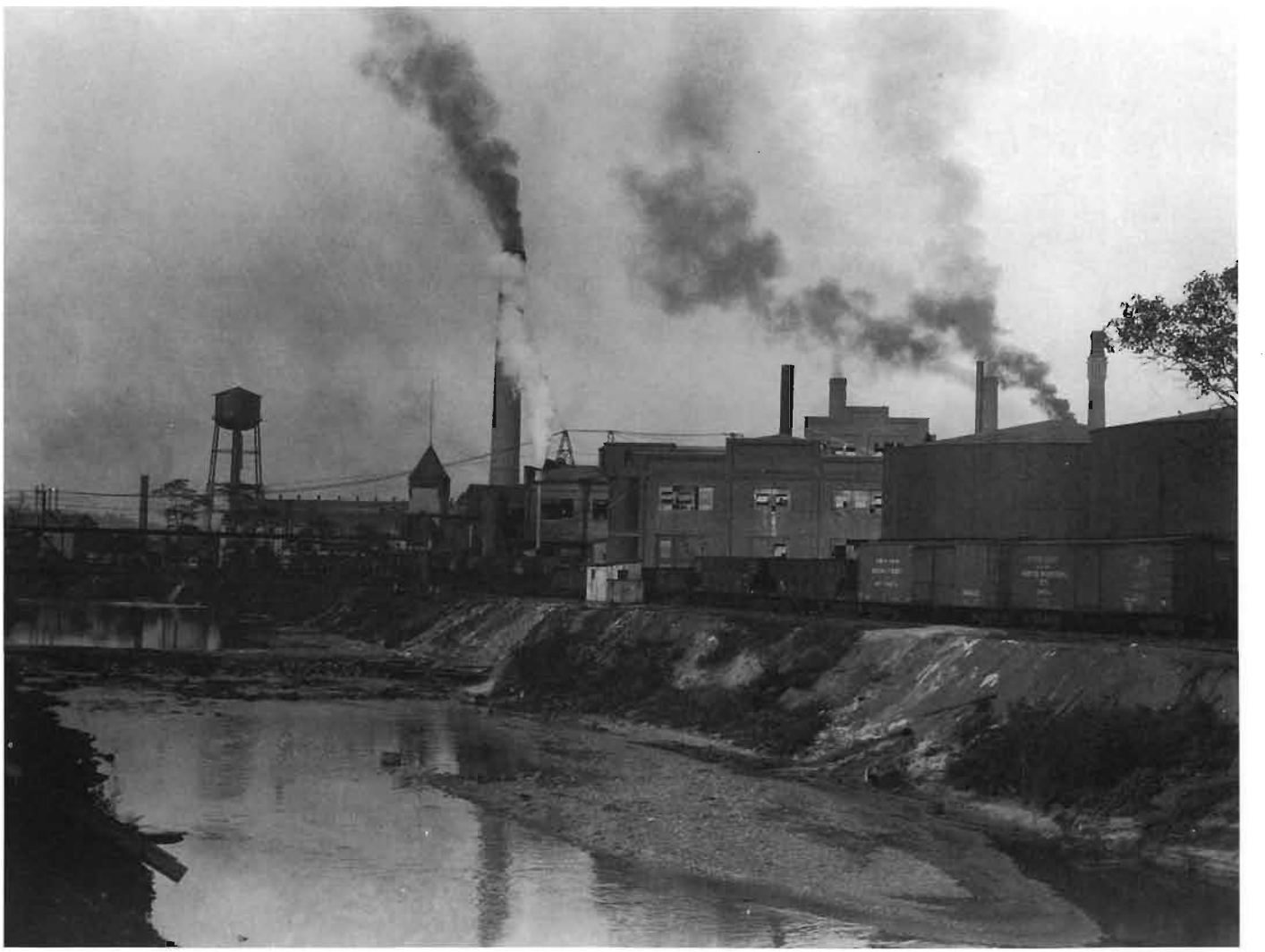
Waterproofing the Mill Creek Flood Plain

Stanley Hedeen

As night must follow day, after the Flood of '37 there would be flood control action. There would be dams and reservoirs, levees and floodwalls, and after that new acts to authorize even newer projects. It is hard to keep track of it all.[1]

The Mill Creek Valley has been flooded repeatedly by backwater spilling upstream from a flooding Ohio River, as well as by storm runoff from the creek's own basin. Newspaper accounts document that Mill Creek floods caused by an overflowing Ohio River occurred about every other year during the nineteenth and first half of the twentieth centuries. One year in five these backwater floods caused significant property damage as far north as Northside.[2]

James Hall described the inundation of the lower Mill Creek Valley in 1847: "the serpentine channel of Mill Creek was entirely lost in the view, and in its stead was a wide expanse of water, covering the whole plain to the base of the hill on either side."



Throughout the nineteenth and first half of the twentieth century the Mill Creek Valley was flooded by backwater spilling upstream from the flooding Ohio River. (CHS Photograph Collection)

Stanley Hedeen, Professor of Biology and former Dean of Arts and Sciences at Xavier University, is the author of *The Mill Creek: An Unnatural History of an Urban Stream.*

The 1847 flood stirred local memories of the larger 1832 inundation, when floodwaters in the Mill Creek Valley reached a level at least a half foot higher.[3]

The repeated flooding prohibited early residential and commercial development on the hundreds of acres of Mill Creek bottomland in Cincinnati. In 1853, City Council instructed the city's civil engineer to investigate the addition of fill to bring the elevation of the Mill Creek Valley floor to the high water line of the 1832 flood. The engineer responded that the valley could be filled "as fast as it will be actually necessary to use this portion of the city." Suggested fill materials included dirt graded off of lots, earth excavated from building cellars, and refuse cleaned off city streets. The engineer concluded by forecasting that the growing railroads "will occupy no small portion of what is now considered comparatively valueless property," and that "an immense business will be done in the southern portion of this valley, in the course of a few years."[4]

As predicted, the lower valley was gradually filled as Cincinnati expanded toward the western hills. By 1880, the Mill Creek's floodway had been considerably narrowed by "making land" for homes, industries, and railroad yards. Continued filling eventually raised the banks of the creek between the Ohio River and Ivorydale by fifteen to twenty feet. From Ivorydale northward through Carthage most of the bottomland west of the stream was raised and occupied by residential and commercial developments. Above Carthage, fill was added to flood-prone land in Reading, Lockland, and Wyoming.[5]

Unfortunately, the elevations of the filled bottomlands were generally insufficient to raise them above the higher Ohio River floods in the Mill Creek Valley. A 1907 deluge caused nearly $1 million in damages, including emergency costs of caring for flood refugees and the expense of restoring flooded areas to pre-flood conditions. Damages from a 1913 flood also totalled almost $1 million. Severe (and expensive) flooding occurred again in 1918 and 1924.[6]

When another Ohio Valley municipality guaranteed flood immunity to industries that might relocate to that city, Cincinnati's city planners were spurred to action. In 1925, they proposed building a dike to seal off all or portions of the Mill Creek Valley from the Ohio River. One version envisioned a dike across the whole width of the valley and included an expensive watergate at the mouth of the Mill Creek. A less costly alternative eliminated the gate by having the dike turn up the eastern side of the creek to Liberty Street, thus protecting the Mill Creek Valley lands adjacent to downtown Cincinnati. The 1925 City Plan suggested that the feasibility of constructing a flood control dike be studied in collaboration with the United States Army Corps of Engineers.[7]

The Corps had become officially involved in flood control just eight years earlier, when in 1917 Congress passed the first Flood Control Act. The act required the Corps to consider flood control needs and other river basin issues during its naviga-

The Mill Creek floods caused significant damage in Northside. Damages from the 1913 flood totalled almost $1 million. (CHS Photograph Collection)

tion surveys. However, subsequent flood control reports compiled by the Corps were general in nature and made no specific recommendations for flood protection, since there was no federal authority to undertake flood control activities across the nation.

During the Depression years of the 1930s, the Corps was ordered to furnish technical assistance to work-relief flood control projects funded through the WPA, PWA, and NIRA programs. These Depression-born activities led the public to consider flood control as a general federal obligation. Following disastrous floods in New England during the mid-1930s, Congress passed the 1936 Flood Control Act that adopted flood control as a federal responsibility where "the lives and social security of people are otherwise adversely affected." Flood control was thereafter accepted as a proper Corps activity on navigable waters and their tributaries.[8]

In December 1936, scattered moderate to heavy rains began falling across the Ohio River's 200,000 square mile drainage area. As the watershed's soils became saturated, and in many places frozen, it became impossible for the ground to absorb massive January downpours that continued to drench the Ohio Valley. The fourteen inches of rain that fell in Cincinnati between December 26, 1936, and January 25, 1937, were nearly five times the normal amount for that period. The Ohio River at Cincinnati, then normally at a twelve-foot pool stage, rose above the official flood stage of fifty-two feet on January 18. Within three days the surging river topped its twentieth century high water mark of 69.9 feet, the crest of the 1913 Flood.[9]

As two inches of rain fell in Cincinnati on January 24, the flood reached 77.3 feet. The rising water pried a number of Standard Oil Company storage tanks from their foundations in the Cincinnati portion of the Mill Creek basin. The upended gasoline tanks spread their contents over the water-filled valley, creating an flammable lake that was immediately declared a no-smoking area. Unfortunately, at 10:30 a.m. an electric streetcar wire snapped and dropped into the floating fuel. The resulting three and a half-square mile holocaust was witnessed and later

A flood in 1933 once again put Knowlton's Corner in Northside under water. (CHS Photograph Collection)

recalled by *Cincinnati Times-Star* reporter George P. Stimson:

Within minutes, the scene was a roaring inferno. Two hours later the dancing flames had consumed the refrigerator and storage building of the Crosley Corporation. In two hours, this building was reduced to twisted girders, fused glass and fallen brick. The fire next raced to the Standard Oil plant. The smoke and flame billowed to tremendous heights as tanks and drums of oil, gasoline, naphtha and other volatile fuels exploded in a staccato fashion. The flames swept through the Triumph Manufacturing Company and the Cincinnati Fence Company. At one time, firemen reported that thirty-two buildings were ablaze. . . ."Black Sunday" a Times-Star reporter with the appropriate name of Bob Waters called it, and so it is known to this day in local tradition.[10]

The Ohio peaked at eighty feet on Tuesday, January 26. The inundated lower Mill Creek basin appeared to be a lake, but one on which there was "no life, except that in rescue craft." Its shoreline followed the 509-foot contour line, thus putting the Cincinnati Reds' Crosley Field under twenty feet of water. This temporary lake, which had taken eight days to fill, drained back into the Ohio River during the next ten days. The 1937 Flood officially ended in Cincinnati on February 5, when the river finally dropped below the fifty-two foot mark.[11]

Damages caused by the 1937 Flood in Cincinnati and Hamilton County totalled $17.6 million, with losses in the Mill Creek Valley accounting for about half that figure. Twelve people died in the county, part of the toll of 137 flood-related deaths in the Ohio Valley. From the Ohio River's headwaters to the Mississippi River confluence and down to New

In 1937, the inundated lower Mill Creek basin appeared to be a lake with its shoreline following the 509-foot contour line and putting the Cincinnati Reds' Crosley Field under twenty feet of water. (CHS Photograph Collection)

Orleans, the flood submerged 12,700 square miles of usually dry land, destroyed 13,000 buildings, severely damaged 60,000 more, and drove 1.6 million people from their homes. The Red Cross assessed the 1937 Flood as the nation's second worst disaster during the twentieth century, surpassed only by World War I.[12]

Numerous flood control bills were introduced in the U.S. House of Representatives during the weeks following the 1937 Flood. The House Committee on Flood Control assembled these bills into a Flood Control Act that embodied the various proposals covering all of the localities that had suffered flood damage. This Act, approved on August 28, 1937, authorized Corps of Engineers investigations of existing flood problems and of the practicality of providing corrective measures. The Corps' studies and flood protection plans resulting from the examinations were funded by $178 million in federal appropriations during 1937 and 1938.[13]

In 1939, on the basis of two years of research and public hearings, the Corps supported Cincinnati's 1925 plan to wall off the mouth of the Mill Creek Valley against Ohio River floods. To determine the necessary height of a barrier dam, the Army Engineers calculated a maximum possible river stage by superimposing the 1913 Flood upon the 1937 Flood. From this theoretical stage they subtracted the height of the total flood waters that would be withheld from the Ohio River by the flood control reservoirs planned for the river's watershed above Cincinnati. These calculations resulted in the Corps' plan for a one-and-a-half mile barrier dam erected to the height of an eighty-three foot river stage.

The barrier dam would consist of earthen levees and concrete walls with openings and gates at railroad and street crossings. The gates would be closed when the Ohio River reached flood stage. The dam also would have a watergate through which the Mill Creek would pass during normal river stages. With this gate closed at flood stage, the waters of the Mill Creek would be pumped through the barrier dam. The engineers determined the maximum required pump capacity by estimating the heaviest rainfall that could occur in the Mill Creek watershed. Having provided for the greatest possible water volumes behind and in front of the barrier dam, the Corps vowed that the structure would prevent any inundation of the lower Mill Creek Valley during an Ohio River flood.[14]

The project was pronounced "economically justified" on the basis of a favorable cost/benefit ratio. The protection of the Mill Creek Valley would save an estimated $14,600,000 in flood losses within a decade, almost twice the barrier dam's estimated $7,543,000 construction expense. Cincinnati's share of the construction cost would be about $1,657,000, financed out of a $5,000,000 flood protection bond issue approved by its citizens in November, 1937. The project also would cost the city between $17,200 and $23,500 annually to operate and maintain.[15]

In 1940, the Cincinnati City Planning Commission and City Council debated and adopted the barrier dam proposal, and local supporters initiated intense lobbying for Congressional support. In an open letter soliciting federal assistance for the dam, the editor of *The Cincinnati Post* assured Congress that the request was not for any "Roll Out the Pork Barrel" appropriation. The editor pointed out that the people of Cincinnati already had voted to tax themselves to pay for the city's share of the project. The letter also outlined the local, regional, and national importance of protecting the Mill Creek basin from Ohio River floods:

In this valley live more than 40,000 of the city's 470,000 residents. In this valley are situated factories which represent perhaps 75 percent of the city's capital investment in industry, and which employ 65 percent of its industrial workers. It is truly the city's "meal ticket."

In this valley is a great network of railroads, the key to much of the rail transportation of this part of the Ohio Valley. In this valley are important machine tool, chemical and plastics factories whose products would prove invaluable to the nation in any emergency of war preparation.

The letter concluded by reiterating that Cincinnati was not begging for a 100 percent gift. Instead, the city was requesting Congress to share in "an investment which will pay rich dividends in preventing human tragedy and business paralysis result-

ing from the recurring floods of the Ohio River."[16]

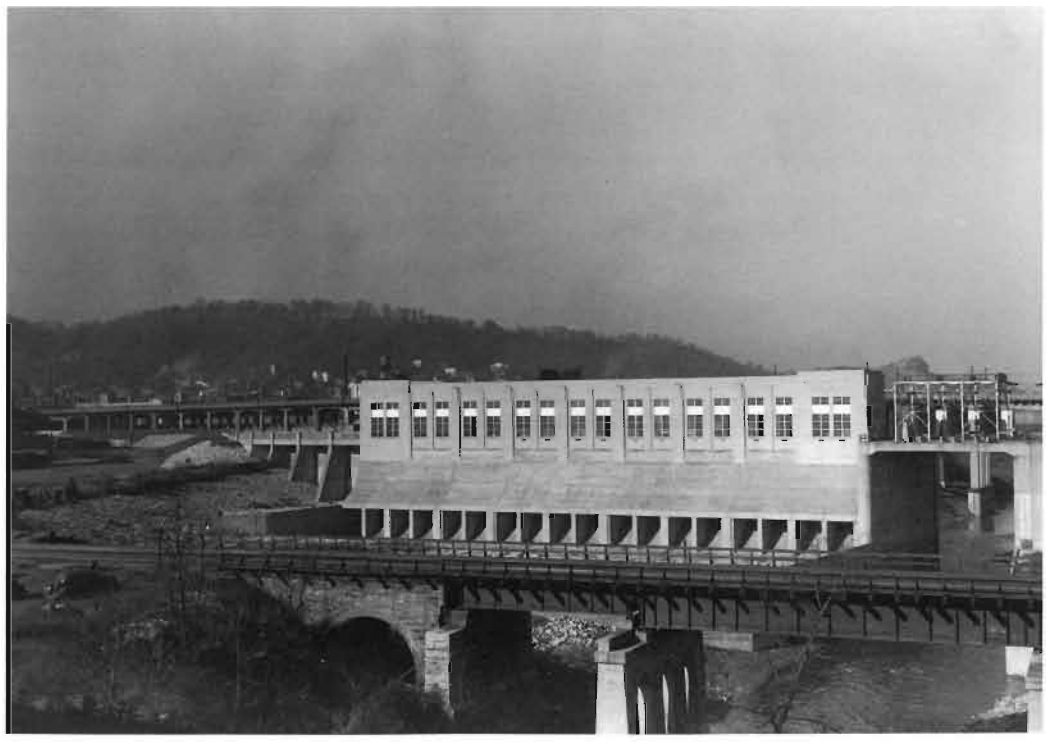
Congress heeded the many requests for barrier dam funding and authorized the Corps to proceed with the awarding of contracts for the project. On October 16, 1941, bulldozers and steam shovels started on a construction program that was projected to last two years. But just fifty-two days after excavation had begun, the nation went to war, redirecting manpower and materials away from federal flood control projects. Work on the barrier dam proceeded fitfully, so that by 1945 the dam was completed only to a height where it could protect the Mill Creek Valley against a sixty-five foot river stage.[17]

In March, 1945, when it became obvious that a quickly-rising Ohio River flood would exceed sixty-five feet, an attempt was made to temporarily increase the Mill Creek Valley's protection to seventy feet by adding sandbags to the unfinished dam. The emergency effort failed on March 6, and the lower Mill Creek basin received its last soaking from the Ohio River. The 69.2-foot flood, the century's third highest, caused at least $3,500,000 worth of damage in the Mill Creek Valley.[18]

World War II ended a few months later, but post-war material shortages and labor unrest hindered the resumption of sustained work on the barrier dam. Construction was stopped altogether in September of 1946 when the President slashed public works spending in an attempt to balance the budget. The dam project, 90 percent completed, was left $650,000 short of the funds required to finish it.

Signaling the city's determination to realize the dream of flood protection for the Mill Creek Valley, Cincinnati quickly loaned the United States the money needed to conclude the project. The loan enabled the barrier dam to be finished by March 1, 1948. The final cost of the project was $11,146,000, of which Cincinnati contributed $1,028,000.

The heart of the dam, which is still functioning, is the pumping station located adjacent to the Mill Creek watergate. This building houses eight huge pumps. When the Mill Creek gate is closed during Ohio River floods, each unit is capable of pumping creek flows into the river at a rate of one billion gallons per day. Smaller pumps also are operated during flood periods to provide for drainage from low-lying



The Corps of Engineers supported Cincinnati's plan to wall off the mouth of the Mill Creek Valley against Ohio River floods with a barrier dam. Construction of the barrier dam was interrupted by World War II and other events but the dam was finally finished at a cost of $11,146,000 of which Cincinnati contributed $1,028,000.

areas behind the dam.

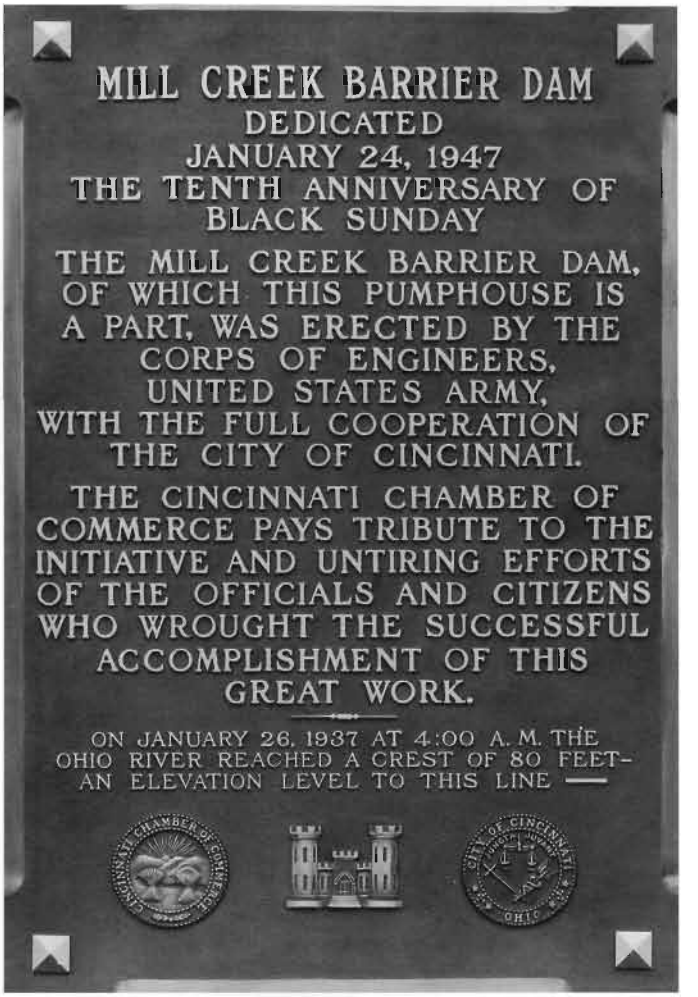
Within a dozen years of its completion, the barrier dam already had reduced flood damage by an amount equal to its total construction and operating costs. The dam yielded its first flood control benefits in only its sixth week of operation: the $11 million project saved over $4 million in flood losses when the Ohio River crested at 64.8 feet. Transportation arteries were not disrupted, and 7,000 people who would have otherwise had to abandon their homes were spared the hardship. An estimated 200 industrial plants were able to continue operations, thereby saving a million hours of work by thousands of men and women. Baseball's Opening Day also was preserved: without the barrier dam Crosley Field would have been under six feet of water on April 12, 1948.[19]

After completing plans to protect the Mill Creek Valley from Ohio River floods, the Corps turned its attention to the second source of valley floods, the Mill Creek itself. The engineers investigated alternative means of flood control and determined the cost/benefit ratio of each method. A favorable ratio over the life of the project is the first criterion that must be met in any flood protection scheme proposed by the Corps. Congress will authorize an investment of federal money in a flood control program only if it provides a return in excess of investment, and thus adds to the national wealth.[20]

The Mill Creek flood protection methods studied by the Corps included dams along the Main Stem or a tributary, and diversion of floodwaters from the Mill Creek's upper basin into the Great Miami River. The engineers determined that costs would exceed benefits in every scheme except one: a $1,471,000 flood control dam located below McKelvey Road on the West Fork Mill Creek. The contemplated dam would afford complete downstream protection from the West Fork Mill Creek flows of record and would reduce flood crests on the Main Stem below its junction with the West Fork Mill Creek. The dam's annual benefit would average $64,100, and so it would have a desirable 1/1.01 cost/benefit ratio.

The Corps also concluded that the dam should be built to provide a recreation reservoir for use by citizens in the Cincinnati "metropolitan area where similar facilities generally are lacking." Since it proved impracticable to allocate annual recreational benefits to specific beneficiaries, the additional $65,000 construction cost for the recreational pool was justified on the basis of "the public interest."[21]

The West Fork Mill Creek Reservoir project was authorized by Congress in the Flood Control Act approved on July 24, 1946. Completed in 1952, the project primarily consists of an earthen dam 1,100 feet long and 100 feet in maximum height. The dam forms a recreation pool with an area of 183 acres at an elevation of 675 feet above sea level. Above this pool, to the crest of the spillway at 702 feet, storage capacity is available for the temporary retention of flood runoff from the 29.5-square mile drainage area above the dam. At full pool, elevation 702, the reservoir has an area of 557 acres.[22]



The Mill Creek Barrier Dam was dedicated on January 24, 1947, the tenth anniversary of Black Sunday. (CHS Photograph Collection)

The operation of the dam began on December 20, 1952, in time to make it "quite a Christmas present for the outdoors man and boy." The Corps granted a lease to the Hamilton County Park District for the development and management of boating and fishing facilities on the reservoir, or Winton Lake as it became known locally. The 1,000 acres of leased Corps property presently makes up about half the total acreage of the Park District's Winton Woods.[23]

The final project cost was $3,538,000, of which $2,967,000 came from the federal government and $571,000 was paid by Hamilton County. Within two decades of its completion, the flood control benefits attributed to the Winton Lake dam had exceeded the total construction and operating costs allocated to flood control. The largest single benefit was realized from January 19 to 21, 1959, when about five and three-quarter inches of rain fell over the Mill Creek Valley. The dam served to reduce downstream discharge from the storm greatly, and thereby prevented an estimated $2,500,000 in damages.[24]

Unfortunately, the 1959 flood still caused about $3 million in total damages. Forty families were forced from their homes in Reading and 800 people were displaced in Elmwood Place. Cincinnati's Northside neighborhood alone sustained an estimated $1 million in losses.[25]

The 1959 flood convinced the political representatives of the affected Mill Creek Valley communities that additional flood protection was a necessity. Following a decade of studies and lobbying, Congress authorized the current Mill Creek Local Protection project as part of the Flood Control Act of 1970. The project calls for the dredging, widening, and realigning of the lower eighteen miles of the twenty-eight-mile-long Main Stem. With the channel capacity thus enlarged, the Mill Creek will be able to handle increased volumes of runoff without overbank flooding. The Corps initially projected the cost/benefit ratio for the channelization project to be a very favorable 1/3.1.[26]

The channel improvement program has proceeded slowly since its authorization, and has proven more costly than anticipated. At present, only 42 percent of the project is accomplished, at an expense of about $110 million. Because completion of the planned channelization activities will cost at least another $200 million, the Corps is now investigating how to finish the flood protection project in a more economically efficient and environmentally sound manner.[27]

The main pump house contains eight huge pumps with each unit capable of pumping creek flows into the river at the rate of one billion gallons per day. (CHS Photograph Collection)

At the 1981 groundbreaking ceremony for the channelization project, Ohio Governor James Rhodes mixed his metaphors when he personified the flood-prone Mill Creek as both a "little monster" and "a sleeping giant." It was in response to similar characterizations of the stream as an enemy that the 1937 Congress initially ordered the Army Corps of Engineers into action against the stream's inundations. The Corps' first defenses against flooding, namely the Ohio River barrier dam and the West Fork Mill Creek Reservoir, proved economically justifiable as well as successful. Now, however, the escalating costs of the Corps' current channel improvement program likely cannot be justified by the endeavor's anticipated benefits.[28]

Many citizens are today calling for a truce in the channelization campaign against Mill Creek flooding. Proposals are being made for land use zoning regulations and protective levees that would eventually eliminate human structures from the flood

plain. In addition to alleviating the need for expensive flood control projects, the removal of damageable property from its flood plain would allow the Mill Creek to be seen as a natural stream worthy of restoration and not a dangerous watercourse to be forever scorned.

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10. George P. Stimson, "River on a Rampage: An Account of the Ohio River Flood of 1937," *The Cincinnati Historical Society Bulletin* vol.22 (1964), pp. 101-102, 105.
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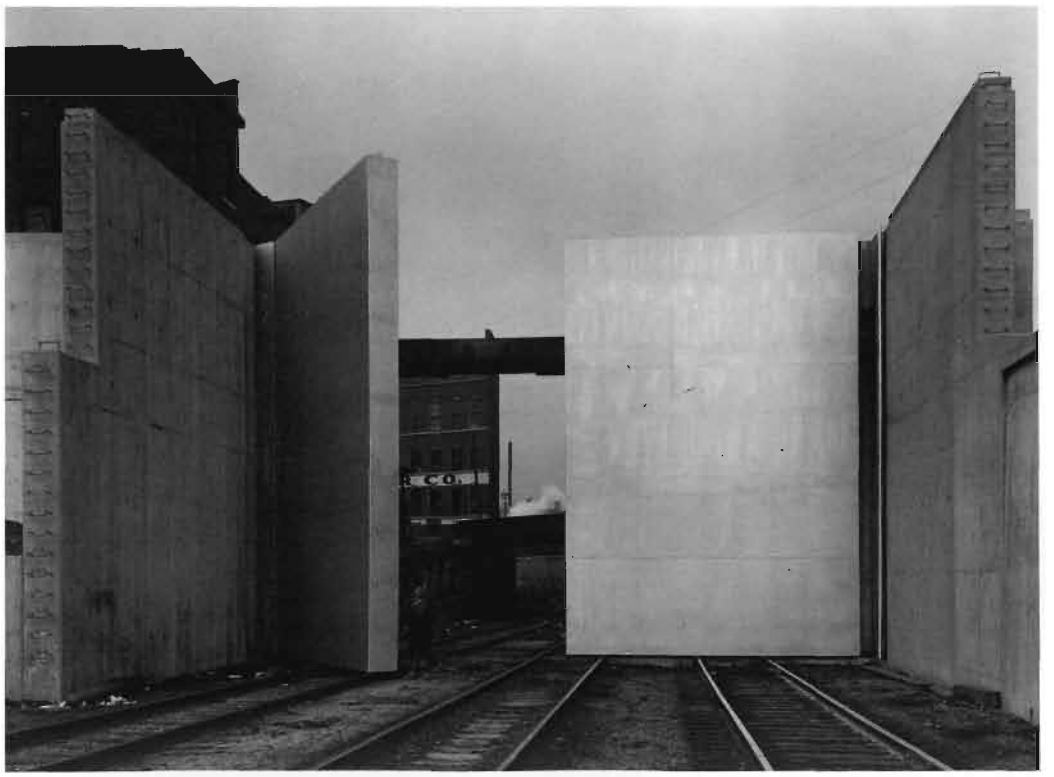
15. "U.S. OK's Plan for Barrier Dam Here," *The Cincinnati Times-Star*, April 25, 1940, pp. 1, 55; Maescher, *Report on Flood Control*, p. 8.
16. Carl D. Groat, "We Ask Congress," *The Cincinnati Post*, March 4, 1940, p. 7.
17. Cincinnati Chamber of Commerce, mailed announcement of Barrier Dam Dedication, January 24, 1937, n.p.



The barrier dam consists of earthen levees and concrete walls with gates at railroad and street crossings. The gates, such as Gate # 11 — the extremely heavy "Swing Gate," close when the Ohio River reaches flood stage. (CHS Photograph Collection)

18. City of Cincinnati Manager, *Annual Report, 1944* (Cincinnati, 1945), pp. 2-3; "Real Protection," *The Cincinnati Enquirer*, April 28, 1948, p. 4-A.
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Congress authorized the West Fork Mill Creek Reservoir project in 1946. Completed in 1952, the earthen dam, 1,100 feet long and 100 feet in maximum height, forms a recreation pool. The Corps granted a lease to the Hamilton County Park District for the development and management of the boating and fishing facilities on the reservoir or Winton Lake as it has become locally known. (CHS Photograph Collection)