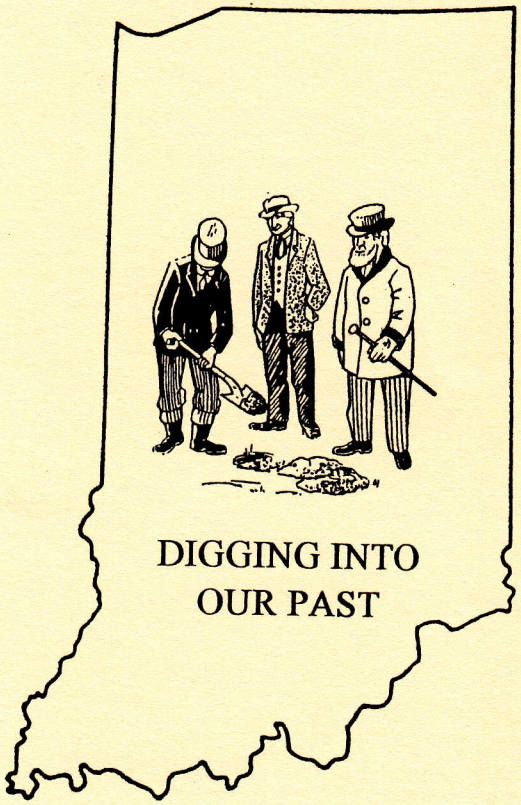
INDIANA CANALS



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INDIANA CANALS

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INDIANA CANALS

The Journal of the Canal Society of Indiana

Volume 10, Number 2 Spring 1999

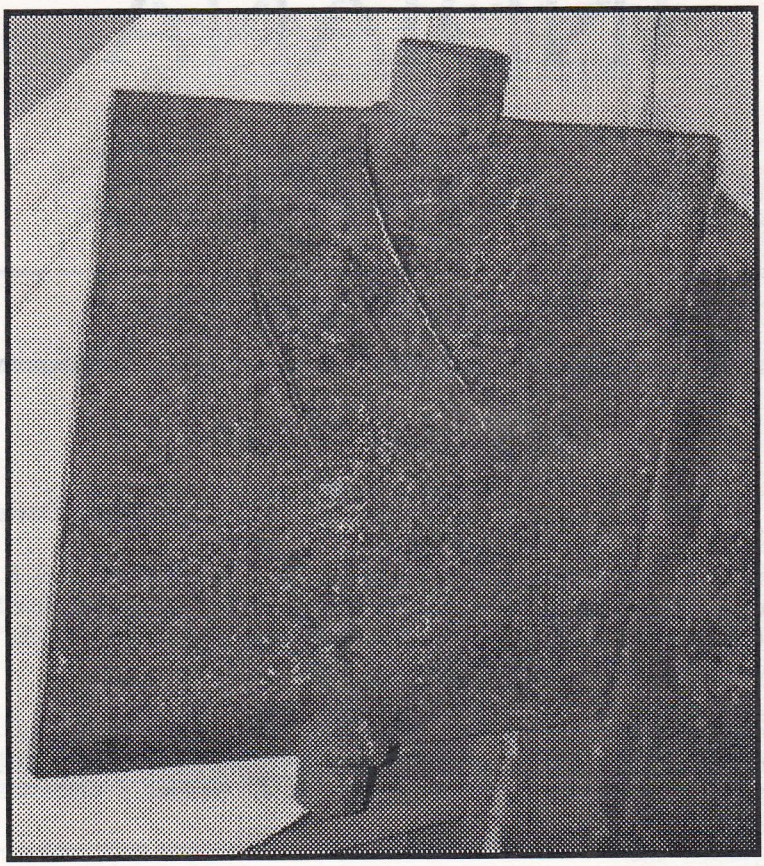
Old Wicket Located

by Charles Davis

Last summer I, Charles Davis of Rockville, found an article on Dr. B. F. Hudson dated April 21, 1914. Dr. Hudson said, "Mr. Johnston preserved a large piece of iron from the aqueduct of the canal across Sugar creek." This started my investigation into what happened to it.

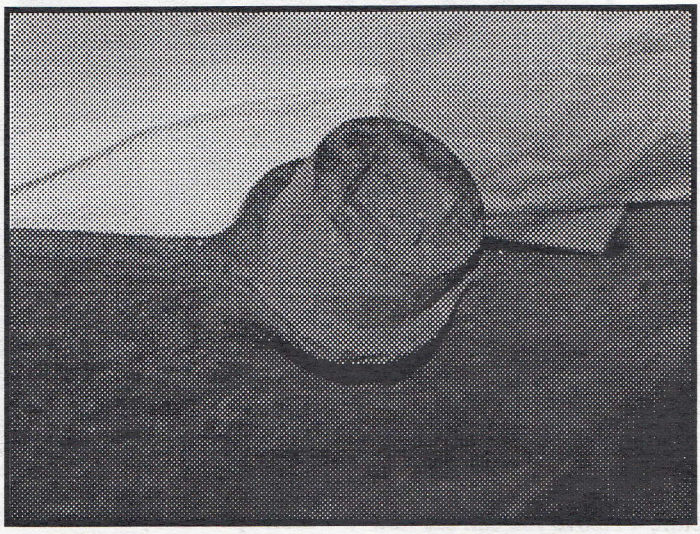
A trip to Montezuma led me to the old Johnston residence. James C. Johnston was the Superintendent for the Wabash and Erie Canal in that area. Ron Thomas lives in the home today. A talk with Mr. Thomas was

In this issue . . . .

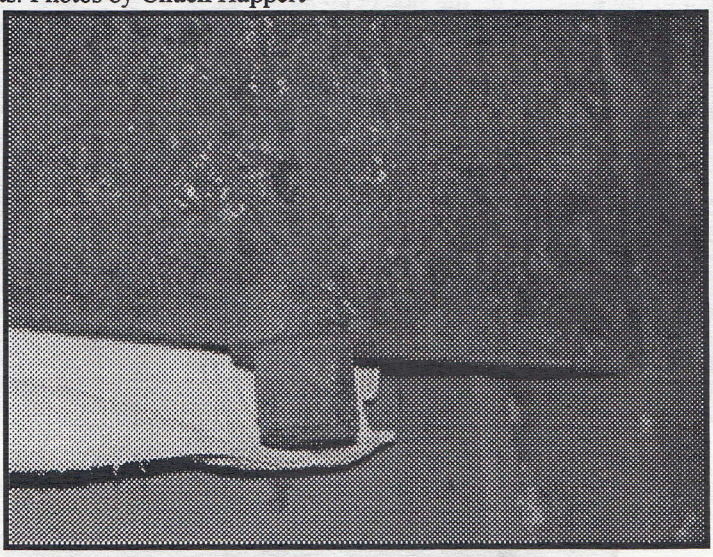


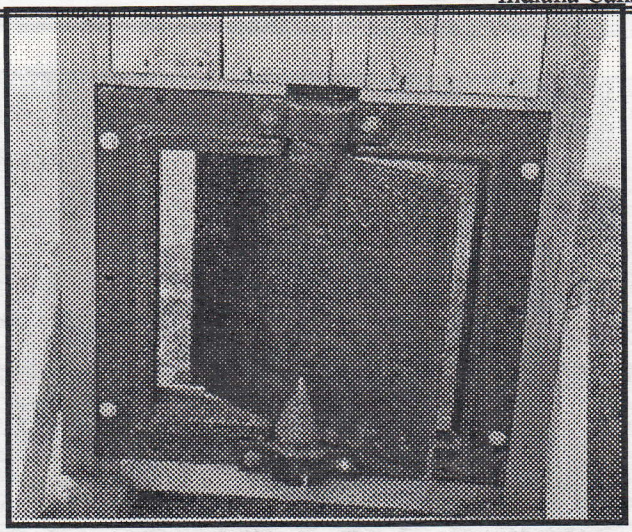
Picture 1 This picture of the wicket gate that was once used on the Wabash; & Erie Canal in Parke Conty, Indiana is now in the Indiana Museum Warehouse at the Stutz Business Center. Linda Badger was kind enough to let Chuck Huppert photograph it on January 26, 1999. It will be a part of the canal display to be located in the new Indiana State Museum.

fruitful. He gave me the phone number of Mr. James Reeder in Raleigh, North Carolina. The Reeders were the former owners of the property. Mr. Reeder said the iron was used as a grill in the yard for several years. Actually there were two pieces. One was stolen during W. W. II. The iron



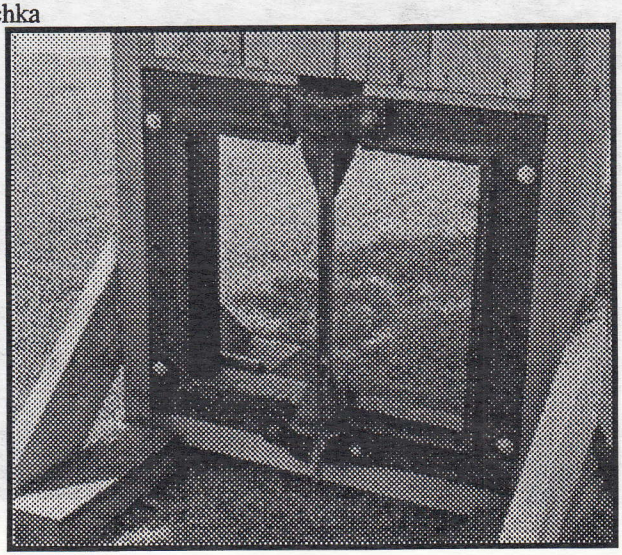
Picture 2 Above you can see the top end of the wicket gate that receives the wicket stem used to open and close the gate.
Picture 3 Below is the flange at the bottom of the wicket gate on which it pivots. Photos by Chuck Huppert





Picture 4 Above you can see how a wicket operates by this model that is located in Providence Park at Grand Rapids, OH on the Miami, Wabash, and Erie Canal. In this photo the wicket is about in the closed position; water can neither enter or leave the lock.

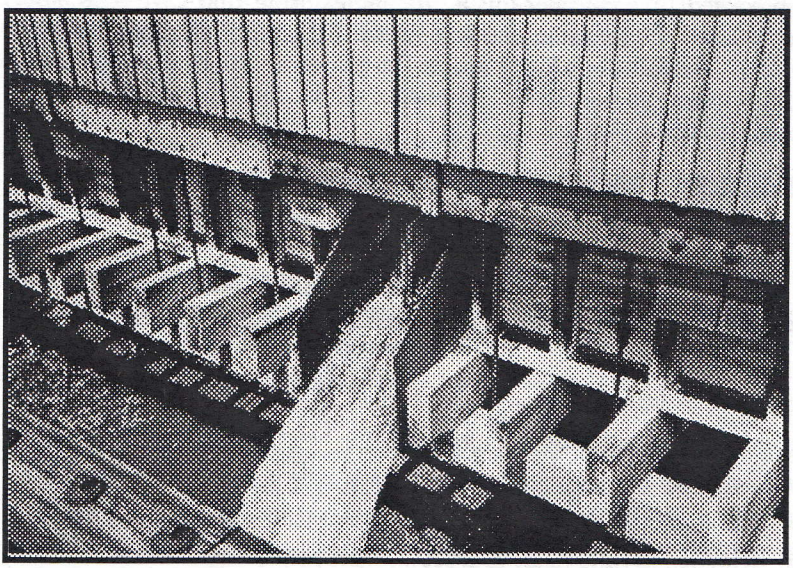
Picture 5 Below the same model is in the open position which releases water from the higher level into the lock or from the lock into the lower level. If the wicket is on the side of an aqueduct, it releases water from the trunk of the aqueduct into the stream below the canal. Photos by Gene Paschka



was in the yard until around 1986 when Mr. Reeder said he donated it to the Indiana State Museum.

Next I wrote to the museum.. Linda Badger, Collections Manager, wrote a very kind letter to me on January 19, 1999. She said that the museum had the large piece of iron in its storage area in Indianapolis. She was very curious and anxious to know more about it. She said, "We are hoping that it may go into a section on transportation in our new museum." She welcomed me to come and take pictures per my request. Due to health reasons I couldn't make the trip from Rockville.

I wrote the Vice President of the Canal Society of Indiana, Chuck Huppert, to see if he could take the pictures since he lives in Indianapolis. Chuck got an appointment with Ms. Badger and took several pictures of the artifact. He also took measurements and sent them to me on January 24. According to the data he sent to me, the large piece of iron is wider than



Picture 6 This picture shows water exiting through a wicket in the Duck Creek Aqueduct on the Whitewater Canal in Metamora. Photo by Bob Schmidt

it is tall. It measures 24" by 24 1/4" by 5/8". (See Picture 1.) The top has a flanged post with a square hole in it for the wicket stem. It is 4 7/8" in diameter and the pin is 3 3/4" in diameter and 2 1/4" long. The square hole in the pin is 1 3/4" square. Chuck did not measure the depth of the hole. (See Picture 2.) The bottom has a similar flanged post, not quite as big and without a hole in it. The bottom flange is 4" in diameter and the pin is 2 3/4" in diameter and 2 1/8" long. The flanged post would fit into a fixed hole in the mitre gate if it is from a lock or in the side of an aqueduct if it is from an aqueduct to allow excess water out. (See Picture 3.) Chuck's pictures arrived on January 29. (See Pictures 4 & 5 for a wicket model and Picutre 6 for an operating one.)

A big "thanks" to Chuck Huppert and Linda Badger for their dedication and kindness. As it turns out the iron is a wicket of the butterfly type. It came from either the Sugar Creek feeder dam, Lock #38 or the Sugar Creek Aqueduct #11 which is just a few yards north of Lock #38. Any suggestions from the readers as to which place this wicket was used will be appreciated. We consider this a rare and exciting find. We especially thank James C. Johnston and Jim Reeder for preserving a piece of our history. The focus of a future article I'm preparing will be who made this wicket, where it was made, the history of the foundry and the people connected to the Wabash and Erie Canal.

RESEARCH PAPERS SUBMITTED FOR MARKERS

Norman Klass of Clay City learned that Clay County had no historical format markers. It was one of a handful of counties that had never erected one. Norman decided it was time Clay County noted the importance of the Wabash and Erie Canal to its development and set out on his own to raise funds to erect markers at two important canal sites. He completed the research and filled out two applications by himself. After learning that there was a canal society, he contacted CSI, told us about his project, and joined our group. CSI is providing some of the

funds needed to place the markers. His statements of significance and research papers (without footnotes) are as follows. A map of Clay County is shown on the center pages of this issue of Indiana Canals.

WABASH AND ERIE CROSS-CUT CANAL

SIGNIFICANCE OF MARKER

The "Cross-Cut" of the Wabash and Erie Canal from Terre Haute on the Wabash River to Worthington on the White River, crossed this area from 1850-1861. The Wabash and Erie Canal was America's longest man-made waterway, running 468 miles from Lake Erie to the Ohio River.

The construction of this canal was part of the system of internal improvements undertaken by the state to assist in making the interior of the state more accessible and to increase population.

The state granted the canal company 37,171 acres of land in Clay County. The company then sold parts of the acreage to home seekers, settlers and speculators. The profits were then used to aid in the construction of the canal.

Construction of the canal brought money to the area in the form of wages and the purchases of supplies and services for those building the ditch.. After the canal was opened much of the area's produce was transported out, local people received their manufactured goods faster, farmers received more for their products and transportation costs of eastern goods were reduced.

The Wabash and Erie Canal was one of the most important phases in early Indiana History. It was a great contribution to the opening up and advancement of Indiana.

WABASH AND ERIE CROSS-CUT CANAL

RESEARCH PAPER

Marker to be six miles south of Clay City where State Road 59 crosses the original cross-cut section of the Wabash and Erie Canal (see Map 1).

As the longest man-made waterway in America(468 miles) the remains of the Wabash & Erie Canal are a great national treasure. In the words of Thomas E. Castaldi, "When the treasures from our past are removed and forgotten, we lose touch with our past. Preserving the past is a gift for those who will follow in the future." It is for this reason that we desire to have an Indiana Historic Marker placed at the site of the Wabash and Erie Canal remains in Southern Clay County, Indiana. This report will give a brief history of the canal and its effects on Clay County.

In the early 1800s water channels were the means of moving the products of commerce. Streams of all sizes were used. They were widened and deepened to increase the number of waterways to meet the ever increasing demand for movement of products, produce, and people. Artificial channels and canals were constructed and filled with water and furnished a much better means of shipping.

According to Counties: Clay and Owen, Historical and

Biographical, in the year 1827, the Congress of the United States made a grant of lands for the construction of the Wabash and Erie Canal, from Toledo, Ohio to Evansville, Indiana. In 1830 and 1831 the legislature of Indiana authorized the start of construction and work began in 1832 on the section between Toledo and Lafayette. The construction of this canal was part of the system of internal improvements undertaken by the state in order to aid in the transportation of goods and to make accessible the interior part of the state. The part of this thoroughfare lying between the Wabash River at Terre Haute and the White River at Worthington, was known as the Cross Cut. This section crossed Clay County, intersecting Perry, Lewis and Harrison Townships. The preliminary examination and surveys necessary for the location were done by Mr. William J. Ball, the resident engineer acting under the direction of the acting commissioner. Its course through the county was northwest to southeast and was twenty miles long. The canal would permit shipping between Evansville, Terre Haute, Lafayette and Toledo.

The financial panic of 1837 caused the state to be unable to meet its obligations and work ceased on the cross-cut in 1839 . In 1845 the people living near the area of the proposed canal voiced the need for the canal and legislation was soon passed for work to resume and work on the cross-cut resumed in 1847. On the 1st day May, 1850, the water from the Eel River reached Terre Haute through the Cross-cut and the first boat passed through from Terre Haute to Worthington in the Spring of 1851.

Many of the men living in Lewis township at the time it was constructed were hired to help dig the ditch. With the wages received for this work many were able to pay for farms or to make improvements. It should also be noted that this was hard work as no machinery of any kind was used in the construction. The work was done entirely with spade, shovel,

pick, wheelbarrow and an occasional one horse cart and scraper. Construction of the canal brought money to the area in the form of wages and the purchase of supplies and services for those building the ditch. "The farmers in the area of the Cross-cut were jubilant when the first load of grain was shipped to Toledo. The price of wheat soared from 18 cents per bushel to 32 cents per bushel." After the canal opened, local farmers received more for their crops and transportation costs were reduced.

Railroads soon took over the job of the canals and in the spring of 1861 the last boat passed through the cross-cut section.

See Picture 7 of the cross-cut section to be marked along State Road 59.

WABASH AND ERIE CANAL
EEL RIVER FEEDER DAM
SIGNIFICANCE OF MARKER

In 1827 the Congress of the United States made land grants available for the construction of the Wabash & Erie Canal. The Canal would become America's longest man-made waterway, running 468 miles from Lake Erie to the Ohio River. The part of the canal lying between the Wabash River at Terre Haute and the White River at Worthington was known as the Cross-Cut. This section crossed Clay County, intersecting Perry, Lewis, and Harrison Townships.

As a summit divide between the Wabash and White River lies

here, both ends of the Cross-Cut had to be fed from the water of the Eel River and its tributaries. This made it necessary to construct a feeder dam and reservoir. The Feeder Dam formed a pool of about 12 miles in length and followed the windings of the river.

After financial difficulties, work on the cross-cut resumed in 1847 and on May 1st, 1850, the water from the Eel River reached Terre Haute through the cross-cut. The slack water from the Eel River feeder dam provided navigation to Bellaire and Bowling Green, the then county seat.

The town of Angela first known as New Amsterdam was laid out in 1838 at the site of the dam. A large flouring mill, saw mill, grist mill and general merchandising establishment was located here and the dam provided a means for shipping lumber and products to many distant parts of the country.

The marker is to be placed four miles north of Clay City where State Road 59 crosses the Eel River. The Feeder Dam remnants can still be seen at low water 300 yards west or down river from the highway bridge (see Map 2).

WABASH AND ERIE CANAL
EEL RIVER FEEDER DAM

RESEARCH PAPER

The Wabash and Erie Canal period was one of the most important phases of early Indiana history. As the longest man-made waterway in America, the remains of the Wabash and Erie Canal are a great national treasure. In the words of Thomas E. Castaldi in his book entitled Wabash & Erie Canal

Notebook "the Wabash and Erie Canal is a treasure from our past that can be discovered simply by looking below our feet." It is for this reason that we desire to enable others to remember this phase of history by placing an Indiana Historic Marker at the site of the remains of the Eel River Feeder Dam.

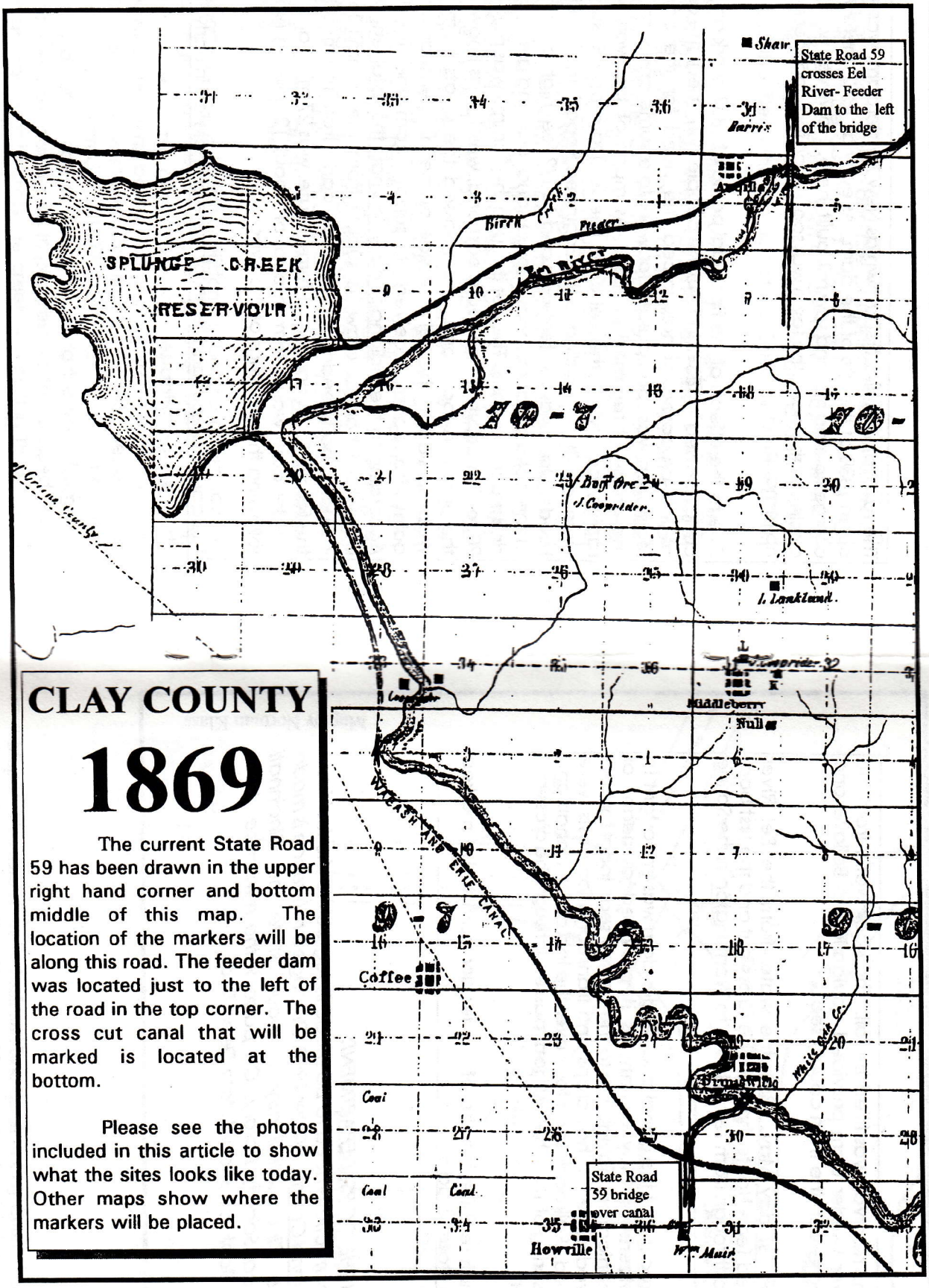
According to Counties: Clay and Owen, Historical and Biographical , in the year 1827, the Congress of the United States made a grant of lands for the construction of the Wabash and Erie Canal, from Toledo, Ohio to Evansville, Indiana. In 1830 and 1831 the legislature of Indiana authorized the start of construction and work began in 1832 on the section between Toledo and Lafayette. The part of the canal that lay between the Wabash River at Terre Haute and the White River at Worthington was known as the Cross Cut. This section of the canal crossed Clay County, intersecting Perry, Lewis and Harrison Townships. As a summit divide between the Wabash and White River lies here, both ends of the cross cut had to be fed from the waters of the Eel River and its tributaries. This necessitated the construction of the Eel River Feeder Dam and Splunge Creek reservoir. According to estimated measurements of the remains, the Feeder Dam was located four miles north of Clay City on the present State Highway 59 and about 300 yards west of the present bridge crossing the Eel River.

As reported in The Indiana Historian, before construction could begin the route had to be precisely determined by surveying the course of the rivers and establishing the best route. After surveying both north and south of the Eel River for several miles no point lower was found and the Feeder Dam reservoir was started in 1837. At the same time, the construction of the side-cut for conducting the water from the dam to the main canal was in progress. As this crossed Birch Creek an aqueduct across the creek was built in 1838.

The town of Anguilla, first known as New Amsterdam, was laid out in 1838 at the site of the dam. As early as 1842, there was a large flouring mill and saw mill built there. However, with the closing of the dam, the town was soon vacated and there are no remains.

Due to the effects of the financial panic of 1837, work on the canal ceased in 1839. In 1845 the people living near the area of the proposed canal voiced the need for the canal, legislation was soon passed for work to resume and work on the cross-cut resumed in 1847. As much of the work was rapidly decaying, the Eel River Feeder Dam and Reservoir were rebuilt. According to the Engineers Report, the Eel River Feeder Dam was 264 feet long and 16 1/2 feet high and most of the distance across was a loose sand requiring great care and much expense. The cut through the Summit was perhaps 20 feet in depth at the south east end, which was known as the Junction locks and these passed the boats from the Wabash side to the Eel river side of the divide near which point the canal received its supply from the feeders. According to the Indiana Senate Journal, the total length of line which had to draw its supply from the summit level, including both feeder and the main canal from the mouth of the feeder to Ft. Harrison at Terre Haute, was 27 miles and the feeder dam would form a pool of about 12 miles in length following the windings of the river.

The dam, side-cut and reservoir were completed in early 1850



CLAY COUNTY

1869

The current State Road 59 has been drawn in the upper right hand corner and bottom middle of this map. The location of the markers will be along this road. The feeder dam was located just to the left of the road in the top corner. The cross cut canal that will be marked is located at the bottom.

Please see the photos included in this article to show what the sites looks like today. Other maps show where the markers will be placed.

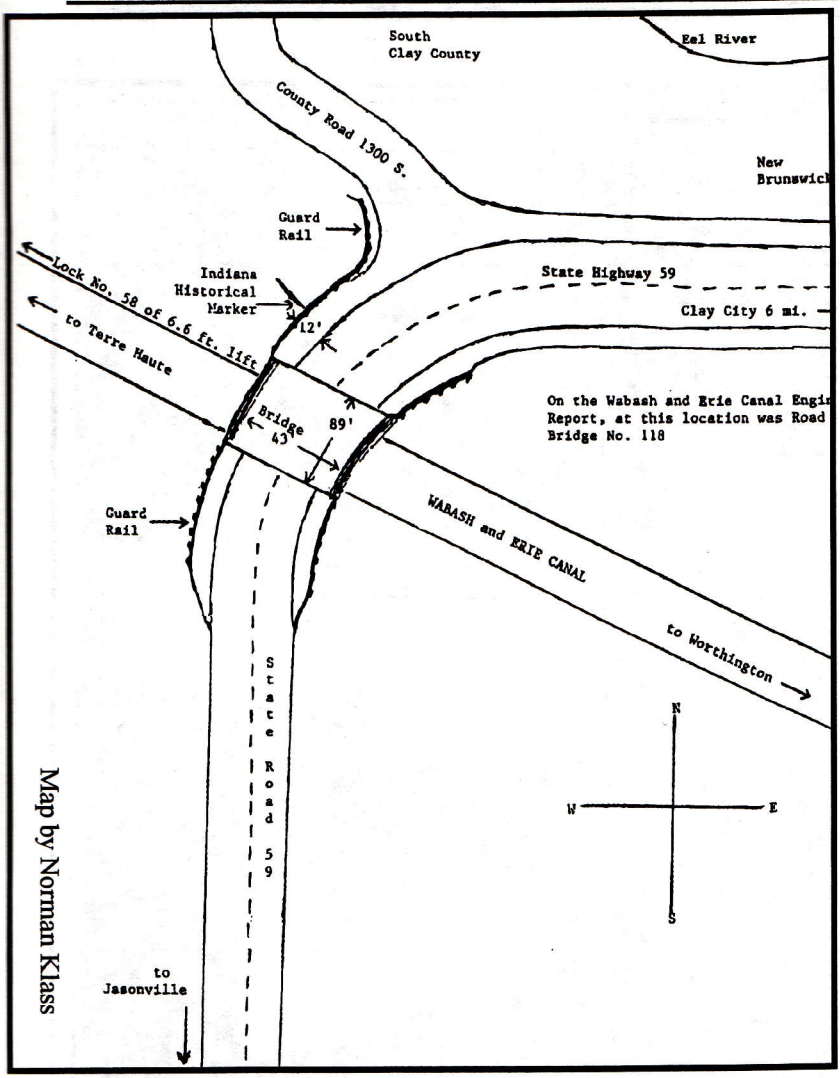
and the reservoir was filled by fall. The slack water from the Eel River Feeder Dam provided navigation to Bellaire and Bowling Green the then county seat.

On the 1st day May, 1850, the water from the Eel River reached Terre Haute through the Cross-cut and the first boat passed through from Terre Haute to Worthington in the Spring of 1851.

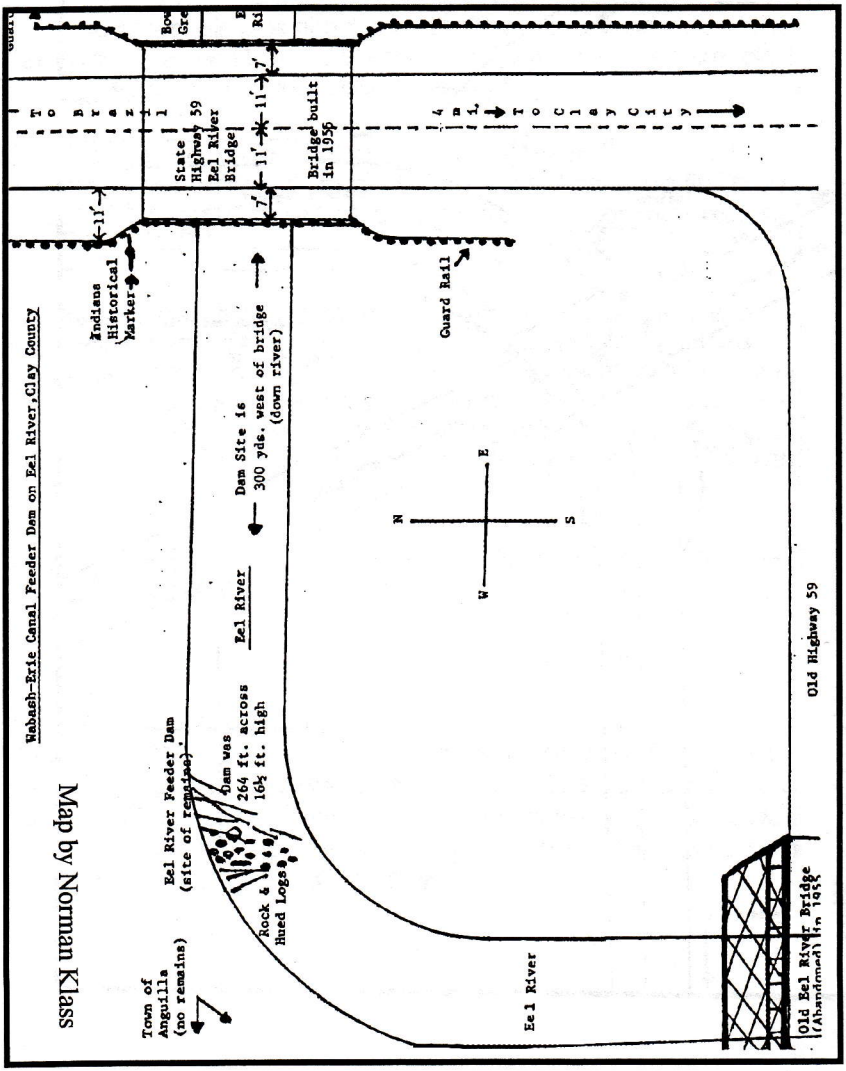
Construction of the canal and feeder dam was important to the citizens of Clay County as it provided a means of communication, navigation to the county seat, local farmers received more for their crops and transportation costs were reduced. Railroads soon took over the job of the canals and in the spring of 1861 the last boat passed through the cross-cut section.

See Picture 8 for the site of the feeder dam to be marked along State Road 59.

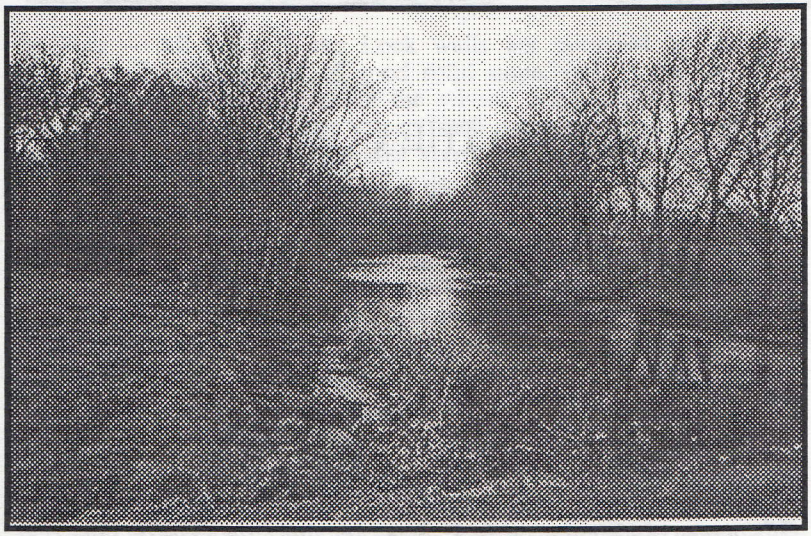
FROM THE OOPS! DEPARTMENT:
Two corrections need to be made in regards to the last issue of Indiana Canals, Winter 1999. On page 3 reference is made to the Cincinnati library. It should state the Cincinnati Historical Society Library. On page 9 the reference states Deed Book 2; it should state Deed Book Z.



Map 1 This map of the Wabash and Erie Canal in Clay County shows the location of the Indiana Historical Marker to be placed on the Cross Cut portion of the canal that now serves as a drainage ditch.



Map 2 This map of the Eel River in Clay County shows the location where the Indiana Historical Marker will be placed that tells about the Wabash & Erie Canal Feeder Dam on the Eel River. It also illustrates what little remains of the dam that can be seen at low water.



Picture 7, top This view is facing northwest from the bridge on State Rd. 59 at the cross-cut portion of the Wabash & Erie Canal in Clay county. The canal is now used as a drainage ditch.
Picture 8, bottom Looking north from the old Eel River Bridge in clay County. The Eel River Feeder Dam was located a little around the bend of the river.
Photos by Bob Schmidt

RULES AND SPECIFICATIONS RELATING TO THE CONSTRUCTION OF THE WABASH & ERIE CANAL

Submitted by Stan Schmitt

This issue of Indiana Canals contains the fifth installment of one of several lists of rules and specifications used for canal construction in Indiana at various times. This list is printed as a pamphlet that was found in the Archives Division of the Indiana Commission on Public Records and was printed for prospective canal contractors of the Wabash and Erie Canal. Following it we offer an explanation as to what the rules and specifications meant and why they were important. Last issue we stopped within the section on lock dimensions and the construction of stone lock walls. We pick up the rules and specifications at that point.

The face stone of the locks shall be laid in good well wrought mortar, free from pebbles and lumps of raw lime, which shall in all cases me mixed or made at least two weeks previous to its being used. The mortar shall be composed of proper proportions of good quick lime and clean sharp sand, together with the proper quantity of water lime, when the same can be procured; the proportions of each to be determined by the superintending engineer. The stone shall be laid with close joints not exceeding in any case one quarter of an inch in thickness and both the horizontal and perpendicular joints shall be thoroughly and completely filled with mortar, extending from the face of the wall at least eight inches back. The face stone shall be thoroughly wet before being laid and the walls shall be kept constantly wet during the time of their being built, and the face stone shall break joints in all cases at least eight inches. The capping stone shall be at least three feet in breadth, of uniform thickness as near as may be at the face and on the back, and those next to the hollow quoins shall be cramped together with iron cramps of the proper form and size. The head of the lock on each side shall be defended by placing a heavy stone of at least two feet in thickness, two and a half feet in breadth, and five feet in length in the upper course extending from the gate recess to the head, provided the quarries used will furnish stone of that size.

Backing -- All parts of the Lock walls not occupied by the face stones shall be composed of good solid stone, well shaped so as to form a strong bond throughout the whole, none of which shall be less than 100 pounds weight except such as are necessary to fill the crevices between stone of the size above defined, when closely laid. Headers not less than eight inches in thickness and eighteen inches in breadth throughout their whole length, and extending from the back, into the wall four feet (or at least so far as the face stone will permit them to extend) shall be so placed as to correspond with each course of the face wall and so that one header from the back side shall extend into each space between the headers of the face; the back and face headers interlocking with each other so as to bind the whole wall firmly together. All the crevices in the walls not occupied by stone, shall be thoroughly filled with good and well wrought grout, composed of lime and sand with a proper portion of water lime (where that material can be procured) which materials shall have been wrought into mortar at least two weeks previous to using them for grout, so as to make the whole as solid and tight as possible. The wall shall be grouted throughout its whole extent after laying each course of face stone and raising the back wall even therewith from time to time as the wall advances in height, and more frequently if the engineer having charge of the work shall direct.

All Stone used in building Locks shall be solid, firm and durable, not liable to be affected by the action of the water and frost--special care must be taken to see that all face stones are of this character.

The lock gates and mitre sills shall be made agreeable to the plans to be furnished by the engineer having charge of the work and shall be composed of good, sound, solid white oak timber and plank, and thoroughly secured with iron or good quality and proper dimensions made and formed agreeable to bills and plans to be furnished by said engineer.

Fender beams and posts of the proper size and dimensions, of good sound white oak timber shall be placed and secured at the head of the locks agreeable to a plan to be furnished, and the directions which shall be given therefore by the engineer having charge of the work.

The bottom and sides of the canal, extending from the foot of the lock at least forty feet, shall be secured from the action of the water passing through the paddle gates by being paved with rough stone or by stone thrown loosely thereon, as may be directed by the

superintending engineer. A tumble to be built agreeable to a plan to be furnished, shall also be built if required by the engineer or acting commissioner, to pass the water from the level above to that below the lock, and estimated and paid for as part and parcel of the lock masonry.

RULES AND SPECIFICATIONS

By Carolyn Schmidt

EXPLANATION OF THE

The Wabash and Erie Canal had only 14 cut stone locks out of its total of 73 locks in Indiana. There were also composite locks composed of uneven stones that were lined with lumber, timber crib locks and timber frame locks. In explaining these specifications we are talking about the cut stone locks unless otherwise noted.

Even though the cut stone lock was the most durable type of lock construction, it was also the most expensive to build. It was cheaper to use the good quality timber that was located along the canal route. Top quality stone was hard to find, had to be quarried and then had to be shipped to the site. The plan was to quickly and cheaply build timber locks and later replace them with stone ones once the canal was completed. Then the stones could be shipped down the canal instead of being pulled to the lock construction site on wagons over almost impassable roads or no roads at all. Unfortunately the replacements were never made. The canal only lasted a few years after completion at its southern end and for only about 40 years on its northern portion.

The cut stone locks that were built were located as follows: Ft. Wayne - Lock #3; Lagro - Locks #12, 13,14, 15 (the Salamonia Quarry was nearby): Wabash - Lock #16; Rich Valley - Lock # 17; outside of Peru - Locks #19, 20; Logansport - Locks # 24, 25, 26; Georgetown - Lock #27; and outside of Riley - Locks #46,47.

The rules and specifications were very explicit as to how the stones should be laid in the lock walls. This was necessary because if the joints weren't tight and well sealed the stones would shift, water seep through the cracks and the lock would deteriorate rather rapidly. The wall closest to the actual lock chamber, called the "face wall," had to be even more secure than the supporting wall behind it. This face wall was to have extremely tight joints with

the best mortar placed between them.

Though specified, I can't say that I've ever really seen mortar on any of these locks. I question whether it was used, if it has leached out, or if these specifications were made for the stone locks that were to later replace the timber ones. Unfortunately the document we are discussing was not dated. I was able to locate the following information about mortar used in stone locks on the Erie Canal in: Bourne, Russell. Floating West. New York, NY: W. W. Norton & Company, 1992, p. 113-114.

Sealing the joints of stone locks was a difficult and expensive process. When building New York's Erie Canal, volcanic ash was imported from the West Indies much like the "trass" or volcanic mud that was collected along the Rhine River and used by European lock builders. The ash was expensive to import. Loammi Baldwin found it took too long to mix the ash and lime in the time-honored manner. He found that grinding the ash before mixing it with the lime was more effective and less expensive.

Canvas White is credited with the discovery of a "suitable local material" to use as mortar. At age 27 he went to England to study how their canals worked and wrote to his father in 1818 that he had traveled 400 miles on foot during this study. When he returned to the U.S. he learned that the highest cost in canal construction overruns was hydraulic cement. He heard that in Madison County a contractor named Mason Harris, who was building the culverts and aqueducts between Salina and Rome, New York, had found a variety of limestone that became solid rather than slacking (weakening or diluting) when mixed with water. White went to the Harris home in Chittenango and watched Mason pulverize the lime, burn it and mix it with sand. This dry mixture was then placed in a bucket of water and left to set up over night. The following morning is was solid and could be rolled across the floor. White than began his experimentation with mining, analyzing and mixing this superior limestone. Without this hydraulic cement the Erie Locks would not stand as solid as they do today.

We know that lime was available in Indiana along the canal route in several places. Huntington, IN was often called "Lime City" for its production of lime for plaster, etc. which it shipped by canal boat. Delphi also had lime kilns which have been located recently through archaeological work at the site. This lime was also shipped by canal. Was it the superior lime found in New York that was good as hydraulic cement?

CONSTRUCTING THE FACE WALL

According to the rules and specifications, all horizontal and all perpendicular joints had to be sealed with this mixture of lime and sand for at least 8 inches back from the face of the stone into the wall itself. When spread between the stones the mortar could not be more than one fourth of an inch in thickness.

MIXING THE MORTAR

The mortar was to be made at least two weeks prior to its use. Limestone had to be burned in kilns to obtain the lime or calcium oxide. The quick lime could not contain any "raw" (not ground or burned) lumps of lime. The sharp sand had to be free from dirt and contain no pebbles. When mixed with water lime (where available) it made a smooth consistent mortar. The superintending engineer was to decide how much water lime to use if it was available. I was unable to discover the difference between quick lime and water lime.

It was necessary to thoroughly moisten the face stones before they were laid in place and to keep them wet during the entire time the wall was being built. This kept the water from soaking out of the mortar into the stones before it had a chance to set. A good quality mortar job needs to be allowed to set up from the inside out. Note today how a sidewalk or concrete slab is poured and kept moist on the surface until it sets up inside. This binds the mortar.

When the stones were placed on top of one another it was important that the joints be staggered at least 8 inches. This was to prevent a long vertical crack from forming following the joints from the top to the bottom of the structure and perhaps allowing a portion of the structure to collapse.

Cap stones were placed at the very top of the lock wall They were to be uniform in thickness from face to back and be at least 3 feet wide. Their length and depth were not assigned. These cap stones, often called "coping" stones, finished off the wall, helped protect it, and were well cut, jointed, and bedded. The cap stones located next to the "hollow quoins" were to be "cramped" together. This merely meant that the cap stones located next to the "semicircular recess cut into the lock wall in which the heel post revolved as the lock gate was opened or closed"* were joined together using huge iron staple-like pieces of metal that were inserted or driven into the top of the stones thus holding them snugly together. (See picture 10, Some Parts Of A Lock Gate) They were to be of the proper form and size. Perhaps some other document was given the engineer as

to what the proper form and size was to be. These stones had a great deal of force placed on them as the huge lock gate swung back and forth. The goon neck or gooseneck strap, "the metal strap holding the heel post of a miter lock gate to the top (coping) of the lock"* was also attached to these stones. (Refer to picture mentioned above)

*Woods, Terry K. **The Ohio & Erie Canal: A Glossary of Terms**. Kent, OH: The Kent State University Press, 1995.

The final specification for the face wall was that a huge heavy stone two feet thick, two and a half feet wide, and five feet long be placed in the upper course of stone before the lock gate recess on each side wall at the head of the lock (upstream end). This was to protect "defend" the lock from injury if struck by a canal boat. If no such stone was available from the quarry, it seemed to be up to the engineer to come up with an alternative plan.

BACKING

The stones behind the face wall were to be good solid stone. Each stone was not to weigh less than 100 pounds. If crevices remained between these huge stones once they were laid in place, smaller stones could be used to fill them.

To tie this back wall to the face wall headers were once again used. A header is the stone which is "laid so its long axis is perpendicular to the face of the wall, extending into the secondary wall." You will recall in the last issue of Indiana Canals, that headers extended from the face wall on every course at intervals of not more than ten feet except on the bottom course. These headers specified for the back wall were 18 inches wide and 8 inches thick for their entire length. They extended from the back side of the back wall into the wall for 4 feet or at least as far as the face wall allowed . The headers from the back wall filled in the spaces between the headers from the face wall. Think of this as a huge zipper. The outer edge of one side of the zipper is the face wall and the outer edge of the other side of the zipper is the back wall. The extensions or teeth of the zipper interlock between one another when the zipper is closed thus tightly joining the article of clothing. In the lock walls, the headers became the "teeth" and firmly joined the face and back wall.

GROUTING

Sometimes spaces or crevices remained between these huge stone blocks. These spaces were to be completely filled with a grout made by mixing lime, sand, and water lime (where available) together at least two weeks prior to using it. As the joined wall was raised the engineer was to try to keep the face

wall and the back wall finished to approximately the same height course by course whenever possible. All spaces between these walls were to be filled with grout thus securely joining them and making them water tight.

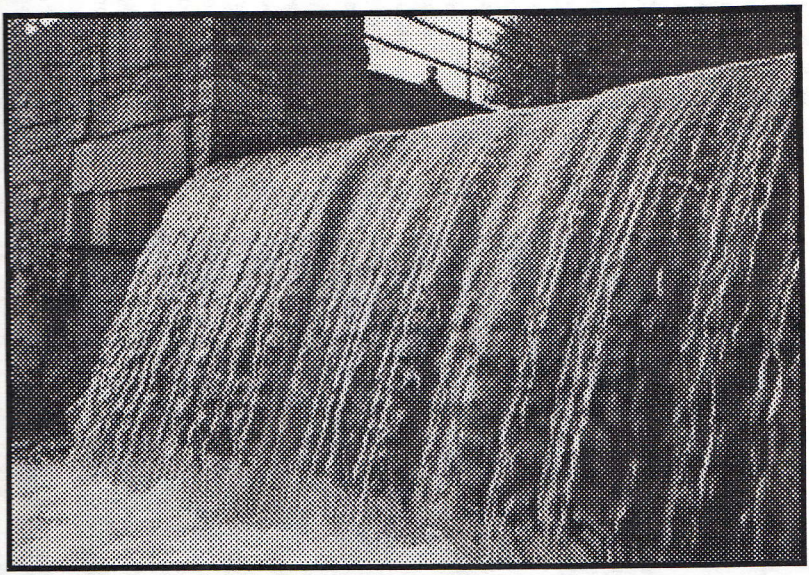
Though the need for good solid stone was stated before throughout the specifications, it is again repeated and explained. Good solid stone is durable and firm. It should not crumble or shale off from the action of the water or from freezing. It points out that this is of the utmost importance especially in the case of the face stones which will have greater exposure to the elements.

The engineer was to furnish a set of plans for the lock gates and mitre sills according to the rules. CSI is trying to locate plans such as these. The gates and sills were to be made of good, sound, solid white oak, timber and plank. Oak proved to be a very strong wood that held up well in constructing locks. Walnut and yellow poplar were also used.

The metal work in the gates and sills was to be of good quality and made in the proper dimensions according to the bill or plan furnished by the engineer. Blacksmiths are often overlooked when the builders of the canals are discussed. Usually mentioned are the stone masons, carpenters, and diggers. Without the blacksmiths, many of the operating parts of the lock would have had to be made of wood, would not have lasted as long, and would not have been as strong. The blacksmiths made the wickets, goon necks, cramps, nails, spikes, wicket stems, lock wrenches sometimes called the "key," etc. Later on some locks they made gears.

White oak was to be used for fender beams and posts that were placed at the head of the lock to protect it. The dimensions of the beams and posts were to be ascertained by the engineer and a plan with directions made and followed.

A pavement of rough stones or loosely thrown stones were to be placed at the bottom of the canal and on its banks for at least 40 feet from the foot of the lock (downstream end). The engineer had the option of which method to use. This stone was to prevent the rushing water passing through the paddle gates or wickets from undermining the lock. In the Gronauer Lock, a timber lock, a fan tail was constructed from the foot of the lock for this very purpose. It was made by placing huge timbers side by side and placing baffles every so often.



Picture 9 The bypass letting excess water go around the lock and fall into the lower level at Whitewater Canal Lock #25 in Metamora. Photo by Bob Schmidt

A final option that was determined by the engineer or the canal commissioner was whether or not to build a bypass or tumble that allowed excess water in the canal to go around the lock. This tumble let excess water drop from the upper level into the lower level without passing through the lock. If a tumble was built, the engineer had to estimate its cost and include it in the cost of lock masonry. No tumbles are seen on the locks at Lagro. Were tumbles built on any of the Wabash and Erie cut stone locks? We know the southern end of the Wabash and Erie often was short of water. They probably didn't need tumbles. Jeff Koehler believes there might have been one on the lock at Riley since there is a groove between the lock wall and the hillside. At one end there is a pile of mixed up stone which might have been the tumble. But what of the locks on the northern end of the canal? Can anyone shed any light on this subject or on my earlier question if mortar was used on any of the cut stone locks?

Picture 10, following page Some of the component parts of a lock at the gate.

SOME PARTS OF A LOCK AT THE GATE

Balance Beam - the beam pushed to open and close the lock gate

Wicket Stem - the pole that extends to the wicket allowing it to be turned

Goon Neck - the metal stap holding the heel post

Heel Post - the vertical post on the side of the lock gate on which the gate turns

Hollow Quoin - the curved recess in which the Heel Post turns

Cramp - the iron piece that holds the cap stones together

Cap stones - the top layer of stones that finish the lock

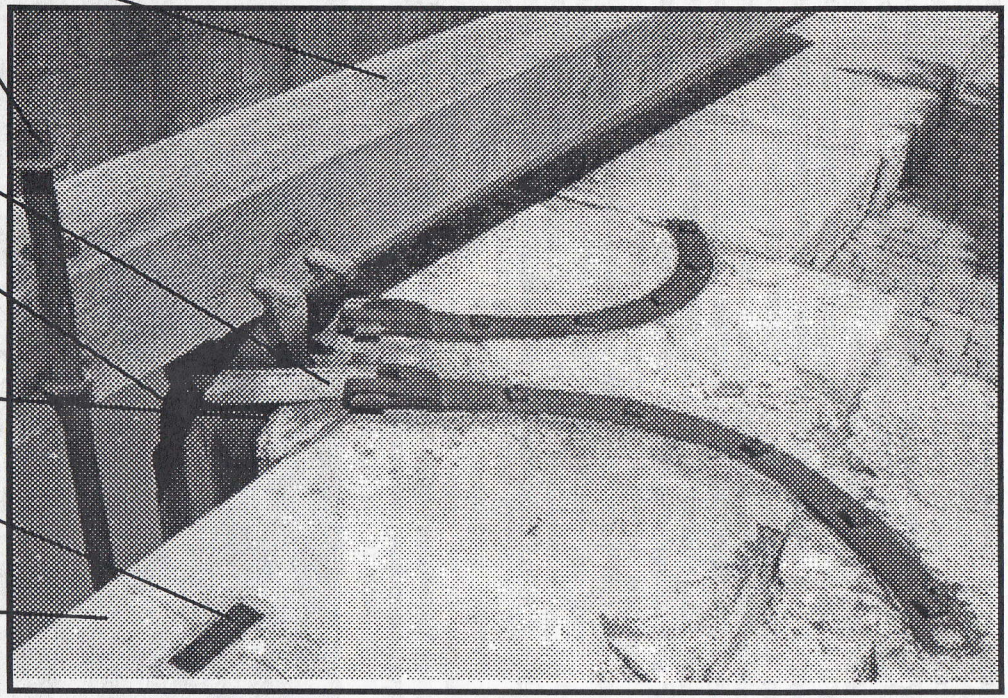


Photo - Gene Paschka

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