side of the bridge has an accessible floodplain that has become very popular while the other side of the bridge is accessible only at the road level and is very unsuccessful due to the narrowness of the sidewalk, the close proximity to the roadway, and the poor maintenance. The point is that although each side of the bridge is dramatically different there has never been any attempt to continue the feeling of movement in a consistent manner. Due to the diverse character of each space it is obviously unrealistic and inappropriate to try to create the same type of feeling throughout the river front but, that is not to say that each area can not be joined and exhibit a sense of continuous movement to the next space. The primary requirement of this project is to address this issue and join at least one side of the riverfront to create a continuous flow of

movement from one defined space to the next giving the sense of a continuous experience or at least an invitation to proceed to the next experience. However, while each space can not be expected to have the same feeling throughout it is very possible to bring out the existing feel or potential feeling of each different area. For example, the area across from Central High School and the Minatrista Cultural Center is characterized by steep slopes, concrete levies, dense vegetation, and the dramatic height from the river level. The positive or potential amenity of this space is the view corridor looking down into the river plain and the wildlife that has taken up residence in this area. Unfortunately, the bad features of this space is the rejection or disassociation of the Minatrista Center and the historic Ball homes to the river itself. The Ball homes are there to preserve a part of Muncie's history and the Minatrista Cultural Center was built to preserve and educate the public about the history of Central Indiana, Muncie, and Indiana itself but, there is no sense of connection or association to one of the oldest historic elements in Muncie; the White river.

The objective of this project, after creating the feeling of unity and connectiveness, is to bring out the potential of several various areas along the White river in Muncie and to reunite the public with the diverse qualities of the river environment. Several of these areas similar to the Minatrista area exist along the White river in that they display or have the potential to be developed into a unique experience whether from the existing features of the area or the potential to exploit a sense of perception.

## Analysis

In order to understand and begin to assess just what the character and potential of various areas along the White river are it first becomes necessary to understand what the relationship of the river is to Muncie and the rest of the region as well as what the character of the river is itself.

Regarding the relationship of the White river to the surrounding region it acts as the recipient of several watersheds and subsidiary streams throughout central Indiana that mainly flows through agricultural lands (Appendix A). Much farther down the state the White river then becomes a subsidiary to the Mississippi river. This is a relatively simplistic analysis but, the relationship to the city of Muncie is far more relevant to this project. Looking at the context of Muncie in relation to the river the development of the city over the last several decades becomes as clear as a road map. Broken sections of historic neighborhoods and the downtown region are all located in the bend of the river along the south edge. Development and "progress" through the decades have caused most these historic areas to become disassociated with the river environment that happens to be the oldest historic feature of the entire region. Obviously the historic significance should be considered but, I did not want this association to dominate my project. Due to time constraints I did not want to make this project branch off into the surrounding neighborhoods. In a couple of instances this has happened quite by accident, though. The river diversity is a prime factor to be considered, as well. The White river is never the exact same character in any two places. In some areas it becomes wide and slow flowing whereas, in other areas it becomes

narrow and rapid. Various areas can change character abruptly as well such as, sudden water falls created from dams that can change a deep, slow flowing, area into shallow rapids in a matter of feet. These are things to consider in regard to how successful these diverse characteristics have made various areas. For instance, the waterfall at the high street bridge has become very popular as a prime fishing area and as a romantic setting whereas, other areas that are slow and relatively unexciting have little attraction at all. Various characteristics such as this can dramatically affect the success of an intended design.

Other features that will affect this design are relationships of physical space to the river's edge such as width, accessibility, relationship to the roadway, topography, vegetation, and the safety factor of the space. I have addressed all of these areas individually and wholistically and found that the most successful areas are on the west side of town because of safety, the accessibility and width of the floodplain, the consistent greenbelt, the separation from the roadway, and the incorporation of a pedestrian trail. For these reasons alone this area beginning from Westside park up to the Washington street bridge have made this the most successful area along the entire riverfront. The success of this area diminishes at this point mainly because the pedestrian trail stops at this point. Aside from this area the next successful area is the waterfall at the High street bridge for the reasons previously outlined. From this point on the ability to utilize the riverfront becomes broken and very limited because there are no connections to lead you into the next defined space and there are few to no inviting experiences to make you want to stop or enjoy the experience of the space.

## Concepts

One of the early approaches I had undertaken was to begin to address the issue of successfully connecting the entire 7-8 mile length of the river corridor. In the early stages of this project The goal was to accomplish this in such a way so that a pedestrian or bicyclist would literally have an uninterrupted system of boardwalks connecting each space under all the bridges. In short it would be possible to move into the next defined area by a ramped boardwalk underneath each bridge rather than through the intersection above. This would prevent the pedestrian or cyclist from having to negotiate traffic and would be the easiest invitation to encourage continuous movement. This idea was not entirely unjustified but it only addressed the connections between intersections and it did not have much to do with the aesthetic appearance at road level particularly to motorists. The idea was worth consideration but, I felt the need to drastically enhance the appearance of the riverfront for all to see not just for the pedestrian users access. It was also my conclusion that something of this nature would not be safe, that it was too contrived in appearance, and generally that it was unpractical for realistic applications.

Another early concept was in trying to bring the public down to the river's edge throughout the length of the Muncie riverfront. This was another well considered idea but, the biggest problem I found with this was not only the impracticality in various places but, that it would eliminate the experiential diversity of many areas creating, rather, a monotonous several miles of one basic experience of being able to walk along the river's edge.

## Final Solution

In arriving at a final solution I realized that a sense of continuous movement was going to have to be something that was implied and would visually appear to lead a person to the other side of the intersection. The solution I began to work toward was in introducing a common theme or a variation upon a theme in all the areas that exhibited a weak or unsuccessful connection. I also came to realize that the one area of the riverfront that was accessible to pedestrians and motorists alike was along the roadway that winds around the river. The only area where the roadway has broken away from the river is on the back side of the Minatrista Cultural Center and this is still accessible to pedestrians. Through a series of observations I noticed people often use the edge of the roadway for jogging, bicycling, and just walking. These observations lead me to reason that the river banks along the roadway were meant to be used. Although, it does not appear that way at a glance. I also noticed that one of the most jarring and incomplete elements at each bridge intersection was the introduction of a sidewalk across the span of each bridge while there are none throughout most of the riverfront. My partial solution to unite the entire riverfront was simply the incorporation of a concrete sidewalk complete with handicap ramps along all of the roadways parallel to the river. However, an easy access sidewalk is not enough to entice someone to cross an intersection and it does not tell the motorist that a significant or continuous space is moving through the intersection that might bring a pedestrian or bicyclist into the path of the car. Rather than paint a sidewalk across the intersection I chose bridge the gap with a band of paverlock bricks that gradually flare at each end to

exaggerate points of entry from the sidewalks. The only problem I saw with this was that I had introduced some very hard elements into an already hard environment particularly where the bridges intersect the space. My solution was to introduce some form of plant material at the entrance of each bridge primarily to soften the intersection of each bridge. However, the rules imposed by the city regarding planting along the levee is very specific about the exclusion of trees and large shrubs. The answer to this problem was to use ornamental grasses. they're relatively attractive year round require very little maintenance and in my opinion give a character of antiquity. This was an excellent choice because several different varieties can be used to vary the theme somewhat. All of this begins to indicate the intended the continuous sense of movement I was trying to achieve but, what is the perception during the evening? Lighting is a very important issue for reasons of safety. Unfortunately, lighting already exists in most of these areas but, it's in the form of modern street lighting on 30'-40' poles. In order to make this a pedestrian friendly environment a much more human scale form of lighting needs to exist. After reviewing the historical context of the city relationship to the river and advice from advisors I chose to incorporate a cast iron street lamp indicative of the style in use around the 1930's. With a continuous band of low level lighting along the length of the riverfront, a continuous sidewalk, a connection through the interrupting intersections and a variable, but consistent, element at each bridge intersection I have achieved my goal to unify the length of the riverfront to a reasonable, successful degree. Now that an aesthetic pedestrian freedom of movement along the river is possible why should anyone want to traverse the length of the riverfront through Muncie? What are the exiting features that make



someone want to move toward the east side? This is where the second half of this project takes shape. I specifically stated my objective was to provide a diversity of experiences along the river after a solution was developed to provide a consistent freedom of movement along the edge of the riverfront. In order to do this the potential of each area had to be evaluated to decide what the experience should or could be. As I previously stated each individual area along the river has it's own separate potential for a different experience or to build upon an existing one. In order to define or delineate individual sections throughout the length of the river I classified the bridge intersections as the boundaries between sections. Due to the change of situational factors the section between the high street bridge and the Walnut street bridge is divided again where Minatrista Boulevard branches off of Wheeling avenue.

I did not feel that it was necessary or appropriate to develop the entire length of the river with individual experiences in instances where the section is already successful such as the west side of muncie or in sections where the security factor dramatically decrease any form of development due to the neighborhood context such as, the far east side of Muncie. The sections I chose to improve upon an existing experience or to develop a new experience specifically includes each section beginning from the Washington street bridge on the west side up to the Broadway bridge on the east side of town.

## Final Solutions

The first section beginning at the Washington street bridge was a relatively simple solution because it basically has the same character as the previous successful sections such as the greenbelt, a wide accessible flood plane, and a separation from the roadway. However, the one thing missing is the continuation of the pedestrian trail. If this was continued up to the High street bridge it is safe to assume that this section will become as successful and popular as the previous areas leading up to it.

### **section 2**

This next area is characterized by the waterfall that exists next to the High street bridge. I have found from observation that this is another area that is already quite successful. Unfortunately, this is one of the areas where accessibility is very minimal. A path exists down to the falls that is marked with wooden bollards at road level, but the slope is so steep that someone of old age would never attempt to get down into the space. I have also noticed people want to get as close to the water and the falls as possible. The solution I wanted in this area was a more gradual path or trail from the roadway down into the flood plane that would be delineated with various varieties and sizes of ornamental grasses mirroring the plantings across the street and at the bridge entrance. However, the experience I wanted to enhance was the accessibility to the edge of the water. The solution in this case was to excavate the slope in a concave manner for people to lean back against or have an area to sit in and to countersink a limestone boulder edge along the water for people to sit upon as well as to reinforce the slope. By placing a natural hard edge against the water people will be more inclined to sit next to the falls

much more so than if a row of benches were placed somewhere in this space.

### **Section 3**

This section exists along Wheeling avenue with the most prominent characteristic being the concrete levee and the concrete wall. This section has always been unsuccessful because the sidewalk is only 4' wide and 1' of that is taken up by utility poles and street trees. With four lanes of heavy traffic beside this sidewalk this width is far too narrow for comfortability. Removing the street trees is not a very acceptable solution as that would leave the space even more bare than it is now and a greater emphasis would be on the traffic rather than the river below. Until the walk is somehow widened it will never be an entirely successful area to move through. But, one way of making this a more hospitable space would be to remove the street lights and incorporate the antique street lamps used throughout the design onto the concrete wall and to use a concrete sidewalk rather than the existing paverlock sidewalk. The existing paverlock sidewalk has become a maintenance nightmare due to the settling and grime that has washed onto it during the winter and the dark color does nothing to welcome pedestrians, whereas the smooth continuity of a continuous concrete sidewalk that is a much lighter color would probably entice more people through the space than it encourages in the existing state. This sidewalk and streetlamp theme then needs to connect with the pedestrian path through the Minatrista Cultural Center where it is presently non-existent.

### **Section 4**

The next section is along the back side of the Minatrista Cultural Center. This area has a strong potential not only to unite the Cultural

Center with the river but, because of the view corridor down the river channel and the wildlife that has taken refuge here. During the summer the undergrowth is so dense most people would not realize the presence of the river below if they did not already know that it was there. My solution is to bring people down into the steep wooded embankment through a boardwalk system indicative of what several of the state parks throughout Indiana have done. This allows the public a view corridor through the trees as well as a wooded area to walk through rather than just seeing it from the other side. With access on two ends it does provide some degree of safety. This solution is also intended to tie the Ball homes and the Cultural center into the river as it should already be doing from a historical standpoint.

### **Section 5**

After the cultural center the next area is characterized by an old section of historic neighborhood and a dense growth of trees along the riverbank. My solution other than introducing the sidewalk and lighting theme is an overlook through the trees just before the Elm street bridge. The intended purpose is nothing more than a pedestrian pulloff that not only provides a view through the trees but also looks directly over an area of rapids that is meant to stimulate the sense of sound much like the area of falls back at the high street bridge except this area has very little traffic to interfere with this experience.

### **Section 6**

Just across the Elm street bridge one of the oldest historic features from the railroad days comes into view in the form of an old, cast, iron trestle bridge that has long since been abandoned. There are two of them in this area but only one of them is still in use. The solution here was to

surround the edges with tall ornamental grasses, put a wooden floor across the bridge, and use it as a pedestrian bridge. Not only does this provide a view down the river corridor but, quite by accident, it makes a connection into the historic neighborhood that has been cut off from the river for decades due to the man made levee. By reviving this historic bridge to serve a purpose it also ensures a few more years of it's survival.

## **Section 7**

Once again we come to an area characterized by a check dam and rapids that happens to be underneath the second trestle bridge that is still in use. The solution in this small area just before entering McCullough park was to take advantage of the shallow rapids by placing flat limestone boulders out into the river itself for people to walk directly out onto whether to fish or simply sit in the middle of the river. This type of solution not only stimulates the sense of sound but, also allows a person to directly experience the river itself.

This is the section I have chosen to cease development in other than to provide the continued access via the sidewalk and lighting features. This is not because the potential does not exist to go farther. On the contrary it has all the potential in the world but, because of the bad neighborhood in the last mile and a half I would not encourage anyone to stop for any length of time. That is not to say that it is not safe to move through the area and that it is an ugly area. It is probably one of the more diverse areas throughout the river and it is reasonable safe during daylight hours to move through the area.

## Discussion of Solutions/ Summary

What I have done in resolving the intended solutions in this project is to design a consistent method and sense of movement all along the riverfront that also includes a visual sense of this movement and a safer environment through a lighting theme. I have also made several historic references and connections without actually having to carry any of this development into any of the historic neighborhoods. Rather I have made implied references and accidental connections that happened to be in the parameters of my design. While moving along the river's edge I have also created a step by step series of ways to experience the river regardless of which end of town the experience is on. For example, on either end of central Muncie I have started by introducing a direct experience of the river itself and from each end created different levels of proximity and intimacy to experience the river as well as different ways to perceive it. Through this diversity it was my intent to create a greater awareness and a greater appreciation of the river environment that has been a neglected part of Muncie's history for too long.

All in all I have achieved the goal and objectives I set out to accomplish and even achieved a few I had not intended. This is the type of project that has the potential to evolve indefinitely and that could never be called finished. My grandfather created the ground work for this type of project twenty years ago with the help of John Craddock by beginning the process and framework for the restoration of the White river. That project has come to fruition in the last several years and now is the time to reintroduce the river into the community it meanders and flows through and to begin to implement various ways to experience it and utilize it

safely. I have found that the most important step to making this a successful river is to follow a masterplan that will begin to unite as much as the river as possible so that people will begin to realize that the White river exists as a complete entity not an episodic water amenity that has been developed as such for the last few decades.

## Acknowledgments

**John Craddock** For his support through research materials, advice and encouragement. Also for striving to work for the reclamation and improvement of the White river, the surrounding environment, and the wildlife inhabitants living there.

**Randy Gimblett** For his advice, strong support and patience during the evolution and preparation of this project.

**Scott Collard** For his dual role as "devil's advocate" and encouraging professor. Especially, for his honest enthusiastic approach to this problem.

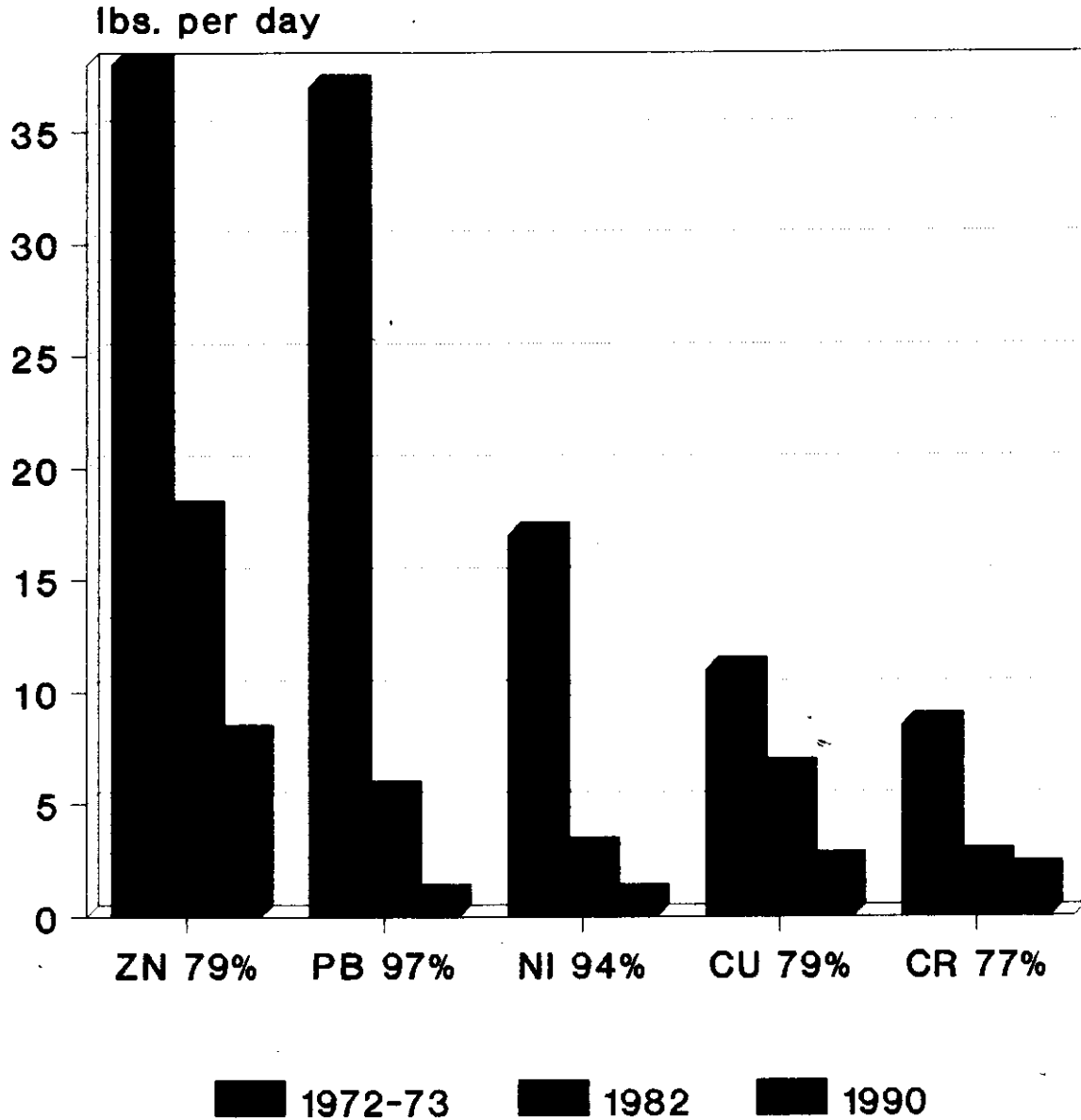
**Ron Spangler** For his role as project coordinator, advice, and generally keeping this project on schedule and on track.

**Paul J. Cooley** For his support through research, advice, historical reference, and most especially for beginning the ground work for the restoration of the White river in 1971 for which this project would not have been possible without.



## Appendix A

# MUNCIE EFFLUENT METALS (1972-1990)



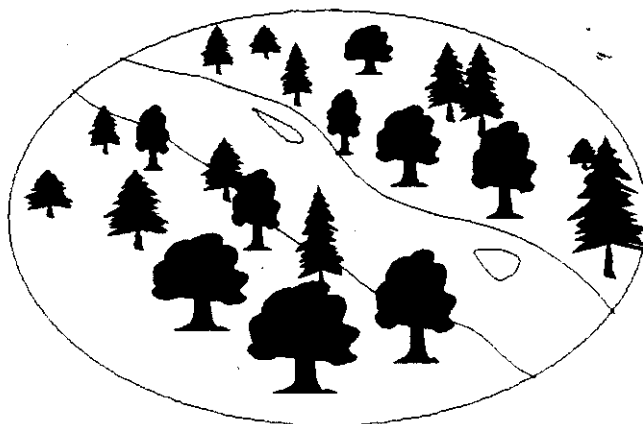
## % REDUCTION

CR6 = BDL

CD = TOO SMALL TO DISPLAY

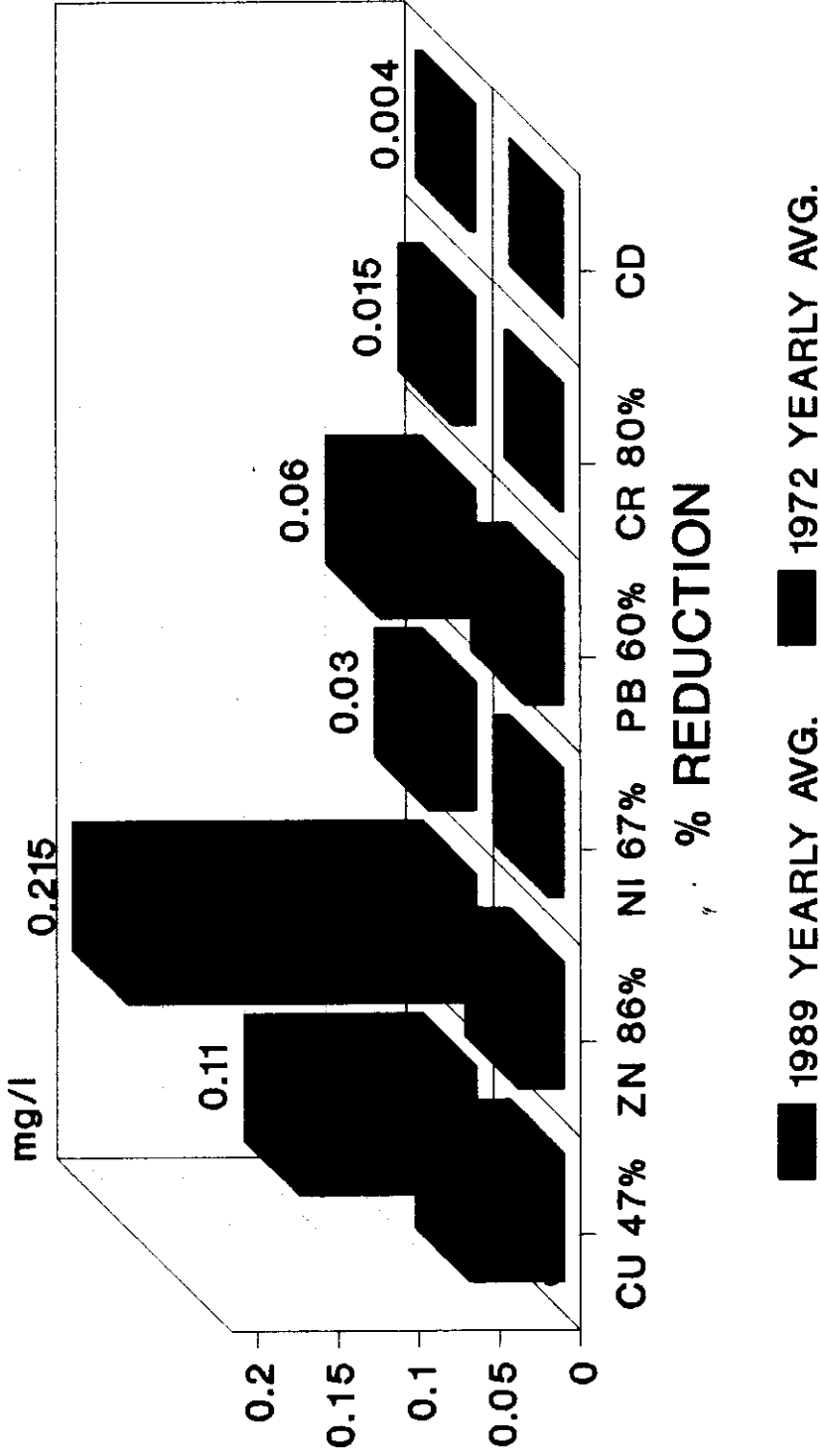
**THE STREAM STATIONS IN THIS SECTION ARE LOCATED ON THE MAIN STEM OF THE WHITE RIVER AS IT PASSES THROUGH MUNCIE. THERE ARE TWO GRAPHS PER STATION. THE FIRST CONTAINS DATA ON METALS AND THE SECOND CONTAINS DATA ON THE OTHER PARAMETERS.**

**THE MAIN STEM STATION GRAPHS ARE IN RED AND BLUE AND THE WHITE RIVER TRIBUTARY GRAPHS IN THE NEXT SECTION ARE IN GREEN AND YELLOW.**



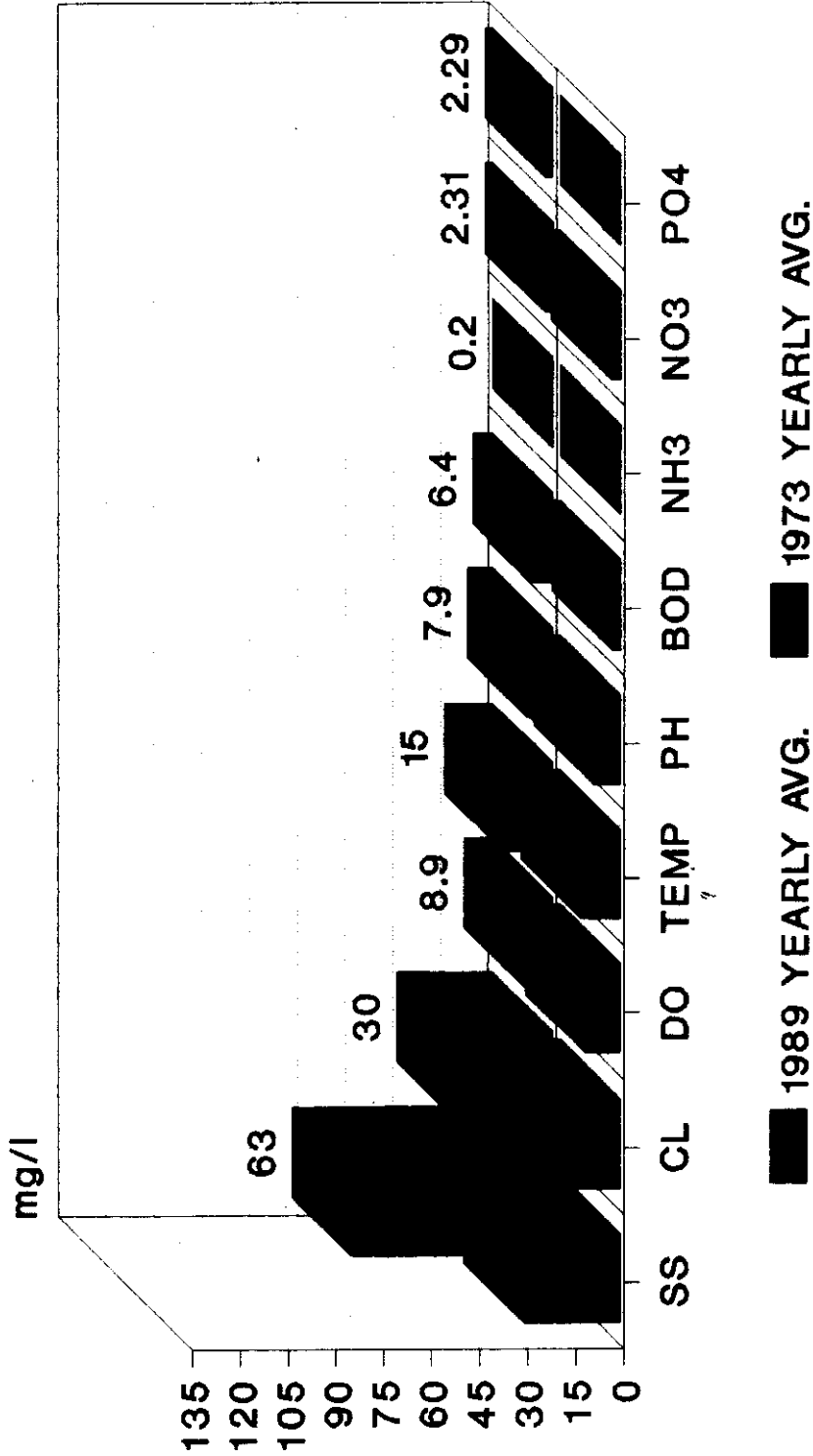
**BUREAU OF WATER QUALITY**

# WHITE RIVER (CITY BASELINE) TILLOTSON ST. BRIDGE



**BUREAU OF WATER QUALITY-STREAM SAMPLES**  
 CD - DETECTION LIMITS  
 STARTED STREAM CD TESTING IN 1975

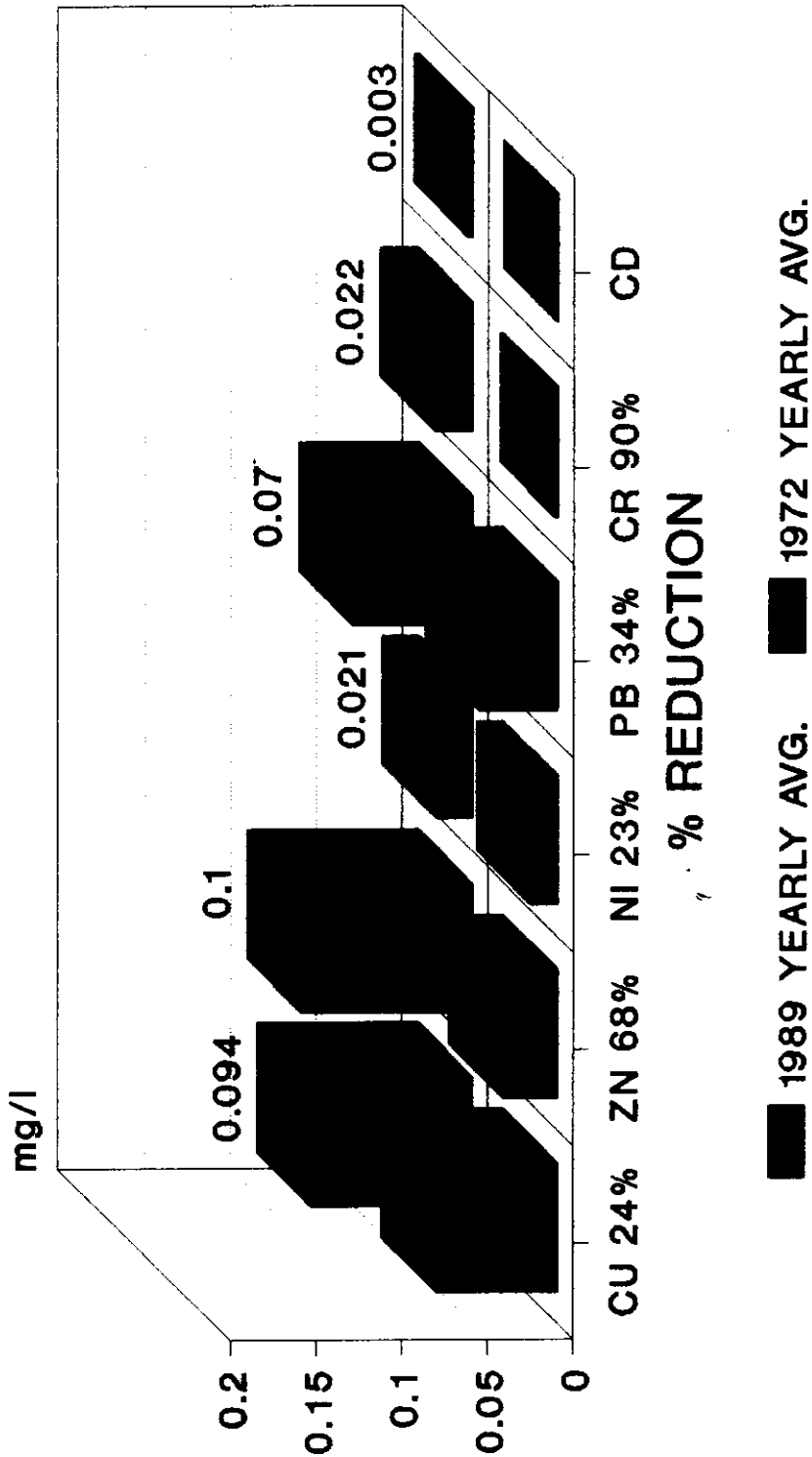
# WHITE RIVER (CITY BASELINE) TILLOTSON ST. BRIDGE



## BUREAU OF WATER QUALITY-STREAM SAMPLES

STARTED NH3 & NO3 STREAM TESTING IN 1975  
NH3 & NO3 AS N / PO4 AS P

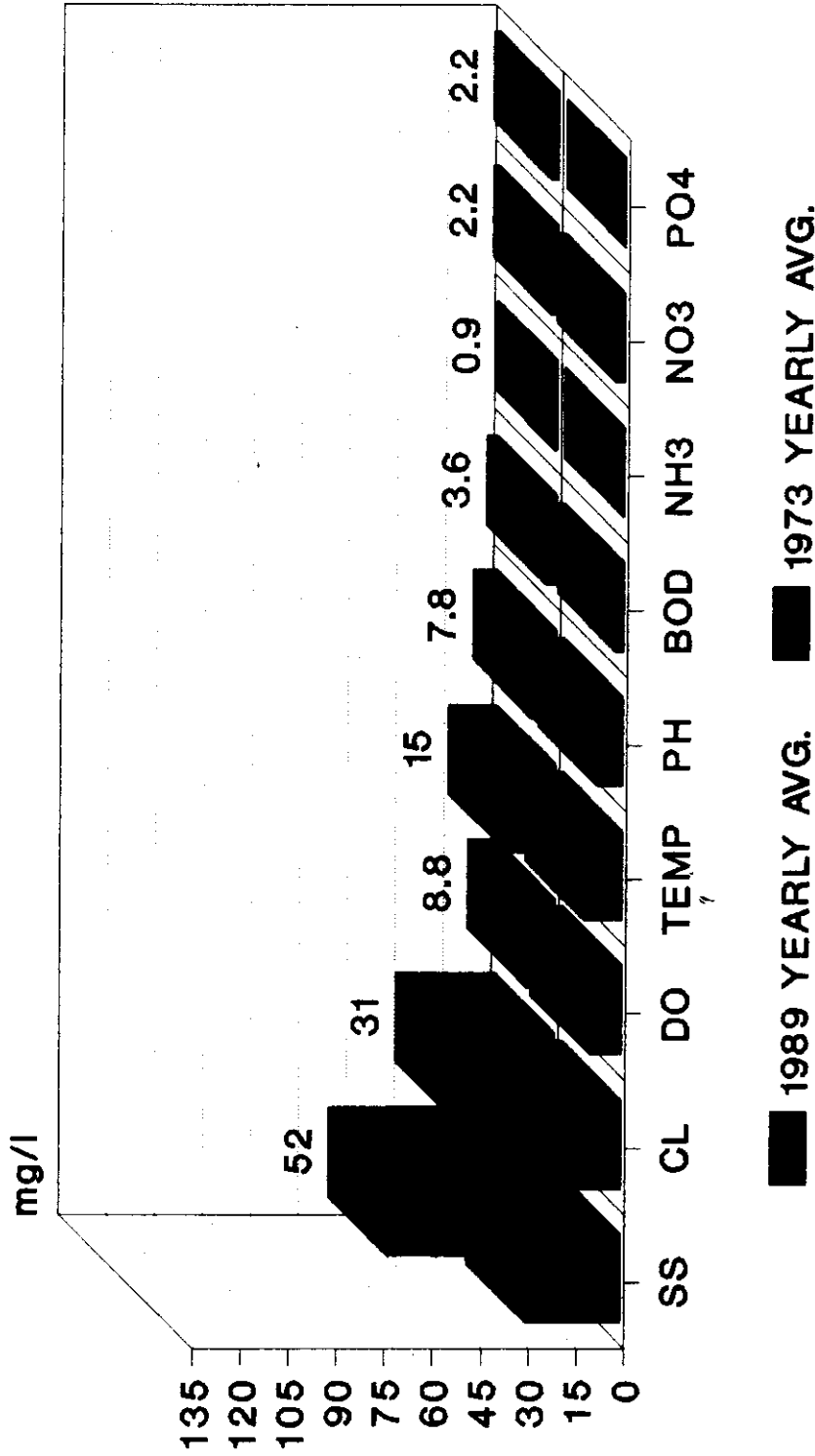
# WHITE RIVER (CITY BASELINE) WALNUT ST. BRIDGE



## BUREAU OF WATER QUALITY-STREAM SAMPLES

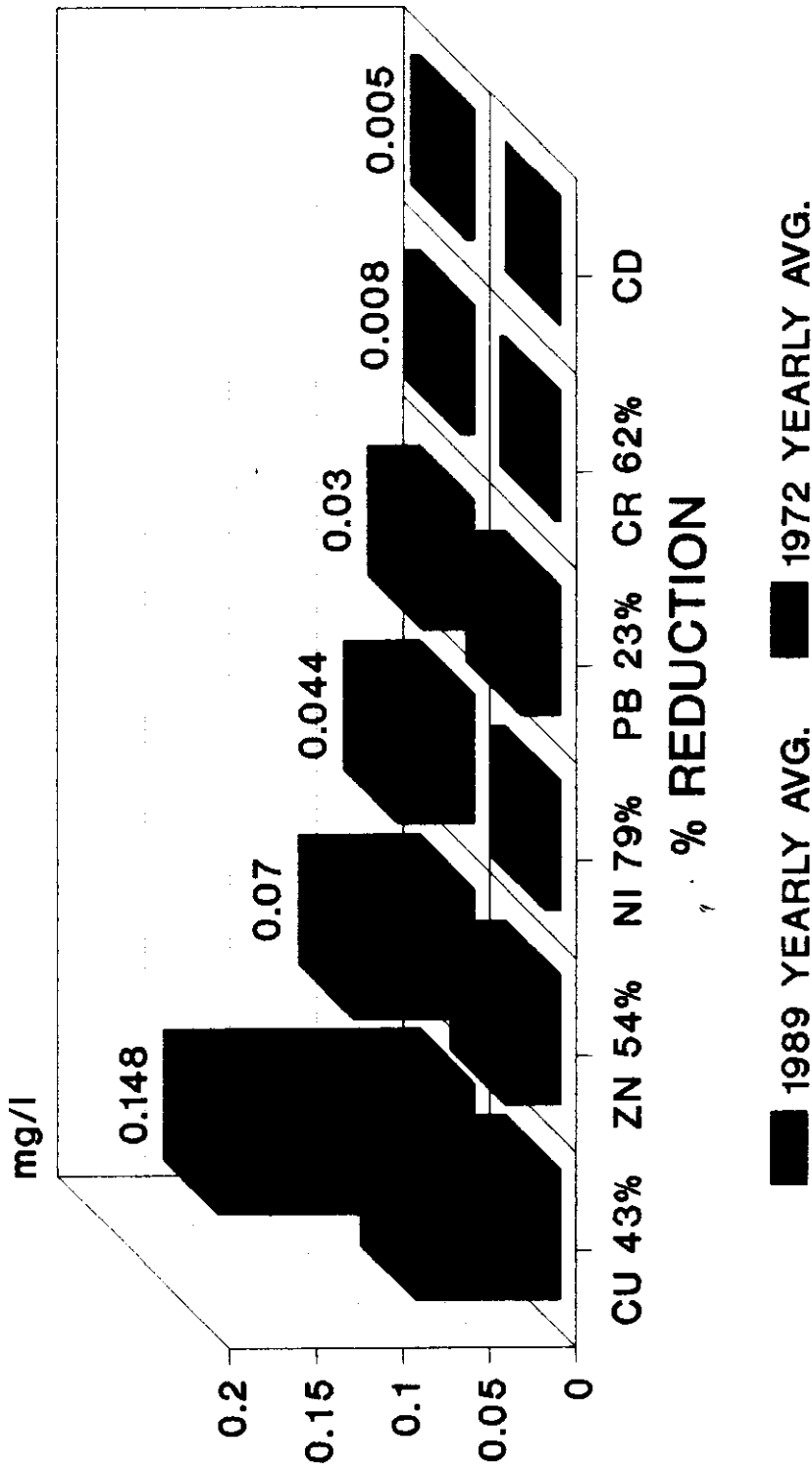
CD - DETECTION LIMITS  
STARTED STREAM CD TESTING IN 1975

# WHITE RIVER (CITY BASELINE) WALNUT ST. BRIDGE



**BUREAU OF WATER QUALITY-STREAM SAMPLES**  
 STARTED STREAM NH3 & NO3 TESTING IN 1975  
 NH3 & NO3 AS N / PO4 AS P

# WHITE RIVER (CITY BASELINE) MEMORIAL ST. BRIDGE

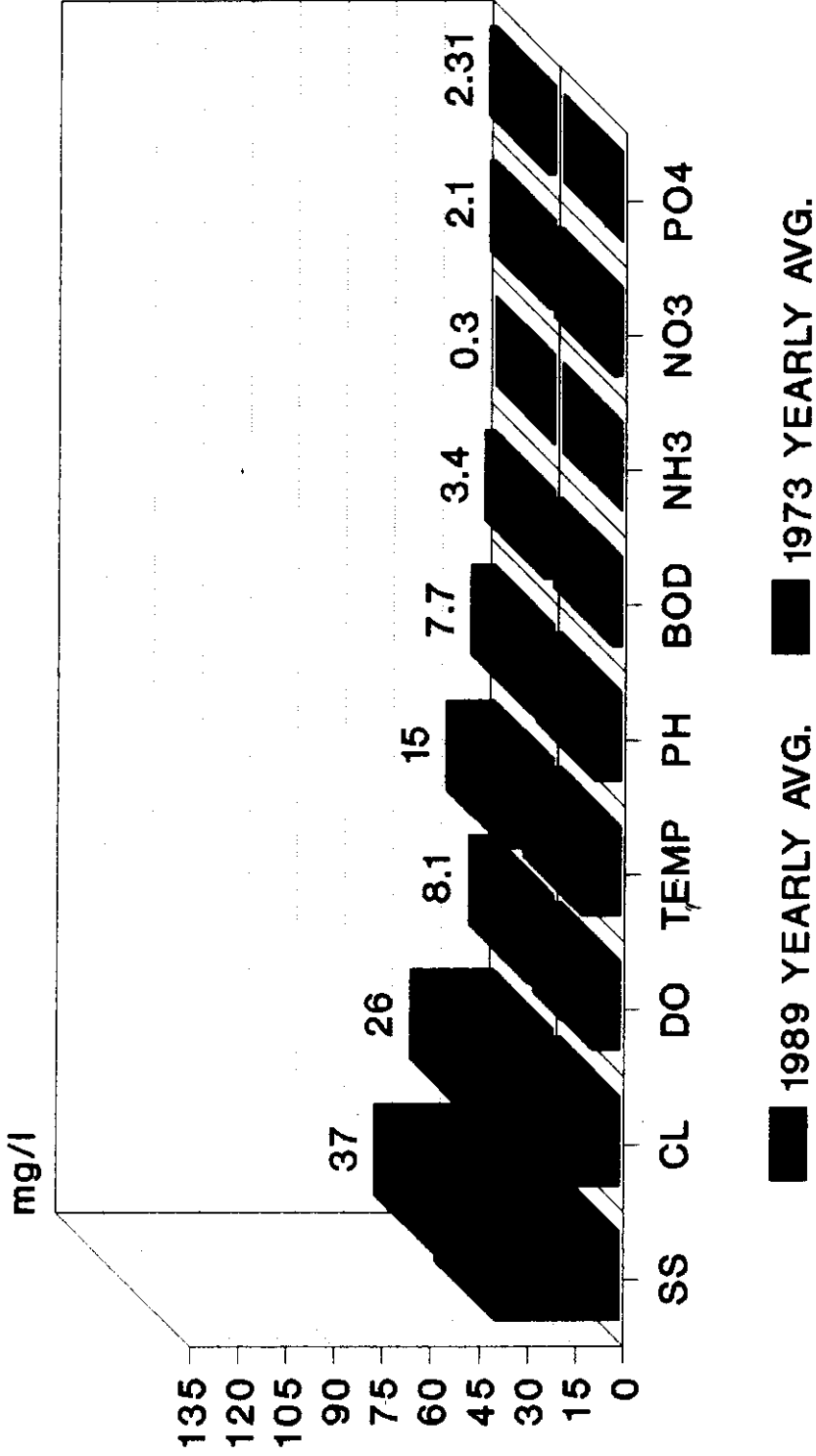


## BUREAU OF WATER QUALITY-STREAM SAMPLES

CD - DETECTION LIMITS  
STARTED STREAM CD TESTING IN 1975



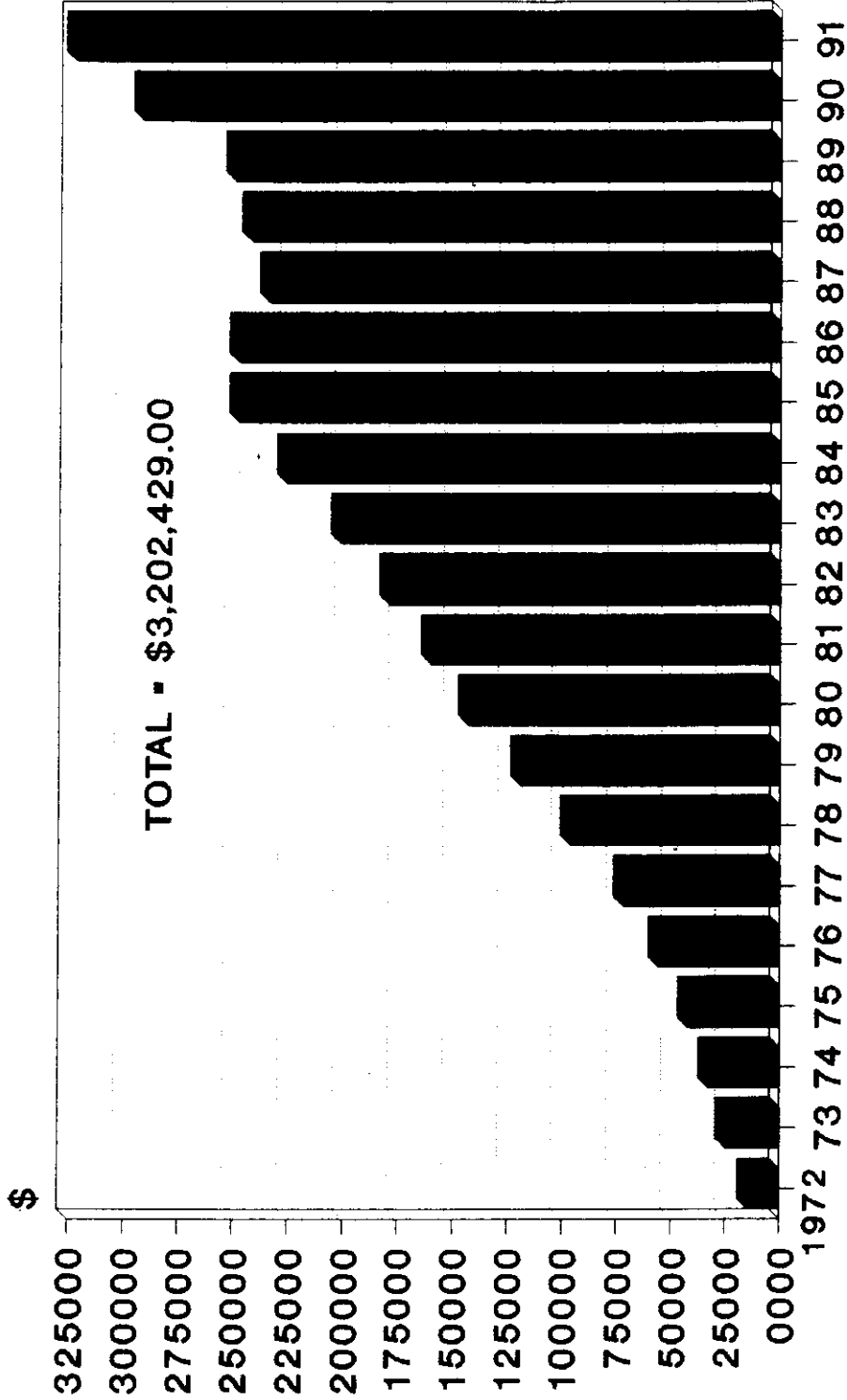
# WHITE RIVER (CITY BASELINE) MEMORIAL ST. BRIDGE



## BUREAU OF WATER QUALITY-STREAM SAMPLES

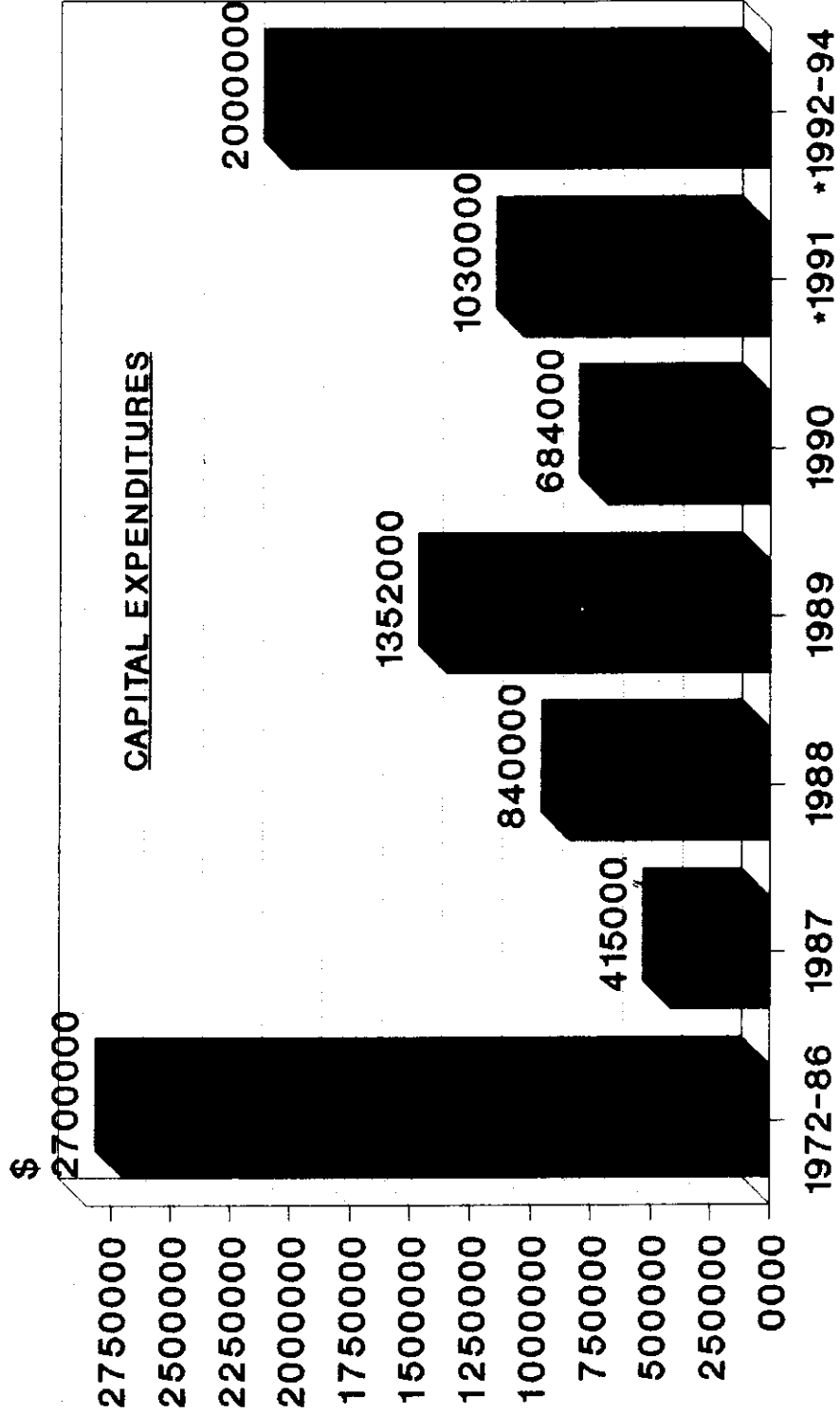
STARTED STREAM NH3 & NO3 TESTING IN 1975  
NH3 & NO3 AS N / P04 AS P

**PORTION OF THE BUREAU BUDGET SPENT  
FOR INDUSTRIAL PRETREATMENT ACTIVITIES**



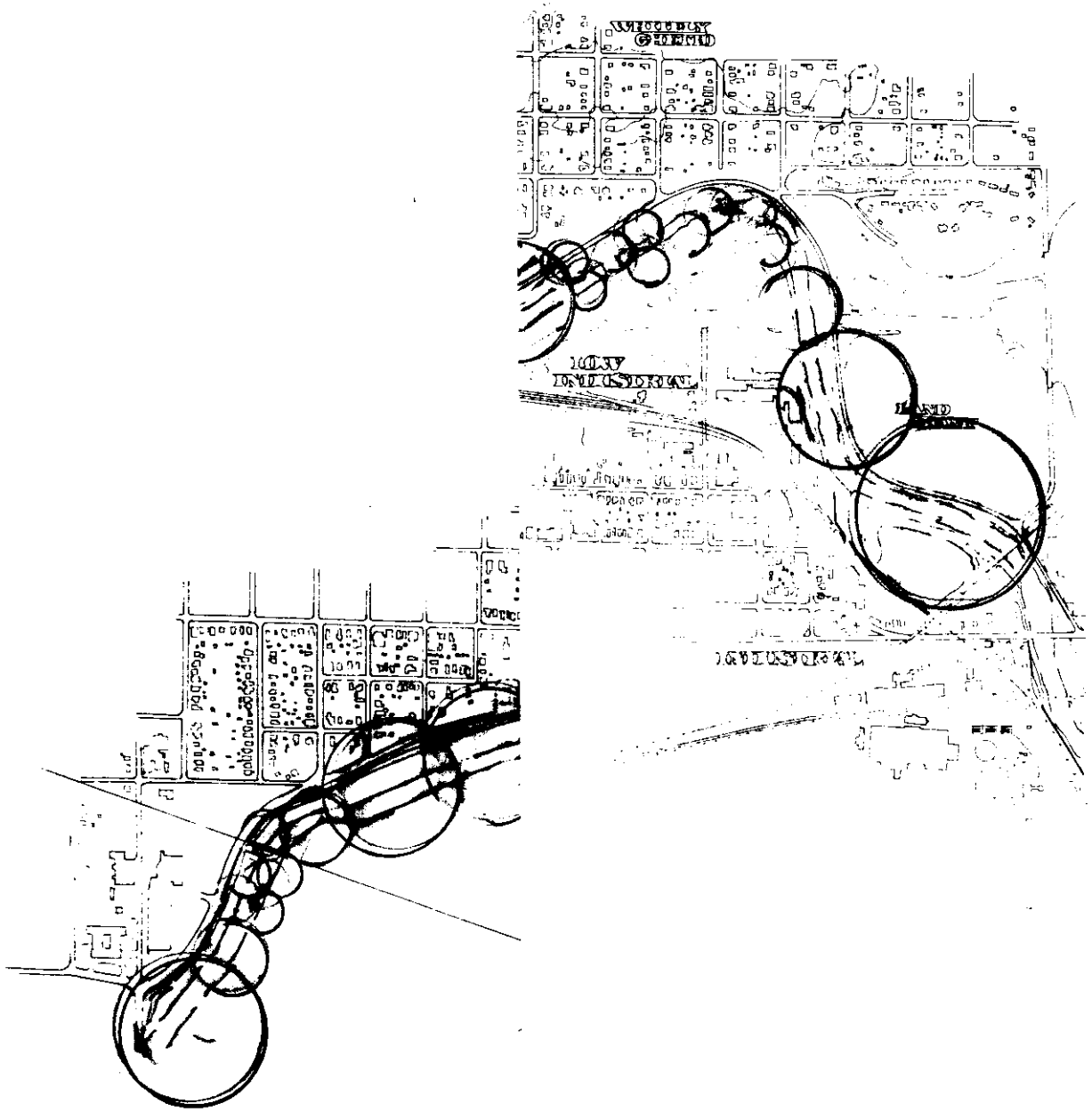
**INSPECTION / ANALYSES / PERMITTING  
MONITORING / ENFORCEMENT**

**MONEY SPENT FOR NEW & ADDITIONAL  
PRETREATMENT BY MUNCIE INDUSTRIES  
1972 - 1994**



**TOTAL = \$9,021,000.00**  
**• • PLANNED EXPENDITURES**

## Appendix B



## Appendix C

