HISTORY OF
LOCAL DRAINAGE IMPROVEMENT EFFORTS
JEFFERSON COUNTY, KENTUCKY

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MARCH 1985

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EARLY HISTORY

The first settlement in Jefferson County was established in 1778. A party led by General George Rogers Clark had been traveling down the Ohio River but had to abandon their boat when they reached the Falls of the Ohio. They set up a camp which was intended to be temporary but soon became permanent. The Falls of the Ohio were directly responsible for the early development of Louisville. It was here that river cargo had to be unloaded and then reloaded beyond the Falls. By 1790 the population of Louisville was 4,700.

One of the earliest recorded accounts of drainage and related problems in Louisville and Jefferson County is contained in "Sketches of Louisville" by Dr H. McMurtrie published in 1819.

"Ponds, marshes, and planispherical accumulations of sand, the two former which disfigure its surface and taint the wholesome gale with nauseous vapours, are now gradually disappearing, before the active energy, and opening eyes of the awakened citizens who seem to be convinced that their fate is in a great measure put into their own hands, and that if they will not remove these prolific sources of disease, they must and ought to suffer the penalties thereto annexed."

The recognition of the need for drainage improvements prompted the State Legislature in 1805 to grant authority to the City Trustees to remove "those nuisances in such a manner as the majority of them should prescribe."

The drainage improvements that Dr. McMurtrie refers to were undertaken in large part by a Captain John Nelson in whom the Trustees had assigned the task.

Although Dr. McMurtrie mentions that efforts to improve drainage had been initiated, in a subsequent section of his book, he states the problem was far from solved.

"The number of ponds and low marshy grounds by which it is surrounded, (some of which are even contained within its bosom), the humidity of the climate, the mildness of the weather throughout the year generally, and the intensity of the heat during the summer, are all circumstances that facilitate the decomposition of animal and vegetable matter, and consequently the formation of those `foul airs,' which spread around them pestilence and death."

And later in a description of diseases in the area, the problem of poor drainage is again alluded to.

"The nature of those diseases incident to any particular spot, may be deduced with great certainty, from the climate and physical topography of the surrounding

country. This being the case, the reader will naturally suppose that bilious, remitting, and intermitting fevers must be common in this place. The most fatal complaint among adults, exclusive of small pox, is a bilious remitting fever, whose symptoms are often sufficiently aggravated to entitle it to the name of yellow fever..... During the months of July, August, and September, so strongly are the inhabitants of this and the adjacent towns, predisposed to this disease, by the joint influence of climate, and the miasma of marshes, and decayed and decaying vegetable and animal matter, that they may be compared to piles of combustibles, which need but the application of a single spark to rouse them into flame!"

The author's concerns were indeed well founded. Three years later in 1822, a catastrophic yellow fever epidemic broke out. Hundreds died and the very existence of the town was threatened. Up to this time the growth of Louisville had been slow but continuous but now any growth at all was threathened as Louisville became known as the "Graveyard of the West".

Another account of the ponds and the epidemic years is contained in Ben Casseday's "History of Louisville", published in 1852. Two of the most important ponds described were Long Pond and Gwathmey's or Grayson's Pond. Long Pond began at the corner of Sixth and Market Streets, and inclining a little toward the Southwest, extended as far as the Old Hope Distillery, on or near Sixteenth Streets. The indentation in the ground, in the alley which commences at Seventh Street and lies between Market and Jefferson Streets, was the former bed of this pond.

The next in importance to the one above referred to was known as Gwathmey's or Grayson's Pond. It began on Centre Street just in the rear of the First Presbyterian Church, and extended Westwardly half way to Seventh Street. Its form was that of a long elipse.

Beside these two principal ponds, there were innumerable others, some containing water only after heavy rains and others standing full at all times. Market street at Third was the site of one of these; Third Street between Jefferson and Green of another; Jefferson Street near the corner of Fourth of another, and so on almost endlessly.

A map of the city as it was in the early 1800's, would present somewhat the appearance of an archipelago, a sea full of little islands. By 1852 from the Woodland Garden to the foot of Fifteenth Street, a distance of nearly three miles, not one of these ponds was to be seen. As the trees were removed from the surface, and the face of theses ponds exposed to the burning sun, they became sources of disease. As long as life was precarious from a hundred other causes, this one remained unnoticed, but as soon as the settlements began to be relieved from other fears for life and

property, this threat began receiving attention. No really efficient action however was taken until after the fearful epidemics of 1822 and 1823, when the Board of Health, appointed to examine into the causes of the diseases and the means of removing the same, urged the prompt and immediate removal of these ponds. The Legislature during the latter year also authorized raising $40,000 by lottery for draining not only the ponds in Louisville, but also all those between the town and the mouth of Salt River. Under this act these ponds were drained, but those below the city were left untouched.

Still another account of the ponds is contained in Dr. Drake's, "Principal Diseases of the Interial Valley of North America" published in 1850. He notes that the City's spread had been up and down the river, much more than from it, as the swales and ponds in its rear limited extention in that direction. He further observed that the descent of the streets near the river drained well, but a few blocks from the river bank, the levelness was so great as to interfere materially with the discharge of the contents of the gutters into the sewer which had been dug behind the town, the outlet of which was into the Ohio some distance below the Falls

Dr. Drake adds an interesting paragraph concerning the autumnal fevers, which had not then wholly disappeared:

"From the earliest period of its settlement, the whole plateau, from the Falls to the Salt River, has been infested with autumnal fevers, intermittent and remittent, simple and malignant. They still prevail; but wherever clearing, cultivation, and draining have extended, they have signally diminished. Louisville itself offers a beautiful example of the influence of civic improvements, in destroying the topographical conditions on which these fevers depend. For a long time, when its population was small and scattered, its streets unpaved, and its outlots overspread with small swamps and shallow ponds, the annual invasions of autumnal fevers were severe; and in 1822, a sickly year over the West generally, it was scourged almost to desolation. With increasing density of population, however, and the consequent draining, cultivation, and drying, a great amelioration has taken place, and fever, especially the intermittent form, is now a rare occurrence in the city."

PORTLAND CANAL PROJECT

As was noted earlier, the development of Louisville was directly related to the Falls of the Ohio and their formidable impasse to river traffic. A canal around the Falls would eliminate this, yet many early settlers were opposed to a canal fearing loss of jobs related to portage of river cargo. The observations of Dr. McMurtrie and his vision of the future in arguing tor a canal in 1819 bear quoting.

"When we consider the rapidly increasing population, the rising importance, and the vast extent of fertile country above the Falls, a country containing from ninety to a hundred thousand square miles, the united lengths of whose navigable water courses may be estimated at five thousand miles, all of which lead to this dangerous pass; when we consider that this pass is the only one through which the inhabitants of that country can seek a market for their produce, and that the loss experienced by them in attempting to descend it, has been averaged at 20,000 dollars per annum! When, in addition to these circumstances, we consider the many public advantages and private gain to be derived from cutting a canal, we are astonished that it is not already completed."

Not only was the canal important in terms of economics, it was also important from a military standpoint. The loss of time in moving troops around the falls would be critical in a military campaign.

As early as 1810, the State Legislature passed a bill authorizing the subscription of $150,000, to the capital stock of the Ohio Canal Company, contingent on the Company raising a matching sum from other sources. Only $50,000, however, was raised and the Company was not able to proceed with the project.

In January of 1825, the Louisville & Portland Canal Company was incorporated by an act of the Legislature, with a capital of $600,000, in shares of $100 each. 3665 of these shares were in the hands of about 70 individuals and the remaining 2335 were purchased by the government of the United States. In December, contracts were entered into to complete the work of the canal within two years for about $375,000. Work was actually commenced in March 1826. Many unforeseen difficulties retarded it until the close of the year 1828. At this time the contractors failed, new contracts were made at advanced prices, and the canal was finally opened for navigation, December 5th, 1830. When completed, it cost about $750,000. It is about two miles in length and is intended to overcome a fall of twenty-four feet, occasioned by an irregular ledge of lime-stone rock, through which the entire bed of the canal is excavated, a part to the depth of 12 feet, overlaid with earth.

By 1836, and in each year thereafter until the

Civil War, more than 1300 vessels were locked through annually. Thousands ran the chute when river stages allowed. Eventually the railroad replaced the steamboat as the primary mode of transport in the development and settlement of mid-America. Flat boats continued as an important form of transport from farm to market well into the steamboat and railroad era. During the peak year of 1847, more than 2200 flatboats from the Ohio Valley were recorded as landing in the New Orleans area alone.

The United States eventually acquired the last outstanding shares of the Canal Company, and after completing improvements to the Canal and constructing replacement two-stage locks, assumed full jurisdiction over the Ohio River on June 11, 1874.

EVENTS OF 1832

Eighteen hundred and thirty two was a year of tremendous inundation through the whole length and breadth of the valley, when the river rose to the almost incredible height of forty one and a half feet above low-water mark. This was an unparalleled flood in the Ohio. It began on the 10th of February and continued until the 21st of that month, having risen to the extraordinary height of fifty-one feet above low-water mark. The destruction of property by this flood was immense. Nearly all the frame buildings near the river were either floated off or turned over and destroyed. An almost total cessation in business was the consequence; even farmers from the neighborhood were unable to get to the markets, the flood having so affected the smaller streams as to render them impassable. The suffering caused by this flood was appalling.

Although Louisville experienced its first wrath of flooding, it was fortunately spared another tragic event that swept the surrounding area that year - a great cholera epidemic. The epidemic was tragic at Cincinnati and many other points in the Ohio valley, as well as elsewhere in the country; but at Louisville the scourge was scarcely felt, except in the fears evoked by its ravages elsewhere. The sanitary conditions and precautions were much more favorable than in years before.

At last the Falls City had earned a reputation for healthfulness and good sanitary conditions, quiet in contrast with its old and most unfortunate fame.

POND CREEK DRAINAGE COMPANY

By far, the most intensive drainage improvements in the unincorporated areas of the County have occurred in the low-lying areas to the south and southwest. Most of the major channels in these areas are manmade and were constructed to make usable land from an existing swamp.

The first, large scale, organized effort to drain these areas was undertaken by the Jefferson Pond Draining Company which was authorized by an act of the Legislature and chartered in 1838. The Company was granted authority to raise capital through taxation and was in existence for about thirty years.

The Company`s projects included Pond Creek, Northern Ditch, Southern Ditch and various tributaries of this system. Although improvements to a number of these channels were made in subsequent years, the alignment set by the Company has remained.

Financing of these projects varied through the years and was always a source of difficulty. Minutes of the board meetings are filled with entries regarding delinquent taxes and attempts to collect them. Initially each property owner in the Company's boundaries was taxed a flat amount of $.05/acre/year. This amount varied from year to year. The minutes later reflect attempts to levy taxes based on assessed value per acre after drainage improvements. Property owners were constantly disputing assessed values and Juries would be summoned to resolve the disputes. Indeed the last entry in the minute books of the board on August 28, 1868 reflect the company's financing difficulties. The minutes note that much opposition had been raised to taxes that had been levied. Claims were made that the collector for the Company had not been afforded the right to seize and sell property as a result of delinquent taxes. Further claims were made that the act of the Legislature which created the Company was unconstitutional. The attorney for the Company was directed to investigate these matters immediately. Apparantly the Company went out of existence shortly thereafter.

LOUISVILLE'S COMBINATION SEWER PROJECT

As the population of Louisville continued to grow, the City began replacing earthen swales and ditches with underground combination sewers. The sewers were designed to handle both sanitary wastes as well as storm runoff, hence the name combination sewers. The following is from "Final Report of Commissioners of Sewerage of Louisville" published in 1942.

"The first sewers of the city were built previous to 1850, according to a list in Louisville Municipal Reports for the Fiscal Year Ending December 31 1868, these being the sewers in the following streets: Second Street, from Jefferson Street to Beargrass Creek (before the Beargrass Cutoff was excavated); Sixth Street, from a point 123 feet north of Jefferson Street to the Ohio River; and Tenth Street, from Congress Street to the ravine north of Monroe (now Rowan) Street. The sewer in Second Street was constructed of stone, being of rectangular cross-section 2 ft.wide and 4 ft. high. The sewer in Sixth Street was constructed of brick, being of circular cross section 33in. in diameter. The sewer in Tenth Street was constructed of brick, being of circular cross section 48 in. in diameter. Other sewers, of similar construction, were built in 1850, 1856, 1858 and so on. Portions of the old sewers built prior to 1850 are still in service.

Beginning in 1858, and continuing in 1860, 1862, 1863, and so on, many sewers were built of egg-shaped or so called `oval' sections, all of the egg-shaped sewers being built of brick, with a few exceptions. Vitrified clay or `stoneware' pipes (circular) were used in 1865, 1870, 1871, and thereafter: and precast cement pipes, both circular and egg-shaped or oval, were used to a small extent in 1872, 1875, 1876, and so on. However, most of the old sewers of the city were constructed of vitrified clay pipes or of brick, and are circular in cross section. Besides these two types, probably the brick, egg-shaped section was used most, in constructing the old sewers."

Later work was constructed by the Commissioners of Sewerage of the City of Louisville. Altogether tne Commissioners of Sewerage was in existence for 23 years from 1919 to 1943. Financing of the work was principally by three bond issues totalling $17,000,000. A total 0f 110 contracts were completed by contractors and 25 projects were constructed by day labor or force account.

The Commissioners of Sewerage was the predecessor of the present day Metropolitan Sewer district.

COUNTY GOVERNMENT ACTIVITIES 1890-1937

In the late 1800's and early 1900's County Government began taking an active role in funding drainage improvements. From 1890 to 1910, Fiscal Court records show many entries related to drainage, primarily culverts crossing major roadways.

A citizens committee was formed in the early 1900's to study the Mill Creek and Pond Creek watersheds and advise the Court of its recommendations for improvements.

On June 7, 1910 the Committee reported on Mill Creek. A major improvement to Garrison ditch had been planned to drain a large portion of the area. This project required additional right of way to widen the ditch. Owners were reluctant to donate the right of way and the County was reluctant to condemn. An alternate route was proposed by a S. F. Crecelius, Engineer. This route would drain the upper portions of the watershed via a manmade ditch directly into the Ohio River. This route would go through undeveloped land and the County would have fewer property owners to negotiate with. The alternate route, the Mill Creek Cut-Off, was adopted by Fiscal Court and Crecelius was hired to do the job for "5% of cost."

On July 19, 1910 Fiscal Court approved the plans for the Mill Creek Cut-Off and authorized advertisement for bids. Two contracts were awarded in 1910 for construction of 7800 feet of the channel at a total cost of $28,514.40.

Other major improvements initiated by the Fiscal Court during this period through the 1930's include the following:

DATE	PROJECT	COST
AUG 1910	LONG RUN FROM ORELL RD SOUTH 4 1/2 MILES	$6,131
SEP 1910	POND CREEK 3.75 MILES	$20,315
JUN 1911	POND CREEK 2.65 MILES	$27,147
JUN 1911	MILL CREEK 4.6 MILES	$32,754
JUN 1914	BIG RUN FROM ILL CENT RR TO MILL CREEK	$7,804
JUN 1914	POND CREEK 2.6 MILES	$40,883
JUL 1914	"C" AND "D" FORKS OF MILL CREEK	$11,251
MAR 1915	MILL CREEK THROUGH BEECHMONT	$3,683
MAR 1915	POND CREEK 1.8 MILES	$25,997
MAR 1915	POND CREEK 1.9 MILES	$12,734
DEC 1916	N. AND S. DITCHES FROM JUNC. TO L&N RR	$10,744
JUN 1916	ADDITIONAL WORK ON N. AND S. DITCHES	$30,420

Numerous other smaller projects were approved through 1935 including the following:

Fish Pool Creek
Fish Pond Ditch
Gheen's Ditch
Bee Lick
Slop Ditch
Corr-Miller Ditch
Waverly Hill Ditch
Black Pond
Long Pond at St. Helen's
Greasy Ditch
Valley Station Ditch
Gagel-Davis Ditch

Also in 1930 the County authorized $40,000 for a joint City-County project for improvements to Beargrass Creek.

In addition, the Fiscal Court records show many entries regarding payrolls for Drainage Crews. No specific projects are identified however. Possibly much of the work was related to maintenance. References are also made to WPA crews in the 1930's but here again specific projects are not identified.

The benefits of many of these drainage improvement projects are alluded to in a report by Ms. Elizabeth Jones:

"This initial drainage effort met with wide approval in the region and several newspaper articles heralded the accomplishments. In 1923 the Courier-Journal published the following article.

`Kentucky furnishes no better evidence of the reclamation of waste lands than what has been accomplished in the "Wet Woods" section of Jefferson County in the last twenty-five years. Thousands of acres of swamp have been reclaimed and made most productive.

There was a time when the "Wet Woods" section was a dismal swamp and sparsely populated. About the only occupation was charcoal burning and this was carried on for many years in the section that became notorious for lawlessness. Many crimes were committed and killings were of frequent occurrence, in many cases the slayers never having been apprehended.

Then the work of reclaiming the waste land began and it was found that draining the water and carrying it off by means of tiling and ditches, left a fine and fertile soil that would produce anything grown in this section of the country. Land that was originally purchased at $5 an acre, and tiled at a cost of $50 an acre additional, now cannot be bought for $300 an acre.

The erstwhile swampy and desolate area has been

transformed into rich and productive farms and truck gardens. The "Wet Woods" formerly abounded in scrubby timber, but much of this has been cleared away in the work of reclamation to increase the acreage of productive farm lands. From a squalid, destitute and malaria-infested district, the "Wet Woods" section through systematic drainage has been made tillable and wonderfully productive.'

Then in 1929 the Courier Journal again acclaimed the reclamation project, stating that `Through the consummation of the drainage project within a generation, the swampy area practically has disappeared and has been made productive.' The article went on to make a comment on the fact that what had been accomplished was `the effacement of what long had been an eyesore to the landscape. Ornate suburban homes have risen in what was once a morass, and high producing truck farms dot the section that at one time was more or less covered with surface water.'"

FLOOD OF 1937

As mentioned earlier, Louisvile was subject to periodic flooding of the Ohio River. In addition to the earlier described flood of 1832 severe floods also occurred in the following years: 1847 (40.7 ft.), 1883 (44.6 ft.), 1884 (46.7 ft.), 1907 (41.4 ft.) and 1913 (44.9 ft.). The most severe flood occurred in 1937 (57.4 ft.). The following is an account from "Louisville Panorama."

"Louisville as a riverfront city, had always been used to minor spring floods, and even major floods now and then. But Louisville in its entire history had seen nothing to compare with the disaster caused when the muddy Ohio, surging and rolling, left its banks in January 1937, to reach a crest of 57.4 feet on January 27, engulfing most of the city and causing millions of dollars of property damage and untold suffering and hardship to thousands of Louisville citizens."

Another account is taken from the Final Report of the Commissioners of Sewerage.

"The flood in the Ohio River at Louisville may be said to have begun when the river, after rising above elevation 420 (the normal elevation of the upper pool), passed the so-called "flood stage" (elevation 431) just before midnight on January 15, 1937. The peak of the flood, elevation 460.4 as determined by the Commission's engineers, at Sixth and Main Streets, was reached on January 27, 1937, at 3:00 a.m., and the river remained at this elevation until 10:00 a.m. on the same date. On February 7, 1937, between midnight and noon, the river had fallen to below flood stage, and on February 8, 1937, between noon and midnight, it had receded to normal pool elevation. This proved to be the end of the flood, the pool of the river remaining practically at this normal elevation for the remainder of the year."

Continuing from the Commission of Sewerage Report-

"After the Ohio River flood of 1937, the Congress of the United States enacted legislation whereby flood protection might be obtained by the cities and towns of the Ohio valley. The legislative act provided that the Federal Government would build retention dams across tributary streams, for the purpose of reducing future flood crests of the Ohio River, and would build levees, floodwalls, and other structures at and around cities and towns located along the river and its tributaries, for future protection against flooding. This latter work is generally known as local flood protection.

The acts of Congress stipulated that the construction of levees, walls, and appertaining structures for local flood protection, including the necessary revisions and additions to the sewerage system of a municipality, would be done with money furnished by the

Federal Government. The design and construction of the work, it was provided by the Congress, would be done under the direction of the Corps of Engineers, United States Army. The congressional acts also stipulated that when the offer of the Federal Government to do the work is accepted, the municipality must furnish, without cost to the Federal Government, the necessary rights of way where structures are to be placed in or across private property."

As a result of this Federal Act, a major flood control system was constructed which protects an area of 17,600 acres. The system comprises 12.8 miles of earth levee, 4.1 miles of concrete floodwall, 13 pumping plants for removal of interior drainage during high river stages, road and railroad closure structures and closure valves for pipes, sewers, and conduits which pass under the protective works.

POST WORLD WAR II BOOM

Following World War II, development in suburban areas began at a rampant pace. Residential subdivisions in the unincorporated areas of the County were being constructed seemingly overnight. FHA and VA financing was plentiful and readily available, and developers lost no time in accomodating this explosive market. The population of Jefferson County (outside the City of Louisville) grew from 385,000 in 1940 to 611,000 in 1960 a 59% increase. While many subdivisions were constructed with adequate drainage systems, most were not. In addition, many areas were developed with no adequate outlet for new subdivision drainage. County development standards related to drainage were minimal and construction inspection was nill. The temptation to develop a poor site and sell the lots for a fast profit was too much for some developers. Many of the mistakes made during this period have come back to haunt the County in more recent years resulting in large expenditures of public funds to correct.

During the 1950's, citizens began demanding relief from poor drainage situations. As a reaction to the growing pressures, Fiscal Court in 1956 created the Jefferson County Surface Water District to cope with the serious drainage problems in the County. The Court further authorized the Metropolitan Sewer District to act as its agent in performing the duties of the Drainage District. In October 1959 the Drainage District employed and permanently assigned a 5 man crew with special equipment to clear drainage ditches throughout the County. The value of the benefits of the work of this crew prompted the Fiscal Court in July of 1961 to employee 7 additional men to form two crews of six men each. One crew performed the clearing of single or concentrated blockages in channels throughout the County and the second was assigned to the Southern Ditch area from Old National Turnpike eastwardly toward Preston Highway.

In addition to the maintenance operations being performed by the Drainage District, the County also began addressing the problem of inadequate capacities of many of the major channels. In May 1955 the Consulting Engineering firm of Watkins and Martin was employed by the County to investigate surface water problems in the southern and western portions of the county. Three watersheds, Mill Creek, Pond creek and Beargrass Creek were studied and a report completed in October 1955. The study recommended that numerous drainage structures of inadequate capacity be replaced and extensive clearing and excavation be performed. The report recommended a "Phase I Program" to consist of channel clearing and grubbing and certain minor channel improvements. This work was undertaken in 1956 and included Mill Creek and its tributaries, as well as Pond

Creek and its tributaries upstream from the Stonestreet Bridge.

Preparation of detailed construction plans and specifications for a major program of improvements on Pond Creek and its tributaries was authorized in October 1956 (as a Phase II Program) and completed in February 1958. The proposed work was divided into four parts as follows:

Contract 1 - Channel improvements along Pond Creek from Stone Street Bridge to its confluence with North and South Ditches.

Contract 2 - Channel improvements along North Ditch and its tributaries.

Contract 3 - Channel improvements along South Ditch and its tributaries.

Contract 4 - Rehabilitation of certain privately owned drainage structures and construction of certain new drainage structures

In order to finance these capital projects, the State Legislature passed a law which empowered the District to determine the need for drainage and to assess the cost of drainage improvement against the benefited property owners. During the period from 1958 to 1960 implementation of this drainage law proved to be unworkable and was later repealed in 1964. The County, recognizing the need for drainage improvements, and upon receipt of County Occupational Tax money beginning in 1961, authorized the District to begin making improvements to major drainage channels using County tax dollars. Actual construction on Contract 1 was undertaken and completed during the summer and fall of 1961 by the George M. Eady Company.

In October of 1961, at the request of the L. and N. Railroad (a large property owner in the area) and the Louisville Chamber of Commerce, the Consulting Engineers were directed to review the construction plans of 1958 to evaluate the feasibility of lowering the surface water elevations approximately 3 feet below those shown on the plans. A report on the restudy of the drainage plans was completed in Jan. 1962. It concluded that it was feasible to lower the expected surface water elevations but not for a full 3 feet in the entire area of study. It further concluded that any significant lowering did not appear feasible unless Pond Creek proper, below the confluence of North and South Ditches was widened, lowered and/or the

slope of the bottom of the ditch was increased. In fact, below Stonestreet Road most of the flooding was related to backwater from the Ohio River and no amount of improvement would significantly reduce flooding. As a result of the extremely large costs involved to effect any significant lowering, plans were only changed where lowering would be cost effective and construction of the remaining work resumed. The following is a breakdown of the Pond Creek Drainage Improvements showing the Contract Number, completion dates and construction costs exclusive of right-of-way costs:

Contract	Date Completed	Cost
I	Jun 1962	$ 135,967
II	Dec 1962	669,260
III	Feb 1964	683,869
IV	Aug 1965	258,039
IV-A	Jul 1965	93,692
V	Sep 1966	242,226
V-A	Nov 1967	566,905

Total Cost = $2,649,961

Total miles of drainage improvements = 41.42 miles

In 1966, the County also provided the funds for the improvement of the South Fork of Beargrass Creek from Bashford Manor Lane to Bardstown Road. This improvement was begun on March 22, 1966 and completed on Jan. 19, 1967 at a cost of $54,979

In addition to work in the Pond Creek and Beargrass Creek watersheds, the Drainage District also began improvements in the Mill Creek watershed. In December of 1964 the District contracted with Hazelet and Erdal, Consulting Engineers to begin work. The Contract called for a preliminary drainage study and report to be submitted under Phase I and construction plans and specifications to be prepared under Phase II. As was mentioned in an earlier section, portions of the upper extremeties of Mill Creek were rerouted directly into the Ohio River via the Mill Creek Cutoff. This resulted in an Upper Mill Creek and a Lower Mill Creek watershed. The following is a list of improvements to both the Upper and Lower Watersheds.

LOWER MILL CREEK

Contract	Date Completed	Cost
Valley Village	Jun 1969	263,793
600 Tributary	Aug 1968	778,634
800 Tributary	Sep 1969	406,559
Lower Black Pond	May 1976	1,218,183
700 Tributary	Oct 1972	189,740
Lower Main Stem	Dec 1976	343,362*
Upper 700 Trib	Nov 1977	542,539*
"B" Tributary	Dec 1976	109,805*
Upper Black Pond	Feb 1978	352,960*
Long Run	May 1978	721,066*
	Total Cost =	$ 4,926,642

Total Length of Drainage Improvements = 22.68 miles

UPPER MILL CREEK

Main Stem	Sep 1972	$ 1,236,505
Wilkie Road Bridge	Jan 1972	41,677
Boxwood Ditch	Aug 1974	726,382
Upper Hunters Trace	Jul 1975	1,126,828*
Cane Run	Feb 1978	712,665*
Blue Tributary	Feb 1978	254,625*
	Total Cost =	$ 4,098,682

Total Length of Drainage Improvements = 8.04 miles

* Paid from Bond Issue (See Next Section)

SOUTHWEST JEFFERSON FLOOD PROTECTION PROJECT.

As a result of the periodic and severe flooding in Southwest Jefferson County from the Ohio River, a flood protection project was proposed in 1970. The project would be cost shared with the Federal Government. The County would acquire all Right of Ways needed for the project and the Federal Government would construct the Floodwall levee and pumping stations. In order to pay for the local share, a bond issue was proposed on the 1970 ballot. The referendum was defeated but was revised and reappeared on the 1972 ballot at which time it passed. The wording of the Bond Issue included not only the flood protection works but also "related drainage improvements". The amount of the Bond Issue was 17 million dollars but with interest earned in subsequent years amounted to approximately 20 million dollars. It was this source of funding that was responsible for many of the Mill Creek Improvements as noted above.

The flood protection project itself is designed to protect an area of approximately 24,100 acres subject to flooding of the Ohio River at a 1937 flood stage. The plan for the floodwall consists of about 70,750 feet of earth embankment and 2,450 feet of concrete wall or about 13.9 miles. The plan also includes 4 pumping stations, 15 drainage structures through the levy and relocations required in modification of affected roads and railroads. Total estimated costs as of 1980 were $76,190,000 of which $66,600,000 is Federal and $9,590,000 Local. The first construction contract was awarded in Oct. 1973 and the entire project is scheduled for completion in 1986. At such time as the project is totally complete and functional, maintenance of the project will become the responsibility of the County.

As was noted earlier, improvements to Pond Creek below Stone Street Road had not been considered feasible since the controlling factor was backwater from the Ohio River, i.e. no amount of channel widening or deepening would change the backwater elevation. With the flood protection project and the completion of the Pond Creek pumping plant however, this situation will be changed. Backwater from the Ohio will be controlled by the levee and headwater will be pumped over the levee. Thus headwater will become the controlling factor and improvements below Stone Street will be effective in reducing headwater flood elevations. This being the case, the County has prepared plans for improvements to Pond Creek downstream to Blevins Gap Road. Engineering costs were paid from the bond issue, however funds have not been made available for construction. The estimated cost for this improvement of Pond Creek from National Turnpike to Blevins Gap Road is $15,000,000.

JEFFERSON COUNTY'S WATER MANAGEMENT PROGRAM

The Water Management Division of the Department of Public Works was created in September 1971 prompted by the need for technical review of proposed zoning and new construction plans. The development that occurred in prior years had resulted in extensive surface water problems that could have been avoided if proper consideration to drainage had been given during the plan development stage.

Although this office is a part of the Jefferson County Department of Public Works, its jurisdiction is County wide and includes the City of Louisville and other incorporated areas of the County. This results from the statutory responsibility of the County Engineer related to approval of development plans. Since its inception in 1971, the division has assumed more responsibilities. The five areas of responsibility of this office are zoning and new construction review, capital improvement construction, inspection and field investigation, local (neighborhood) drainage maintenance and main channel drainage maintenance.

Construction plans are reviewed by this office and followed up by field inspection to assure that drainage facilities are constructed to prevent on-site and off-site stormwater damages. In addition special emphasis is placed on erosion and silt control.

One innovative hydraulic concept introduced by this office was that of surface water retention. This concept, simply stated, requires that runoff after construction should not exceed pre development runoff. This is made possible by reserving areas on site to temporarily store surface runoff and then release it slowly after the rainfall subsides. This is particularly applicable in areas where downstream improvements are not feasible to accomodate increased runoff from new development. Retention may be accomplished in a number of ways such as parking lot storage, drainage swales with throttled outlets or areas set aside specifically for storm water storage. The particular method varies from site to site and with the innovation of the designer.

The number of construction plans reviewed annually is a function of the local economy and varies from year to year. Most recently, in 1984, 863 plans were reviewed. These included 40 subdivisions, 263 commercial and 560 other.

In 1978, the County elected to participate in the National Flood Insurance Program. Prior to this time, no flood insurance was available from private insurance companies. The National Flood Insurance Program is federally subsidized and is administerd by the Dept. of Housing and Urban Development. As a condition of the Federal government making flood insurance available, the County was required to adopt a Flood Plain Management

Program to assure that future development was not flood prone. An extensive mapping program was undertaken to indentify flood prone areas of the County. This mapping program resulted in identifying floodway areas and flood way fringe areas. The floodway area is that area that is required for handling a storm that would statistically occur once in a hundred years. No development is permissible in the flood way area that would impair the capability to convey the hundred year flood. The flood way fringe is adjacent to the flood way and is subject to flooding by the 100 year storm. Development in the floodway fringe is permissible but only if the site is elevated above the 100 year flood elevation or special flood protection measures are constructed. Enforcement of the flood plain regulations as related to new construction is a function of the Water Management division.

The second area of responsibility is administering capital improvement projects, i.e. drainage improvements built with public monies. These projects are either designed in-house or by consulting engineers, depending on the scope of work, and then constructed by private contractors selected by competitive bid. Funding of these projects has either been with federal community development money, general county money or special grants from the state.

In 1975, the County began receiving Federal Community Development money. The Community Development Block Grant program replaced several categorical block grant programs such as Urban Renewal and was designed to give local officials more say in administering projects. In addition, grants were received annually which allowed for orderly project planning and execution. The goal of the Community Development program was to improve living standards in low and moderate income areas. In order to determine project priorities and oversee the administration of the program, the Fiscal Court appointed a Citizen Advisory Group consisting of citizens from many of the low and moderate income areas to make recommendations to Fiscal Court. Projects funded under community development were generally under four categories; drainage improvements, housing rehab, parks and misc. Based on recommendations from the Advisory group, drainage received the largest percentage of the funding. From 1975 to 1984 approximately $8,000,000 had been appropriated for drainage. Most of the projects were desinged to improve localized drainage in neighborhoods that had been built with inadequate systems. Below is a list of some of the larger projects constructed with Community Development funds and approximate project costs.

Project	Cost
Berrytown/Griffytown	$ 1,900,000
Zib Lane Area	185,000
Glengary/Homestead Acrea	500,000
Valley Village	780,000
City of Lynnview	175,000
Fairview Avenue Area	250,000
Villa Ana	730,000
Bridget/Doris Area	210,000
Edlin/Aganza Area	160,000
Nash/Tolls Area	270,000
Huston/Beatty Area	350,000
Minor Lane Heights	450,000
Riverside Gardens	760,000
Kentucky/Daisy	160,000
Big Run Drainage	280,000
Omar Khayyam	175,000

In addition to Community Development projects, general County revenue has been used to fund some capital projects in recent years. This has been on somewhat of a limited basis however since Community Development funds were readily available. Areas that did not qualify for CD funding and were in need of drainage improvements were funded from general funds and include the following: Rosemary Drive, Sungold Estates and Cheri Village. One large project has been funded by County funds with limited cost sharing by the State is the Shady Villa Area. This project is being constructed in five phases. Currently phase III is 70% complete. The estimated cost for the entire project is approximately $1,900,000.

One of the more interesting projects constructed by this office in recent years has been the Dry Bed Reservoir. The purpose of this project was to lower flood levels along the South Fork of Beargrass Creek. This project is located in the upper reaches of the watershed off Taylorsville Road in the Houston Acres subdivision. It has the appearance of a huge dam with a stair step spillway on the side cut out of existing rock. The area behind the dam however, is normally dry except for the creek which flows through a pipe at the base of the dam. During heavy rainfalls however, the pipe is not large enough to pass all the storm water and water backs up behind the dam and is released slowly through the pipe. It functions much like the retention basins described earlier but on a much larger scale. This project was cost shared with the State funding 50% and the City and County each contributing 25% for a total cost of about $3,000,000.

The third area of responsibility is inspection and field investigation. The Water Management Inspection Staff

is responsible for making personal contact with citizens who have informed the County of drainage related problems. After field review and consultation, a solution is then recommended along with the party responsible who is requested to resolve the problem. Follow-up is often necessary to insure completion. The number of inquiries vary seasonally with the spring and fall being the busiest seasons. Approximately 1250 inquiries were processed by the inspection staff in 1984. In addition the inspection staff is responsible for ensuring compliance by builders and developers with the Metropolitan Subdivision Regulations and with County Works Construction Standards and Policies in the area of Water Management.

Local (Neighborhood) Drainage Maintenance is handled by three small crews that perform maintenance and remedial construction on deteriorated drainage facilities and storm sewer systems. Most of their work is done in the restricted areas of subdivisions in side and rear yard easements instead of roadway right of ways. Often they combine their efforts with other maintenance personnel to provide support on larger drainage channels or roadways. In 1984, a total of 320 projects were completed. Most were small projects, some were large and some were cost shared with the citizens who most directly benefited.

Prior to 1979 maintenance of major drainage channel was contracted to the Metropolitan Sewer District. The County in 1979, in an effort to be more cost effective assumed direct responsibility for major channel maintenance. The County presently has approximately 100 miles of improved channels to maintain. Approximately 50 personnel are employed in drainage maintenance. They work year round repairing wash-outs, mowing the channels, spraying to prevent undesirable growth, and performing special functions as necessary to maintain the improvements and protect the County's investment.

FUTURE OF STORM WATER MANAGEMENT

Through most of the history of Jefferson County, the design and construction of storm water facilities has been one of the least understood and most neglected aspect of the planning process. From the perspective of elected officials, everyday needs such as roads, water supply systems and other facilities have generally taken precedence. Rapid development of the County after World War II created numerous problems and severly overloaded inadequate sytems. In more recent years, the County has made great strides in not only correcting some of the worst problem areas but also ensuring that drainage is adequately addressed for new construction. Continuation of these efforts is essential to ensure that problems are not created in the future.

One item which should be addressed if the County is to complete needed capital improvement projects, is an orderly method of financing these projects. With a few exceptions, funding of capital projects has been hapazard and has had no sense of continuity. To a large extent, funding has resulted from reaction to a crisis or disaster. Funding of capital projects for utilities such as water supply, sewers, gas and electric are made possible through user fees. There is no comparable analogy for storm water projects. All projects have been financed by the public in one form or another. This generally results in non benefitted property owners paying a disproportionate share of project costs. The attempts to fund projects through assessments to benefitted property owners however has never been successful. Perhaps one method of orderly financing would be through a special user fee as part of sewer charges. Regardless of the method of financing, there should be some sort of drainage fund established so that funds can be made available on a regular basis to ensure orderly planning and implementation of drainage projects.

Another matter which should be addressed to improve the effectiveness of the County's Water management program is the concept of Watershed Planning and Management. At the present time, the drainage requirements for new construction are reviewed on an individual basis. Each developer is required to provide for on-site retention or to show that the downstream drainage system is adequate to convey the increased runoff. It has been proven over the last few years that constructing many small, on-site retention basins is not the most efficient or effective method of handling increased runoff. A more efficient method would involve studying the entire watershed (which is now possible through new technology and computer methods) and constructing fewer, but larger, regional retention basins. These basins would not only be more efficient in controlling the increased runoff but would

also be less expensive to construct and maintain. Financing of these regional basins could be possible through bonds issued by the County. The bonds could be retired by fees imposed on developers based on the amount of increased runoff generated by the new development. These fees would probably not represent additional costs to developers, particularly if on-site retention would have been required.

In order to pursue this concept, the Water Management office initiated a Watershed Management Committee in the summer of 1984. This committee has consisted of representatives of Jefferson County, City of Louisville, Metropolitan Sewer District, Health Department, State Highway Department, Soil Conservation Service, Corps of Engineers, Professional Engineering Societies, and the Association of General Contractors. The committee has recommended that the City, County and MSD jointly contribute $60,000 each for a total of $180,000 to employ a consulting engineering firm to conduct the watershed study. Requests for funding have been included in the proposed budgets of each entity for the Fiscal Year beginning July 1985.

Finally, the effectiveness of Storm Water Management can be increased by eliminating many of the overlapping functions of the agencies. The above mentioned study would include a review of the functions of the agencies, the legal basis for each, and make recommendations for streamlining the plan review functions.