THE FALLS CITY ENGINEERS

A HISTORY OF THE LOUISVILLE DISTRICT CORPS OF ENGINEERS UNITED STATES ARMY 1984-2004

Leland R. Johnson and Charles E. Parrish

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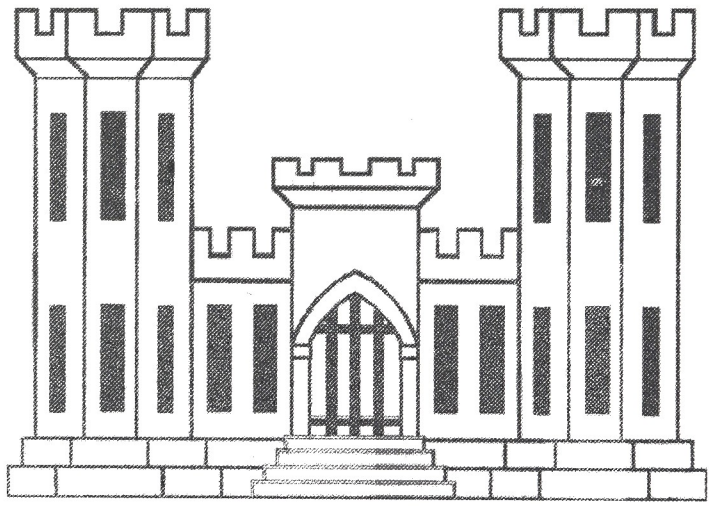

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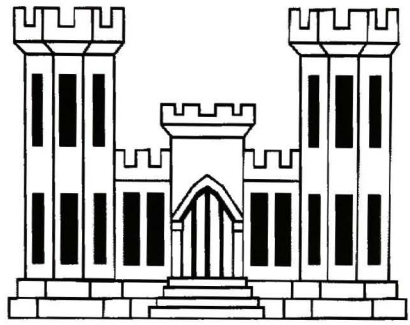

Leland R. Johnson and Charles E. Parrish

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FOREWORD

Colonel Raymond K. Midkiff

This volume completes a trilogy of historical surveys of the U. S. Army Corps of Engineers' Louisville District, which has had a presence in the Falls of the Ohio area for two hundred years. Initially the District operated the Louisville and Portland canal at the Falls, and in two centuries, the United States Congress expanded its navigation mission to include flood protection, water supply, hydropower production, recreation, emergency response, environmental enhancement, and support to the nation's military forces. The District's original assignment to construct and manage navigation infrastructure at the Falls of the Ohio continues into the twenty-first century with the building of a second 1200-foot lock at the McAlpine Locks and Dam. At the Olmsted project, the District in 2005 is constructing massive locks and a dam to replace two of the Ohio River's wicket dams, the last vestiges of the river canalization project completed in 1929. The navigation mission likely will remain a major task of the District during this century and beyond. Likewise the District will continue to execute its other missions and take on new ones as charged by federal directives. As it has for 200 years, the Corps will aspire to meet new engineering and technological challenges to serve the region and the nation with distinction.

I know the fifty-three engineer officers and the sole civilian who preceded me as District Engineer would join me in expressing deepest thanks to thousands of men and women who have served in years past and who now serve with dedication and honor in the Louisville District. All are public servants in peace and in war and have helped this agency earn recognition as "Engineers to the Nation."

Essayons.

Colonel Raymond K. Midkiff
District Commander

PREFACE

It's difficult to know where you are going and how to get there, if you don't know from whence you came.

Maj. General Ernest J. Harrell

The mission of the U. S. Army Corps of Engineers' Louisville District is to provide quality, responsive engineering service to the Army and the nation. The district plans, designs, builds and operates water resources and other civil works projects to provide a variety of benefits to the taxpayers including flood damage reduction, navigation, recreation, and environmental restoration. It also provides military construction services for the Army and Air Force and offers design and construction management support for other federal agencies.

How the Louisville Engineer District obtained its missions has been a leading issue in the three-volume serial history of the institution. The first volume written in 1972 traced the district's origins from the Army engineers' early explorations of the Ohio River valley to the district's formation in 1886 and briefly outlined its evolution to 1972. The second volume completed in 1983 described the troubled transition from 1972, when the district lost its military construction mission, to 1983 when it completed the last of its big flood control dams. Near the end of that era, the district seemed on the verge of becoming chiefly an operations district with minimal engineering and construction functions.

In this, the third volume, we trace a twenty-year revival of the district as both a military construction and civil works agency. We explore its expansion into the environmental restoration arena, and into nationwide engineering and construction management programs for the armed services. We outline how a local civil-works-only district, in the decades between 1984 and 2004, became a regional military construction force and one of the Corps' leading districts. Before embarking on this review, however, a concise summary of the district's historical evolution may be instructive.

The Louisville Engineer District's history is rooted in the role it had in developing Ohio River navigation, notably at the Falls of the Ohio, where the natural river dropped twenty-six feet and blocked waterborne commerce. For more than two centuries, the Army Engineers have worked at the Falls, assisting local engineers with planning passages around the obstructions and supporting the Louisville and Portland Canal Company, which built and operated a canal around the Falls from 1830 to 1874. At the direction of Congress, the Engineers completed the canal's enlargement and the locks built there during the American

Civil War. These stone-masonry locks of 1865 were still at the canal until a 2003 replacement project removed them.

In 1874, Congress accepted control of the Louisville canal, and the Corps of Engineers opened an office there that became known as the Louisville Engineer District. The district's officers and civilian technicians thereafter worked continuously to manage the canal and other federal projects along the lower Ohio River and its tributaries, the Green, Kentucky, and Wabash rivers. In 1875 the Corps began constructing locks and dams along the entire length of the Ohio River, a canalization project. With completion of Lock and Dam 53 in 1929, the district completed the canalization of the Ohio. These first locks and dams served until the 1950s, when the Corps began replacing them with modern high-lift locks and dams. By 2005, the district was building the last of the eighteen modern structures at Olmsted, Illinois, near the river's mouth. Estimated to cost more than $1 billion, Olmsted locks and dam became the costliest navigation project ever built by the district.

In addition to its core navigation mission, the district acquired flood damage reduction when Congress, spurred on by record Ohio River floods of 1936 and 1937, provided major funding for projects to alleviate flooding damages in Louisville District's area and elsewhere. The district built local flood protection projects and turned them over to local governments for management, and also built twenty multipurpose dams and lakes for flood damage reduction on tributaries of the lower Ohio River. The district's first multipurpose dam project was Cagles Mill Lake, Indiana, completed in 1953, and the last was Taylorsville Lake, Kentucky, which became operational in 1983. In conjunction with the local protection projects, these dams and lakes subsequently accrued more than a billion dollars in flood damage reduction benefits.

The district's military construction mission began during the 1941 mobilization for the Second World War, when the district built camps, airfields, ordnance plants, and training facilities in Kentucky, Indiana, Ohio, and Illinois. It provided engineering and construction management services to the Army and Air Force in its geographic area until 1972, when the mission was transferred as a result of reduced workloads. The military mission returned to the district during the defense buildup of 1982, when Louisville was assigned support for Army and Air Force installations in a five-state area. In 1982, its military support went to eight Air Force and nineteen Army installations, although these numbers decreased as a result of the Defense Base Realignment and Closure program of the 1990s. Among the larger military projects the district built in recent decades were the Acquisition Management Complex and Medical Center at Wright-Patterson Air Force Base, Ohio, the Defense Construction Supply Center at

Columbus, Ohio, and the U. S. Army Recruiting Command headquarters at Fort Knox, Kentucky. The district also received nationwide design and construction management missions from the U. S. Army Reserve and National Guard.

During its early history, the U. S. Army Corps of Engineers earned praise for contributing to the national economic development, but in the late twentieth century it also received criticism for nation-building. Public demands and Congressional mandates of the 1970s made environmental factors a major consideration in project designs. Because the public also demanded the preservation of riverine environments, the Corps expanded its regulatory programs to assure environmentally sustainable alterations to streams and wetlands. Congress also mandated the restoration of past environmental damages, and the district, in response, expanded its programs for remediating environmental contamination at Defense department installations and at its own projects. Ecosystem restoration became a significant new District mission.

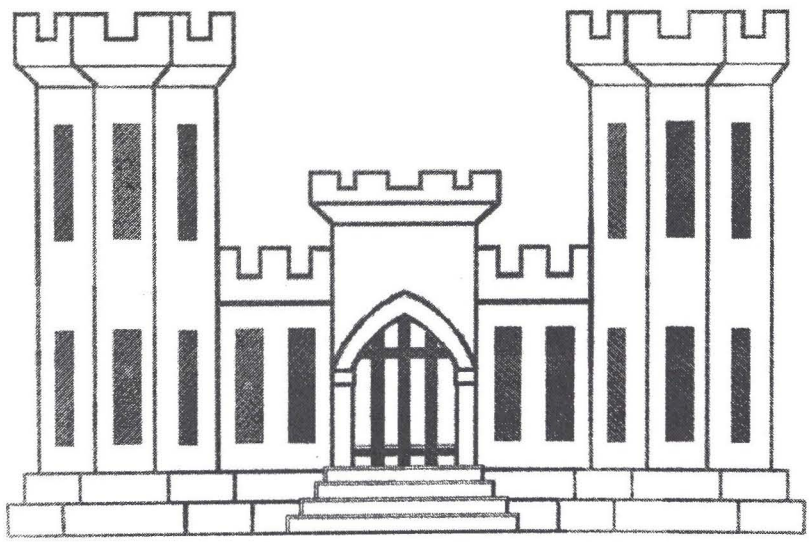
The environment-shaping public programs of the Corps were dynamic, and change became a principal constant. The Louisville District from 1984 to 2004 sought to anticipate the changing public environment, managing the changes effectively and in some cases initiating changes. In 1988, it revised its administrative matrix, adding project management to its traditional functional organization. Subsequently it focused on employee empowerment, total quality, and partnerships to improve its services to its "customers," the armed forces and the taxpayers. These initiatives positioned the district for potential and expanded missions of the twenty-first century: nationwide responsibilities for the Army Reserve and National Guard, ecosystem restoration, water supply, and other services mandated by the public, the Department of Defense, the Congress, or the President.

Since 1984, technological innovations in design, materials, and construction methods have challenged the district. Computer-aided engineering has improved capabilities for generating quality designs as well as reducing the time required to produce alternative designs. New materials have enhanced the quality of construction and also shortened the time for shop fabrication and field erection. Construction methods have evolved toward increased mechanization and automation, while electronic communications fostered collaboration among engineering professionals and management teams. The district resolutely pursued efficient and economical performance of its missions to remain competitive.

The authors were privileged to observe the district's responses to these mission challenges during the past twenty years. They are grateful to members of the district's staff and work force who contributed to the engineering

education of historians, and they list just a few of these friends in the following acknowledgments. They should warn readers that most numbers used in this volume have been rounded for ease of understanding, and readers must consult the sources for the exact figures. They also must admit their understanding of many of the subjects treated is limited, and therefore they are sadly responsible for any errors of fact or interpretation in this volume. Still, they are proud to count themselves among the Corps personnel who consider themselves to be stewards of water resources, preservers of riverine environments, and builders for the nation.

Leland R. Johnson
Charles E. Parrish



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During the twenty years reviewed in this study, the authors received educational assistance and cooperation from so many Corps personnel and scholarly colleagues that a listing would fill more pages than available. Yet, the authors must express their heartfelt gratitude to some friends who surrendered their valuable time to history.

Colonel Robert A. Rowlette initiated this historical study and without his support it would not have been undertaken nor completed. Contract administrators Jon Fleshman and Vanessa Whitworth together with Carol Labashosky and Todd Hornback of the district public affairs office cheerfully conveyed assistance and information. Joe Theobald, Mark Yates, and Lisa Frazier of Contracting division managed the historical accounting. Ralph Walz of the Executive office and his predecessors Fred Huelson and Max Bohrer shared their wisdom with the historians.

The authors' studies of project development received encouragement from all district divisions. In Engineering Division, David Beatty and Bill Byron provided hydrologic data, Ron Kiser and Rick Schultz outlined technical information, and Jeff Johnson, Hershel St. Ledger, and Roy Karlen shared their memories. David Klinstiver and Charles Haddaway III welcomed the authors to the McAlpine project, and Richard Shipp supplied information on the Olmsted project. George Jageman, Jr., Carroll Winslow, Gordon Stevens, Richard Russell, and friends gladly explained transitions in their Construction division. Neal Jenkins, Neill Tyler, Sharon Bond, and Marcella Denton offered insights into the planning process. Donald Basham, David Dale, Gary Serke, Gary Chisholm, George Flickner, Larry Bibelhauser, and Fred Grant outlined the evolution of the project management division.

Exploring operations of the completed projects found facilitation from Oren Bellis, Jack Bleidt, Norb Whitlock, Robert Fuller, Robert Smallwood, Peter Frick, Doug Shelton, Lee Anne Devine, Robert Willis, Eugene Dowell, Charles Decker, Robert Van Hoff, Steve Rager, and Ron Waller, plus the crews at locks and lakes throughout the District. Legal complications were explained by Ann Nunn, Fred Rager, Stephen Smith, Dale Holmes, Robert Rudd, and Robert Pessalano. Real estate intricacies were elucidated by Fred Morgan, Robert Humphreys, Cathy Hall, Roger Williams, Wendell Wilkinson and Michael Barter. The authors had valuable assistance through the years from information managers David Duggins, Mike Lush, Debi Schoenbaechler, and Wanda Stoffregen.

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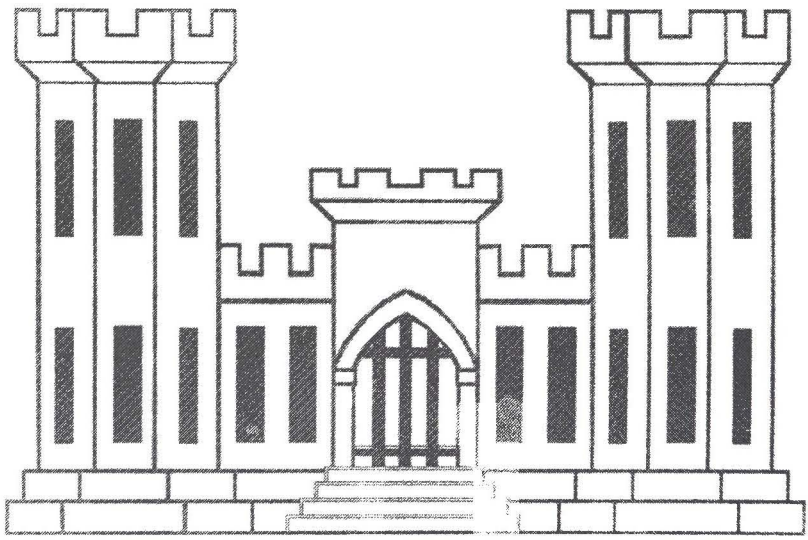


PROLOGUE

Twenty years seems brief, just 7,300 days, yet the two decades following 1983 transformed the Louisville Engineer District. Formidable challenges, new missions, evolving institutions, and changing leadership irrevocably altered the district's matrix. In 1983, the district emerged from its "big dam era" and embarked on turbulent decades of reassessment, reorganization, and revival. When turmoil subsided twenty years later, the district had novel strategic visions, perceiving itself as an environmental steward of national water resources, as a defender of national security, and as a smart engineering and management institution. This study attempts to trace the evolution of these expansive visions of the district as one of the Corps' leading districts.

Before launching this account of the district's advance into the 21st century, however, readers who missed two earlier studies of its history might benefit from a brief review of the institution's first century of service.[1]

Becoming a permanent office of the United States Army Corps of Engineers on March 15, 1886, the Louisville District in 2005 pursued two broad missions: supporting the armed services for national defense and managing a water resource program mandated by Congress. For the Army and Air Force, it managed real estate, offered engineering services, performed construction, and prepared for mobilization in five states: Kentucky, Indiana, Ohio, Illinois, and Michigan. As proposed by the President and directed by Congress, it managed water resource programs in most of Kentucky and Indiana and sections of eastern Illinois, southwestern Ohio, and northern Tennessee. Its 75,550 square-mile area is the size of all six New England states plus New Jersey and Delaware. Its watershed encompasses the lower 545 miles of the Ohio River and all its tributaries except the Cumberland and Tennessee rivers managed by the Nashville District.

Although it employs a mostly civilian workforce, the district takes pride in being part of the United States Army, demonstrating this in 2003 when dozens of its personnel volunteered for service in Operation Iraqi Freedom, where they managed efforts to restore Iraq's infrastructure. As part of the Army, the district embraces a military chain of command: Louisville and other districts report through the general commanding the Great Lakes and Rivers Division at Cincinnati to the Army Chief of Engineers at the nation's capital, a straightforward three-tiered command chain first forged in 1888. As defined by a modern Chief of Engineers, the Corps embraces these goals:

> *The mission of the U. S. Army Corps of Engineers is to provide quality, responsive engineering service to the Army and the nation. The Corps*

plans, designs, builds and operates water resources and other Civil Works projects to provide a variety of benefits to the taxpayer including flood damage reduction, navigation, and environmental restoration. They also provide military construction for the Army and Air Force and provide design and construction management support for other Federal agencies.[2]

The Louisville District shares in most of the Corps' modern missions and activities (except seacoast harbors). This was far from the case, however, in 1886 when its sole function was rebuilding and operating the Louisville and Portland Canal around the Falls of the Ohio. This canal had become federal property in 1874 when Congress bought out the company's stock and assigned its management to the Corps of Engineers, specifically to an officer stationed at the canal.[3]

Although Army engineers have served in the Ohio valley since pioneer times, the Corps initially had only resident construction offices in the region. Before the Civil War, the Chief of Engineers dispatched officers to places where Congress or the Army had approved construction projects. The officers opened resident engineering offices, acquired equipment and workers, and contracted to build the structures, and after completing their tasks, saluted and moved on to the next job. This pattern necessarily changed when the Corps took charge of the Louisville and Portland Canal. Louisville's canal had the first navigation locks built on the Ohio River; indeed, the first locks ever operated by the Corps. Unlike the transitory construction missions of the earlier era, the navigation locks required continuous operation by an experienced workforce; and the Chief of Engineers recognized the canal management deserved a permanent office commanded by an officer. This office became known as the Louisville Engineer District, and it has enjoyed a continuous history and command chain since 1886.

Although always part of the Army, the Louisville District at its formation had no military missions because the Army in the nineteenth century split its engineering-construction requirements between the Corps of Engineers and the Quartermaster Corps. The Army made the Corps of Engineers responsible for seacoast fortifications and combat engineering, leaving military construction in the nation's interior to the Quartermaster Corps. This arrangement prevailed until 1941 when President Franklin Roosevelt assigned all military construction to the Corps of Engineers.

From the onset of the Second World War until 1970, the Louisville Engineer District built and expanded the Army's posts and airfields in its region. It built Camp Atterbury in Indiana, Fort Campbell in Kentucky, and other cantonments.

It expanded Fort Knox and Fort Benjamin Harrison. It paved airfields to serve the Army Air Corps that reorganized as the U. S. Air Force in 1947. The district's military construction workload dwindled during the 1960s, however, and in 1970 the Chief of Engineers sought to reduce costs by centralizing administration, transferring Louisville's military work to the Omaha and Baltimore Districts. Louisville thus became a "civil-works-only" district during the 1970s.

Engineer districts outside the Ohio valley managed military construction within the valley through the 1970s, but the increased defense funding and rebuilding campaign of President Ronald Reagan's administration returned a military mission to the Louisville District. The Chief of Engineers in 1981 reassigned to Louisville the supervision of military engineering, construction, and real estate for the Ohio River Division in five states, an area larger than it had managed before 1970. Although the scope of its military program depended upon fluctuations in defense funding, from 1982 through 2005 the mission proved a mainstay of the district's program, with budgets sometimes exceeding the funding available for civil works. The district's military mission received its highest priority, and, indeed, from 2003 through 2005 dozens of the district's workforce volunteered for service overseas in Afghanistan and Iraq.

Although the Louisville District was formed in 1886 to manage only the canal at the Falls of the Ohio, its civil works mission expanded during the ensuing century to include navigation improvements along the lower Ohio River and its tributaries, the Wabash, Green, Kentucky, and smaller streams. Federal projects on each of these streams have unique histories, but, for ease of understanding, the civil works programs of the district are best divided into four central overlapping phases, each approximately fifty years in length. This fifty-year time frame is not entirely coincidence: engineers typically design locks and dams for an average fifty years of service before replacement. In each of these four phases, the Corps focused on broad programs marked by specific engineering technologies:

- *Open channel program.* The first phase beginning in 1824 aimed to clear the Ohio River's channel of snags—fallen trees—and boulders obstructing the safe passage of boats, and to achieve a low-water channel depth of at least three feet for shallow-draft steamboat commerce. The Corps of Engineers used channel clearance as its principal design for Ohio River navigation for fifty years, until 1874 when it initiated a second plan.

- *Canalization program.* Authorized in 1875, construction of the second plan began in 1879 and continued until 1929. Called the canalization project because it aimed to make the Ohio River resemble a slackwater canal, this

was accomplished by building locks and dams along the river's entire course, providing a minimum depth of nine feet for towboat and barge commerce. The 600-feet-long and 110-feet-wide navigation locks then could pass standard barge tows around the dams. As part of its canalization program, the Louisville District constructed a 600-foot-long lock in the Louisville and Portland canal that became Lock 41 in the numbered Ohio River series, and then it built the locks and dams along the lower Ohio to Lock and Dam 53, near Cairo at the river's mouth. This canalization system served Ohio River commerce well for fifty years, and, indeed, thanks to innovative engineering, the locks and dams numbered 52 and 53 remained in use through the first decade of the twenty-first century.

- *Flood Control program.* The third phase, the flood control program, aimed to reduce flood damages along the Ohio and its tributaries. In response to national policy promulgated by Congress in 1936, the Corps of Engineers in 1938 completed a comprehensive plan for building seventy-eight dams and reservoirs on the Ohio's tributaries. These aimed to reduce flooding below the dams and, through coordinated operations, control the Ohio's flow, reducing it during flood seasons and augmenting it during droughts. Many modifications of the 1938 plan occurred during its fifty-year construction phase, but by 1988 the seventy-eighth flood control dam was completed. Of the seventy-eight dams and reservoirs built by the Corps in the Ohio River basin, the Louisville District built twenty, ending its "big dam era" in 1983 with completion of the Taylorsville Dam on the Salt River.
- *Modernization program.* The fourth half-century phase began in 1955 when the Corps initiated modernization to replace the Ohio's canalization locks and movable dams finished in 1929. The replacement project sought to reduce the number of lockages necessary to pass the Ohio River's course to eighteen, with each of the modern locks and dams replacing two to five of the obsolete locks and dams. The Pittsburgh and Huntington Engineer Districts built the new structures on the Upper Ohio River, and the Louisville District built modernization structures on the Lower Ohio from Cincinnati to its mouth. Louisville started building its section in 1955 at Markland Locks and Dam near Cincinnati and proceeded generally in downstream order with the McAlpine, Cannelton, Newburgh, Uniontown (John T. Myers), and Smithland Locks and Dams. By 2005, the District was building the last Ohio River modernization structure, the Olmsted Locks and Dam near the river's mouth.[4]

Use of the techniques pioneered in each of the four phases persisted. In 2005, the district still used the open-channel methods of the early nineteenth century, dredging navigation channels and maintaining a fleet and workforce

at its Louisville Repair Station to clear channels and repair locks and dams. Through innovative engineering, it kept two obsolete locks and dams completed in 1929, numbered 52 and 53, in service pending completion of the Olmsted project. Although its era of flood control dam construction ended in 1983, the district had twenty big dams and lakes to operate, an increasingly challenging task as the first dams completed fifty years of service. Thus persisted the early technologies of the district's history.

As its commanders sometimes observed, the Louisville District's plate was full to overflowing during the twenty years preceding 2005. Its workload steadily increased, while it also confronted intense pressure to reduce its workforce. Reorganizations, streamlining, downsizing, and outsourcing campaigns constantly challenged district managers throughout the two decades under review. One solution to the dilemma of increasing workload versus declining workforce involved closing obsolete projects where operations no longer served commerce. Before 1983, the district had closed locks and dams it had once operated on the Wabash, Rough, Barren, and Green rivers. From 1981 to 2001, it shut down its operations at fourteen Kentucky River locks and dams, transferring their management to the Commonwealth of Kentucky. Although sad to historians, these closures allowed district managers to redistribute the workforce to modern projects and, in time, benefit the taxpayers.[5]

In addition to streamlining the workforce, the district and Corps at large reorganized in response to continual urging from the Army, Congress, and Presidential administrations to reduce design and construction time and cost growth. In civil works, these initiatives often emanated from the Assistant Secretary of the Army for Civil Works. One significant initiative in 1988, for example, resulted in formation of the district's project management division, representing the district's first major administrative reorganization since the Second World War. Appointed for every large-scale design-construction effort after 1988, project managers supervised and coordinated the work "from cradle to grave" and sought to constrain time and cost growth.[6]

By 2005, the district had traveled far down the path toward "smart engineering" in its efforts to reduce time and cost growth. Traditionally, the district used its own engineers to design structures, or it had employed private architect-engineer firms for the design and then it took competitive bids to build the structures. While use of traditional methods continued, the district also experimented with design-build contracts, meaning that contractors both designed and built an entire facility to meet specific needs of the Corps' clients, usually an Army or Air Force agency. Its engineering and project management divisions, moreover, vigorously pursued innovative, smart engineering as a

means of building projects like the Olmsted Locks and Dam at lesser cost in shorter time. The last of the modern locks and dams on the Ohio River, the most expensive individual project in district history, the Olmsted project was seen as a challenging test run for both project management and smart engineering.

Since 1983, computers have become ubiquitous tools at the District as they have throughout American business and government operations. In project management and planning, they were used to analyze project benefits and costs and to develop comparative scenarios for various designs. Engineers used them instead of the traditional slide rules, calculators, and drafting tables for design functions. Project managers and construction offices used them to track scheduling and costs, and operations personnel relied on them to monitor project performance in the long term. Indeed the district during two decades after 1983 steadily advanced toward a "paperless environment," using electronic communications and data rather than traditional paper reports and files.

Computer tools, in combination with internet services, made electronic management possible. Historically, the Corps' relationship with its contractors sometimes had been confrontational. Computers, however, enabled the district to embark in the 1990s on the road to "partnerships" with both clients and contractors. After initial meetings of district managers with their clients and contractors, project managers used electronic communications to maintain a "virtual partnership" among all participants. This is one reason why the district's chief of project management, David Dale, in 2004 could announce to the District's contractors without trepidation: "We cannot be successful, if you are not successful!"[7]

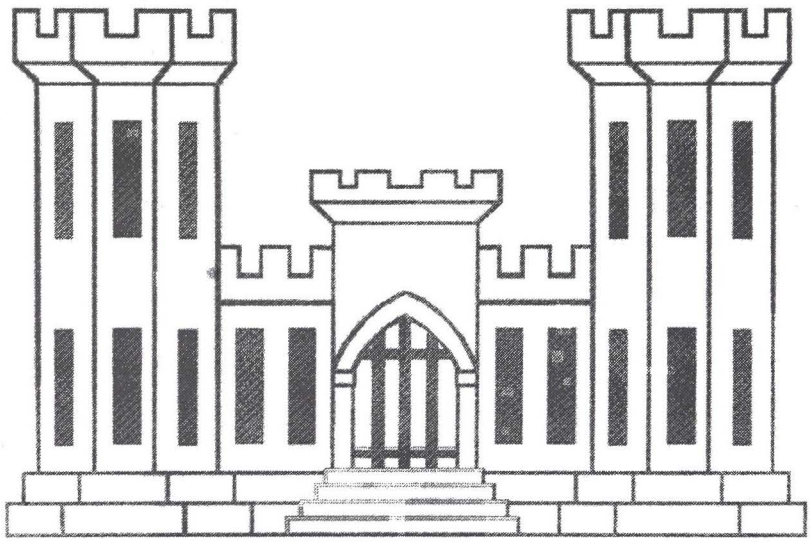
Electronics also found application in efforts to speed the Corps' review processes. Before 1975, the project plans were prepared at the district and subsequently reviewed by the Division, the Board of Engineers for Rivers and Harbors, and finally the Chief of Engineers before submission to Congress and the President. This management style usually consumed months and years before a project's plans finally moved to the construction phase. This slow process was further complicated in 1975 when a fifth layer of review was officially added at the office of the Assistant Secretary of the Army for Civil Works, who submitted project plans through the Secretary of Army to the Office of Management and Budget for inclusion in the President's annual budget. Project development thus proceeded with all deliberate speed.[8]

Efforts to reduce this cumbersome process began during the 1980s, and in 1993 Congress closed the Board of Engineers for Rivers and Harbors. The effort continued through implementation of simultaneous review efforts, and in 2004

Lieutenant General Robert Flowers, Chief of Engineers, proposed deploying modern electronic communications to eliminate the delays often resulting from the multiple review levels. Flowers proposed that his headquarters and his Division offices would become, electronically, part of the district's management teams; conducting reviews as planning progressed rather than after the plans had been drafted. "One Corps, operating virtually," became General Flowers' clarion call for the future.[9]

During its first century the district and the Corps frequently earned praise for contributing to the nation's economic development, but this changed in the 1960s when environmental groups attacked the Corps' techniques. Until then the Corps had considered environmental alterations as minor factors in its decisions. Public demands and Congressional mandates changed this, especially after the National Environmental Policy Act of 1970 required the full inclusion of environmental factors in project planning. Within a few years of this law's passage, Louisville District had ninety-two personnel in environmentally oriented positions, mostly in its planning division. Gradually, the Corps came fully to understand the meaning of ecology—that social well-being and personal health are inextricably linked to the health of our environment. Still, the Corps' historic caricature persisted, and as late as 1987 some environmentalist pictured the Corps as "environmental rapists."[10]

The public also demanded that past environmental damages be repaired, and the Corps became one of the nation's speicalists in that arena. Responding to demands for cleaning up past environmental damages, the Corps gained experience in the Superfund program and began cleaning up existing and former military installations. It also learned much through its regulatory efforts to protect riverine environments. By 2005, the district took exceptional pains to see that its own projects were environmentally sustainable and included protection for the nation's dwindling supply of wetlands. It also had a role in cleaning up hazardous and toxic wastes, preserving fish and wildlife resources, managing cultural resources, and assisting the armed services with environmental problems at their installations. Although another 7,300 days may elapse before public vilification of the Corps entirely wanes, the Corps and its Louisville District by 2005 considered themselves to be stewards of the riverine environment.[11]



1
THE FUNCTIONAL DISTRICT

In 1983 the Louisville Engineer District had a functional organization—very functional. It was completing the last of its twenty enormous flood control dams, most with spillways cut through solid rock and large enough to pass herds of elephants. It was completing the sixth of its series of huge locks and dams astride the beautiful Ohio, each with lock chambers long and broad enough to engulf fifteen jumbo barges in a single operation. It had lined sections of the Ohio River with floodwalls and levees, making port cities resemble the ancient towns that walled themselves against attacks. So well organized and oiled was the district that to some citizens it seemed a juggernaut.

Understanding the functional management system and how the district used this efficient system to accomplish the Corps' missions is fundamental to comprehending its recent history. This method was ubiquitous throughout the Corps from the Second World War until a major transition began in 1988, when it adopted a project management system. Before 1940, however, the Corps did not practice functional management. It emphasized personal management and accountability. A brief review of the Corps' management evolution provides clarity to this transition's significance.

PERSONAL ADMINISTRATION

For lack of a more descriptive term, the administration system of the Corps during the nineteenth and early twentieth century may be labeled "personal." The engineer in charge of building a structure such as a lock and dam was held personally responsible for its success or failure. If the project succeeded, he received the respect and credit he deserved; if it failed, unless mitigating circumstances contributed to the failure, he was transferred to a line of work more suited to his abilities. We use "he" properly here, because then there were few, if any, female engineers in the profession and perhaps none in the Corps of Engineers. In the Corps, the person in charge of a project held the title assistant engineer because he assisted the District Engineer, an Army officer sent to manage civil works for the Chief of Engineers and held personally responsible for his district's performance. To illustrate the personal administration system then prevailing, one might consider the career of Assistant Engineer William H. McAlpine, a successful civil engineer memorialized at the McAlpine Locks and Dam forming Louisville's harbor.

Young McAlpine, graduate of the Massachusetts Institute of Technology, joined the Corps at the Kentucky River project in 1902 as a junior engineer, then a job title. His talents were such that he soon became the assistant engineer for the Kentucky River, responsible for completing the locks and dams building along the river. McAlpine had full charge of that work. In addition to leading the planning, design, and construction of new locks and dams, he also managed the maintenance and rehabilitation of the older locks and dams and supervised their operations—true "cradle to grave" management.

When McAlpine's talents brought him promotion into the District Office as its Principal Assistant Engineer, at the start of the First World War, it became logical for him to assume command as District Engineer when military officers transferred overseas to combat theaters. After the war, McAlpine directed the completion of Lock and Dam 41 at Louisville, and then managed construction of the remaining locks and dams completed along the lower Ohio by 1929. The Chief of Engineers then made him the Principal Engineer at the Upper Mississippi Valley Division, followed by appointment as a civil works expert at headquarters. Congress memorialized his achievements when it named McAlpine Locks and Dam—the only major project in the United States bearing the name of a civilian employee of the Corps.[1]

William H. McAlpine, civilian District Engineer during WWI

The Corps' personal accountability system could also be illustrated with stories of failed assistant engineers. No need to multiply these illustrations, however, because Corps historians have penned histories featuring activities of many assistant engineers in districts throughout the nation. The personal management system served the nation well until the Second World War, when the Corps undertook the construction of Army bases and airfields throughout the world, and no longer had sufficient experienced assistant engineers to conduct its program efficiently. The Louisville District alone undertook dozens of huge military projects, expending a million dollars a day in 1942 on their construction, a sum equaling its entire annual budget in the prewar years. In 1942, the district's fiscal branch, to illustrate, prepared monthly financial reports on fifty military projects, and performed it manually, without computers.[2]

Such megaprojects cannot be managed personally, and the Corps switched to functional management. It stationed Area and Resident engineers at military bases

to manage the construction, but the design was accomplished in the engineering division at the district office, purchasing lands needed for the bases was done by the real estate division, and other functions were performed by offices created for the purpose. The functional management system encompassing engineering, construction, and operations division had been pioneered by Amercian railroad corporations in the nineteenth century, and applied quite successfully to building transcontinental railroads and the rail lines spidering the nation by 1940. The Corps therefore emulated the best private business management methods when it adopted the functional system during the 1940s.[3]

After the Second World War, the Louisville and other districts continued to manage their workforces in functional divisions. While the military workload declined after victory, the district launched civil works megaprojects—flood control dams and modern navigation locks, and, like military construction, these immense works also required functional management. Moreover, the Chief of Engineers mandated that districts adopt the functional organization.

Under functional management, the district formed its organization according to the standard project progression: planning, engineering, real estate, contracting, construction, and operations divisions. In addition, it formed support offices for litigation, budgets, accounting, safety, personnel, and routine duties. Functional divisions were further subdivided into branches and subordinate sections, and the entire network rested upon the technical teams that performed the work. No single person, like the prewar assistant engineers, supervised a project "from cradle to grave," as the anthropomorphic metaphor went. Instead, projects moved steadily through the functional divisions as if on an assembly line.

From 1953 to 1983, the divisions functioned productively in Louisville district. Building twenty massive flood control dams in those thirty years, on the average the District put a new dam into operation *every eighteen months*. Simultaneously, it built six modern dams with double locks on the Ohio River, dozens of floodwalls, levees, and channel-widening projects to protect against flooding, while at the same time performing structural expansion in support of the armed services.

The district's workforce in 1983 included more than 1,100 civilian technicians and only about a dozen military officers, dubbed "green suiters" by the civilians. At the apex of the organization chart was the commander, known as the District Engineer until the Army in 1978 designated the Corps of Engineers a Major Army Command. Typically, the District Engineer had in his command approximately a dozen officers in development assignments for up to three

years. Most came to the district from graduate schools with master's degrees in technical engineering, construction management, or related fields. They also had completed the Army Engineer School's Advanced Course, and usually had commanded soldiers before their assignment to the district.[4]

The Colonel had an officer, usually a lieutnant colonel, serving as his Deputy Commander, while other officers received assignments suiting their career goals. Most served in the district's field offices at Fort Knox, Fort Campebll, or Wright-Patterson Air Force Base, where their communication skills eased interfaces obtained in the district, the Army expected to acquire engineers with mature management capabilities useful during defense mobilization, a rationale amply supported by the Engineer officers' achievements during past mobilizations. When the officers worked in the district, their civilian supervisors contributed to evaluation of their performance and potential for meeting the Army's future needs for mobilization commanders.[5]

The district's functional internal divisions presented these officers a panoply of opportunities for practicing their professions. They could participate in military projects of differing scopes funded by the Army, Air Force, and Defense department agencies, and they could develop military engineering talent as well through their experiences at civil works projects. In either field, they quickly learned the functional oragnization wherein each dsitrict element took the lead during six successive project stages in the following general order: planning, engineering, real estate, contracting, construction, and operations.

EXPANSIVE PLANNING

William "Bill" Leegan, first Chief Planning Division

Newest of the functional divisions was the forward element, planning, established in 1970 and managed successively by William Leegan, Neal Jenkins, Robert Fuller, and Sharon Bond. Before 1970, project planning was accomplished in a branch within the district's engineering division, led for many years by John Kurrasch. Then, as today, planning required intense coordination with local governments seeking flood protection and willing to pay their share of the costs. Much of the planning function before 1970 also involved participation in basin-wide studies for the Ohio River valley along with comprehensive planning for its larger tributaries such as the Wabash and Green rivers. Out of these pioneering basin-wide studies came the big flood control dams the district built in the thirty years from 1953 to1983.

Thus, the basin studies were some of the most productive planning endeavors ever ventured.

Comprehensive basin planning—analyzing water resource needs within an entire river valley—emanated from early twentieth century progressive thought that the piecemeal porkbarrrel projects of the nineteenth century should be supplanted by rational planning, by basing project designs on analysis of all water resource needs along a river from its source to its mouth. The Chief of Engineers first directed his district officers to initiate comprehensive basin planning in 1913, and Congress further directed the Corps of Engineers to launch basin studies in 1927. The resulting plans, known as the 308 reports, considered potential developements for navigation, flood control, hydroelectric power and allied purposes of every major river in the United States. Out of these studies, eventually came the Louisville District's twenty multiple purpose (multipurpose) flood control dams and lakes. In recent years, flood control has become supplanted by the term flood damage reductions.[6]

By the 1960s, however, comprehensive basin planning had fallen from favor. Comprehensive planning was costly, and Congress no longer funded them except as reevaluation and in such special cases as the Appalachian Water Resource Studies by the Ohio River Division during the late 1960s. Rather than broad, basin-wide studies, the district's planners turned to individual project studies, involving intense coordination with local governments seeking flood reduction or other solutions to their water resource problems. With the authority (before 1986) to perform preliminary and feasibility studies at full federal costs, the planners, at request of local governments, visited the localities, analyzed alternative solutions to water problems, and presented their recommendations to local leaders and Congress. Robert Fuller, the district's planning division chief in the 1990s, succinctly summarized his division's business development function: "We have engineers, scientists, and support people who are the interface with the public in their desire for developing civil works projects. We're the project development group. We hear about problems and opportunities from congressional interests and the public, and we work to provide solutions."[7]

The Corps's planning program met frequent complications from national policy initiatives when presidential administrations from Fanklin Roosevelt to Richard Nixon contemplated centralizing federal water resource programs. Presidents Roosevelt and Harry Truman supported the formation of regional basin authorities with centralized control by a National Resources Planning Board. For a decade it appeared the Corps might lose its civil works mission to civilian basin-resource planning agencies, similar to the Tennessee Valley Authority. Congress opposed the efforts to create additional basin authorities,

and during the 1950s President Dwight Eisenhower sought increased control of water resources development through budgeting. It was his Bureau of Budget that issued the landmark Circular A-47 in 1952, raising the bar for water resource funding. This execitive order stipulated that the benefits of every project purpose—flood control, recreation, navigation—must exceed their costs individually; moreover, it made fifty years the maximum time for project benefits to repay the federal investments. The Corps' planners thereafter had to calculate not only total project costs and benefits, but also the comparative benefits and costs of each project purpose for no longer than fifty years. If a proposed project's benefits did not exceed its estimated costs, plans were shelved, and only in exceptional cases did Congress direct that a project br built when not found worthy by a favorable benefit-cost ratio.[8]

The John Kennedy and Lyndon Johnson administrations, through a Water Resources Council, imposed national standards for water resource programs that placed additional requirements on the district's planners. By the 1960s, moreover, the urbanized and educated elements of American society had become more interested in recreation, water quality, cultural resources, and environmental preservation than the traditional flood control and navigation purposes of the Corps' water resource programs. Congress responded to this new public interest with legislation imposing additional requirements on project planners, notably the National Historic Preservation Act of 1966 and the National Environmental Policy Act signed in 1970 by President Richard Nixon. Complying with these new policies required the expertise of biologists, foresters, archaeologists, historians, and other disciplines, in addition to the Corps' traditional engineering professionals. The Lousiville District recruited the experts needed to meet new requirements, placing most in its planning division established in 1970.[9]

Neal Jenkins, who managed Louisville's planning program for years, saw the National Environmental Policy Act as a watershed in the District's history. He later recalled that during his first years with the Corps, its orientation was toward large lake projects that enjoyed substanial public support. Later, he remembered, the public began to feel the Corps had gone too far with its big projects, and public concern about environmental impacts increased. "That sort of public awareness and changing of attitudes," he said, "was reflected in a very profound way by passage in 1969, of the National Environmental Policy Act".[10]

Jenkins had the privilege of writing the district's first Environmental Impact Statements, and he recalled with amusement that they were merely five pages in length. As the 1970s progressed, these primary documents became ever more thorough, or excessvie according to some people, reaching multi-volume scope as the district constantly added new expertise. The district's planning division therefore grew rapidly, and by 1983 it peaked at seventy-five employees, all

coordnating studies with local and state governments, collecting and organizing data required by the old and new federal policies, and drafting their reports for congressional action. Despite these efforts, many projects were challenged in courts.[11]

THE ENGINEERING PHASE

Following planning division's initial project studies, the engineering division began preconstruction engineering design, converting the concepts into site related specifications and drawings for constructors' guidance, a task the division performed at typewriters and drafting tables unitl the 1980s. In the quarter century after 1983, Noah Whittle, Philip Hasselwander, and Bruce Murray led the division's transition from the manual into the electronic era; moreover, they reorganized their division to meet ever shifting project patterns. After the military construction mission returned to the district in 1982, the engineering division had both military and civil works programs, but an outline of civil works' engineering will be instructive before describing the military program's evolution.

Historically, the engineering division's survey branch managed by William Kreisle performed its work on the ground, mapping project sites to secure full knowledge of terrain and other features. This was still done in 2004 by Boyd McClellan's surveying and mapping section in Kenneth Besser's engineering management branch, but surveying technology had evolved exponentially. The survey transits and paper maps of old were largely supplanted by electronic devices, connected by satellite to the global positioning system and generating digital maps for computer display. "We don't do surveys with a chain and transit anymore," McClellan laconically observed.[12]

As the surveys branch mapped each job, the foundations and materials branch (renamed the geotechnical and dam safety section managed by Jeffrey Schaefer) investigated soils and subsurface conditions at project sites, drilling to sample the underlying strata. This group deployed its own drilling rigs and crews until 1995, when it switched to drilling by contract. Geologic exploration was critical to project design, analyzing not only the characteristics and stability of soils and subsurface rock, but also factoring earthquake potential for the designs. While the geotechnical team analyzed the geologic conditions, the hydrology and hydraulics team, led by James Skinner and his successors, analyzed precipitation, streamflow, and runoff records at project sites to determine elevations and dimensions for designing spillways, outlets, filling and emptying systems, and water control structures. This team, historically, designed very conservative structures, and it was extremely rare for floods to reach heights sufficient to pass through emergency spillways at the flood control dams.[13]

An old joke among professionals says that mechanical and electrical engineers design weapons, while architects and civil engineers design targets. This did not apply to civil works teams, such as Stephen Durrett's design branch, that encompassed all these disciplines and more for project design. The design branch teamed Holly Gittings' structural engineers with Larry Cozine's architects and Rick Schultz's mechanical and electrical engineers. These skilled, experienced engineers analyzed project requirements and developed complex plans and specifications for the guidance of construction engineers and contractors, while Verle Heindselman's team estimated a project's costs for budgeting and reference against contractor bids.[14]

While the district had its own design teams for civil and military programs, increasingly it turned to architect-engineer firms for assistance with its engineering tasks. Bruce Murray, and his predecessors as engineering division chief, in early project phases had the choice of performing the design "in-house," or awarding the design work by contract to an architect-engineer firm (an "A-E"). If the latter were selected, then a project would be designed and built by two contractors, an A-E for the design and a competitive contractor for the construction. Gerard Edelin, the district's chief of A-E management, pointed out, however, that by 2004 the engineering division had a third choice: it could contract with a single firm to perform both design and construction ("design-build"). This highly competitive environment stimulated the district and its contractors in their drives to find innovative value engineering, meaning new and cost saving designs and construction methods.[15]

After Stephen Durrett's design team, Kenneth Besser's engineering managers, and Ron Kiser's civil engineers had completed their respective tasks, project plans and guidelines were distributed to construction firms interested in bidding for the work. The lead in advancing a project then passed to the contracting division (formerly supply and procurement division). Managed successively by James Mackin, Joseph Theobald, Christy Watts, and Mark Yates, the contracting division conducted bidding for contracts in accordance with strict legal rules legislated by Congress. Project plans and drawings were distributed to all firms expressing interest in bidding for the work; before 1983 this required making multiple copies of the papers for mailing. After contractors reviewed these documents, preparing their own management plans and cost estimates, they gathered at a site where their competitive bids were opened to compare prices and plans. The contracting division with engineering teams then evaluated the bids, selecting the best and usually the lowest bid to receive the work assignment. When the contract was formally awarded and announced by the congressional delegation, the contracting division thereafter managed contract payments and modifications in association with the construction division.[16]

Before the construction division and he contractors could begin work, however, titles to project lands had to be obtained. Although local government obtained real estate needed for local flood reduction projects, the Corps was responsible for land acquisition at its flood control lakes and navigation projects. Long before construction contracts were awarded, the real estate division conducted public meetings to explain procedures to land owners and met personally with each one. The land owners by law were guaranteed a payment equal to the fair-market value of their properties, either through negotiated agreements or by court decisions. At most projects, disagreements over fair-market value often made headlines; yet the real estate division typically acquired ninety percent of the lands amicably through negotiations. Of the remaining ten percent, about half were settled in courts to secure clear titles, not to settle price disagreements. From the 1980's through 2005, the chiefs of the real estate division have been Max Bohrer, Robert Humphrey, Wendell Wilkinson, Ralph Eliott, and Michael Barter.[17]

THE CONSTRUCTION BASE

After project lands were acquired, the district's construction division opened a field office, often in a trailer, at the site headed by a resident or project engineer, who reported through an area engineer to the chief of construction. Led in the late twentieth century by Richard Russell, Gordon Stevens, Richard Schleicher, and into the twenty-first by George Jageman, Jr., the construction division's staff were known as "hardhats" because they donned safety devices when inspecting project sites. At resident offices, the staff monitored work performed by contractors, counting the loads of soil and rock removed, measuring the concrete yardage placed, even counting the fall of piledriver hammers. With this information, they estimated the amount of work accomplished to pay the contractors. Resident engineers also ascertained that contractors were using the materials and methods specified in their contracts to assure quality control, and at larger projects they had a laboratory for systematic testing of the materials.[18]

Resident engineer offices commonly closed once a project was built and their staffs moved on to other projects. As a result, the construction division underwent constant reorganization as its staff moved from one job to the next. In addition, the District's military construction mission often fluctuated, forcing workforce redeployment to meet changing obligations. In 1983, the construction division had six area offices it had inherited from other districts at Wright-Patterson Air Force Base, Fort Benjamin Harrison, Fort Campbell, Fort Knox, Quad Cities, and Cincinnati, each with subordinate resident or project offices. By 2004, however, it had only two area offices at Fort Knox and Wright-Patterson

Air Force Base, and three resident offices at Fort Campbell and the Olmsted and McAlpine civil works projects. The two civil works projects were so large and significant that their resident engineers reported directly to the construction chief, George Jageman, Jr. In the twenty years from 1984 to 2004, the construction division opened and closed field offices so often that personnel who did not enjoy frequent moves soon found more sedentary employment.[19]

OPERATIONS AND READINESS

After the construction division completed its project phase, the district's public affairs office usually arranged a dedication ceremony to honor political dignitaries and others supporting the project's funding; and afterwards the operations division saw to it that the project served the purposes for which it was built. This was typical sequence at the district's twenty multipurpose dams and at its navigation locks. Local government agencies, not the Corps, operated and maintained the flood reduction projects, such as floodwalls and levees, that they had sponsored and cost-shared to secure their construction.[20]

Managed by Kenneth Mathews until 1998, and by Robert Fuller into the twenty-first century, the operations division nimbly navigated troubled waters in the twenty years following 1983. This division had an expansive history before 1983, with flood control dams and lakes, and modern locks and dams on the Ohio River, steadily moving into operational phases, but no new projects came on line during the following two decades. When Taylorsville Dam and Lake began operation in 1983 as the district's twentieth multipurpose project, it marked the end of the "big dam era" at Louisville, a historical watershed seen also throughout the Corps. In 1984, for the first time in recollected history, the Corps' national budget for operations and maintenance exceeded the amount Congress provided for new construction.[21]

The Louisville District completed no new locks and dams from 1983 to 2004, and the number of locks and dams the operations division managed declined. In 1955, the district had thirty-eight locks and dams in operation: seven on the Green, fourteen on the Kentucky, and seventeen on the Ohio River. The Green River locks closed during the 1960s, except Locks 1 and 2 that had been rebuilt to extend their service. As the district built six modern locks and dams along the lower Ohio River from 1955 to 1980, each replaced two to five of the older locks and dams completed by 1929. By 1983, only two of the antique locks, Nos. 52 and 53 remained in service. The district thus reduced the number of lock and dams it operated on the Ohio River from seventeen to eight.

While commercial barge traffic thrived along the Ohio, commerce diminished on its tributary streams, a trend seen nationwide. AS the barge towing industry adjusted to larger modern locks on the main stem, it left smaller locks on tributaries obsolete. On the Kentucky River the district in 1983 sought to transfer its fourteen locks and dams to the Commonwealth of Kentucky, which valued them for recreationand water supply. The transfer process was still underway in 2001, when the last commercial traffic on the Kentucky River ceased. By the twentieth century's end, the district had only ten locks and dams in operation: eight on the Ohio and two on the Green River. Division chiefs Mathews and Fuller, with lock operations manager Gene Allsmiller, thus constantly reallocated lockmasters and operators from the obsolete locks to the newer locks or to places where they could offer greater public service.[22]

Steady reduction in the number of navigation locks did not reduce the district's annual maintenance and repair challenges. For this function, the district maintained its work fleet to move its repair equipment from the Louisville Repair Station to locks requiring maintenance. Robert Willis, A. John Colombo, Martin Clegg, Elmer Schlensker, Rick Lewis, and Rick Morgan managed the maintenance force along the rivers, repairing lockgates and equipment at the modern locks and keeping old locks 52 and 53 in service. To reduce the time locks were closed for repairs while barge tows waited, these managers

Locks and Dam 52, Ohio River Mile 938.9

recognized they needed more powerful floating plant equipment to ease the maintenance of huge gates at the Ohio's modern locks and dams. By 2004 they had begun to obtain this heavy equipment, notably the gigantic lift crane, named *Henry M. Shreve* after the Corps' snagboat hero of antebellum years, and the powerful towboat *J. C. Thomas*. This stalwart floating plant would be useful along the Ohio's entire course, and indeed on other inland rivers where the Corps needed to move extremely heavy materials.[23]

In 1983 the Operations division had a regulatory function branch, organized in 1975 in response to legislation such as the 1972 Clean Water Act. William Christman, Don Purvis, James Townsend, Lee Anne Devine, and K. Doug Shelton, Jr. managed this branch's expanding regulatory authories, seeking to preserve riverine environment from development encroachment and degradation of aquatic habitats. Where once the Corps had focused on structural impacts upon navigation channels, by 1983 it considered a dozen factors, including the effects on fish and wildlife, cultural resources, and air and water quality, before granting permission for an alteration to a river. This policing function was among the most controversial of Corps programs, arousing public protest when the Corps denied or delayed applications for permits to alter riverine environments or degrade wetlands, and in some cases, when it granted the permits. President Ronald Reagan's administration, committed to reducing government regulation, urged the Corps to speed the resolution of applications for environmental alterations. The Corps and districts complied, issuing general or blanket permits for minor, non-contentious activities in rivers and streams. Still, the district's regulatory staff evaluated more than two thousand applications yearly, including controversial applications for riverside casinos. Controversies aside, on this branch often rested the district's prestige as environmental stewards.[24]

As part of the Army, the district must prepare for any mobilization, especially during floods and natural disasters afflicting the Ohio River valley. It first oragnized its emergency management center in 1964, managed since then by Frank Jones, Kenneth Mathews, Norman Gilley, Michael Beaird, and Steven Rager, These leaders, with small staffs, prepared for emergencies through advanced contingency planning, managed the district's response to disasters in its geographic area, and coordinated the district's work with the Federal Emergency Management Agency and other Engineer Districts. These functions expanded in 1979 when the Corps became a Major Army Command and Congress funded improved military mobilization planning.[25]

"Our adversaries are historians," Lieutenant General E. R. Heiberg III told the Corps, when announcing the enhanced mobilization planning of the early 1980s. he meant that historians have been highly critical of national preparedness for earlier conflicts, and the new readiness program aimed to derail historical

criticisms in future conflicts. He pointed out that readiness could also serve as a deterrent to war, if adversaries were aware that the Corps could mobilize American construction and industrial might for defense in short order.[26]

Responding to this mandate, the Louisville District in 1980 elevated its emergency management section to branch status with a staff of four mobilization experts. Moreover, to emphasize the mobilization mission, the operations division became known as the Operations and Readiness disvision. The district then participated in a series of Army-wide exercises testing the mobilization system to detect actions that might improve defense readiness. In these exercises, the district focused on how it and its contractors would cooperate with the armed forces to convert the Ohio River valley's vast industrial resources from peacetime to military production, aiming to slash response time by half. Louisville took a lead in mobilization planning, because it became the locus of the military mission reassigned to the Ohio River Division in 1982.[27]

RETURN OF MILCON

The military construction mission, commonly abbreviated as "milcon," returned to the district, after a decade's absence, in 1982, reflecting President Ronald Reagan's emphasis on national readiness and defense funding. The district, where the civil works budget was declining, greeted its return enthusiastically. Louisville became responsible for military construction support for the armed forces in a five-state area assigned to the Ohio River Division, with an annual budget estimated in 1982 to climb to $135 million, compared then to its $90 million annual civil works program (including operations). The Division commander in 1982 had the option of choosing any of the four districts within his purview to undertake the military mission, but Louisville then still employed some staff that had managed military work before 1970, notably Gordon Stevens. Stevens had supervised military construction as assistant chief in 1970 before becoming the chief of construction. The district thus was ready and able.[28]

Edward Hoagland, the resource manager, handled the transition. He arranged the transfer of personnel and projects from the Mobile, Baltimore, Omaha, and Kansas City districts, performing military missions in five central states, back into Louisville's functional organization. Louisville's commander, Colonel Charles Eastburn, considered the new assignment a godsend, because in 1982 he expected to lose 130 of his civil works staff under mandated reductions. Instead he gained 380 perosnnel for military construction and real estate work. This net gain increased the district's workforce from about 900 in 1981 to approximately 1,200 by 1983, nearly the staffing level that prevailed before 1970.[29]

As the military mission arrived, the engineering division created a separate military branch with seventy personnel organized in five sections, initially led by Darrell Gordon and Patrick Lankswert. The construction division meanwhile absorbed six field offices with their staffs serving military bases. And the military real estate mission effectively doubled the size of the real estate division managed by Robert Humphreys. The real estate division's staff increased to one hundred, and among the personnel returning to the District was the assistant chief of real estate, Lawrence Link. Link had transferred from Louisville to Baltimore District with the mission in 1970, and thus came back to Louisville in 1982 without leaving the building. The area office he had managed for Baltimore had been located in Louisville's federal building.[30]

The future of the district and its functional divisions seemed bright in 1983, at least to Colonel Eastburn. While the Reagan administration sought to reduce the federal workforce generally, its emphasis on defense brought increased staffing and budget to the district, which launched its greatest military construction and real estate effort since 1942. Although its civil works construction had dwindled, it also was beginning one of its larger local flood reduction projects, along Cincinnati's Mill Creek, and it was planning the seventh of its modern locks and dams on the Lower Ohio River to replace Locks and Dam 52 and 53 built in 1929. Moreover, steadily growing Ohio River commerce often produced traffic queses of barge tows awaiting use of the locks, especially when the 1200-foot long lock chambers closed for repairs and the tows had to pass the auxiliary 600-foot chambers. It became apparent that something should be done to alleviate traffic congestion at the locks, but this could not begin until the President and Congress resolved their nagging, dispute over water resource cost-sharing. Congress and the President of both political parties were at loggerheads over cost-sharing issues, and had not agreed upon the passage of a major waterways omnibus bill since 1970. How this log jam was broken will be related in subsequent chapters.

OBSERVATIONS

Historically, Americans have considered the Corps of Engineers as the nation's fixers, its problem solvers. If the nation and its armed services wanted military bases, airfields, and ports built anywhere in the world, the Corps got it done. If the nation needed a secret weapon, requiring huge plants, a hundred thousand workers, engineering laboratories, scientific advances, all undetected by an enemy, the Corps' Manhattan District did it, in less than three years, 1942-1945. If Americans needed flood protection, help during natural disasters, engineering expertise, the Corps was able.

As district public affairs officer Jon Fleshman would point out, however, during the twentieth century, media perception became as important as reality; and the Corps suffered severe image impairments. It had become known for its men and women in gray, pokerfaced experts lining a head table alongside a uniformed colonel—staid relicts of the early century when economic and social progress equated with structural engineering and building. During the decade of the environment, the 1970s, the Corps struggled to recover its public image, stressing environmental and cultural preservation features in its project planning and administration. All too often the public perception persisted.[31]

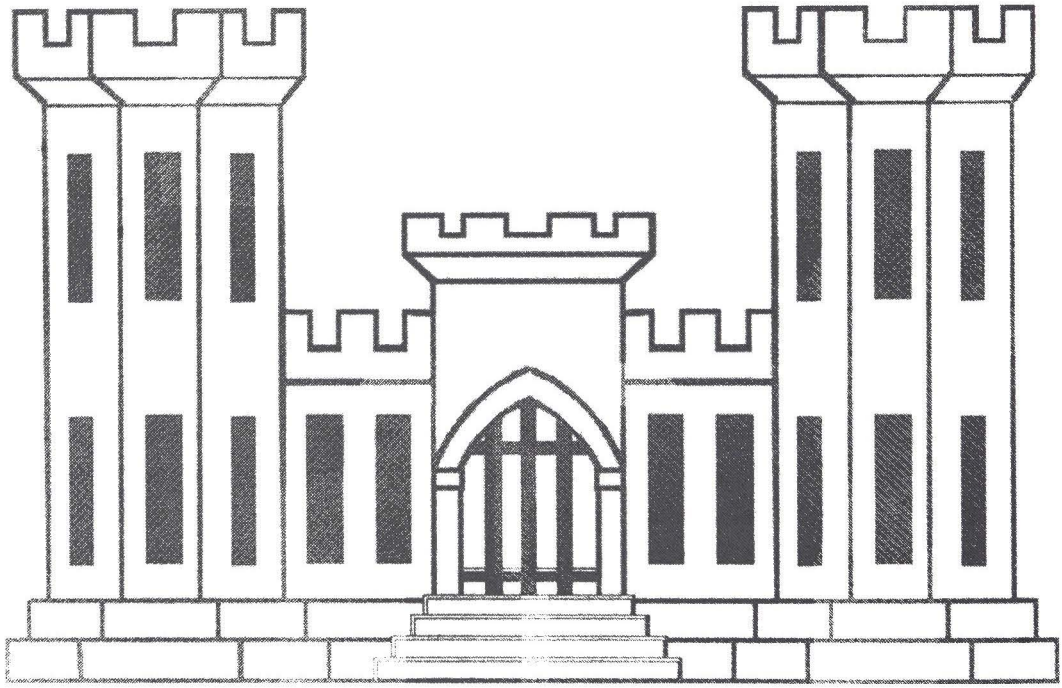
Critics sometimes quipped in the 1970s that an elephant is a mouse built by the Corps of Engineers. This reflected a perception that Corps structures were overdesigned, goldplated, too costly, and took too long to build. Indeed, most Corps projects took as long as twenty years to move from concept to completion. Reality or not, this perception extended to the top by 1983, to presidential administrations and the assistant secretaries of the army appointed by the President for civil works programs. They and the Corps' leaders mulled over management changes that might reduce project costs and speed projects from "cradle to grave."

While individual civil works projects had often required twenty years to move from concept to dedication, in truth, Louisville's functional divisions had performed well for forty years, swiftly constructing twenty multipurpose dams along with six modern locks and dams. As noted earlier, by planning and building several of these structures simultianeously, the district transferred one of these structures to its operations division about every eighteen months between 1953 to 1983, a record unlikely to be matched because the rules have changed so dramatically. Nevertheless, perception had become as important as reality by the 1980s, and the chorus of complaints grew louder.

Some critics belittled the Corps' functional organization as an elephantine "stovepipe" network. Within the Louisville and all Corps districts, section chiefs reported to branch chiefs, who reported to division chiefs. The offices of the Division commander at Cincinnati and the Chief of Engineers at the nation's capital mirrored the districts, employing functional specialists who reviewed the work of colleagues at the districts. Grasping the byzantine stovepipe of the Corps, critics complained, resembled the fabled blind men groping an elephant. There was some truth to this barb: no internet email existed in 193, and people seeking problem resolution often were doomed to playing telephone tag, hunting for the key responsible officer in the Corps' organization.

Recognizing this complaint's validity, the Corps opened One Stop offices at its districts during the 1980s for its military clients. The facilities engineers at

army posts and air force bases could telephone or contact the One Stop office, confident that their message or problem would be conveyed quickly to the person responsible. But nothing similar was done in the civil works arena, and criticisms mounted, culminating by the end of the 1980s in a sweeping reorganization that appointed project managers as one point contacts for each major project, making them responsible also for managing the budget and schedule of their assigned project. In a sense, this marked a return to the personal management system of the early twentieth century. As the first major reorganization in Corps administration since the 1940s, the project management concept did not abolish the older functional divisions. But it aimed to make the Corps more responsive to its clients while also controlling costs and maintaining project schedules, challenges that will be discussed in subsequent chapters.



2
THE PROJECTS OF 1983

Government is not the solution to our problems.
President Ronald Reagan

President Ronald Reagan's administration of the early 1980s had enduring influence on Louisville District activities, especially management of its projects. Reagan's bolstering of national defense initially brought the district a renewed military mission to expand facilities at Army and Air Force bases and airfields throughout its five-state area, and subsequently brought assignments to assist with the closure and environmental cleanup of obsolete Defense facilities. The district's military mission budget in its first year, 1982, quickly surpassed its civil works budget, and it remained the district's largest engineering-construction workload through the remainder of the century.

At his inauguration in 1981, conducted at the moment American hostages in Iran were released, President Reagan announced that he considered the federal government a problem, not a solution. Reductions in many federal programs, including the Corps' civil works, followed as the Reagan reforms proceeded. His administrator for the civil works program, William R. Gianelli, inspected the Louisville District in 1981, and his mandates subsequently impacted the district's workforce, its environmental regulatory efforts, and its civil works projects. This chapter reviews a few of the impacts that the thriving military program and declining civil works mission had on the district, highlighting the status of the District's larger projects in 1983.

REAGAN REFORMS

President Ronald Reagan's election in 1980 was widely interpreted as a mandate for reduced federal regulation, a "back-to-the-states" vote favoring the return of selected federal programs to state and local governments, and a vote for stronger national defense. His early changes in defense and water resources policies bore out this viewpoint. Soon after his inauguration, the President released the previous presidential environmental advisors and employed a new staff with reduced funding, while streamlining the Ohio River Basin Commission and similar basin planning groups by withdrawing federal funding support. His administration then initiated "regulatory reform."[1]

"Regulatory reform" extended to the Corps' authorities under Section 10 of the 1899 Rivers and Harbors Act and Section 404 of the 1977 Clean Water Act,

which required permits for any alterations to riverine environments. To make the Corps' permit actions less burdensome on the public, the Reagan administration pressed for a system of "general permits" to allow stream alterations in specific categories to proceed without formal applications for permits. The Corps and its Louisville District responded, issuing both nation-wide and regional permits generally aimed at reducing the paperwork required of the public.[2]

To manage regulatory reforms and "back-to-the-states" defederalization in water resources programs, President Reagan appointed William R. Gianelli as his Assistant Secretary of the Army for Civil Works. Gianelli had directed Reagan's state water resources agency when he was governor of California. As part of his orientation to the Corps' programs, Gianelli visited the Louisville District in late 1981, reviewing its regulatory program, navigation projects, construction of Taylorsville dam, and its role in the Ohio River streambank erosion litigation.[3]

The stream bank erosion cases had begun in 1975 when hundreds of landowners along the Ohio River filed suits for large damages, claiming the higher water levels created by the modern locks and dams had caused, or accelerated, the river's erosion of their property. The Corps responded that the erosion and caving banks were natural phenomena, not caused by its new dams and higher pool levels. To collect supporting evidence, the Ohio River Division formed a task force to obtain historic photographs and maps of caving banks, to survey and map the caving banks, and to analyze soils and hydraulic actions at specific erosion sites. This field work cost the life of a district employee, Allen Curtis, in 1980 when high winds and waves capsized his survey boat. By the time Assistant Secretary Gianelli reviewed the cases, the Corps' counsel had submitted the evidence to the courts, which issued decisions favorable to the government. More landowners then sued in a second-round case that continued until 1985, when the courts determined the government was not liable for the erosion damages at issue.[4]

At Taylorsville, Secretary Gianelli inspected the district's last flood control dam under rushed construction. Resident Engineer Donald Basham and a staff of fourteen technicians in four branches—technical, administrative, quality assurance, and materials testing—managed the work of contractor Potashnick Engineering Corporation, then raising the earthfill dam toward its crest. An injunction had suspended this construction in 1980 while courts reviewed the constitutionality of Kentucky's cost-sharing agreement for the project. Intense federal and state negotiations followed, until Kentucky's Governor John Y. Brown, landed by helicopter at Taylorsville to announce that he would sign new cost-sharing agreements, with the state paying its share of recreational development costs. With the court injunction lifted, construction resumed and in June 1982 Donald Basham announced the dam had been topped out.[5]

Decdication of Taylorsville Lake, 1983 (right-left) Congressman William Natcher; MG Richard Kim; Colonel Charles Eastburn; unidentified

Taylorsville dam provided its first flood damage reduction in May 1983 and that month Lieutenant General Joseph Bratton, Chief of Engineers, and Congressman William Natcher spoke to a celebrating crowd at the dam's dedication ceremony. "If every department of the Federal government were operated as successfully as the Corps of Engineers," said Congressman Natcher, "we wouldn't have any trouble in this government; you take my word for it." If by success the congressman meant the construction of dams, certainly he was correct, but the District had no new dams under construction in 1983. Under study were two flood control dams that could have joined Taylorsville in reducing flood damages in the Salt River basin, going far toward reducing the suffering seen during the subsequent 1989 and 1997 floods, but no congressional or local agencies expressed much interest in the dams and the projects were shelved. [6]

In 1981, Secretary Gianelli also toured the district's Repair Station and examined some of its navigation structures. The district had recently completed Smithland Locks and Dam and was studying the sixty-two miles of the Lower Ohio River, where Locks and Dams 52 and 53, completed in 1929, still operated. To keep the two old locks serviceable, the district in the 1970s had built a temporary 1200-foot long lock—matching modern lock dimensions—at the two old dams. These temporary locks were ingeniously built at low cost essentially as cofferdams, using interlocking cellular steel piling as the lock walls. The design life of these temporary locks was an estimated fifteen years, meaning by 1981 it was time to get moving if the design and construction of replacement locks and dams on the lower river required the twenty years typical of large civil works projects.[7]

The earliest studies had contemplated building a modern replacement for Locks 52 and 53 at Mound City, Illinois. This site, however, was a few miles from the epicenter of the 1811 New Madrid earthquake, the greatest earthquake in American history, more powerful than the 1906 San Francisco earthquake. The 1811 earthquake had caused the Mississippi River to flow upstream briefly, had formed Reelfoot Lake in Tennessee, and had rippled the earth. Its shock was felt as far as Louisville where it had tumbled chimneys, but it had caused few fatalities because the area near its center then had few inhabitants or structures. In view of this earthquake threat and other factors, the district examined sites farther up the Ohio River at Joppa and Olmsted, Illinois. By 1981, the district had selected Olmsted as the new lock and dam site: the river alignment was straighter and its width narrower, affording better approaches to the locks for barge tows, and a shorter dam with resulting lower construction costs. The district recognized that it was imperative to start the design and construction of Olmsted Locks and Dam soon to avoid the high costs of rebuilding Locks 52 and 53, and Secretary Gianelli heard of this need during his visit. District Commander Charles Eastburn said he considered Olmsted the most significant project on Louisville's agenda.[8]

After assessing the Corps' activities in the district and throughout the nation, Secretary Gianelli announced the Reagan administration would press for three major policy changes: greater state and local participation in project planning, reduction of federal expenditures for civil works, and increased cost-sharing by beneficiaries, meaning state and local governments. He proposed breaking the standard water project studies into two phases: an initial federal reconnaissance, followed by a feasibility study only when local and state agencies were willing to pay half the cost of continuing. This would curtail federal expenditures for studies that ended with negative decisions. The nonfederal agencies could pay their half of study costs through direct participation in the studies, involving them intimately in the planning process. Moreover, Gianelli proposed that state and local governments pay up to thirty-five percent of total water project costs. He expected the willingness of nonfederal agencies to pay these increased costs to become a "powerful test of a project's merits that substitutes for the kind of bureaucratic scrutiny that inevitably delays a project's implementation and increases its costs."[9]

LOCAL PROTECTION

By 1983 the district had considerable experience cooperating with local agencies and conservancy districts. Communities that wished to use Corps lakes for water supply paid all costs of providing the water, and communities that wanted recreational features at Corps lakes, for community use and to stimulate

a tourist industry, paid half the recreational costs. And except in a few cases exempted by Congress, local governments contributed substantially to the costs of local flood reduction, including floodwalls, levees, and stream channelization. Federal law required that local agencies acquire the lands needed for a local flood reduction project, pay any damage claims resulting from its construction, and operate and maintain the finished projects. Indeed, national estimates indicated the nonfederal share of local flood reduction projects before 1986 averaged about nineteen percent of total costs. The district had dozens of these local flood reduction projects at various planning and construction stages in 1983; some were just beginning while others were old. The list, in fact, included one where construction had begun in 1939.[10]

Authorized shortly after the great 1937 flood, the Pigeon Creek floodwall and levee system aimed to protect lowlands at Evansville, Indiana, from flood devastation. The district had divided this project into three work sections with various subdivisions, and had begun construction of the first section in 1939. Work at Evansville ceased during the Second World War, while the district focused on its military mission, then resumed after the war. The district had completed the first two levee sections by 1960, but Pigeon Creek allowed the Ohio's flood waters to back into Evansville. Moreover, because heavy rains dispatched seething floods down the creek, Evansville's leaders urged the district to build a flood control dam astride the creek to reduce flooding while also enhancing community recreation and water supply. To this request, the district responded that the proposed dam on Pigeon Creek lacked economic justification, but levees built alongside the creek could reduce its flood damages. Evansville sponsored those levees and also supported transforming the levee and creek area into a fifteen-mile-long greenway with hiking trails, canoeing, and recreation fields connecting with two city parks. Yet, the work at Pigeon Creek hit several snags.[11]

President Jimmy Carter in 1977 included Pigeon Creek on his "hit list" of water resource projects that he wanted stopped. When construction resumed, the district dropped plans for building levees on both sides of the creek, and work stopped pending efforts by the local sponsor to obtain more rights-of-way. In 1981, Colonel Charles Eastburn informed Evansville's leaders that the Pigeon Creek recreational greenway had been disapproved because the local sponsors expected to donate lands rather than cash as their share of its costs, nor could the sponsors locate the over one million dollars required as the local cost share. Minus the greenway, the levee along the south side of the creek was at last completed in 1994, *fifty-five years* after the project's start. This project certainly skewed the common estimate that Corps projects averaged twenty years from concept to completion. By the time the $50 million Pigeon Creek project was

completed, some structures built early in its history were near the end of their fifty-year design life.[12]

By sharp contrast, the district designed and built many small flood reduction projects economically and expeditiously in the early 1980s. An excellent example occurred at Perryville, Kentucky, a historic community located adjacent to the Civil War Perryville battlefield. Chaplain River, a Salt River tributary, often flooded the town's commercial block known as Merchant's Row, built in the 1840s. When the district planned a channel-enlargement project, the Perryville community feared the project might destroy the existing natural stone-retaining wall and shade trees alongside the stream with resulting degradation of its historic ambiance. Sensitive to these concerns, the district designed the project to preserve the trees and to apply stone veneer on the concrete wall to lessen visual impact. The fill alongside the concrete wall actually became a short river walk with a raised courtyard for exhibits and gatherings. At its completion in 1985, the Chaplin River channelization delighted the community. "If the project was going to be concrete and more concrete, we didn't want it," a Perryville leader remarked, but "the project turned out to be just the opposite." Built in a short time for $235,000, it was completed for less than its originally estimated $250,000 cost.[13]

Perryville, Kentucky, Local Protection Project

While the district generally had several small projects at rural communities like Perryville underway simultaneously, these were continuing authority projects, meaning Congress allowed their construction under the Corps' statutory authorities. Most of these small flood reduction projects received little media attention, but its larger projects in the cities attracted greater attention and frequent criticism. In 1983 these urban projects included those authorized in 1968 for flood reduction at suburban Louisville and in 1970 for Cincinnati's industrial area.

From 1947 to 1956, the district had built an immense floodwall and levee system with thirteen pumping stations protecting Louisville against devastation from floods like that of 1937. This afforded no protection however, for suburban Jefferson County. The county's population had mushroomed during the 1950s and 1960s, and new homes were erected without much concern about the hazards of development within the Ohio River's floodplain. Serious flooding regularly troubled the county, especially in 1964 when a flood forced evacuation of the Valley Village and Pleasure Ridge Park communities and closed Dixie Highway, a vital north-south transportation artery After the 1964 disaster, Jefferson County requested the district to plan for protecting the southwestern section of the county bordering the Ohio River. County voters approved funding for their local share of project costs in 1972, and on October 27, 1973, Congressman Gene Snyder and Jefferson County Judge Todd Hollenbach broke ground for its construction.[14]

The Southwestern Jefferson County project aimed to place a thirteen-mile-long levee-floodwall along the Ohio River from the mouth of Salt River north to tie into the levee ringing Louisville. Averaging twenty-five feet high, the levee would protect against floods on the scale of the 1937 flood, protecting about 24,000 acres adjacent to Dixie Highway, where more than 50,000 people lived and worked. When the Ohio flooded and the county closed road openings through the levee, four pumping stations would move water from behind the levee back into the river. Initial project plans also envisioned a small dam to impound Pond Creek, a stream behind the levee, forming a lake for urban recreation.[15]

The construction division opened a resident office to manage the Southwestern Jefferson County project, headed initially by John Emmerich, succeeded later by Norman Longworth. They managed the phased project with a five-section sequence for construction. As the first levee section neared completion in 1976, however, work stopped while archaeological studies of the construction areas were conducted. This occurred because in 1974 Congress had enacted legislation reemphasizing the importance of cultural resources management at Corps projects.[16]

The Archeological and Historic Preservation Act of 1974 (Moss-Bennett Act) extended cultural resource preservation requirements to all federal projects, also approving the use of project funding for the recovery, protection, and mitigation of historic resources affected. Managed by historian Charles Parrish and archaeologists Brent Smith, Donald Ball and Jan Hemberger, the cultural resources group in the planning division coordinated their studies with State Historic Preservation Offices, the Heritage Conservation and Recreation office in the National Park Service, and the National Advisory Council on Historic

Preservation at all projects, including the Southwestern Jefferson County levee.[17]

The Falls of the Ohio region is a rich vicinity for prehistoric research, and preliminary investigation of the levee area in Southwestern Jefferson County recovered many cartons of artifacts, dating back to the Paleo-Indian period. Under contract with the district through the National Park Service, archaeologists from the Universities of Kentucky and Louisville excavated sites near the levee, and, beneath several feet of soil, found nearly four hundred human burial sites and the midden of a culture contemporaneous with that of Ancient Egypt. These excavations yielded one of the largest collections of prehistoric materials ever studied in Kentucky: thousands of recovered projectile points, pottery and stone tools revealed the social organization of the first inhabitants at the Falls. When excavations concluded in 1977, the University of Kentucky prepared an elaborate report of its findings, the University of Louisville added the recovered artifacts to its collections, and contractors covered the excavations to permit project construction to advance.[18]

Archeological investigations, Southwest Jefferson County, KY

Three of the five levee sections—nine of the thirteen miles total levee length--were in place by 1983, and two of the four pumping stations were ready for testing. Meanwhile, construction of the proposed dam and lake on Pond Creek was suspended until the stream's water quality was improved. Resident Engineer Gary Fitzgerald advised the media that the partly completed project would furnish Jefferson County little flood protection until the remaining levee section was built and all pumping stations were operational. It would require another six years' work before that was acccomplished.[19]

Upriver at Cincinnati, Ohio's Governor James Rhodes broke ground in April 1981 for the Mill Creek project, the district's largest local flood reduction effort of the 1980s, and its third project in the Mill Creek valley. After heavy industry along the creek suffered horrific damages during the 1937 inundation, the Corps built a barrier dam across the creek's mouth where it entered the Ohio.

When the Ohio flooded, bulkheads in the barrier dam closed to hold out the flood while pumps discharged the creek's flow into the river. During the early 1950s, the district also built a flood control dam on Mill Creek's West Fork. It helped reduce the creek's flooding, and its lake within the Cincinnati urban area became one of the top recreation spots in the district. Known as Winton Woods, the lake typically served more than a million recreationalists annually. Neither the barrier nor the flood control dam, however, ended headwaters floods that regularly flushed down the creek, taking with them parts of the industrial plants lining the lower stream. And in 1970 the district proposed channel enlargement and levee construction along eighteen miles of the creek from the barrier dam upstream into Butler County.[20]

Strongly supported by industries damaged by the floods, the Millcreek Conservancy District organized under state laws as the project's sponsor, and secured congressional approval in 1970. Initial plans called for construction of the channelization project along the lower creek in Hamilton County, while the Soil Conservation Service devised floodplain management plans to restrict development along the upper creek in Butler County. Opposition to the Mill Creek project was minimal initially, and the protection it offered industry gave it an excellent benefit to cost ratio; that is, the flood damages it prevented would soon repay the investment in its construction.[21]

The district expedited the Mill Creek project, designing eighteen miles of channel enlargement, two miles of levees, and eight miles of fills, three pumping stations, and twenty-nine new bridges across the enlarged channel, plus the relocation of seven miles of sewer lines. Plans also called for acquiring 620 acres along the creek to create a greenway replete with parks, trails, and boating for public recreation. William Leegan, then the district's planning chief, saw Mill Creek as an excellent opportunity for the district to demonstrate its talents as a "well-balanced resource planning and development agency."[22]

Calling the creek a "little monster," because it flooded the area on the day he saw it, Governor John Rhodes broke ground for Mill Creek's construction in the spring of 1981, and the district began work, with James Houchins managing the construction. The district divided the channelization into segments numbered from Section 1 near the barrier dam to Section 8 near the Butler County line, expecting to pursue the work in timed phases and complete all sections by 1995. Because work could begin only where the sponsor, the Millcreek Conservancy District, had acquired the land, the district began work in 1981 at Section 7A near the project's upper end. Donald Basham of the construction division remarked that when he joined the district, in the 1960s, he had first worked on the Evansville levee, a local project that lingered on for many years, and it

appeared to him that the Mill Creek project might supplant Evansville as a long-term endeavor. This proved an accurate forecast, although perhaps not entirely as Basham expected.[22]

FALLS OF THE OHIO

The unique Falls of the Ohio National Wildlife Conservation Area approved by Congress in 1981 was the most unusual civil works project the district had underway in 1983. This project resulted from years of planning for the Falls, the fossilized coral limestone reef near McAlpine Locks and Dam, which had troubled the states of Indiana and Kentucky and the Corps for two centuries.

Falls of the Ohio, below upper gates, McAlpine Locks & Dam

Because the reef formed two miles of whitewater rapids that blocked pioneer river commerce, a corporation formed in 1830, with federal support, to build a narrow canal on the Kentucky side to move boats past the Falls. When Congress purchased this canal in 1874 and assigned its management to the Corps, it became a principal impetus for formation of the Louisville District. The district not only managed the canal, it also dammed the river at the Falls, rebuilt it as Dam 41 in the 1920s, and replaced it with McAlpine Dam in 1960. This dam submerged the upper rapids and formed a deep harbor for Louisville and its neighbors, but a section of the Falls remained visible near the Indiana bank downstream of the dam. This open Falls area attracted geologists and paleontologists, who found nearly 900 species of coral fossils at the site, and it delighted ornithologists who identified 245 bird species attracted to the Falls.[23]

After the National Park Service in 1970 recommended that the Falls become a park administered by a bi-state commission, Congress approved the concept and the states of Kentucky and Indiana formed the commission. Beset by funding and coordination difficulties, the commission never developed the proposed park. The district took intense interest in this planning, however, because it related directly to the functioning of its McAlpine Dam and also its repair station, located on Shippingport Island between the canal and the Falls. The district had purchased all of Shippingport island in 1960, and the island could be used for bird-watching or other studies only with the district's permission.

Congressmen of Indiana and Kentucky during the late 1970s introduced a series of bills to make the Falls either a national park, a wildlife management area, or a wildlife conservation area. Congress selected the latter in 1981 when it enacted a bill sponsored by Congressman Gene Snyder of Kentucky. This law allowed the Department of the Interior to designate the Falls a wildlife conservation area, and provided that the Corps would acquire the lands and manage the area. Although the Corps had managed some construction at the first national park at Yellowstone during the nineteenth century, and during the 1970s it had developed the Big South Fork National Recreation Area (Cumberland River) for the National Park Service, it had never before undertaken the management of a wildlife conservation area. In August 1982, Congressmen Gene Snyder, Romano Mazzoli, and Lee Hamilton, aboard the *Belle of Louisville,* dedicated what was to become the sole National Wildlife Conservation Area in the United States.[24]

When the $300,000 initial funding for the Falls became available in 1983, the district's planning and real estate divisions began their work. Planning division's David French and James Loper led teams preparing the project master plan, while the real estate division's Virgil Barrow and Robert Rudd undertook title searches and negotiations for the land to be acquired. Titles to riverside land often may be murky, and the real estate team required frequent assistance from Stephen Smith and the district's office of counsel with litigation and settlements at the Falls. Historically notable was settlement of the claims by descendants of United States Senator John Rowan that they owned the Falls. Better remembered as owner of a Bardstown, Kentucky historic house that songwriter Stephen Collins Foster immortalized as "My Old Kentucky Home," Rowan had led the company formed to build the original Louisville and Portland canal. He had acquired a title in 1821 from Kentucky to the entire Falls extending to the Indiana boundary, and his descendants still claimed ownership. The real estate division settled the Rowan claim and other property rights at the Falls through negotiation or litigation, but it soon became evident the Falls project would require more funding. In the meantime the planning division devised a master

plan that included a center to interpret the Falls' history and its unique geology and wildlife for the visiting public. Implementing this project feature involved recruiting a partner capable of managing the center and also sharing its costs. These issues were to challenge the district throughout the 1980s.[25]

KENTUCKY RIVER

As promised during his election campaign, President Ronald Reagan sought to curtail the federal workforce, and he ordered a 10 percent reduction in the Corps workforce for civil works. The Chief of Engineers responded with a directive to streamline the Corps' Divisions and Districts, reducing the number of regulatory personnel and decreasing lockage services and recreation facilities. Brigadier General R. S. Kem at the Division and his district engineers reviewed their staffing and placed the burden squarely on their operations divisions. They closed twenty-two public recreation areas at Corps lakes to reduce staffing requirements. They also cut lockage services at the upper ends of Ohio River tributaries where minimal commercial traffic existed, albeit at significant cost to public relations.[26]

At Louisville, Colonel Eastburn ordered the closure of Green River Lock 3 and Kentucky River Locks 5 through 14, welding the lockgates shut, stripping the locks of equipment, and transferring the lock operators who did not retire to other work. Except for local officials grumbling about "pencil-pushing public servants" who thought lock operations should be profitable, no intense resistance surfaced along the Green River to the closure of its Lock 3. Clamorous protests arose, however, at Frankfort, the state's capital on the Kentucky River.

Although commercial barging through the upper Kentucky's River locks had ceased during the 1970s, a thriving recreational traffic remained, enjoying the Kentucky River's grand scenery during summer seasons. In response to public protests against the lock closures, Secretary Gianelli relented, directing the district to resume operating Locks 5 through 14 upstream of Frankfort during the summer of 1982 to serve recreational boaters. At the same time he approved the planned closure of the locks, and urged that the locks' operating costs and staffing be shifted to the protesters at Frankfort, possibly to state government. Many communities in the prosperous Bluegrass region bordering the Kentucky drew their water from the river, and state government took interest in preserving the locks and dams to assure reliable water supply. Negotiation and litigation with the Commonwealth over these issues rambled on through the 1980s, becoming a priority of Eastburn's successor as District Commander, Colonel Dwayne Lee.[27]

MILITARY CONSTUCTION MISSION

Colonel Dwayne Lee arrived at the Louisville District in 1983 from the Office of the Chief of Engineers, where as an assistant director of civil works he had become familiar with the Reagan administration's policies. Soon after Lee's arrival, Lieutenant Colonel James Sargeant and Major Richard Trombley became his deputy commanders for military and civil works, succeeding deputies Thomas Hueman and Hampton Conley. They recognized the merits of Reagan's policies, but feared the constant hammering at salaries and benefits earned by federal employees might affect morale, and also make recruiting skilled professionals more difficult.[28]

Fortunately for Louisville, it had received the military construction mission in 1981 and it prospered compared to other districts conducting civil works only. The full impact on the district of the Reagan bolstering of the defense budget had become apparent by the end of 1982. "Things happened in all the armed services when that shift in the defense budget occurred," Colonel Lee observed, "and much of the early money went into the construction program in the services. So, the early 1980s were big years in the defense construction budgets of all the services."[29]

In 1982, the district added more than 300 personnel to its workforce for the military mission, opened new office space, and acquired field offices to match an annual workload of $166 million. Gordon Stevens, chief of construction division, elected not to create a separate branch to administer military construction. While field inspection of military projects differed from that of dams and civil works, both military and civil works consisted chiefly of contract administration by the construction division, and its staff in the field offices were, or would become, equally facile at managing both. The Cincinnati Area Office, for example, administered the Mill Creek flood reduction project for civil works, and then added a military project for the Defense Supply Agency and a wastewater grant program for the Environmental Protection Agency in eastern Kentucky.[30]

Supporting three Army commands and three Air Force commands in its five-state region, the district had 274 design projects and 123 construction projects underway at thirty-eight Army, Air Force, and Defense Department installations. In addition to the Area Office at Cincinnati, the construction division acquired or opened five more area offices at Wright-Patterson Air Force Base, Ohio, Fort Benjamin Harrison, Indiana, Fort Campbell and Fort Knox, Kentucky, and Quad Cities, Illinois. Its Cincinnati office soon became a resident office under the Fort Knox area office, leaving just five area offices in action. The construction division subdivided its area offices into resident and project

offices to manage the workload, and soon added new resident offices at Scott Air Force Base in Illinois and at Columbus, Ohio.[31]

Centered within the nation's industrial heartland, the district provided installation support for the Army's heavy armor plants, including tank production facilities at Lima, Ohio, and Detroit, Michigan, along with the Army ammunition and chemical command at Rock Island Arsenal, Illinois. At Lima, it managed construction of facilities for manufacturing the Abrams tank, and at Fort Knox it built barracks and schools to house and train tank crews, plus maintenance shops and wash racks to keep the tanks rolling. Its largest and most complex Army project became the multi-phased Renovation of Armament Manufacturing (REARM) facilities at Rock Island Arsenal, including both new construction and the renovation of historic structures. As its most challenging project, however, the district built an immense medical center at Wright-Patterson Air Force Base that had to be erected around an existing hospital, providing medical services throughout the construction period.[32]

Military construction was done largely by private contractors under competitive bidding procedures, much like civil works projects, and most of the jobs involved standard building renovations, family housing, and the like, but done under rigid time frames mandated by Army or Air Force commands. Military work commonly involved more frequent change orders after construction had begun, and the construction division's contract administration branch therefore expanded to meet this challenge. By 1983, it was processing seventy change orders each month, compared to about twenty-five per month when the district had civil works only.[33]

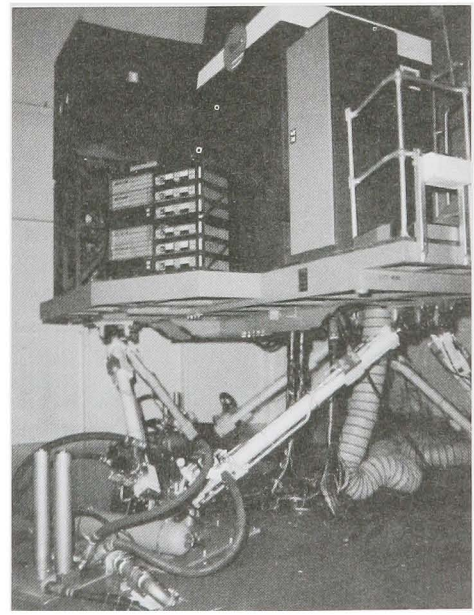
The military branch of engineering division became responsible for preparing designs and specifications for a broad array of military structures. With major assistance from architect-engineer firms, the engineers developed standard designs for repetitive structures, complex designs for new and esoteric buildings, and intricate designs for renovating existing structures. Many of the aging barracks at military posts had been built when the Army was practically all male and consisted largely of short-term draftees, rather than volunteer career soldiers. The barracks renovations of the 1980s therefore commonly involved removing open-bay interiors with gang latrines and showers, and installing partitions and private lavatories to convert the old barracks into more comfortable long-term living spaces. Most older barracks and related structures, moreover, had been erected before energy conservation was a significant concern, and their renovations included insulation and design changes to increase energy efficiency.[34]

The military real estate mission, unlike civil works, involved little new land acquisition, because most military construction took place within existing installations. The district's initial real estate effort consisted of leasing buildings and property for 1200 Armed Forces Recruiting Stations throughout the five-state area, by far the largest program of its kind nationally. In addition to managing land resources at military bases, disposing of surplus properties comprised a major element of the military real estate work. This included marketing timber harvested at the military bases, and disposing of surplus property when the Reagan administration ordered its sale to retard the growing national debt and stimulate local business development. The surplus public lands sold at military reservations and obsolete civil works projects contributed to the 112 Corps of Engineers and 307 Army surplus properties offered for sale to the public nationally in 1983, with revenues credited to a special Treasury account reserved for retiring the national debt.[35]

MILITARY CONSTRUCTION PROJECTS

"The work is coming on in steamrollers, with new design projects coming up almost every day," said resource manager Edward Hoagland, commenting on the District's military construction effort. "The people we have on board are all working overtime. The projects range from the $100 million hospital at Wright-Paterson and a $75 million heating plant at Chanute Air Force Base, and the $88 million phased refurbishment of the Rock Island Arsenal, to simply tackling a huge backlog of maintenance and repairs at other bases, which had been put off for years for lack of defense funding."[36]

The first military projects tackled by the district included an avionics shop and parachute repair building for the Air Force Reserve at Chicago's O'Hare airfield, biotechnology and flight control laboratories at Wright-Patterson Air Force Base, rehabilitation of Detroit Arsenal and the Indiana Army Ammunition Plant at Charlestown, Indiana, family housing and classroom buildings at Fort Knox, plus barracks and family housing renovation at Fort Campbell. The district inherited from other districts the renovation of Ireland Hospital, which it completed at Fort Knox in September 1982, and a "high tech" project at the Screaming Eagles' nest in Fort Campbell, building a flight simulator with moving cameras to convey the sensation of



Flight Simulator, Fort Campbell, KY

flight for pilot training with startling realism. Of special interest was renovation of the historic buildings at the Rock Island Arsenal, where high ceilings were lowered and new windows installed to conserve energy.[37]

From the Navy Civil Engineer Corps, the district acquired construction management, in late 1982, for two more Air Force installations, the Newark and Grissom Air Force Bases. Grissom in northern Indiana was the world's largest refueling base, serving the tanker planes that refueled Strategic Air Command bombers while in flight. Newark in central Ohio was home to the Aerospace Guidance Center, which repaired guidance systems of aircraft, missiles, and submarines, and maintained standard calibration for the design of precision instrumentation. Both presented challenging structural designs.[38]

With these additional projects, the Air Force in some years rivaled the Army as the district's largest customer. Most Air Force projects were managed by Area Engineer Henry Vickers, a Kentucky native with a graduate engineering degree from the Massachusetts Institute of Technology. Vickers had joined the district in 1959, managing civil works construction at Markland, Cannelton and Smithland Locks and Dams before moving into military construction. His office at Wright-Patterson Air Force Base had a staff of forty-four supervising $150 million per year in construction projects. In 1984, his office inspected the completion of biomedical, flight control, and materials laboratories that, respectively, evaluated the impact of flight on aircraft crews, analyzed aircraft design characteristics, and developed aerospace materials such as the ceramic tiles used on the space shuttles.[39]

Resident Engineer George Jageman, Jr. managed renovation and additions to the Wright-Patterson Air Force Base hospital. A Louisville native and University of Louisville graduate; Jageman joined the district in 1969, and like Vickers learned construction management at the locks and dams before becoming Resident Engineer. He and a staff of nineteen managed the multi-million-dollar project to convert the base hospital into a modern medical center. Wright-Patterson had a hospital built when most personnel were male, and it had open-bay wards and gang showers. Renovations converted these wards into semi-private rooms with separate lavatories and showers, while new additions to the hospital doubled its size. The old hospital had 291,000 square feet of space, and the new construction added 365,000 square feet, making it the second largest hospital serving the Air Force. The additions included circular intensive-care units with patient beds on the outside of the circle and nursing stations in the center. They housed nine new operating rooms, a dental clinic, auditorium, and expanded outpatient areas. To adhere to modern safety codes, the additions also had a steel framework with expansion joints to add flexibility in case of

earthquakes, more fire escapes, more efficient ventilating and air-conditioning systems, and oxygen and suction facilities beside each patient's bed.[40]

The medical center complex became the most highly visible project in the District's military program, and hundreds of visitors including three-star generals inspected its progress. Resident Engineer Jageman always took dignitaries to see the unique hyperbaric chambers under construction in the complex. There, burns and wounds were treated with oxygen therapy under triple atmospheric pressure—under pressure, oxygen acts as healing agent for festering wounds and gangrene. One of the largest hyperbaric facilities in the world, able to treat twenty-two patients at a time, its scope and healing powers impressed all knowledgeable visitors. After the hospital additions were completed essentially on schedule in 1986, Colonel Dwayne Lee boasted they were aesthetically pleasing structures that generated rave reviews from the Air Force.[41]

X PAN-AMERICAN GAMES

William Drummond, the elder at Fort Benjamin Harrison, Indiana, who had been a Corps construction manager since 1955, became excited by the annoucement of new bachelor-enlisted quarters to be built on a tight schedule and available for the Tenth Pan-American games of 1987. These were four brown brick buildings, each three stories high with copper trim, sophisticated housing that Drummond thought a far cry from the open-bay barracks with side-by-side bunks and community showers of his day. Project manager Fred Grant explained these barracks were the new "two plus two" modular design. Each module had two bedrooms for two people, connected by a semi-private bath shared by the occupants. Moreover, all the barracks sported day rooms equipped with couches, televisions, game equipment, and laundries on each floor. These were, Grant mentioned, the first facilities of their kind designed and built for the Army.[42]

Colonel Dwayne Lee explained these impressive barracks were completed early, largely as a result of the X Pan-American Games. The quadrennial Pan-American games, begun in 1926, included forty-two nations in North and South America united in a Pan-American Committee with offices at Mexico City. Held a year before the international Olympics, they offered American athletes fine training for the Olympics to follow. Disputes arose in 1983, however, over which city would host the 1987 Pan-American games, with Havana, Cuba, and Indianapolis, Indiana, leading the race. Indianapolis received the nod after the Reagan administration, through the State and Defense departments, offered its support, rather than see Fidel Castro become host of the games. After all, the United States earlier had boycotted the 1980 Olympics because they were held

in Moscow, and the Soviets had boycotted the 1984 Los Angeles Olympics. As Colonel Lee further explained, Fort Benjamin Harrison near Indianapolis could offer housing for the international athletes, and this involved the district because the fort had plans for several new barracks. "A number of those barracks were moved up in the program," Lee observed, "to be finished early as housing for the Pan Am athletes."[43]

Once decisions to hold the games at Indianapolis and to house the athletes at Fort Benjamin Harrison had been made, the district accelerated the new barracks construction to make them available by the summer of 1987. It dispatched Charles Haddaway III and Richard Markwell to the site to serve as temporary Area Engineer and Assistant Area Engineer. Through its One Stop program, redesignated the Installation Support Program in 1985, the District offered commanders and facilities engineers at posts such as Fort Benjamin Harrison any design engineering or construction management services needed for their basic operations and maintenance. The commander at Fort Benjamin Harrison therefore requested the district's assistance with upgrades to water, utilities, and security systems to protect the athletes against terrorist attacks. In addition, as the Department of Defense's real estate agent, the District's real estate division initiated actions to allow 5,000 foreign athletes to move onto an Army post for several weeks, while renting motels for temporary use by soldiers during the games. These vigorous efforts to meet stringent deadlines became an interesting highlight for the district's sports fans, and proved vital to the success of Indianapolis as host of the Olympic-quality games. How the district accomplished this mission is related in a subsequent chapter.[44]

The novel Pan-American games tasking was merely a sidelight to an astounding growth in the district's military program of the mid-1980s. Although the pundits of 1981 expected the district to receive a military mission of perhaps $135 million in yearly construction placement, the total rose to double that estimate by 1986 as the Reagan administration pursued rapid defense buildup in its showdown with the "evil empire," the Soviet Union. This effort erased any broad concerns about declining morale in the district. Its workforce included engineers who entered their profession because they enjoyed challenging tasks, solving problems, and finding solutions. Given the responsibility, flexibility, and authority to solve problems, the district, like the Corps at large, is always a viable, healthy organization. And certainly the military mission of the Reagan years provided such stimulating challenges.[45]

In addition to the defense expansion of the 1980s, Army and Air Force installations in the district, as throughout the nation, had a huge backlog of construction and improvements that had long awaited funding. Soldiers and

airmen were still living in antiquated barracks thrown up for the all-male draftees of the Korean and Vietnam conflicts, with some dating back to the mobilization of 1942. The armed forces had become all-volunteer services, and the career servicemen with families needed safe and decent housing. To improve the soldiers' quality of life, in the 1980s the military installations within the district's arena were playing catch up.

"Catching up. Heavens!" exclaimed Colonel Dwayne Lee: "The Department of Defense construction program during the 1970's hardly got any money for facilities, so we had many facilities that really needed replacement and repairs. We played catch-up for a while and had a big construction program." Obviously, he predicted, the district's military mission would eventually reach a plateau and level off into a stable sustained program.[46]

OBSERVATIONS

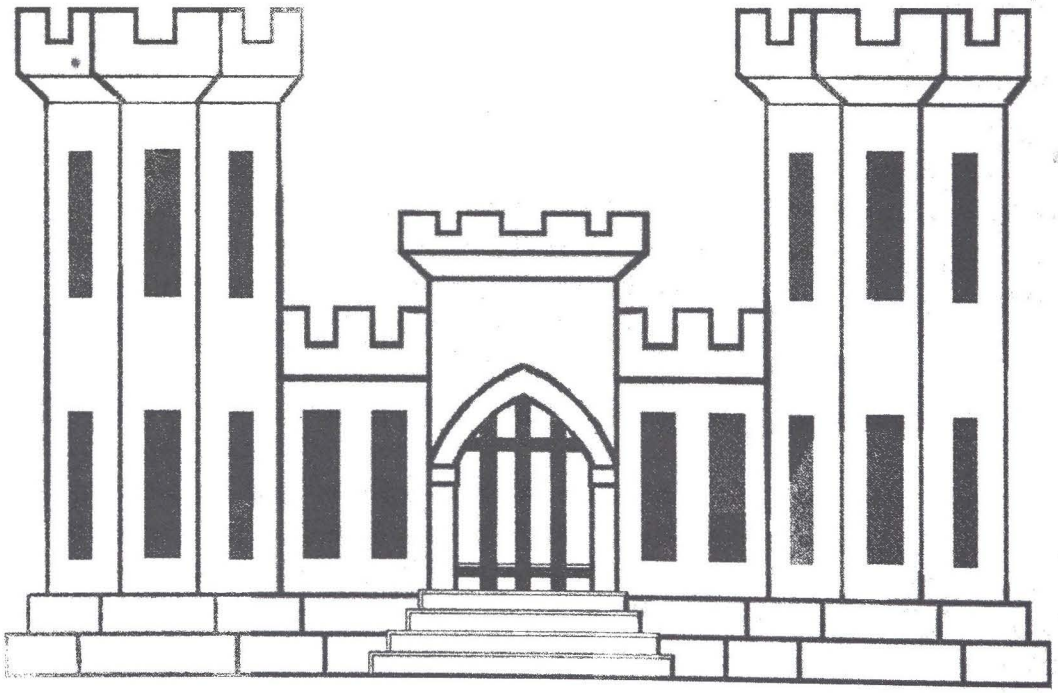
President Ronald Reagan's first administration coincided with the end of the "big dam" era in the Louisville District. Without large flood control dams on its agenda, the district focused on its local flood reduction projects, applying the environmental, recreational, and historic preservation criteria enacted by Congress in the 1970s. In some cases, as at Perryville on the Chaplin River, the district successfully implemented those criteria. Its efforts to add environmentally appealing urban-recreation greenways to its long-term projects at Evansville, Mill Creek, and Southwestern Jefferson County foundered, however, on local cost-sharing, water quality, and related issues.

President Reagan initiated policies designed to curtail the federal workforce and lessen the burdens of federal regulatory enforcement. These policies quickly extended into the district, which responded by issuing general regulatory permits, shutting down obsolete navigation projects, and closing some public recreation areas, thereby allowing a reduction in its workforce to meet the President's objectives. These actions, nevertheless, together with a diminishing workload, threatened the morale of the district's civil works personnel.

The President's robust national defense policies, however, returned the military mission to the district, bringing with it added personnel, bracing challenges, and boosted morale. While the revitalized military mission had minor impacts on the district's planning and operations divisions, it doubled the staffing of the real estate division, added five new area field offices to the construction division, and required major recruiting in the engineering and contracting divisions. Thus, all except two of the district's six functional divisions underwent significant reorganization to meet the military requirements of the early 1980s. The return of the military mission, moreover, demonstrated how civil works can

complement national defense, by providing technical expertise valuable when national priorities shift, in time of peace as well as war.

This expertise also involved the district in such unique projects as the Falls of the Ohio National Wildlife Conservation Area and the X Pan-American Games, but these were challenging short-term ventures. For the long term, the District's leaders in 1986 expected its growing military workload to level off, and they expected new civil works projects, notably a replacement for Locks and Dams 52 and 53 on the Lower Ohio River and a planned expansion at McAlpine Locks, to cushion the expected decline in military work. The proposed new civil works projects could not begin, however, until the President and Congress resolved their nagging disagreements over the merits of increased local cost sharing, an impasse that delayed the enactment of major water resources bills for sixteen years.



3
DESIGN AND BUILD SUPERLATIVES

Here more than most other places, what you see are some unique and fully creative ways of going through the problem solving process.
Lt. Colonel Michael Calnan

Reelected in 1984, President Ronald Reagan pursued his first-term policies: bolstering national defense to confront the Soviet Union while constraining domestic budgets, including the Corps' civil works. These policies brought the Louisville District abundant challenges in military construction for the Army and Air Force, while its civil works program languished. The administration also pressed for reductions in the workforce assigned to the Corps' civil works through the 1980s; and the future of civil works generally seemed dim, at least until the President and Congress settled their long-running dispute over increased cost sharing by state and local agencies. Still, the Corps and Louisville District found ample opportunities to apply their expertise to engineering challenges for the Army and Air Force bases.

Many of the district's challenges of 1984 involved completing structures and facilities in a hurry to meet urgent demands. The Reagan administration believed the Soviet Union might use its numerical superiority to launch a conventional war in central Europe, and the military therefore rushed its preparations for this "AirLand Battle." Tight deadlines, limited contingency funding, bid protests, and contractor claims, all combined to hamper the district's efforts to satisfy its clients. Because the district itself could not begin to perform all the military construction assigned to it, it resorted extensively to defense contracting, a procedure highly favored by the Reagan administration over the employment of additional civil servants. To undertake most projects, the District typically used design and build contracts; that is, it awarded a contract to design a structure then awarded a second contract for its construction. During the 1980s, however, it also began using design-build contracts, awarding a single contract for both the design *and* the construction of a facility. Because design-build contractors performed both tasks, construction could begin even before the final designs were completed. The first of its *design-build* contracts came as the district rushed to complete the Athlete Village at Fort Benjamin Harrison, Indiana, in time for Vice President George H. W. Bush to officially open the 1987 Pan-American games.

PAN-AMERICAN

On August 8, 1987, 4,453 athletes from thirty-eight American nations paraded into the Indianapolis Motor Speedway for the Tenth Pan-American games. Many waved flags bearing the multilingual motto "America, Espirito, Sport, Fraternité," which loosely translated as "The American spirit of friendship through sports." Legendary basketball star Oscar Robinson carried the torch symbolizing this spirit into the stadium and passed it to the superb gymnast Kristie Phillips, who in turn handed it to the celebrated runner Wilma Rudolph. When Rudolph jogged up steps to the cauldron and ignited the Pan-American Flame, Hoosiers and Kentucky colonels alike applauded, and track-and-field fans everywhere waxed ecstatic.

The Pan-American president presented the official games flag to Indianapolis Mayor William Hudnut III, and then introduced Vice President George H. W. Bush. "Today, I solemnly proclaim open the Tenth Pan-American Games in Indianapolis, Indiana, in the United States of America," Bush pronounced, and the immense crowd at the brick yard roared its approval. The Louisville District staff, especially Area Engineer Charles Haddaway III and Colonel Dwayne Lee, were equally thrilled. They had accomplished the short-fuse mission assigned them by the Army, and the commander of Fort Benjamin Harrison, to ready the Athlete Village for the games.[1]

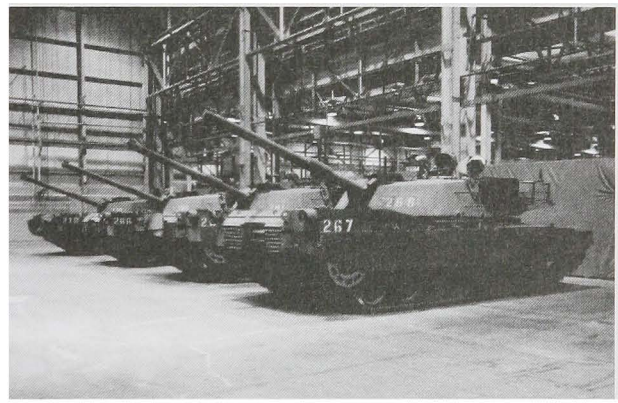
When orders had come from the Secretary of Defense to prepare comfortable housing for five thousand athletes at Fort Benjamin Harrison, the Louisville District had only about eighteen months to complete the project before the games began. Then, it was building at the fort the Army's first enlisted barracks on the "two plus two" modular design, but only one of four new barracks was completed, and construction of the remainder had to be accelerated to meet the Pan American deadline. In addition, the district's real estate team had to arrange for use of the fort's facilities by the international athletes, and to arrange alternative temporary housing for the soldiers in hotels and motels during the games. The fort's commander also tasked the district with providing security fencing and related features to protect the athletes against threats like that marring the 1972 Munich Olympics, where a terrorist attack had decimated the Israeli team.[2]

The security mission included building a double-line, 3.4-mile long, chain-link fence around the barracks, enclosing about 100 acres, with interior fencing surrounding a practice track also under construction. Security fencing was supplemented by television surveillance monitors and electronic intrusion systems activated by contact or sound. Because the security work had to be done

quickly, the district elected to award it as a *design-build* contract, the first it had ever awarded. Before 1986, the district had either performed project designs with its own engineering staff, or had contracted designs to architect-engineering firms then awarded a second contract for the construction. The design-build concept, popular in private industry, employed a single contractor both to design a project and to construct it. Under this concept, contractors presented their preliminary design, capabilities, and cost estimates, and their bids were evaluated on all these criteria, not just bid prices. The district's first design-build contract for the security features at Fort Benjamin Harrison, bid competitively, went to Bechtel National of California, which had developed similar security facilities for the 1984 Los Angeles Olympics. The contract included not only security for athletes at Fort Benjamin Harrison, but also for game sites at Indiana and Purdue University campuses, at the Eagle Creek regatta area, and the equestrian games at Camp Atterbury. The district and contractors accomplished these tasks on schedule, providing safe spaces for the games, and the games proceeded at a record-setting pace, closing at the Hoosier Dome on August 23 without any threatening incident.[3]

COLD WAR GAMES

While the Pan-American games gave the district an intriguing challenge, its missions for the American Army and Air Force were not games, but a deadly serious component of the defense buildup against the Communist bloc. Thanks to President Reagan's national defense initiatives, the district built dozens of projects throughout its five-state region during the 1980s. For the Army, it had major projects at the forts, Benjamin Harrison, Campbell, Knox, and Sheridan, and also at the Rock Island Arsenal and Army tank plants in Detroit and Lima, Ohio. The far-flung, and at times esoteric, projects at these defense installations moved ahead rapidly under district management.



Army Tank Plant, Lima, Ohio

When the Pan-American games concluded, the facilities built at Fort Benjamin Harrison for the athletes were recycled as housing for enlisted troops. The construction of additional new barracks also began that year, while renovation of the Harrison Village family housing area proceeded. Renato Leonardi, project engineer for the Harrison village refurbishment, pointed out

that new construction was always easier than rehabilitating old family housing, but it saved considerable sums to renovate when the original structures were fundamentally sound.[4]

Renovations at Fort Benjamin Harrison included what Larry Bibelhauser described as perhaps the largest maintenance-repair project the Army ever funded. This involved upgrading the Major General Emmett J. Bean Center, the largest building in the Army's inventory. With thirty-six acres of interior space, this building was occupied by the U. S. Army Finance and Accounting Center that issued three million paychecks a month. Initial plans involved renovating the center's top floor, by removing asbestos and upgrading the utility infrastructure, then gradually working down through the building, hoping to reach the ground floor by 1996. As it happened, however, these plans were disrupted and the plans for the renovation suspended when the Secretary of Defense ordered Fort Benjamin Harrison closed.[5]

Another fort also caught up in the closure vise was historic Fort Sheridan near Chicago, Illinois. When this fort became Fourth U. S. Army headquarters and home of the Army Recruiting Command, the district had begun renovating its historic barracks to convert them into command offices, also converting the fort's horse stables into computer centers. The district in 1986 began building new barracks at Fort Sheridan, with yellow brick walls matching the old fort's structures, and also demolishing some barracks and condemned buildings. Because nearby Lake Michigan was eroding its shores and threatening a Fort Sheridan family housing area, the district also completed two lakeshore protection projects there, a unique mission for the inland Louisville District but similar to its bank protection work along the Ohio River. Major Robert Ralston, heading the Corps' Fort Sheridan office, thought his most interesting project, however, was the fort's new commissary.[6]

The fort's commissary—military supermarket—became the district's second design-build contract, awarded in response to Congress's questioning of why military commissaries cost substantially more to construct than civilian supermarkets. Thomas Riddle, managing the project, explained that a House subcommittee had requested an experiment to determine if the design-build contracts used in private business might construct a commissary faster at less cost than the standard Army contract procedures. At request of the Troop Support Agency, the district undertook a test project at Fort Sheridan. It gave potential bidders only such criteria as the average monthly sales, number of employees, stock inventories, and delivery systems, without specifying the building's size or layout. The district awarded this contract to a firm with extensive experience in supermarket construction, which then designed the building's foundation and

structure. The district reviewed the designs and allowed the contractor to begin work on the foundation while continuing to design the building's architectural, mechanical, and electrical features. This simultaneous design and construction saved considerable time, and the contractor completed the building in eleven months for $3.1 million. Inspector Dan Mangialardo estimated this design-build contract had saved two years of construction time and about $1 million in costs. "In regular Corps contracts, the contractor is bound by a design," Mangialardo said, explaining, "there is no leeway. In design-build, there is leeway and there are more field decisions to be made."[7]

The district's design-build commissary received plaudits from the Chief of Engineers and Congress for innovative, quick construction. The Troop Support Agency thereafter used it as a model for commissary construction throughout the Army, but the structure itself did not serve the Army long. When the commissary was completed in 1988, the Defense Department elected to close Fort Sheridan.

Fort Campbell at the Kentucky-Tennessee state line was never in danger of closure. First acquired and built by the Corps in 1941, at 164 square miles in area it became one of the largest military posts in the world, and home to the third largest military population in the Army. In addition to military facilities, it included 4,000 homes and seven schools, plus hospitals, chapels, banks, restaurants, commissaries, service stations, swimming pools, and all the facilities of a modest city; indeed, it is larger than many Kentucky and Tennessee towns. With construction managed at various times by the Nashville, Mobile, and Louisville Engineer Districts, Fort Campbell and its 101st Airborne Assault Division have constantly challenged the Corps to keep up with the Army's changing strategic requirements.

Led by Wayne Goodaker, Ernest Drott, John Briggs, John Holler, William Keown, Jana Ryan, and others, the district's Fort Campbell Area Office and subordinate offices often had several Corps officers on its staff to interface with the military clients. This proved especially useful during the Reagan administration, when the Army's command vigorously planned for a predicted "AirLand Battle," confronting a Soviet blitzkreig in Europe. At Fort Campbell, this preparation involved developing a multipurpose range, which allowed the combined and simultaneous training of tanks, infantry, and attack helicopters on a single range using live fire.[8]

The district began constructing Fort Campbell's multipurpose range in 1986 along a three-mile long corridor equipped with mobile targets. Targets with silhouettes resembling enemy tanks and armored vehicles moved along rails to simulate an approaching force, and dozens of infantry popup targets

also advanced along tracks to threaten the troops in training. These targets were computer controlled and when struck by bullets would collapse, with sensors recording the hit in a control center. Computer programming permitted varying the target combinations for differing war games to challenge the troops in training. Building this system of moving targets required burying over thirty-five miles of power and data cables leading from the targets to the control center; and this proved hazardous because the range had seen service earlier as an artillery range. Unexploded ordnance (UXO) found in the area had to be removed by experts before excavations to install the cables could proceed.[9]

In addition to Fort Campbell's training range, the district also completed flight simulators for training Blackhawk helicopter pilots, maintenance hangars for aircraft, Special Forces quarters, and vehicle wash racks. These wash racks were not the common car washes, but elaborate cleaners for the 101st armored vehicles after they had been tested on the range. With six acres of concrete parking and concrete catch basins, together with miles of drains and piping, the military wash racks could clean twenty-five vehicles hourly. They had self-contained "gray water" systems to avoid discharging the waste water, and they were surrounded by earthen berms lined with geotextiles to prevent dirty and oily water from reentering the environment. The district subsequently became a Corps expertise center for wash-rack design at installations worldwide.[10]

Vehicle Wash Rack, Fort Campbell, KY

Among many projects for the families resident at Fort Campbell, the district managed the construction of bowling alleys, chapels, and youth and daycare centers. Its workload in the family housing arena was slightly reduced, however,

by the Reagan administration's privatization policy, meaning use of the private sector for work formerly done by the government. Congress, in Section 802 of the 1984 Military Construction Authorization Act, approved a program to provide housing for soldiers on private lands with private capital, offering private investors guarantees that military families would occupy the housing for up to fifteen years. Under this authority, private investors in 1985 began building a 300-unit apartment complex in Clarksville, Tennessee, to supplement the existing military housing at Fort Campbell. This privatization initiative, however, did not apply to housing on the base itself.[11]

At Fort Knox, the historic home of Army armor near Louisville, area engineer Donald Basham managed renovations for the base's Directorate of Engineering and Housing, enhancing the livability of old family housing with new electrical wiring, plumbing, patios, porches, sidewalks, and parking spaces. David Dale managed construction of the fort's new child-care buildings, completed in1988 on schedule in spite of many modifications. The district's Fort Knox team also inspected construction of a new bridge over the Salt River, providing all-weather access to the fort's northern training range.[12]

In the district's northern sector, Major David Diedrich and William Gilmour headed a resident office at Detroit serving three large customers: the U. S. Army Tank-Automotive Command at Detroit Arsenal, the Detroit Tank plant producing M-1 military tanks, and the Selfridge Air National Guard Base. In the mid-1980s, this office managed contracts for re-roofing the Detroit tank plant, installing central heat, and resurfacing its test track.[13]

The Lima Army Tank Center received construction management, however, from the District's resident office at Columbus, Ohio, headed by David Sennett. This office inspected contracts to re-roof the Lima plant, improve a test track, and construct two new buildings. The Columbus office managed construction for the Army elsewhere throughout central and northern Ohio, together with Air Force projects at Newark and Youngstown airfields.[14]

At Selfridge Air National Guard Base in the district's Michigan sector, William Gilmour managed the district's second commissary design-build project, based on a concept design by Al Scalzo of engineering division. This new building centralized commissary services from five different buildings at the base into a single 74,000 square-foot structure that, after just seventeen months of design-construction, housed a bakery, delicatessen, fresh fish market, and the amenities of civilian supermarkets.[15]

AIR FORCE SUPPORT

The Air Force was the Army Air Corps until 1947 when it separated from the Army. The Air Force employs fine engineers, including civil engineers at its bases, but most Air Force engineers specialize in aircraft and electronics design, leaving the airfield structural support to the Army engineers, the original builders of most Air Force bases. As a result, the Louisville District has provided engineering-construction management for most Air Force bases within its military area, notably at Scott, Chanute, and Wright-Patterson fields.

Chanute Air Force Base near Rantoul, Illinois, was one of the oldest airfields in the Air Force, established in 1917 and named for pioneer aviator Octave Chanute. The district expanded the base in 1942, and in 1943 more than 25,000 airmen trained there to fly bombers. During the Cold War, Chanute field became a technical training center specializing in B-52 aircraft and missile system maintenance. The district continued its support at the field during the mid-1980s. Among other projects, it built a fire-fighting school with classrooms and training facilities for dousing aircraft fires, and in 1987 it completed a weather-training school and new barracks for 500 personnel.[16]

It was at Chanute that the district had its earliest experiences with alternate dispute resolution (ADR), a legal process adopted by the Corps in the 1980s to reduce costly delays accompanying litigation. Through arbitration and mediation, the Corps, through ADR, sought to resolve disputes with contractors over claims or defects without adversarial court actions, benefiting both the Corps and its contractors. One case at Chanute, for example, involved moisture in a brick wall at a barracks, which condensed against vinyl-coated sheet rock and generated a mold problem. Rather than litigation against the architect-engineers that designed the wall, or the contractor who built it, the Corps brought all parties into a single room for an alternate dispute resolution. When they intensely disagreed, everyone walked out of the meeting except resident engineer David Klinstiver and the contractor's superintendent who hammered out an agreement one-on-one. All parties accepted a share of the responsibility, and as a result the district got the brick wall rebuilt within three months, whereas litigation might have delayed the work for a year. A creative settlement where the parties shared the pain and corrected the mold problem, this was a precursor of the improved relationship with contractors that the district cultivated as "partnership" during the 1990s.[17]

At Scott Air Force Base in Illinois, east of St. Louis, the district opened a resident engineer office managed by Gerald McGill in 1986 to handle a growing construction effort. Scott Air Force Base became home to the Military Airlift

Command, the Air Force Communications Command, and the U. S. Transportation Command serving all the armed forces; and the district built facilities there for all three commands. Notable was the Communications Command headquarters, where the District turned again to design-build contracting to speed progress for its customer. When it could not obtain acceptable bids through standard contracting, the Air Force worried that its funding for the headquarters building, usually available for just two years, might expire before the building was under contract. To speed the work, the district turned to the design-build contract used earlier for Pan-American games security and for commissaries, and it awarded the entire package to J. S. Alberici Company of St. Louis.[18]

At $23 million, the Communications Command headquarters became the largest design-build contract in the district by far, and one of largest in the Corps. It used the "fast track" concept to expedite progress, beginning construction before the building's complete design was available. Driving the building's deep-pile foundation, for example, was completed several months before the Corps and Air Force approved the final structural design. This volatile project concept required intensive management and close coordination among the resident engineer, the construction and engineering divisions, and the Air Force civil engineers, and through team effort, the structure was completed by October 1989. Inside, this building had advanced communications within a unique layout with a hexagonal shape, and outside it had scoops directing natural lighting into the interior. It proved to be a national award-winning design-build structure.[19]

Less successful was the U. S. Transportation Command headquarters building, usually called the Transcom building. Established in 1987, the Transportation Command aimed to integrate military transportation for rapid deployment worldwide. This command had just fifty personnel in 1987, but mushroomed to more than five hundred by 1989; and it became desperate for additional office space. The district therefore pressed rapidly ahead with the building design and awarded its construction contract in August 1989, with an ambitious schedule for completion in nineteen months, a very tight deadline.[20]

The contractor for the Transcom project was the sole bidder, submitting a bid that was less than the funding Congress had made available, but not much less. A narrow three percent of funding remained to meet contingencies—meaning unexpected costs. Such an unexpected contingency, moreover, arose even as construction began, when the contractor encountered soil problems beneath the building's foundation. Correcting this quickly consumed most of the contingency funding. Resident Engineer Gerald McGill kept the job on track during construction, but when the contractor completed the structure in 1992, not enough funds remained to pay his legitimate claims. This forced the

Transportation Command to "reprogram," meaning to request additional funding from Congress, an action no command wishes to take. Commenting on this serious issue, Lieutenant Colonel Michael Calnan, the District's Deputy Commander, observed that in its rush to deliver what the Transportation Command had asked, pressing ahead with the construction under severe constraints, the district's effort had ended with a dissatisfied customer.[21]

At Wright-Patterson Air Force Base, where George Jageman, succeeded Henry Vickers as Area Engineer, the $114 million Medical Center was not completed until 1989, but the district had turned some sections over to the Air Force for beneficial occupancy as early as 1986. This 670,000-square-foot hospital could accommodate 400 overnight patients, and was equipped with a dental clinic, medical library, auditorium, and the largest hyperbaric chamber for wound and burn treatment in existence. Drawing on his long construction experience, Jageman proudly announced that his team had held this project's cost growth down to ten percent, compared to the typical twenty percent he had observed during the inflationary 1970s.[22]

By the 1980s, powerful mainframe computers had become ubiquitous throughout government, and the district was pleased to accept the challenge of designing and building a technically complex operations center for the Air Force Logistics Command at Wright-Patterson. With its design awarded in 1988, the center was a 106,000-square-foot structure designed to house millions of dollars worth of computers and their operating staffs. This building would become, observed project manager Rick Lotz, "the hub of a big wheel that will monitor and keep track of the whole logistics and supply system throughout the entire Air Force."[23]

United States Air Force Museum, Wright-Patterson Air Force Base, Ohio

In 1988, Wright-Patterson area office also pressed ahead with its most publicly visible effort, an addition to the United States Air Force Museum. Funded by matching public funds with private donations, the addition, named the Modern Flight Gallery, provided airy display space for fifty historic aircraft, including a B-52 Stratofortress. This immense hangar had steel-roof arches that were post tensioned to the foundation slabs for added stability. For this unique museum, the district created a special force of construction managers to monitor the work, and this team completed the construction with substantial cost savings. When the job was done, the team joined the crowd that attended the museum's opening on schedule on April 30, 1988. The museum subsequently became one of Ohio's larger tourist attractions.[24]

Perhaps the district's most unusual Air Force project was the Radiac Laboratory at Newark, Ohio, used for calibrating medical equipment. David Sennett and the Columbus field office managed this $23 million endeavor, built entirely underground for the Aerospace Metrology Center's use. With neutron, cobalt, x-ray, and high and low intensity cesium ranges built underground, shielding the structure to prevent radioactive contamination of the surrounding groundwater was essential. To lower the subsurface water table before excavating the ranges, a trench filled with slurry went down around the site's perimeter, then wells and pumps removed the interior water. After excavation, concrete slabs, coated with bentonite, asphalt and polyethylene sheeting, formed the floor and walls up to six feet thick surrounding the ranges. Moreover, each range had lead-shielded doors to contain the radioactive elements. Completed in just a year, the radiac lab began its service in 1988.[25]

ENVIRONMENTAL PROTECTION

While building radiac labs, athlete villages, computer centers, tank plants and ranges, museums, yellow brick barracks, and an array of military facilities, the district also undertook a "work for others" program, providing engineering-construction services for federal agencies, notably the Environmental Protection Agency (EPA). Established in 1970, this agency used grants to fund local construction of water quality enhancement projects, and it also contracted for the cleanup of highly contaminated sites with a Superfund Congress had created, through taxes on the chemical and petroleum industries. The EPA employed few engineers, and the Corps initially had hoped to become the EPA's primary design-construction agency. The EPA employed the Corps, however, largely for inspection of the work done by contractors for local and state agencies.[26]

Nowhere more than in the wastewater management grant program, administered by the EPA, was the success of the national environmental

movement more apparent. Legislation of the 1970s created a federal program to improve national water quality, involving the expenditure of billions of dollars. The legislation established stringent water quality standards that every firm and government agency had to meet by specific deadlines. This stick was accompanied by a carrot in the form of federal grants of up to seventy-five percent of the costs of building facilities needed to treat effluents. Second in dollar size only to the interstate highways as the largest public works program in United States history, and far exceeding costs of the Corps flood control programs, the wastewater management program was never branded "porkbarrel," nor were there discussions of imposing federal user fees.[27]

Under agreements with the Chicago and Atlanta regional offices of the EPA, the Louisville District embarked on the wastewater management program in 1982. Every few weeks, it received lists of communities in Kentucky and Indiana that received federal grants for new wastewater treatment plants, additions to existing plants, or sewer line extensions. Construction division personnel at the field offices checked the records of the grantees, and the consultants they had employed, for funding and construction capabilities then followed this initial review with inspections of the work as it progressed. The district had no authority to order construction deficiencies corrected, but it reported them to the environmental regional office administering the grants, which took appropriate actions. By 1981, the district had twenty-two personnel assigned to the wastewater grant mission, administering 256 grants in Kentucky and Indiana worth $1.2 billion in federal funds. The $270 million wastewater plant at Indianapolis, in terms of cost, ranked in size with the largest single military contract ever awarded by the district.[28]

The EPA, in 1982, also requested Corps assistance with its efforts to clean up hazardous and toxic wastes, under its Superfund program. Toxic waste dumps requiring remedial engineering to prevent further contamination of the environment were to be cleaned up through contracts with private firms, with the Corps in urgent situations serving as the contracting officer. The primary responsibility for the Superfund work, however, went to the Huntington and other districts within the Ohio River Division, not to Louisville.

By the mid-1980s, the Corps' work for the EPA tapered down as larger wastewater treatment plants were completed. Lexington, Kentucky, completed its $23 million Town Branch wastewater treatment plant in 1986; and the Indianapolis project reached its final phase, completing the $65 million Belmont plant to dewater, process, and incinerate sludge. Louisville's Metropolitan Sewer District also completed a $20 million wastewater treatment plant for southwestern Jefferson County. By 1988, the wastewater treatment plant program centered at

smaller communities, and district field personnel were inspecting construction of thirty wastewater plants in Indiana and thirteen in Kentucky.[29]

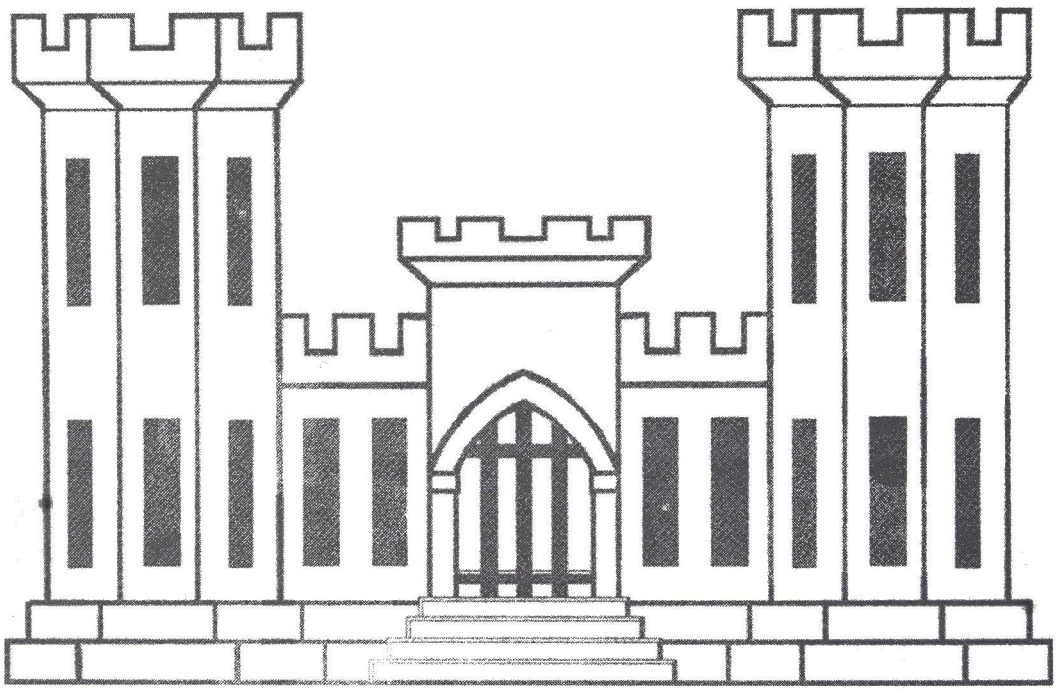
The district's field offices, in addition, inspected construction of a few Superfund projects. In 1987, they inspected work at Elkhart, Indiana, which built a water treatment plant to clean groundwater contaminated by industrial solvents. At Gary, Fort Wayne, and Marion, Indiana, they inspected Superfund projects, involving placement of caps and remedial work at old landfills. The Superfund and wastewater plant inspections required regular travel by construction division personnel to each of the sites for project oversight, but as these projects were completed the district's role gradually declined.[30]

SUPERLATIVES

The largest, the fastest, the oldest, the newest--only superlatives adequately categorized the district's military construction mission during the Reagan administration. Serving Army and Air Force needs for engineering-construction management challenged the district throughout the 1980s as the armed forces enhanced accommodations for volunteer career soldiers and their families; and as they prepared for a potential AirLand Battle against Soviet aggression in Europe. Few analysts then predicted the fall of the Berlin Wall and the collapse of the Soviet Union in 1991.

The Louisville District eagerly responded to national defense requirements of the 1980s, completing many challenging military projects on time and on budget. Observing that the district's response was educational, especially for military officers assigned to manage the effort, Lieutenant Colonel Michael Calnan, the District's deputy commander, commented that he had observed unique and creative problem solving techniques used in the military branch.[31]

By 1986, the urgent phase of the district's role in preparing for the "AirLand Battle" had begun to stabilize, as President Reagan and Mikhail Gorbachev of the Soviet Union made cooperation a priority at their summit meetings. In late 1987, they signed the Intermediate Nuclear Forces Treaty (INF) to reduce the number of nuclear weapons in the arsenals of both countries. With this developing cooperation, Defense Department budget experts began reconsidering closure of older and surplus military bases throughout the United States and within the Louisville District. And as its military mission leveled, the District had hopes that a long-standing impasse between the President and Congress might be broken, allowing resumption of civil works projects within the district and throughout the nation. How this long-standing executive and legislative dispute was resolved is dealt with in the next chapter.



4
BROKEN IMPASSE

People are engineers because they enjoy solving problems. When they work to solve problems, we have a happy, viable, healthy organization.
Colonel Dwayne G. Lee

Two nagging stalemates, one local and the other national, stalled the district through the early 1980s. Both reflected President Ronald Reagan's desire to reduce the federal presence in national life and shift costs and control to local and state governments. Locally, the Kentucky River troubled the district's operations division. Nationally, an impasse over project cost-sharing delayed water resource legislation needed to restore vitality to the civil works program. The district commander and the Chief of Engineers devoted primary attention to these political issues and, with the assistance of their staffs and members of Congress, took steps toward resolving these issues and pleasing their customers in the mid-1980s. Like corporate America, during the late 1980s the Corps adopted as its principal slogan a mandate for improved customer care, no matter who was the customer. "Whether our customers are each other, the taxpayer, the person who wants a permit, or the soldier at Fort Knox who is getting a new child care center, these are our customers," pronounced Lieutenant General E. R. Heiberg III, Chief of Engineers, during one of his perennial visits to Louisville and his field offices around the nation.[1]

Improved customer care seemed dependent on fostering a healthy and well-equipped workforce, and the Corps and its Louisville District initiated holistic programs for the health of their employees, and began deploying desktop computers and software programs to enhance individual effectiveness. Reorganized business management, also emulating the private sector, became a foundation for the Chief of Engineers efforts to focus attention on the Corps' customers, whomever they might be. His sweeping initiative altered the Corps' fundamental approach to solving its customers' problems, launching its transition from a functional to a matrix business orientation.

President Reagan's administration at last found common grounds of agreement with Congress over local cost-sharing for civil works projects in the landmark Water Resources Development Act of 1986. This legislation broke a sixteen-year impasse by increasing the local share of flood reduction project costs and mandating that local governments participate in project planning. If the Corps built flood reduction projects in the future, closer coordination with local agencies became imperative; and the Corps recognized its need to serve

these customers through reorganizing its project management procedures. Many Corps vehicles sported "The Corps Cares" bumper stickers by 1988, a slogan that in truth reflected the Corps' revamped approach to water resource development along with its traditional support for the armed forces.

KENTUCKY RIVER

As mentioned in earlier chapters, tradition holds that major Corps water resource projects usually take as long as twenty years to move from conception to completion. On the Kentucky River, the district learned that closing obsolete civil works projects might also require two decades. When efforts to shutdown the Kentucky River locks began in 1981, no national policy for closing worn-out projects existed; therefore, the district learned by empirical experience rather than through established historical patterns. In earlier closures, for example at the Ohio River locks and dams built before 1929, the district merely blasted the dams and lockwalls out of the way and declared the property surplus. State or local agencies sometimes took the lock reservations for parks or other uses, while in other cases the properties sold outright for private use.

The Kentucky River had fourteen locks and dams, all built before the First World War. The five nearest the river's mouth had been built by the Commonwealth of Kentucky between 1836 and 1842, and the upper locks, numbered 6 through 14, had been built by the Corps between 1880 and 1917. These were designed to pass through steamboats one at a time, and served this purpose until steamboat commerce disappeared during the 1930s, supplanted by towboat-barge traffic. The Kentucky River locks were too small, however, for much towboat-barge commerce, although towboat firms made valiant efforts to use them by disassembling tows at each lock and passing through one barge at a time.[2]

Efforts to use the river for commercial towboating ceased during the 1970s upstream of Lock No. 4, located at Frankfort, the state capital. In 1981, therefore, the District ceased operating locks upstream of Frankfort. Its leaders perceived no economic reason for employing lockmasters and crews or maintaining structures where no commercial traffic existed. This left only the lower four locks connecting Frankfort with the Ohio River in service, supporting a single towboating firm that barged sand and aggregate.[3]

As noted in a previous chapter, the public protested the Kentucky River closure loudly and acrimoniously. Although commerce no longer plied above Frankfort, recreational boating thrived as people enjoyed the scenic Palisades lining the river to historic Boonesboro and the famous High Bridge. Assistant

Secretary of the Army for Civil Works William Gianelli directed the district in 1982 to reopen some locks during summer recreation season while also planning their permanent closure. The Commonwealth of Kentucky responded through litigation, seeking to force the Corps to continue operating and maintaining the locks. Yet, the project had been built to support commercial navigation, not for recreational boating, nor to supply water for the Bluegrass region.[4]

Colonel Dwayne Lee described the Kentucky River dilemma as the most interesting civil works situation he faced, and the only area in the district with an unusual involvement with politics at either national or state levels. Colonel Lee began closure negotiations with his trump card, announcing the district would seek congressional authority to dispose of the Kentucky River locks and dams—that is, declare them federal surplus and either transfer them to state and local agencies, or sell them to the highest bidders—just as had been done at obsolete Ohio River locks. But he and his staff had qualms about this proposal, asking what might happen if Congress authorized the disposal, yet no agency wanted the locks. "We decided," Lee recalled, "the greatest potential buyer was the State of Kentucky, which had a sufficient resource base to take on a project of that magnitude."[5]

Assistant Secretary Gianelli had requested that state and local officials protesting the closure prepare a plan for future operations by the state, and the Commonwealth formed a task force, which recommended in 1984 that the state consider leasing the locks for operation during the summers. Later that year, Colonel Lee, Congressman Larry Hopkins, and the Assistant Secretary met at Frankfort with Kentucky Governor Martha Layne Collins; and when Governor Collins agreed the state would consider taking ownership of the upper locks, the Assistant Secretary released the funding needed to repair the locks for resumed operations. At Lock 5 on May 21, 1985, Colonel Lee and Governor Collins hoisted Kentucky's state flag over the project. The negotiated agreement provided that the state during a three-year interim would fund operations, while the Corps provided maintenance until the state accepted ownership of the locks and dams.[6]

Governor Martha Layne Collins and Colonel Dwayne Lee at Kentucky River ceremony

The Commonwealth organized a water patrol and recruited retired lockmasters to assist it with lock operations, and it managed the locks successfully for several summers. When Congress in 1986 authorized permanent disposal of the locks, the Commonwealth created the Kentucky River Authority to manage lock operations, also giving it bonding, regulatory, and eminent domain powers. After a severe drought in 1988 severely strained water supply at Bluegrass communities, the Commonwealth enacted legislation to accept ownership of the locks; moreover, in 1990 it gave its Kentucky River Authority broad powers to manage the river's water, funded from surcharges paid by communities using the river's water supply. Ironically, this arrangement left operation of the locks upstream of Frankfort, which had been built by the Corps, to the Kentucky River Authority, while the district operated the lower river's antique locks built by the Commonwealth before the Civil War. Yet, the Kentucky River impasse had seemed broken in 1986, and soon, the Corps hoped, state government might accept full ownership of the locks and dams.[7]

LEADERSHIP TRANSITION

District commanders customarily transferred to new commands on a triennial rotation, and Colonel Dwayne Lee thus did not remain at Louisville to see the Kentucky River situation concluded. Before transferring in 1986 to the Waterways Experiment Station at Vicksburg, Mississippi, however, he expressed his personal concerns about the district's future in both military and civil construction.[8]

Noting the steeply rising curve of the district's military construction had faltered in 1986, Lee attributed this largely to two factors: the Gramm-Rudman-Hollings Act and the decision to rebuild Fort Drum. The Gramm-Rudman-Hollings Act of 1985 set targets for eliminating federal budget deficits by 1990, decreeing automatic cuts from each budget item, starting with a five percent reduction in 1986. "You might have a six million dollar job and have it designed, not anticipating you are going to have to whack off five percent," explained Colonel Lee, adding: "So, what the services did was make programming decisions to delay projects and build them in a year or two."[9]

Congress had decided in 1984 to rebuild Fort Drum, New York, as home of the 10th Mountain Division, a light infantry division. Congress also elected not to fully fund the fort's construction, and to require the Army to absorb the costs within its existing budget. About 130 new buildings and housing for 400 families were to be built at Fort Drum from 1986 through 1989 without significant increases in Army budgets. "This meant that every other Army post in the world will be short changed from 1986 through 1989," Colonel Lee warned,

"in order to pay the bill at Fort Drum." Subsequent budget constraints at Fort Knox and Fort Campbell, for example, reduced the district's construction efforts and leveled its military program.[10]

In the civil works arena, Colonel Lee considered the proposed Olmsted Locks and Dam to be the key to the district's future. In 1985 he had presided at public meetings concerning this project, and had forwarded its feasibility studies to the Chief of Engineers for action. This $750 million project would replace the obsolete, deteriorating Locks and Dams 52 and 53, but Lee feared the public did not fully comprehend the need for stepping ahead with Olmsted's construction. "The impacts, if we ever had a major shutdown, especially at Lock 52, are unbelievable," he warned: "We are talking in excess of a billion dollars lost in economic activity if we have a major shutdown at Lock 52."[11]

At Colonel Lee's move to Vicksburg in 1986, Colonel Robert Oliver transferred from the Army War College to serve as District commander. His arrival came at one of the District's perennial leadership transitions. Deputy commanders Richard Trombley and James Sergeant were succeeded by Lieutenant Colonels John Langowski and Michael Calnan. Executive secretary Betty Sibley retired and the executive assistant also changed when Frederick Huelson suffered a heart attack and retired.[12]

Fred Huelson, Executive Assistant, 1980-1987

Huelson had been executive assistant to District's commanders since 1980, becoming famous within the Corps for folksy humor, especially his one-liners called "Huelsonisms." This gift proved useful as he assisted the commanders with congressional liaison, building-space management, union negotiations, and general troubleshooting. Huelson had joined the District in 1964 in the operations division, managing reservoirs in Indiana before becoming chief of the natural resources branch, then executive assistant. Although the construction program had leveled by 1987, Huelson at his retirement predicted future stability because the District, he pointed out, "controls the lower Ohio River which is the center of inland navigation in the United States."[13]

Succeeding Huelson was Ralph Walz, a Louisville native and Vietnam veteran. Walz joined the District in 1977 as analyst in its resource management office, known before 1980 as the comptroller's office. Led successively by Edward Hoagland, Stephen Butler, and Marvin Ormerod in recent decades, the

Ralph Walz, Executive Assistant and Congressional Liaison

resource managers advised commanders on budget, personnel allocation, automation, and program policies. As a resource manager, Walz brought a new perspective to the executive office, attuned to the quality of life issues that Colonel Robert Oliver addressed. "The Executive Assistant position is one of those jobs that does not have a lot of strict definition," Walz explained: "It really depends on the commander you're working for and the priority issues facing the District."[14]

Colonel Oliver had become concerned with quality of life issues while at the Army War College, participating in fitness, nutrition, and stress management programs, and he sought to implement the Army's "caring leadership" initiative in the District. He pointed out that a preventive holistic health program might not only benefit the lives of the District's workforce, it might also lower the overhead charged to the district's customers—by reducing the annual sick-leave costs that were included in the overhead.[15]

This logic earned support from Ohio River Division commander Peter Offringa, and Oliver launched what he labeled the "wellness" program. The District opened conference space and Walz and Hoagland, together with Kenneth Besser and Mark Reynolds, facilitated studies of employee health benefits. Joseph Theobald and Pat Wiggington led a wellness committee that, in response to employee suggestions, managed the opening of a training area with exercise equipment and aerobic classes for employee use after hours. Classes also began in the district to offer information to personnel on such health-related issues as heart disease and smoking.[16]

In a related quality of life effort, Colonel Oliver supported the formation of a day care center for the children of workers in the federal building, which was renamed the Romano L. Mazzoli building in tribute to Louisville's longtime congressman. By the 1980s, single parents comprised a growing number of employees in federal as well as private sectors. Managers like Oliver often supported the formation of child care centers near work places, to reduce parental need for personal leave to care for their children. As the largest tenant of the Mazzoli building, the district took a lead in coordinating creation of the child care center with the General Services Administration. Susan Toutant and other district staff championed the concept, its counsel advised on legal matters, and its contracting office developed contract packages. After two years' planning, the

non-profit "Uncle Sam's Place" day care center opened in 1989, conveniently serving working parents with children under school age.[17]

In 1987, the District employed 1,276 in its workforce, and their spread may be instructive. Colonel Oliver had 3 personnel in the executive office, 6 in program management, 3 in internal review, 1 in the equal employment office, 4 in public affairs, 3 in the safety office, 13 in the office of counsel, 24 in resource management (comptrollers), 28 in contracting division (formerly supply and procurement), 100 in real estate, 47 in planning, 268 in engineering, 182 in construction, and 402 in operations divisions, plus interns and temporary employees. And it then had two new offices: information management with 56 personnel and logistics management with a force of 14 personnel, while its personnel office had transferred in 1984 to the Ohio River Division's management.[18]

The Chief of Engineers mandated reorganizations of the district's personnel office and office of administrative services as part of a national restructuring to secure reductions in personnel, while also improving control over information resources. Under continuing pressure from the Defense Department and the Office of Management and Budget to improve efficiency, the Chief in 1984 mandated the consolidation of Corps personnel offices, and this was done by administering district personnel offices from an Ohio River Division office.[19]

Formation of the district's offices of information management and logistics management had its origins in the proliferation of "micro-computers" and databases during the 1980s. About 1984, the computer industry had launched sales of personal computers for individual use. These early "PCs" had a disk-operating system requiring users to memorize command prompts and keystroke combinations, but many mastered the system and put these tools into service for a variety of office functions. Several systems with different software were used, however, and often these were incompatible with other systems.

Concerned by system redundancies and inconsistencies, the Army in 1984 created an Information Systems Command to devise an integrated information base, including telecommunications, records management, data processing, publications, and audio-visual resources. Complying with this Army initiative, the Chief of Engineers requested studies of information systems throughout the Corps. Studies at the Ohio River Division and the district subsequently identified the distinct information systems then in use and recommended improvements.[20]

To implement these improvements, the Chief of Engineers, in late 1986, ordered the creation of information management and logistics management

offices at his divisions and districts. At Louisville, its automated data processing center and sections of its office of administrative services, handling publications, records, word processing, and communications, were combined to form an information management office. The remaining sections of the office of administrative services, with travel, property accounting, and supply functions, became the new logistics management office.

This was a traumatic reorganization for the office of administrative services, which had existed since the Chief Clerks had managed non-engineering functions for the district before 1942. Well managed successively by James Mitchell, Roy Germano, and Mary Best, the office of administrative services had a long, successful history. After Mary Best retired, Kenneth Besser consolidated personnel from the automated data processing center and administrative services into the new information management office. The new office supervised computer services, the mail system, publications, records management, radio communications, audio-visual services, and the technical library. One its first initiatives converted the technical library into computer training space, thereby initiating the eventual closing of the library. More than 350 employees in the first year learned new computer systems at the library, and more soon followed. Their training, together with the computer industry's development of a "user-friendly" graphical interface, gradually returned report and letter typing duties to the internal divisions and branches, eventually resulting in closure of the district's word processing center.[21]

This presented an interesting life cycle in the district's history. Before 1942, each office had a secretary who provided typing services. The paperwork became so massive during the 1940s that a pool of skilled and fast typists formed in administrative services to supply typing services for all district offices. The district's executives at that time sadly lamented the loss of their secretaries to the typing pool. In 1977 the typing pool abandoned manual typewriters and switched to electronic word processing, still providing centralized keyboarding for the entire district. The advent of personal computers with graphical interfaces, in combination with the district's training classes during the late 1980s, however, returned typing services to the internal divisions, branches, and sections, resulting in closure of the word processing center, formerly the typing pool, in 1991. Technology drove this life cycle, from decentralized to centralized and back to decentralized services in a half century.[22]

Sections of the office of administrative services concerned with travel, property and supply inventory became the logistics management office in 1987 led by Sandra Cumbea. Because the Chief of Engineers had identified deficiencies in the Corps' manual property accounting system, he mandated improvements, and Cumbea's first challenge involved switching to the property

barcode inventories used in supermarkets. Cumbea and her staff attached bar code labels to nonexpendable property throughout the district, creating an electronic inventory. When they finished this labor-intensive task, they had labeled 23,000 items worth $28.5 million.[23]

Another logistics change at that time aimed to reduce transportation costs. The Army mandated a study of converting vehicles used by its personnel from the military to the General Services Administration (GSA) fleet, and Colonel Oliver directed Jane Myers of the district's transportation branch to undertake this study. Study results indicated the Corps might save by using GSA vehicles. Army regulations prevented the Corps from selling its vehicles until each had reached a specific mileage; and, because its vehicles typically were driven just a few miles daily, the district had become saddled with older vehicles. The GSA replaced its older vehicles regardless of their mileage, and the district therefore disposed of its vehicles and switched to GSA transportation to secure both savings and newer vehicles.[24]

In addition to internal reforms, Colonel Oliver confronted formidable external issues. He expected the Gramm-Rudman-Hollings balanced budget act to reduce funding for the district's military customers, thereby abbreviating its military construction program. He noted that the Defense Department allowed its forces to select agencies other than the Corps to manage large construction contracts, and the Corps necessarily operated in a competitive environment. While the district had reduced its design costs on military projects to 7.1 percent, the best in the Corps, Colonel Oliver urged further reductions in overhead to remain competitive. In civil works, his major concern was the cost-sharing provisions of the Water Resources Development Act of 1986, which he feared might hit hard at the district's planning and design work, if the potential customers found cheaper means of conducting feasibility studies.[25]

ENDING THE IMPASSE

By 1986 the deteriorating national infrastructure had become a primary concern for the district and the Corps. The average age of navigation locks in the Ohio River system was estimated at forty-six years, and the flood control dams at thirty years. Some needed rehabilitation and others needed replacement, but the lengthy impasse between Congress and the President over cost sharing for flood control and marine fuel taxes for navigation projects delayed modernization of the aging facilities.[26]

Congress in 1978 had imposed a tax on marine fuel, with revenues going into an Inland Waterways Trust Fund to pay half the costs of new navigation projects. President Reagan's administration endorsed steep increases in this fuel tax, and

declared that no new waterways construction could proceed until Congress approved further tax increases. While awaiting this legislation, the district proceeded with planning for its proposed replacement projects at Olmsted, Illinois on the Lower Ohio River and at McAlpine Locks in Louisville. When Congress doubled the fuel tax to twenty cents per gallon in 1986, and created an advisory panel of waterways operators to monitor expenditure of the revenue, the district was prepared to step ahead with navigation structure replacements.[27]

This fuel tax provision became part of the historic Water Resources Development Act of 1986 signed by President Reagan in November 1986. Approving 262 new water resources projects, this act found support from an unusual alliance between the Reagan administration and environmental lobbyists, the former because the Act promised to transfer tax burdens to state and local agencies, and the latter because they believed it might slash "unneeded and environmentally destructive pork-barrel water projects." This Act, indeed, incorporated dramatic policy changes.[28]

In addition to doubling the fuel tax and creating the inland waterways board, the 1986 Act mandated that states or agencies desiring water resource projects take part in and share the costs of feasibility studies. Already paying all the costs of water supply and half of the recreation costs of water resources projects, state or local agencies would now pay up to thirty-five percent, about a third of costs for construction of Corps flood reduction projects. How this thirty-five percent local share was set by Robert Eiland affords an enlightening sidelight on policy development. Eiland, an experienced state engineer from California, appointed special agent by Assistant Secretary of the Army William R. Gianelli, later claimed he had devised the thirty-five percent cost-sharing formula in a single afternoon. After learning the Water Resources Council estimated that local agencies, by purchasing project lands and paying damages, contributed an average of only nineteen percent of flood reduction project costs, Eiland said he merely doubled the local contributions to thirty-eight percent, then rounded it off to thirty-five percent as the fair local share of costs, before presenting his recommendation.[29]

The President and Congress expected these increased costs and "up-front" planning expenses would provide a "market test" to eliminate projects lacking broad support, thereby saving the costs of studying projects that might never be built. Assistant Secretary of the Army for Civil Works Robert Dawson, who had a hand in drafting the 1986 Act, claimed its provisions would restore credibility to Corps public works. "The old epithet of pork barrel, which was justifiably at times hung around our neck," Dawson proclaimed, "just won't be available to a critic anymore."[30]

Culminating policy initiatives by the Carter and subsequently the Reagan administration, the 1986 Water Resources Development Act rejuvenated the Corps' stalled civil works program. Within the Ohio River Division, it authorized four navigation modernization projects: Grays Landing and Point Marion locks on the Monongahela River in the Pittsburgh District, Winfield locks on the Kanawha River, and Gallipolis locks on the Ohio River in the Huntington District. The Louisville District's Olmsted and McAlpine replacement projects were not approved by the 1986 Act, but the path had opened for them to advance toward construction, with half their costs paid by their users, the towboat industry, rather than by all taxpayers.[31]

While the towing industry was prepared to deliver its fifty-percent share of navigation project costs, Colonel Oliver was not confident that local governments would meet their thirty-five percent obligation toward the costs of flood reduction projects. Robert Dawson agreed that this presented a critical moment in the Corps' public works program, until local sponsors decided whether they were willing to finance a larger share of project costs. Oliver proudly announced that Owensboro, Kentucky, had signed the district's first local cooperation agreement under the 1986 act, but this concerned protection from riverfront erosion, not flood reduction. The 1986 Water Resources Act authorized studies of two local flood reduction projects in the Louisville District: at West Carrollton along Holes Creek and at Fairfield along Pleasant Run, both in southwestern Ohio. Planning at West Carrollton proposed to widen Holes Creek to expedite the passage of flood waters, while planning for Fairfield proposed to build dry-bed reservoirs that would temporarily hold flash flooding for slower release. It pleased Oliver and the district when both communities signed letters of intent to cooperate in these local flood reduction projects. Indicating that local governments with adequate resources might be willing to incur the financial obligations, this boded well for the district's future civil works program.[32]

News of this advance was matched by even better news internally. In late 1987, Don Purvis, the district's navigation chief, together with technician Michael Allgood and boat operator John Magness, took the district's survey boat onto the Ohio River at Mound City, Illinois. They never detected the approaching towboat *Dixie Express* and its barges, which ran over their work boat. When the workboat surfaced behind the tow, Purvis and Allgood were trapped inside the boat's hull. Thrown from the boat, Magness swam back to the hull and dived down to open a hatch and release his partners. When the three surfaced, the towboat crewman pulled them from the river. Good luck does not adequately describe their escape; few people have ever survived similar collisions.[33]

OBSERVATIONS

Ronald Reagan, the first president since Eisenhower to complete two full terms in the White House, presided over renewed national optimism and a showdown with the Soviet Union. The administration's strong defense posture brought the Corps of Engineers and its Louisville District a renewed military construction program, which they pursued vigorously.

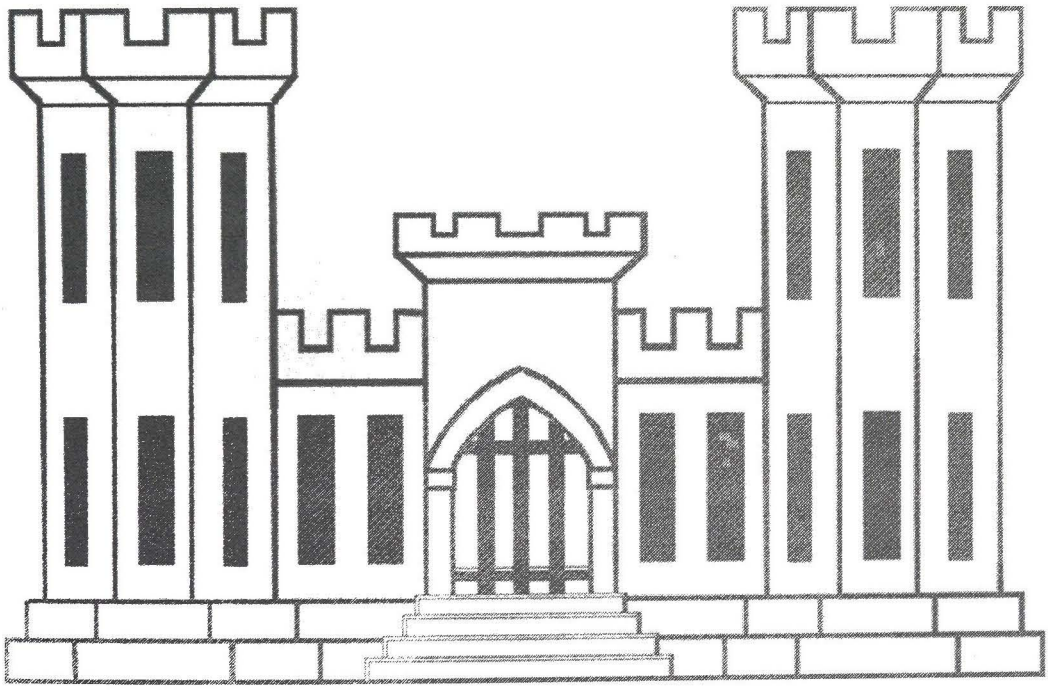
Among the domestic achievements during the Reagan administration was an end to the sixteen-year stalemate over the Corps public works. Unbalanced budgets and soaring federal deficits made shifting tax burdens for civil works projects to state and local agencies palatable to Congress, especially when combined with the rationale that an increase would provide a "market test" for the projects. The 1986 Water Resources Development Act became the linchpin of civil works policy, and it proved an enduring policy because subsequent administrations made no significant effort to revise it. This seemed a return toward nineteenth century federalism, when state governments and the private sector, rather than federal agencies, were the nation builders.[34]

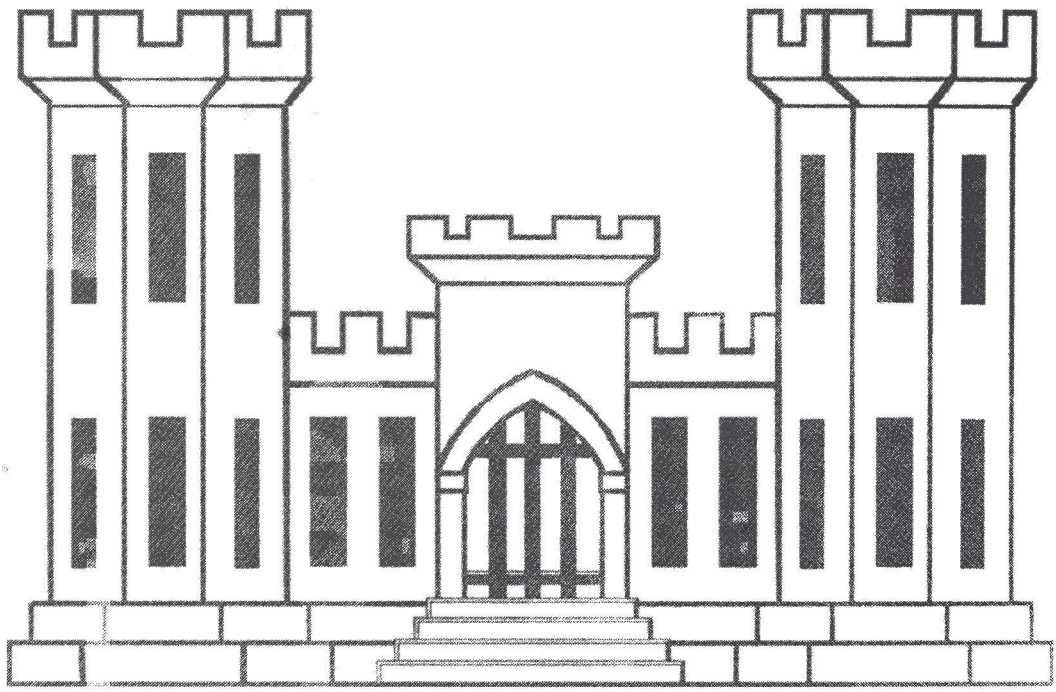
Although the waning Cold War in 1988, together with federal budget troubles, slowed the steep increases in military spending and stabilized the district's military construction efforts, the cost-sharing, fuel-tax increases, and user fees of the 1986 legislation paved the way toward resumed civil works construction. By 1988 the district had several commitments from local sponsors for studies of local flood reduction measures, and it had plans for replacing older navigation structures along the Ohio River ready for congressional action.

Colonel Robert Oliver lamented, however, that although the impasse on the Kentucky River had been broken in 1985 when Kentucky agreed to take ownership of the locks, the transfer was not proceeding as swiftly as hoped. By virtue of the 1985 agreement with the Commonwealth, the district had hoped to deliver ownership of Locks and Dams 5 through 14 to the state in 1988. Pleading lack of funding, the state, through its congressional delegation, sought to persuade the federal government to continue maintaining the locks and dams—this despite the fact that the locks supported no commercial traffic and never would again. In addition, the state insisted the Corps could not merely depart, leaving the locks and dams in deteriorated condition.[35]

To avoid future conundrums, Lieutenant General Henry Hatch, Chief of Engineers, sought a major shift in the "Corps Culture," by launching his "Initiative 88." This proposed identifying the most costly, most visible, and most controversial civil works projects in each district, and establishing a project

management office to monitor their costs and progress in close consultation with nonfederal sponsors. This concept contemplated switching Corps Districts, as least in theory, from their functional to a matrix organization. How the Louisville District implemented this initiative is the next subject.[36]





5
CRADLE TO GRAVE

Good management can solve problems.
Robert Page, Assistant Secretary of the Army

Cradle to grave—beginning to end, alpha to omega. Engineers commonly quoted this mantra to highlight the Life-cycle Project Management concept adopted by the Corps of Engineers in 1988. In a sense, this concept reflected a swing of the pendulum back toward the Corps management system of the nineteenth century, a personal responsibility system that assigned to Assistant Engineers the full control and responsibility for waterways projects. This personal form of administration had ended during the 1940s when the Corps transitioned to functional management. Yet, when the Chief of Engineers launched "Initiative 88," mandating life-cycle management for major projects, the Louisville District already had extensive experience in this arena in its military programs. Nevertheless, adapting life-cycle management to civil works as well as military projects signaled dramatic shifts in the district's functional administration.

Responding to this initiative and other challenges, Colonel Robert Oliver in 1988 sought to guide the district toward new vectors by drafting a five-year strategic plan. Still, the best laid plans of all water resources agencies may confront unexpected challenges, and these would afflict the district in both the civil and military arenas. A record drought in 1988, followed by severe floods in 1989, renewed the public spotlight on the district's civil works. And significant disruptions to its military program arrived on the wings of orders from President George H. W. Bush, Congress, and the Defense Department, to close selected military bases.

MILITARY PROJECT MANAGEMENT

When Lieutenant General Henry Hatch dictated "Initiative 88" as his response to demands for life-cycle management, the district had been using this system since its military construction mission had resumed in 1982. Major General Richard Kem, commanding Ohio River Division in 1982, had reviewed project management practices nationwide, and found it applied differently at several districts. At some districts, engineering division personnel managed projects in the design phase, and construction engineers managed them through building phases. At other districts, project management was accomplish entirely

within their construction divisions. Reviewing these models, Kem learned the Missouri River Division had placed the project management function within the engineering division, because many project challenges arose at the start—scheduling milestones, performing designs, interacting with the clients. Preferring the Missouri River Division system as applied at Omaha, Kem reasoned the potential for time loss was principally up front in the engineering division.[1]

Ohio River Division and its Louisville District therefore adopted the Missouri River Division model in 1982 when they resumed the military mission. At the start of each large military project, they appointed a project manager to keep the work on schedule and within budget, but these were known as project engineers, rather than as managers, because they were on the engineering division staff. When an armed forces representative requested the design and construction of a structure, the district commander and staff appointed an engineer to master the client's needs and to control project progress from ground-breaking to dedication. Generally, this procedure proved so satisfactory for military clients that thoughts arose of applying it also to civil works.

Robert Page, President Reagan's appointee as Assistant Secretary of the Army for Civil Works, expressly pressed the Corps in 1987 to expand the life-cycle system of project management to include civil works as well as military projects. Previously an executive with a construction company, which had employed the project management system, Page commented that the construction industry generally considered the Corps of Engineers to be "arrogant and unfair." Indeed, a common construction industry aphorism of 1982 held that the Corps consisted of "great engineers, lousy managers."[2]

In Secretary Page's opinion, the Corps of Engineers with its functional management compared unfavorably with the private sector management practices, and he declared that it still lived about thirty years in the past. Without big flood control dams to build, the Corps needed to reformulate its base, finding a management system that might complete projects on schedule and within budget. This change became imperative after the 1986 Water Resources Development Act increased the cost-sharing and participation of local sponsors in federal water resource projects. Local sponsors seldom had sufficient funding to pay for large cost overruns, and few had the persistence to stay with a project, if its completion required the twenty years considered typical of Corps projects. Moreover, Page believed "the Corps had to do something positive about their image that they had to communicate better with the private sector and their brothers and sisters out there in the engineering-construction business."[3]

Although Secretary Page found Chief of Engineers E. R. Heiberg III rather skeptical of the life-cycle management concept, program testing began at the Tulsa and Mobile Engineer Districts. Tulsa developed project management by merging its engineering and construction staffs into a single division, while the Mobile District embarked fully on "cradle to grave" project management.[4]

In 1988, Secretary Page found an ally for his management initiative in the influential Senator Patrick Moynihan of New York, chair of the Senate Energy and Public Works Committee's magnetic levitation (maglev) task force. Moynihan vigorously campaigned for a federal program to build superconducting tracks capable of propelling railroad trains, levitated a fraction of an inch above the tracks, at speeds exceeding 300 miles per hour. In Moynihan's opinion, the nation desperately needed such infrastructure improvements as maglev railroads, but the Corps of Engineers had become too set in its ways for the task. Stung by this and similar criticisms, Lieutenant General Heiberg and his successor as Chief of Engineers, Henry Hatch, formed an Office of Strategic Initiatives to identify new roles for the Corps as project managers.[5]

Supporting this initiative, Secretary Page campaigned vigorously for the Corps to adopt the life-cycle project management concept nationwide. He declared the Corps needed to improve its cost accountability, shorten its review process, and make its managers more responsible. "It sometimes took twenty years to get a project approved and started; this was wrong," Page lamented, "and when problems occurred on a project, no person was responsible—fingers always pointed over the wall to some vague group." The Corps must have project managers who become personally responsible, Page demanded, along the lines of private-sector engineering firms that typically strove for only five percent overhead on construction projects. "Good management can solve problems," became Page's maxim.[6]

As part of "Initiative 88," General Hatch issued a circular in July 1988 that launched the Corps' transition to life-cycle management. He instructed districts to designate a civilian Deputy District Engineer for Project Management, to assign project managers to each major project, to establish a project review board chaired by the new deputy, and to open program management offices to advise the deputy. The most challenging hurdle involved merging the Corps' traditional functional divisions with the life-cycle system. The Louisville District accomplished this by leaving its functional divisions in place, but funneling projects through the Deputy District Engineer for Project Management. Chiefs of the functional divisions retained responsibility for their traditional services together with the schedules, budgets, and workforces they needed to provide those services. This change proved a shocker after forty years of functional

management, exacerbated by orders that no new personnel could be hired to staff the new project management offices. General Hatch insisted that in time the new system would pay off, nevertheless, declaring: "We believe that developing quality projects on schedule and within budget can best be accomplished by combining the strength of our existing functional elements with a strong project management organization."[7]

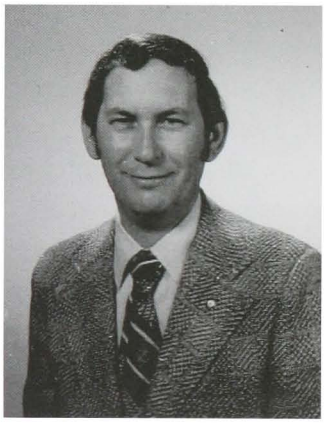
While admitting the district seemed apprehensive of these changes, Colonel Oliver welcomed an opportunity to appoint a new group focused on winning projects. He and the district opened its project management office in the summer of 1988, with Lieutenant Colonel John Langowski acting as Deputy for Project Management with a four-member staff: David Weyer, Holly Gittings, Sharon Raque, and Diana Pack.

Colonel Langowski explained that the district's previous process had involved managerial handoffs among the technical divisions. The planning division performed the feasibility studies and leading work, then passed a project along to engineering division for design, then to construction division for building, and finally to operations division. The managers in charge of a project changed at each of these breakpoints, and, in Langowski's opinion, this resulted in delays and sometimes forced budget revisions. Local sponsors, required in 1986 to invest heavily in their projects, needed single points-of-contact and unity of direction in their daily contacts with the Corps. Virtually all Corps projects, Langowski explained, eventually would have project managers except the smaller projects that would be directed by technical teams. The project managers' essential missions were two: control projects costs and limit schedule extensions.[8]

Under Langowski's leadership, project managers were appointed in 1988 for the district's two large navigation projects, David Weyer for Olmsted Locks and Dam and Sharon Raque for the McAlpine Lock Replacement on the Ohio River. Technical teams led by Linda Murphy, James Emly, and Gregory Wright became responsible for local flood reduction projects at Evansville, Fairfield, and Mill Creek, Ohio. In 1988, the Evansville project neared completion; construction was underway along Mill Creek at Cincinnati, while the Fairfield project in an urbanized area of Butler County, Ohio, awaited cost sharing commitments from a local sponsor.[9]

The Fairfield project, authorized by the 1986 Water Resource Development Act, culminated an innovative engineering effort that began in 1979. Neill Tyler of the planning division, with assistance from Nancy Wolf of information management, developed a computer program to analyze the viability of nonstructural flood reduction at Fairfield. They examined, for instance, structural

floodproofing—jacking buildings up above flooding levels and constructing sturdy concrete supports beneath them—but concluded it could not be efficiently done in Fairfield, where buildings commonly were multi-level structures nearly impossible to hoist without damage. To curtail flooding at Fairfield, therefore, the district planned three drybed reservoirs on Pleasant Run and its tributaries. These would trap flash floods for subsequent slow release, but would not have permanent pools for recreational or other uses, These drybed reservoirs resembled the nearby dry dams built by Ohio's Miami Conservancy District after 1913's devastating flooding. The estimated $11 million cost of the Fairfield project, however, proved daunting for the local sponsor, which under the 1986 guidelines had to raise about $4 million as its share. Hence, the Fairfield project became the first casualty of increased cost sharing. The community eventually modified the plans and built its own flood protection without federal assistance.[10]



Neal Jenkins, Deputy District Engineer for Project Management

While the search for a permanent civilian Deputy District Engineer for Project Management progressed, Don Reid and Noah Whittle were successively detailed as the acting Project Management deputy. When the selection went in 1989 to Neal Jenkins, previously chief of the planning division, as the Deputy for Project Management, he and his new office staff investigated, learned, and adapted tracking systems that could help them establish and meet schedules and budgets for civil works projects throughout their planning, design, and construction phases. These tracking systems were designed to answer needs for project continuity and accountability "from cradle to grave."[11]

INDIANA PLANNING

When Neal Jenkins became the leader of the project management group, Robert Fuller succeeded him as the chief of planning division. A native of Newcastle, Indiana, with urban planning and environmental degrees, Fuller transferred to Louisville from the Ohio River Division, where he had been the assistant chief of planning. Although he presided over a gradual decline in staffing of the planning division, matching the declining civil works program, Fuller took pride in his division's accomplishments, particularly in levee projects at Rushville, Indiana, and at South Frankfort, Kentucky, the first levees built by the District since the 1970s.

During his orientation, Fuller learned that Congressman John Myers complained that the Corps was unresponsive to the needs of his district and of

Indiana generally. First elected to Congress in 1967, Myers served his district for thirty years and became a noted advocate of improving the Wabash River for commercial navigation—the barging of coal and corn from Terre Haute to the Ohio River. Repeatedly, Myers sponsored studies of the Wabash by the Louisville District, and just as often the district reported that improving commercial navigation on the Wabash would not be economical. And, except for Patoka Lake, Myers' efforts to secure Corps public works in Indiana came up short. As the ranking Republican of the House subcommittee for water resources, he often used his position to chide the Corps. After complaining to the subcommittee about how Wabash floods had destroyed his and other Indiana farm crops, Myers once joked: "We apologize for starting the meeting late but we had a National Prayer breakfast, and if you can't get it through the Corps, we pray for it."[12]

Robert Fuller and his planners met with Congressman Myers' staff, who advised they were dissatisfied with the Corps' outreach—that Louisville District had not fully informed local governments in Indiana of the statutory assistance available to them. Fuller set out to remedy this neglect, initiating a concerted effort to meet with local officials at many communities. Out of this coordination grew several small projects performed under the Corps' continuing authorities—its statutory authority for limited yet beneficial local water resource projects. One of these authorities emanated from Section 205 of the1948 Flood Control Act, allowing the Corps to undertake local flood reduction projects worth up to $5 million in cooperation with local agencies prepared to share the costs.

Of the Section 205 projects, perhaps the most memorable was the local protection afforded to Rushville in southeastern Indiana, where people regularly suffered flooding by the Flatrock River. When the Rushville community requested help, Fuller, Robert Ledford, and study manager Shehab Eddin initiated a fast-track, cost-shared Section 205 study that produced comparatively swift action. Fuller explained that they brought in environmental interests at the study's beginning, and coordinated with them throughout the process. The planners designed around environmentally sensitive areas, and provided any mitigation required. In Fuller's opinion, this cut six months off the study's time.[13]

The Rushville project included a long levee and short floodwall together with gravity outfalls, storm sewers, and the removal of an old railroad bridge from the enlarged river channel. Rushville's mayor Sharon Bostic and Congressman David McIntosh proudly dedicated this project in December 1999, after the district and its contractor completed the work months ahead of schedule. Done in less than ten years from cradle to grave, this fast-track effort halved the twenty years that critics had lamented as typical of Corps projects.

Colonel Robert Slockbower at dedication of Rushville, Indiana, Local Protection Project

Congressman Myers also asked the district what role it could take in rebuilding the Indianapolis waterfront, where it had built a floodwall years before. Fuller advised him the district, under modern design criteria, would not have built a floodwall blocking public access to the river; the Corps therefore could redesign the floodwall to meet modern standards. When Myers then obtained congressional funding for modernizing the floodwall, the district conducted a public hearing on this plan on Halloween, and project opponents attended in costumes resembling barrels, mocking the plan as "porkbarrel." Yet, Myers persisted in his demand for an expanded Corps role in urban waterfront development. The rationale that old flood reduction projects could be redesigned to modern standards eventually prevailed, at Indianapolis and at other locations across the nation.

Robert Fuller observed that the Rushville and other initiatives proved to Congressman Myers' satisfaction that the district was interested in meeting Indiana's genuine needs, and it converted him from cynic to supporter. "This was very timely," Fuller pointed out, "because in 1994 he became chair of the Energy and Water Development committee when the Republicans became the majority in the House of Representatives. He was particularly interested in what we could do at Indianapolis, to help them make some sense out of the city's downtown waterfront."[14]

MASTER PLANNING

On the premise that the district should plan its future, rather than reacting to events as they occurred, Colonel Robert Oliver launched strategic planning for the district's program in the five year period from 1988 to 1992. Responding to the Chief of Engineers' strategic planning initiative, Oliver recognized that abrupt national policy changes and sudden Army command decisions had profoundly influenced the district's activities throughout its history, but he and

his staff assumed that no similar significant shifts would occur in the immediate future.[15]

In civil works, the staff in 1988 anticipated few new projects except the two Ohio River navigation improvements and smaller projects with active local sponsors. The district's annual civil works budget had stabilized at about $60 million, half for operating existing projects; and the staff anticipated little increase until construction of the Olmsted and McAlpine Locks replacement projects started. The staff expected the district's future planning function to decline. In civil works, the construction division's workload depended on production by the engineering division, which in turn could not proceed without congressional authorization of new projects.

The district's military construction program had declined thirty-four percent in three years, from $343 million annually in 1985 to $225 million in 1987. Moreover, military funding was shifting from the construction of new facilities to support for the installation or base engineers in their efforts to upgrade base infrastructures. Imposed national hiring constraints meant the district necessarily would reduce its in-house labor and contract out for additional services from private architect-engineering firms.[16]

Colonel Oliver and his staff saw that the district needed to reduce its overhead on project design and construction, which then averaged about seven percent compared with the five percent average typical of the construction industry. Yet, a third of the district's overhead was outside of its control. The Ohio River Division at Cincinnati provided the district with centralized personnel management, automatic data processing, finance and accounting, and laboratory services, charging the costs to Louisville and other districts within the Division. Recognizing the need to reduce overhead, the Division commanders began reducing these centralized services. In the years following 1988, the Ohio River Division closed its laboratory, merged personnel management into an Army-wide consolidated program, and reduced centralized automatic data processing as its districts acquired microcomputers and trained staff in their use. Colonel Oliver's five-year plan envisioned placing computers at every desk in the district, then connecting them for shared communications over a local area network.[17]

Although the district's master plan recognized that natural disasters would afflict people within its geographic region, and emphasized contingency planning for these and other emergencies, it did not forecast that severe drought and floods would come so quickly. But even as the district's master plan neared completion, a prolonged drought began in the spring of 1988.

A LONG DRY SUMMER

Spring typically is the Ohio River valley's wettest season. Before the Corps of Engineers had completed locks and dams in 1929, creating slackwater on the Ohio from headwaters to the mouth, spring was the season when flatboats bearing pioneers, packet boats loaded with export produce, and barges filled with coal set out from Pittsburgh and upriver ports to float through the shoals to Louisville. In springtime, pioneer shippers expected rains and resulting high water to inundate the rocky Falls of the Ohio, allowing their vessels to descend safely over the Falls past Louisville on the way south to New Orleans. In historic times, only in 1819 and 1930 had the annual spring rises failed; and 1930 became the driest year of record in the Ohio River valley.

Arid conditions in 1987, however, made it apparent that drought and water shortages might occur unless more precipitation fell, and the district and the Ohio River Division initiated drought contingency planning. Except where local agencies paid the costs, the district's flood control dams lacked water supply functions, although their operational releases could be managed in some instances to improve stream flow on the Ohio.

When little rain or snow fell in the Ohio River valley during the winter of 1987-1988, the Louisville and other districts began storing water in Corps lakes earlier than usual in 1988 to prepare for an oncoming drought. Although six of the district's lakes never reached normal summer pool for lack of rains, this early effort to fill the lakes later produced dividends, when the spring rains missed the Ohio valley, the river and its tributaries grew shallow, and summer's dry weather extended to the brink of disaster.[18]

On the Ohio River, the drought especially affected its lower eighteen-mile stretch, where no dams impounded its flow and the district used dredging to maintain navigable depths. When the river gage at Cairo fell to its lowest stage in June 1988, it exposed sandbars blocking passage by barge tows between the Ohio and Mississippi rivers. Kenneth Mathews and his operations division brought contract dredges to reopen the channel, while the water management staff coordinated releases from upstream dams to augment the river's flow. Barges carrying critical shipments to southern industrial plants soon deserted the Mississippi River, and embarked down a new alternate route completed in 1985 to the Gulf of Mexico. The Tennessee-Tombigbee Waterway saw its traffic mushroom in 1988, by 260 percent over 1987's tonnage.

On June 3, tows began grounding on shallows near Mound City, Illinois, and the U. S. Coast Guard took charge of managing barge traffic in the vicinity. The district's operations division opened an emergency office at Mound City and

rushed the contract dredge *Elco* to the spot to open the channel. Later, the dredge *Potter* from the St. Louis District also came as reinforcement to remove the blockage. Working through July and into August, these dredges cleared nearly six miles of channel to open a passage for critical cargoes.[19]

While the operations division handled the crisis on the lower Ohio, as the drought grew dire the district found itself inundated by a flood of missives from thirsty communities, which recognized the Army controlled the valley's precious resource—the water stored above the Corps flood control and navigation dams. Both the governors of Indiana and Kentucky declared the drought an emergency, forming task forces to alleviate disaster; and Robert Biel with the district'swater managementbranch cooperatedwith state authorities to the extent legally possible. The Corps owns water purification units and tank trucks for delivering potable water to combat theaters, and it may also deploy these to supply disaster victims when the President declares an emergency, but

Low water conditions, Ohio River, Drought '88

the 1988 drought did not become an official federal disaster. The Corps stores water at its flood control dams, but use of that water supply is restricted to local agencies that have paid all the costs of storage. Neither of these water sources, therefore, were easily available during the drought. Similar legal restrictions did not apply, however, to water stored in slackwater pools at the Corps' navigation dams, and communities harvested water from these pools extensively, especially the dry Bluegrass region, where thirteen local utility systems took water from the Kentucky River pools. It was this use of the Kentucky River locks and dams for water supply storage that brought formation of the Kentucky River Authority in 1990 to protect this precious resource.[20]

The Corps commanders and Assistant Secretary of the Army Robert Page visited the drought area to inspect the field response, and they insisted that the district maintain accurate daily records of actions taken—why, when and result. "History is a great teacher," Page remarked, "and we should not have to reinvent the wheel each time we face this situation." In Page's opinion, the Corps did a first-class job managing the drought, and he concluded: "They took to it like a duck to water."[21]

The Louisville District was less complimentary of its own service in the emergency. Fortunately for the district and the valley's people, the unusual climatic pattern of 1988 continued when rains fell over the basin during the typically dry months of July through October, resupplying the thirsty and restoring lower Ohio River navigation. Had those months been as dry as normal, the 1988 drought might have surpassed that of 1930 as the most severe in the valley's history. Although summer rains ended the drought emergency, the district's post-action study was highly critical of its own response. In 1988, it had no drought emergency plans, and it had reacted to the crises as they occurred, always behind the curve. In the aftermath, the district began preparing drought management plans for each river basin in its area, planning intensive coordination with state and local agencies. These contingency plans developed the administrative and legal details for allowing the temporary sale of water from Corps lakes to parched communities during future droughts.[22]

THE WET SPRING

On the heels of the 1988 drought came the spring floods of 1989. In late February, up to twelve inches of rain fell across central Kentucky, causing severe flooding in the Green, Salt, and Kentucky river basins. The four flood control dams in the Green River basin cut five feet off the top of the flood, which otherwise would have become second only to the 1937 inundation as the record. Flood damages were so severe at Boston, Lebanon Junction, New Haven, and Shepherdsville in the Salt River basin that the Commonwealth formed a task force to again study the proposed Campground Dam and Lake for flood protection. The task force found little public interest in the project and subsequently dropped it. Flood destruction along the Kentucky River was reduced in 1989 by the North Frankfort floodwall, completed in 1971, but South Frankfort experienced again a disaster like that it had suffered during its record flood of December 1978.[23]

Assistant Secretary Robert Page flew to Frankfort to see the flood damages, and was briefed on the emergency by commander John Langowski and Robert Biel of the District's water management section. Langowski pointed out the

North Frankfort floodwall alone had prevented $22 million in flood damages in its protected area. Soon after the flood, Frankfort agreed to become local sponsor of a project to build a floodwall protecting South Frankfort, and the district began its construction in 1991.[24]

The lead during the 1989 flood emergency was taken by the district's emergency management branch, headed by Michael Beaird, who had succeeded Norman Gilley in 1988. This branch of operations division then had seven specialists, with Harold Frankel focused on natural disasters, Carter Sexton on flood reduction project performance, and Norman Longworth on compliance and conservation programs. In addition to natural disasters, this branch coordinated district activities and planning for military mobilization, continuity of operations, and responses to terrorist threats. This branch also responded to emergencies outside the district, when requested by the Federal Emergency Management Agency or by other districts. After the 1989 flood, the branch sent district personnel to South Carolina to help with recovery from Hurricane Hugo, and then in October to California to assist with the rebuilding following an earthquake. Rare indeed were the years when some district staff were not participating in disaster recovery work at ravaged locations throughout the nation or its overseas possessions.[25]

Banner on the floodwall, Frankfort, Kentucky Local Protection Project

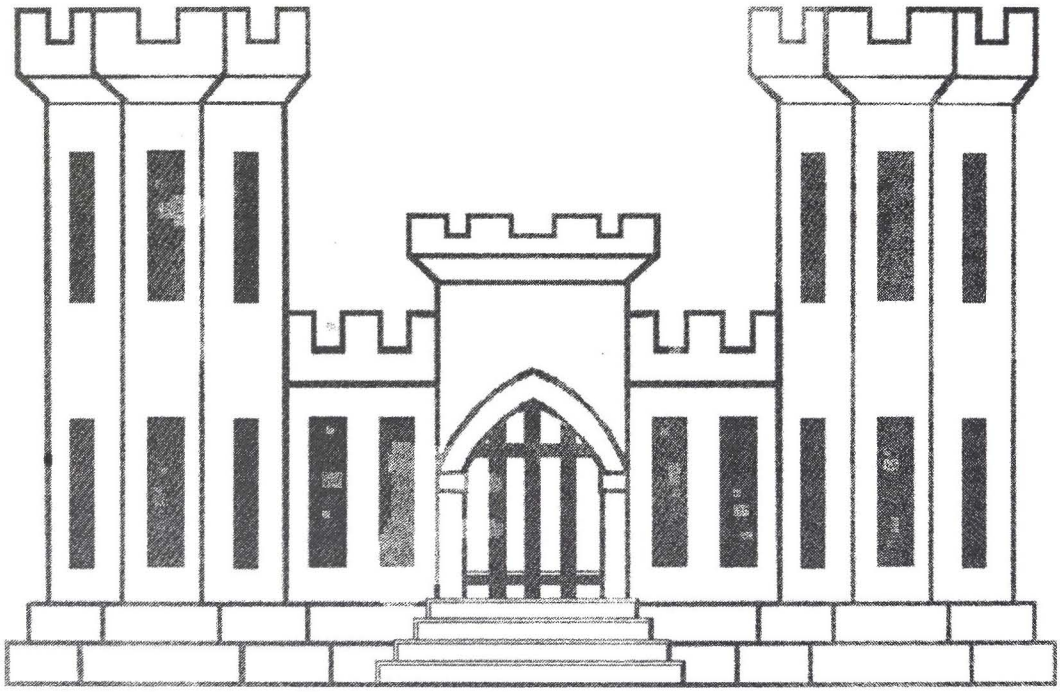
A COMMAND CHANGE

Colonel Robert Oliver departed the district just prior to the 1989 flooding to accept another assignment, leaving Louisville a healthier district with strategic plans in place. On leaving, he highlighted his pride in district efforts to see that the taxpayers and its customers were getting their money's worth. He bluntly asserted that the Louisville District had become the "standard bearer for the Corps."[26]

Lieutenant Colonel John Langowski, Jr., who succeeded him as District commander, was an unusual engineer officer, holding not only a distinguished

record as combat engineer in Vietnam but also a doctorate in geography from Southern Illinois University. As Oliver's deputy, Langowski had been instrumental in securing improved control over the district's complicated budget and expenditures system. That is, all the expenditures—salaries, training, travel costs, supplies—were cataloged as they were expended, charged directly against project work in many cases, as reimbursable costs in other instances, as "technical indirect" overhead of a technical division, or as district office overhead. The accounting system was as complicated as it sounds, but it provided crucial information for the commanders and supervisors when they sought to solve problems through good management.[27]

Langowski's rise to district command coincided, not only with the 1989 flooding, but also with a change in national administrations. Vice President George H. W. Bush, elected president in November 1988, succeeded Ronald Reagan as the Berlin Wall was coming down and the Soviet Union collapsing. President Bush had promised to strive for "no net loss of wetlands" in the future, necessarily challenging the Corps' regulatory personnel and its new project designers. Perhaps the most dramatic policy shift, however, emanated from the Defense Department's stand-down efforts, led by the Base Realignment and Closure Commission, to consolidate military bases and close posts that seemed no longer to serve national defense requirements. Thus, district project managers, always focused on the "cradle" of new project construction, shifted their attention to the "grave."



6
A GEOGRAPHIC PERSPECTIVE

We have plenty of water in the United States, but not always located where we can make best use of it in that sense, you can see the geographical perspective.

Colonel John Langowski, Jr.

In the early twentieth century, the Corps' critics complained that it conducted water-resource development on a piecemeal basis, one project at a time without full consideration of impacts on other geographic sections of a river basin. In response, the Corps eventually reorganized its management on a river-basin basis, and, by 1913, the Chief of Engineers had initiated comprehensive river basin planning. The Corps thus sought a geographic perspective, balancing the needs of a basin's headwaters region with effects on its lower reaches. In one sense, when the Corps embraced life-cycle project management in 1988, it sought a similar expansive perspective, managing water resource projects not only as geographic units but also as chronological entities, "from cradle to grave."[1]

"We will no longer have the luxury of sequential or step by step development of navigation projects," observed Major General Ernest Harrell, the Ohio River Division commander in 1988. He referred specifically to the design and construction on the lower Ohio River of the Olmsted project, widely considered a pilot case for the life-cycle project management system. Efforts to improve project design, while also reducing construction costs, placed Olmsted Locks and Dam high on the list of the most challenging projects ever encountered by the Louisville District.[2]

Business as usual in the district's military construction arena ceased in 1988, when the Defense Department announced it would close many installations as part of its Base Realignment and Closure (BRAC) initiative. Geographically located as a regional center serving many older military bases, the district faced the closure of several facilities where it performed military construction. In the long-term, these closures could diminish the district's military workload, but, in the short term, much work was required to prepare the bases for closure. Indeed, the BRAC program substantially expanded the district's environmental engineering efforts, because most bases, before closure, required environmental remediation—the detection and removal of unexploded ammunition from firing ranges, and the removal of soils or structures contaminated by petroleum, explosives, or chemicals. Cleansing the geography of closing bases of hazardous

materials was imperative before they were transferred to other agencies or sold at public auction.

To these military and civil works challenges were added the tests presented by hiring freezes, construction moratoriums, and the wetlands initiatives of President George H. W. Bush's administration. Moreover, the district also was challenged by the president's suspension of the Mill Creek project near Cincinnati, and finally by the Gulf War of 1991. These years became, as a District commander observed, a testy epoch in the district's history.

THE OLMSTED TEST

Geographer John Langowski, Jr. firmly believed that Olmsted Locks and Dam would test the Louisville District's new life-cycle project management for water resources. Assistant Secretary of the Army for Civil Works Robert Page and the Chief of Engineers agreed. Congress formally approved Olmsted construction in 1988, the same year in which the Corps adopted its project management approach for water resources development.[3]

The district's feasibility studies for the Olmsted project, replacing antique locks and dams 52 and 53 on the lower Ohio River, had begun in 1981. Under its traditional functional management, the district completed its Olmsted feasibility study by 1985 and submitted it for reviews. Technical reviews of the study by the Ohio River Division Engineer, the Chief of Engineers, and the Board of Engineers for Rivers and Harbors followed. Policy and funding reviews were accomplished for the President by Secretary Robert Page, working closely with the Office of Management and Budget. House and Senate committees also reviewed the Olmsted project for Congress. Although the district had completed its feasibility study in about four years, it required an additional three years for the Olmsted project to pass muster before Congress approved it in 1988, thereby allowing the district to proceed with detailed engineering for Olmsted's General Design Memorandum (GDM).[4]

Because Olmsted's authorization coincided with the 1988 formation of project management offices in the district and throughout the Corps, Secretary Page, a principal advocate of new management, urged that the Olmsted project should provide a litmus test for the new approach to water resources development. Colonel Langowski later explained the Olmsted project, as it passed from its feasibility study into general design, was an ideal project to serve as template for project management techniques. On several occasions, Langowski recalled, the district explained to Secretary Page how it was "improving our procedures towards developing better cost estimates, making more detailed schedules

or milestones for the project evolution, and how we were implementing the process."[5]

Colonel Langowski became the district's first Deputy for Project Management, opening the project management office in 1988 with three engineers and an administrative assistant as its initial staff. In early 1989, Neal Jenkins succeeded Langowski as the project management deputy, with seven projects originally assigned to his office. Because seven projects exceeded the number of managers, Jenkins assigned some projects to technical teams. The managers moved quickly ahead with the Olmsted project's engineering, and in March 1989, just a year after receiving congressional approval, they finished a General Design Memorandum and submitted it for review.[6]

Pursuing efforts to reduce costs and construction time, the district made the Olmsted project one of the most innovative in its history. One of the early innovations, for example, involved applying the Global Positioning System (GPS) to the project surveys. Boyd McClellan and the district's survey branch became the first in the Corps to apply the revolutionary GPS system, relying on Defense Department space satellites to precisely determine geodetic positions. The survey branch used satellite surveying to establish horizontal and vertical controls at Olmsted, and also applied electronic field instruments that could store and convert survey data for analysis in microcomputers. In combination with computer-aided drafting and design software (CADD), this allowed the survey branch to produce three-dimensional ground contours of Olmsted's geography. Because satellite data transmissions could be monitored best at night, when solar flares were less disruptive of electronic transmissions, McClellan had Frank Fowler and Don Sims working night shifts to accomplish the GPS studies. They learned that GPS could establish horizontal controls for real-estate boundaries, for monitoring movements in the district's dams, and for setting controls for aerial photogrammetry. Merged into the Geotechnical branch in 1990, the surveys group embarked on pioneering GPS studies for the Corps' Waterways Experiment Station and other agencies. Indeed, members of the group then predicted that GPS, in time, would make travelers' road maps obsolete, as eventually it did for people who could afford the technology.[7]

Upgrading traditional engineering practices became the roadmap at the Olmsted project, integral to Corps efforts to reduce construction costs and control growth of the project's initial 1985 cost estimate. Initial project plans contemplated two parallel 1200-foot-long locks to pass tows around the dam, matching the configuration of Smithland locks completed upstream of Olmsted in 1971. The towing industry strongly advocated this double 1200-foot lock design at Olmsted, because its tows suffered costly delays at older locks above

Smithland, when 1200-foot locks closed for repairs, and tows had to be split in half to pass through 600-foot-long auxiliary locks. The towing industry had considerable influence on the Olmsted project's design, because the industry agreed to pay half of its costs through funding from the marine fuel tax.[8]

When the district submitted its General Design Memorandum (GDM) in 1989, Colonel Langowski noted that Olmsted would become one of the first Corps projects to test the life-cycle project management concept. Therefore, he observed, this GDM had an increased emphasis on developing detailed baseline cost estimates and schedules compared with earlier projects. Adjacent to the twin 1200-foot locks on the Illinois side of the river, the GDM proposed that Olmsted dam be built in three sections: six tainter gates in the first section next to the locks, a navigable pass in mid-river, and a third section comprised of fixed weir butting against the Kentucky bank. Each of these sections merits description.[9]

A fixed weir merely is a dam over which the river spills during higher water stages. The Corps originally built its fixed weirs of concrete, but, when undertaking the Ohio River modernization during the 1960s, it learned that a dam constructed of filled cellular steel piling, resembling a temporary cofferdam, could supplant concrete for service in a fixed weir. The Corps' value engineers suggested using the cofferdam as the weir itself, rather than expending additional funds to build a concrete dam. This cost-saving design had become standard by 1989, and would be used in the Olmsted weir section, extending from an abutment on the Kentucky bank out to the navigable pass section.[10]

In the dam section adjacent to the locks and nearest the Illinois bank, the General Design Memorandum proposed to install tainter gages. Tainter gates had a longer history than cellular-piling weirs: Jeremiah Tainter patented the gate bearing his name in 1886, and the Corps built its first tainter gates in 1890 on Wisconsin's Fox River. Tainter gates proved more efficient than other gate types, and the Corps therefore adopted them for the Ohio River modernization. Sometimes called sector gates, tainters had an upstream face of sheet metal formed in the sector of an arc and supported by girders connected to a trunnion (axle) fixed between two tall concrete piers. Tainters did not slide or roll up the piers to open a passage for floods or ice; instead, their metal sectors rotated upward on axles, clearing the river's surface to allow ice or flood water to pass beneath. Through electric motors, tainter gates could be raised or lowered with controls in a dam's operations building, affording effective management of the pool waters upstream of dams. The Olmsted design of 1989 included the tainter-gate section, but engineers had qualms about using them there. Because this project was located in a seismically active area, engineers asked what might be the effects of a major earthquake on the tall concrete piers that supported the

tainter gates? The district's Feature Design Memorandum (FDM), drawn up during the 1990s, addressed this concern.[11]

Olmsted dam's central navigable pass was the third and most challenging section designed. All dams numbered 1 to 53 in the 1929 Ohio River canalization project had included navigable passes. These consisted of movable dam sections formed of wickets. Wickets stood upright, holding a nine-foot-deep pool during drought or low-water stages, then dropped to the riverbottom at higher stages to pass barge tows over the dam without stopping for lockage. French engineers had designed these movable wickets on the Seine River near Paris, and the Corps of Engineers in 1875 had adapted them for use on the Kanawha and Ohio Rivers. By 1989, however, the Corps had replaced all except Dams 52 and 53 of the Ohio's movable wicket dams with dams that had no wickets or movable navigable passes.[12]

At Dams 52 and 53, barge tows passed through navigable passes without the delays of lockage nearly half of each year, and the towing industry insisted that Olmsted dam should include this time-saving navigable pass section. To raise or lower wickets in a navigable pass, the operators used a steam-powered maneuverboat to hoist the wickets upright, or drop them to the bottom. This was done in all kinds of weather at substantial hazard to the workers; injuries, and some fatalities, had afflicted maneuverboat crews at the old wicket dams. Safety therefore became a concern in designing a navigable pass for Olmsted dam, and the engineers searched for more reliable means of opening and closing a navigable pass, without sending boats and crews onto the river in harm's way.[13]

The district's engineers and their colleagues reviewed movable dam designs. One was a drum gate, a buoyant cylinder floating in a sunken recess that could be lifted by filling its recess with water, thus forming a dam that could be raised or lowered. Among other designs were sector gates with hydraulic pistons to raise them, flap gates hinged to a concrete foundation, an Aubert gate used in France, and a Gaddie gate designed by an engineer at Ohio River Division. While studies of alternative designs continued, in the General Design Memorandum the district, for cost estimating purposes, selected an articulated strut gate, raised by a hydraulic piston located in a dry gallery in the foundation beneath the wickets.[14]

This and related design and construction challenges—the need to build locks and dams capable of withstanding major earthquakes, plus monetary inflation—boosted the total estimated project costs in Olmsted's General Design Memorandum to $775 million. While the GDM forecast Olmsted's completion by 2000, the district pressed for an accelerated schedule, which would permit

starting the new locks and dam in 1991 and completing them by 1998. Major General Ernest Harrell, Division commander, commented he was well pleased with Louisville's project management for Olmsted, but he warned "we must also have adequate funding if we are going to accelerate our navigation projects."[15]

General Harrell created a Navigation Projects Executive Review panel to meet for discussions of the challenges faced at Olmsted and other navigation modernization projects along the Ohio, Monongahela, Kanawha, and Tennessee rivers, in the four Engineer Districts reporting to the Ohio River Division. In addition to participating in the Division's review panel discussions, the district also formed a committee with representatives from the Corps' Waterways Experiment Station and Construction Engineering Research Laboratory to help identify the best navigable-pass design, and look for additional means of reducing construction costs.[16]

The district's hydraulics and hydrology branch, in the meantime, undertook computer analysis of wicket operations to compare dams composed of both tainter gates and wickets with dams consisting entirely of wickets. Its analysis showed that tainter gates, by controlling pool stages, would reduce wear and tear on the wickets, but the resulting cost reductions were not sufficient to offset the costs of tainter gates, with tall concrete piers in an area subject to violent seismic activity. Thus, tainter gate piers at Olmsted would necessarily be strongly reinforced to withstand earthquakes. In a supplemental General Design Memorandum, the district therefore eliminated tainter gates from Olmsted's design, switching to an all-wicket dam. This change, however, did not determine which of the wicket design configurations might be adopted, a question that remained a challenging test for the district's engineers and project managers into the 1990s.[17]

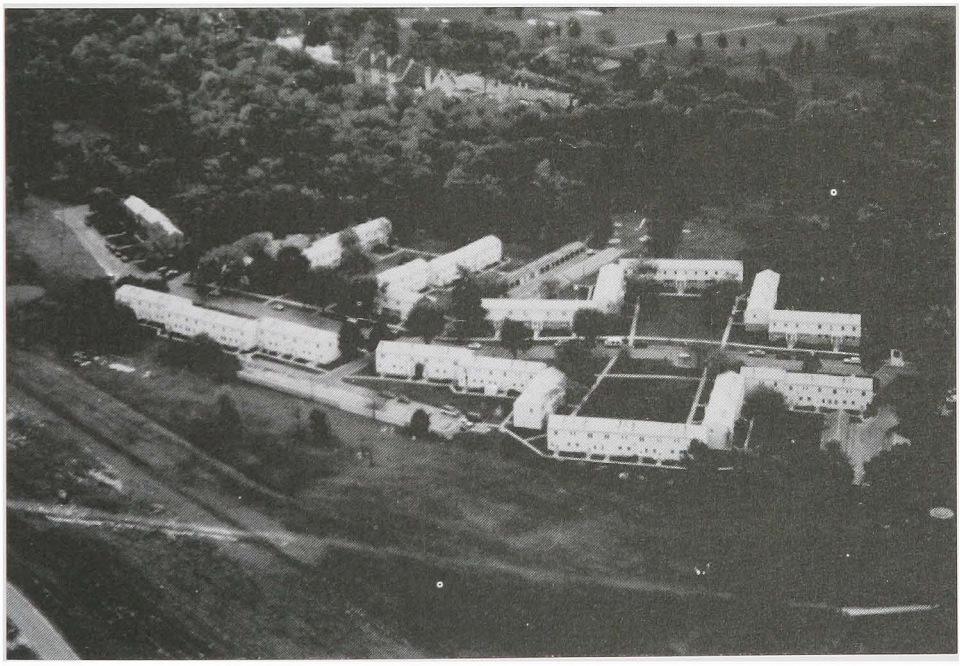
THE BRAC TEST

Colonel Langowski and his deputy, Major Robert Buhts, proudly announced in 1989 that Louisville had led the Corps for two consecutive years in military construction performance, completing 100 percent of its work budgeted by the Army and Army Reserve and 92 percent of its mission for the Air Force. Richard Schleicher and Donald Basham, leading the district's construction forces, shared the commander's pride. They were concerned, however, about the effects of the Base Realignment and Closure (BRAC) initiative of the Bush administration.[18]

As the Cold War waned, President George H. W. Bush and his Secretary of Defense Richard Cheney sought to close military bases and installations that appeared obsolete, and to consolidate or realign forces from the closing bases to other bases. A special BRAC commission reviewed the efficient use of military installations nationwide, and proposed closing 86 installations. Six of

the closing bases were located within the Louisville District: Fort Sheridan near Chicago, Illinois; Jefferson Proving Ground near Madison, Indiana; Chanute Air Force Base at Rantoul, Illinois; Indiana Army Ammunition Plant just north of Louisville; the Pontiac Storage Facility in Michigan; and the Lexington-Blue Grass Army Depot in Kentucky. The district had built most of these facilities during the mobilization for the Second World War, except Fort Sheridan, which was built in the 1880s.[19]

The Pontiac Storage Facility in Michigan stored and shipped industrial equipment needed for mobilization, and the BRAC commission recommended closing it and transferring its stocks to Seneca Army Depot. The Lexington-Blue Grass Army Depot had limited storage space and aging facilities in need of reconstruction, and the commission proposed distributing some of its functions to Tobyhanna and Letterkenny army depots in Pennsylvania and Redstone Arsenal in Alabama. Closing Jefferson Proving Ground would move its mission—evaluating ammunition—to Yuma Proving Ground in Arizona. Chanute Air Force Base at Rantoul, Illinois, housed a technical training wing that would transfer to training wings at other bases. The Indiana Army Ammunition plant near Charleston, Indiana, was recommended for partial closure only, disposing of land not used there for its mission.[20]



Fort Sheridan, Illinois

Fort Sheridan, a historic post north of Chicago built of classic yellow brick in 1888, had become headquarters during the 1980s of Fourth U. S. Army and the Army Recruiting Command. A small project office, led by Captain Robert Ralston, managed the renovations at Fort Sheridan, converting barracks into

command headquarters and horse stables into computer centers, removing vintage frame buildings and building new, air-conditioned barracks. Indeed, one of the district's first design-build contracts went toward providing the fort with a new commissary. Because Fort Sheridan was located within an urban area, with little space for expansion, the BRAC commission recommended transferring the Fourth Army and Recruiting Commands to Fort Benjamin Harrison, Indiana.[21]

These closures, in the long term, meant reductions in the district's construction mission. This decline began in 1989 with suspensions and deferral of new projects planned at Lexington-Blue Grass Army Depot and Chanute Air Force Base. In the short term, the closures meant increased efforts for the district's planning, real estate, and engineering divisions. Rob Fuller and his planning division staff conducted public meetings to coordinate closures with local officials at each installation, and to begin preparing the environmental-impact statements required at each closing base. Wendell Wilkinson and his real estate division became responsible for property disposal at the closing bases. Earlier, surplus land at closed bases had first been offered to federal, state, and local agencies for new uses, and if no government agency wanted the land it was sold to the public. In 1989, however, the land could also be transferred to local "Reuse Authorities," formed to manage the property for various purposes. In addition to the land disposal challenge, the real estate division reviewed the application of the Homeowners Assistance Program at the closing bases. This program reduced financial impacts on government personnel at the closing bases by reimbursing part of their property values, lost when forced to sell residences to move to their new duty stations. Eventually, the homeowners leaving Rantoul at Chanute Air Force Base received some assistance from this program.[22]

The district selected Robert Mullins, Jr. of engineering division as its BRAC program coordinator, while Noah Whittle and Philip Hasselwander reorganized the engineering division to meet the formidable environmental restoration and remedial challenges at closing bases. They formed environmental-engineering branches and sections to devise sampling and analysis programs for assessing chemical, biological, radiological, or other contamination at the bases, for developing expertise in removing substances such as lead paint and asbestos, and for designing projects to restore the environment of closing bases before their sale or transfer to other agencies. This accruing expertise eventually made Louisville an environmental-support district for active military installations, assisting base commanders and engineers with their environmental compliance and pollution prevention efforts.[23]

Reviewing the district's response to the BRAC initiative, Colonel Langowski, near the end of his time as commander, commented that he had assembled teams

to assist each base commander with the closure process. Moreover, the district would be heavily involved with the design of new facilities at bases receiving missions from the closing bases. "I would expect that this will actively call for the district's participation," Langowski predicted, "for the next five to eight years."[24]

The base closures of 1989 proved merely the first of a series of BRAC initiatives that continued during the Bush administration, through President William Clinton's two terms, and into the following Bush administration in the twenty-first century. These came after Colonel Langowski departed in May 1989, however, when he transferred to become deputy division engineer at North Central Division in Chicago, subsequently retiring to Southern Illinois.[25]

THE MANAGEMENT TESTS

Colonel David Peixotto, who took command of the district in May 1989, earlier had commanded an engineer company in Vietnam and the Albuquerque District from 1984 to 1987. He came to Louisville from Corps headquarters, where he had served as assistant director of engineering and construction. At his arrival, he declared: "The entire Corps is under sharp scrutiny, as Life Cycle Project Management (LCPM) becomes the standard of operations. We in the Louisville District are the standard bearers with Olmsted Lock and Dam praised as the best example of LCPM."[26]

Later, he said the LCPM and other challenges made his command at Louisville resemble standing in the eye of a storm. The Assistant Secretary of the Army for Civil Works and the Chief of Engineers, in the 1990s, continued their focus on moving the Corps from its traditional system into the matrix of Life Cycle Project Management. In early 1990, they ordered the formation of a Programs and Project Management Division in all Corps division and district offices. At Louisville, this resulted in realignment of the existing Project Management office and Programs Management office into a new division, initially staffed with forty-six people, all coming from other offices and divisions because no increases in the total workforce were permitted. Most of the new division's recruits transferred from the engineering and construction divisions, and Donald Basham became assistant to Neal Jenkins, who then served in dual capacity as both chief of Programs and Project Management Division (PPMD) and as Deputy Commander for Project Management.[27]

In civil works, this project management division took direction of the on-going Olmsted, Mill Creek, Evansville, and Fairfield projects, and in 1990 added the McAlpine Lock Replacement project and new flood reduction projects

authorized at Salyersville and Hazard, Kentucky, and West Carrollton, Ohio. The new division also inherited management of on-going military design and construction projects, but their campaign to build these became hampered by a moratorium that President Bush and Secretary Cheney clamped on the military program.

As part of a campaign to slow federal budget growth, the Bush administration in 1990 froze the hiring of more federal employees, meaning the district and other Corps offices could replace retiring or transferring personnel, but could not increase the workforce. At that time, the district had 1,184 employees, and needed more to staff its new program and project management division; yet it could not hire them. In addition, the administration placed a temporary moratorium on the award of new construction contracts, and the district, therefore, could not begin projects it had ready for construction until the administration lifted the moratorium.[28]

"We are under a construction moratorium, a hiring freeze and a possible sequestration of one-third of our money for fiscal year 1991," Colonel Peixotto complained, observing: "It's like being in a storm and unable to see the blue sky we know is on the horizon." He explained that the district, in response to this budget crunch, had reduced its costs through belt-tightening—less travel, fewer supplies, and suspended training—to conserve every dollar for its central missions.[29]

The hiring freeze especially troubled the operations division, where chief Kenneth Mathews and staff sought to respond to another of President Bush's initiatives. During his election campaign of 1988, the president had highlighted his environmental policy, mandating "no net loss of wetlands." The operations division was responsible for implementing this mandate, and it needed added personnel in its regulatory branch to handle a steadily growing permit process for wetlands and aquatic environments. Permit applications nearly doubled in 1989, rising from 323 in 1988 to 630, a growth that continued into the 1990s, but the operations division, as a result of the hiring freeze, could not employ personnel to bolster its regulatory branch. The revised policies on wetlands and "prior converted croplands" also fanned public controversies, straining the regulatory branch as it sought to answer public questions.[30]

Operations division's resources were further strained when Mike Beaird, successor to Norman Gilley as Readiness branch manager, responded to requests for emergency assistance from state governments and the Federal Emergency Management Agency. Toward midnight one Saturday in August 1989, an Indiana official called Beaird to warn that intense rains had filled Lake Manitou

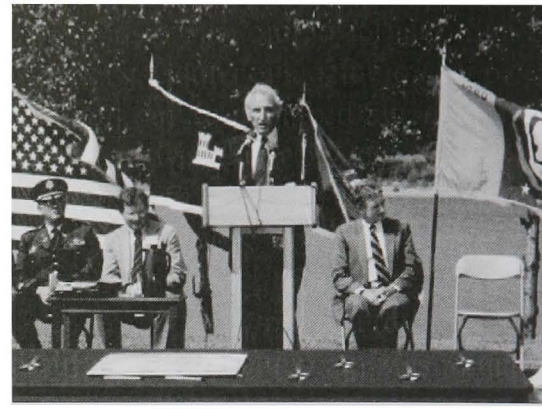
in Fulton County, Indiana, forcing evacuations because the dam and spillway threatened to wash out. This was not a Corps lake, but the Corps has statutory authority to respond to emergencies; and Noah Whittle dispatched geotechnical specialists Bruce Murray and Charles Rucker to assist Indiana officials. Indiana flew the two specialists by helicopter immediately to the dam, where community volunteers were sandbagging against the rising waters. Flood water seeping through the dam and roaring over the spillway made it a dangerous situation, and Murray and Rucker called for pumps to lower the lake's level. The district rushed its pumps to join those supplied by state and local agencies; and a nearby construction contractor supplied rubble to raise the dam and prevent its overtopping. The Corps team recommended cutting an emergency spillway into the dam, and, with this advice, local officials and volunteers stabilized the dam, averting disaster.[31]

On the heels of this classic floodfight came two national disasters: in August, Hurricane Hugo ravaged South Carolina, and soon afterwards the Loma Prieta earthquake stunned California. Simultaneously, the district responded to requests from the Federal Emergency Management Agency, sending nineteen engineers, technicians, and contract specialists to the south and twenty-nine to the San Francisco area to manage debris removal and repairs. Before these volunteers returned, fourteen specialists went also to eastern Kentucky to assist with recovery from flash flooding, and Mike Beaird's team became involved in alleviating public fears about an erroneous earthquake prediction in the New Madrid fault area near the Olmsted project.[32]

LOCAL FLOOD REDUCTION TESTS

While 1989's emergencies tested the district's preparedness against floods and earthquakes, other tests arose at its local flood reduction projects. For example, testing revealed a deficiency at the Southwestern Jefferson County project in the Metropolitan Louisville area.

After a 1964 flood disaster, Jefferson County had funded the local share of a levee-floodwall project protecting the county's southwestern sector, and Congressman Gene Snyder broke ground for its construction in 1973. The district's construction division managed the building of this thirteen-mile-long, twenty-five-foot high earth levee in a five-section sequence, completing the project in 1989 after sixteen years of labor. Congressman Romano Mazzoli, aboard the steamboat *Belle of Louisville,* dedicated the completed project on September 8, 1989, and the Metropolitan Sewer District, the local sponsor, took over its operations. The project included huge pumps to remove drainage water from the interior of the levee system, when gates were closed to stop flooding



Congressman Romano Mazzolli speaking at the dedication of Southwest Jefferson County, Kentucky Local Protection Project, 1989

from the Ohio River. During testing, however, these pumps malfunctioned, requiring major and expensive repairs. Hayes "Ted" Haddox, who succeeded Stephen Smith as the district's chief counsel, and his colleagues pursued litigation against the contractors and manufacturers of the defective pumps, obtaining a landmark court decision in the government's favor eight years later.[33]

When the Bush administration applied its policy test to the Mill Creek local flood reduction project in Hamilton County, Ohio, the project failed. As described in an earlier chapter herein, the district had begun work on this project in 1981 and had proceeded through the 1980s as quickly as the local sponsor acquired lands and rights-of-way for the construction. Mill Creek was a complex channelization project through one of the nation's major industrial areas, requiring the relocation of utility lines, the reconstruction of many bridges, and other measures. Although it was the channelization-type project frequently condemned by environmentalists, its estimated benefits far exceeded its estimated costs, and it enjoyed strong local support in Ohio. The district had divided the eighteen-mile-long project into sections for phased construction numbered from Section 1 near Mill Creek's mouth to Section 8 near the Butler County line. It had completed one section and had initiated work at others by the end of the 1980s.[34]

Because Congress had approved the Mill Creek project in 1970, it was not subject to the higher cost-sharing requirements of the 1986 Water Resources Development Act, and steady increases in its estimated costs brought national attention. Nancy Dorn, Robert Page's successor as Assistant Secretary of the Army for Civil Works, sent her office's special assistant, Robert Eiland, to Cincinnati for an independent review of progress at Mill Creek. Eiland returned a report highly critical of Mill Creek, and Secretary Dorn in 1991 abruptly suspended the work. She listed four basic reasons for the suspension: estimated project costs had increased 126 percent since its 1970 authorization; the local sponsor had not acquired all real estate needed for construction; landfills bordering the stream contained potentially hazardous materials; and the local sponsor had not

begun maintenance of the completed work. Attempts by Louisville District and the Millcreek Conservancy District to resolve these issues began in 1991, and continued throughout the 1990s. The general reevaluation of the Mill Creek project will be discussed in subsequent chapters.[35]

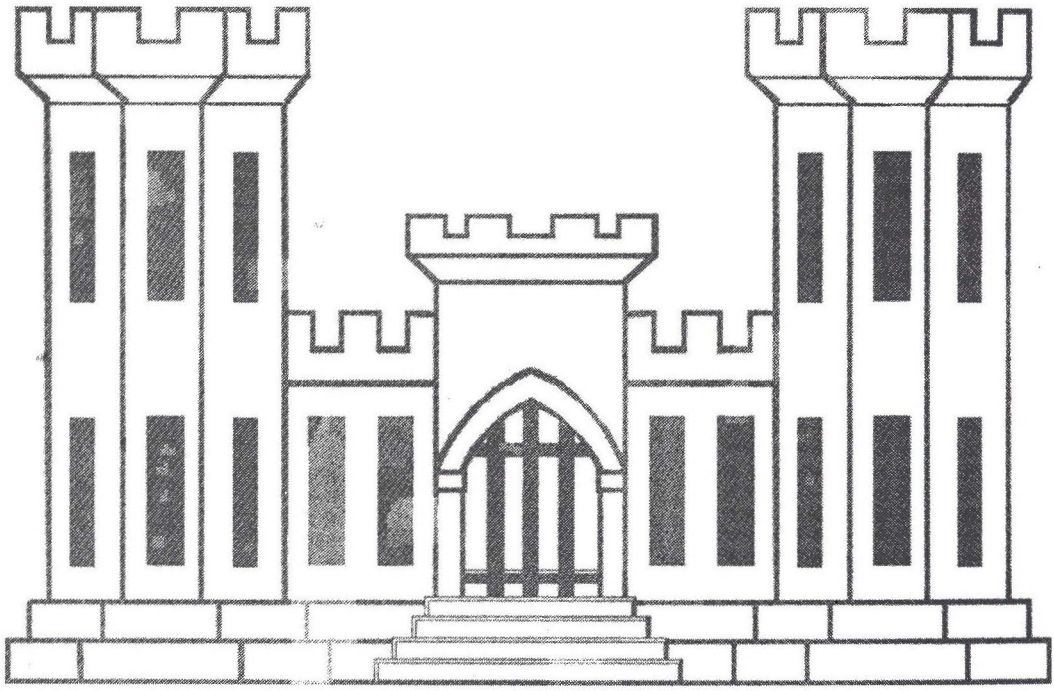
The final global test of the George H. W. Bush administration began in 1990, when Iraq invaded and conquered its neighbor, Kuwait, an ally of the United States. The Bush administration formed an international coalition and combined these forces for Operation Desert Shield, preparing for an invasion to free Kuwait. Although far removed geographically from Kuwait, the Louisville District as part of the Army Corps of Engineers became involved in this test. Fifteen of the district's employees, who were members of the Army Reserve, were called to active duty, further exacerbating the district's workforce shortage.[36]

Then in January 1991, the district's workforce, like most Americans, watched media coverage of Operation Desert Storm's combat with horror and pride. "When war broke out in the Persian Gulf, the images were lighting up our television sets," recalled Colonel Peixotto, adding: "With technology, we instantly saw the damage done to the enemy, but the war's effects back home weren't so immediate."[37]

Although Desert Storm brought swift victory, it left Kuwait in shambles, smoldering with oil fires ignited by the retreating Iraqi army. The Corps of Engineers received the post-war mission of rebuilding Kuwait's infrastructure, with financing provided by the liberated Kuwaiti government. When the Corps asked for volunteers to supply Kuwait with engineering and technical expertise, seventy district employees responded to the call. Only ten were selected for the Kuwait mission, however, and these were Ralph Forney, Frank Kalisz, Joseph Pike, Patrick Neichter, Charles Lockman, Albert Reyes, John Jent, Kevin Jefferson, Brenda Butcher, and Major Robert Buhts, the District's deputy commander.[38]

Colonel David Peixotto received the call to command the Kuwait Emergency Recovery Office for the Corps, administering contracts for restoration of Kuwait's infrastructure. He departed for Kuwait in January 1992, remarking that he considered the district's future bright in spite of the hiring freezes, construction moratoriums, and base closures. He predicted the civil works program would blossom as the Olmsted and McAlpine navigation improvement projects began construction, perhaps followed by expansions at the Cannelton, Newburgh, and Markland locks and dams. Although the district's military mission would decline at the bases closed by the BRAC commission, the bases receiving the functions and troops would surely require new facilities to accommodate the augmented

forces. "What the Corps was doing 100 years ago is much different than what we are doing today," Peixotto optimistically concluded, "and 100 years from now we will be involved in yet other areas of public service."[39]



7
FOCUS ON PARTNERSHIPS

You need a fantastic past to build upon, but the focus needs to be on the future.

Colonel Herbert F. Harback

Except during the Gulf War of 1991, funding for national defense decreased during President George H. W. Bush's administration. From 1990 to 1993 as the Cold War reached its conclusion, President Bush and Defense secretary Richard Cheney curtailed armed forces personnel by nearly twenty percent. These reductions, plus the moratorium on military construction imposed in 1990, forced the Corps of Engineers into a defensive mode. To these national restrictions, the Corps responded with thorough explorations of reorganization as a means of reducing costs, thereby focusing on the future satisfaction of its customers, the armed forces.[1]

The drive to reorganize the Corps reached its apex in 1991 when the Base Realignment and Closure Commission (BRAC) and Secretary Cheney recommended closing more installations across the nation. In compliance with the BRAC initiative, the Corps itself confronted possible closure of several of its field offices. Lieutenant General Henry Hatch, Chief of Engineers, formed a task force to plan reorganization for the Corps' future, and this force included among its membership Louisville District advisors, Donald Basham and Robert Fuller of the executive staff. General Hatch traveled widely promoting his reorganization concepts, and when visiting Louisville, in 1991, he reported his reorganization plans contemplated closing several Engineer Districts, although not Louisville. Under plans Hatch then advanced, Louisville, in fact, would have substantially expanded, acquiring missions from districts suffering closure. Without reorganization for the future, some managers forecast the Corps might eventually be eased out of its role as the Army and Air Force military construction agency. "Surviving until 2000," therefore, became a clarion call of Colonel Herbert Harback when he took the district's helm in January 1992.[2]

A University of Illinois graduate, Colonel Harback announced his pleasure at coming home to the district after various command and staff assignments throughout the nation. An author of publications on military and business leadership, Harback had a reputation as a motivational speaker, presenting nearly a hundred programs each year, concerning the higher quality standards concept that swept the Corps as it did American business during the 1990s. He and the district soon embraced Total Quality Performance (TQP) as its

business standard, establishing a Senior Quality Council and devising strategic plans to emphasize services to its customers, the armed forces and Congress. This initiative, later labeled Total Quality Management (TQM), emulated the business management standards that had earned Japan fame for its product quality and helped make it a global leader in export trades.[3]

PARTNERSHIPS

Allied to the district's total quality initiative was a partnering concept, involving formal commitments by the Corps, its customers, and its contractors to strive as a team for timely, cost-effective projects. Partnering was based on trust, common goals, and shared cultures, as opposed to the relationships that prevailed earlier in the district's history. Before 1992, Louisville's construction mangers held contractors rigidly to project design specifications to assure quality; consequently, confrontations with contractors sometimes disrupted project schedules, leading to costly litigation and dissatisfied customers. If this adversarial process continued, Corps managers feared that Defense agencies might turn to construction management organizations outside the Corps. The Corps managers saw formal "partnering" with contractors and customers during a project's early phases as a means of diminishing costly confrontations and their consequences, thus enhancing the Corps' chances of "surviving until 2000."[4]

State highway departments implemented the partnering concept in association with their construction contractors during the 1980s, and a highway contractor first proposed partnering to the Louisville District. In 1989, a contractor suggested partnering for paving taxiways at Wright-Patterson Air Force Base—and Area Engineer George Jageman, Darrell Nation, and colleagues at the district accepted, agreeing to manage the project through a partnership including the Corps, the contractor, and the customer, the Air Force. Through this early mutual commitment, the parties worked to resolve any issues as they arose in efforts to complete the work on schedule, on budget, and without litigation.[5]

Colonel Harback became the district's "champion of partnering." He highlighted partnering as an effort to reduce the future costs of Corps projects through alliances formed with the contractors and the customers. By focusing on improving relations with its customers and contractors, the Corps might use "partnering" to become more competitive. During 1992 therefore, the district entered twelve partnering agreements on projects worth $150 million, fostering settlements of conflicts before they escalated to claims litigation. By the end of 1993, the district had joined in forty-six formal partnerships valued at $286.6 million, and this trend continued through the decade.[6]

Partnering and "total quality" thus dominated the district's changing management in 1992. Returning from the Kuwait reconstruction effort, Major Robert Buhts became Harback's director of quality, while Lieutenant Colonel William "Ty" Edwards became the deputy commander. These command shifts were accompanied by civilian staff retirements. Neal Jenkins retired as deputy commander for project management, succeeded by Donald Basham. The longtime chief of engineering, Noah Whittle, retired, replaced by Philip Hasselwander, who had earned a reputation for leadership in both Louisville and Pittsburgh Districts. When Richard Schleicher retired in 1992, George Jageman, became the new construction division chief. A pioneer of the partnership, quality, and openness initiatives, Jageman, significantly, placed his office at the construction division's entrance, rather than at back windows as customary in some divisions. These three executives joined their partners on Colonel Harback's Senior Executive Council, implementing the district's total quality management program for its 1,115 full-time civilian and nine military personnel in 1992. Of these, 650 worked at the district office, and the remainder in fifty-four field offices, placing about $300 million worth of construction annually, two-thirds of it for the military services.[7]

REORGANIZING THE CORPS

Because the district and the Corps at large had dual civil and military missions, they answered to several components of Congress and to each presidential administration. They reported to the Secretary of Defense for military construction, and to the Assistant Secretary of the Army for Civil Works in their water resource and civil programs. Their activities were controlled to a large extent by committees of Congress for the armed services and for energy and water resource development. During the 1990s, they thus became enmeshed in disagreements among these committees and agencies over the proposed reorganization plans for the Corps' future.

Lieutenant General Henry Hatch's reorganization agenda developed largely in response to the Defense Department's Base Realignment and Closure Commission (BRAC), which requested the Corps to consider closing some of its field offices. General Hatch formed a task force on reorganization, chaired by Frederick Bayley, to study the issues and present alternative plans, and the Bayley task force proposed closing several Engineer Districts. Although this study originated as a Defense department initiative, Congress approved it, and in the Energy and Water appropriations act of 1990 directed the Corps to examine restructuring its field offices.[8]

As planning proceeded in 1991 and the impacts of restructuring Corps field offices became apparent, Congress removed the Corps from studies mandated

by the Base Realignment and Closure Commission, and directed that no funding for civil works would be used to close field offices, its districts in particular. Discussing the reorganization plans with members of Congress, the Corps learned they were unanimous: Congress demanded full-service districts be left in place to provide services their constituents needed—it wanted the decision-making district commanders to remain situated in their own local communities.[9]

Lieutenant General Arthur Williams, successor to General Hatch, reconstituted an Engineer Reorganization advisory panel under the leadership of Brigadier General Albert Genetti, the Division commander at Cincinnati. Genetti and his associates proceeded with a restudy during 1992, with support from the Assistant Secretary of the Army for Civil Works, Nancy Dorn. The Genetti task force completed its report on national reorganization of the Corps in the summer of 1992, and its report received significant recognition from Congress. In the 1992 Energy and Water Resources appropriation bill, Congress stated it was fully "aware of the need to reduce overhead costs of the Corps of Engineers." Although Congress again declared it would not approve closing any engineer district, it did offer funding for a Corps reorganization aimed at saving more than $100 million annually.[10]

As General Williams implemented his reorganization plans in 1993, none of his existing districts closed and, indeed, Congress added a new district at Boston, Massachusetts, increasing the number of districts to thirty-six. Thus, the reorganization had few immediate impacts on Louisville or other districts. The burden fell instead on the Engineer Divisions, which were reduced in number from thirteen nationally to a total of eight through merger in 1993. This constituted, General Williams pointed out, the first major reorganization of the Corps in a half century.[11]

As the Corps fine-tuned its reorganization in 1997, the Ohio River Division at Cincinnati closed, supplanted by the Great Lakes and Ohio River Division, usually abbreviated simply as the Lakes and Rivers Division. The Chief of Engineers closed the North Central Division, formerly located at Chicago, Illinois, and transferred management of its three districts—Chicago, Buffalo, and Detroit—to the new Lakes and Rivers Division at Cincinnati. Thus ended the historic Ohio River Division, formed in the early twentieth century to manage water resources in the entire Ohio River basin. Commanders of the new Lakes and Rivers Division would continue the management review functions of the former Ohio River Division, and would develop the complex expertise needed to administer America's Great Lakes, a formidable challenge quite distinct from river basin engineering.[12]

Closure of the Ohio River Division had few major effects on activities at the Louisville and other districts. Personnel of the Division's human resources office and logistics management office transferred from the Division's to the district's payroll, but their duty stations remained at Cincinnati. In 1996, the Ohio River Division Laboratory transferred to the district's engineering division for operation pending a management review that eventually closed it and all other division-level laboratories. Thereafter, the Corps' technical research would be accomplished at its four national laboratories, located in Mississippi, Virginia, Illinois, and New Hampshire. These reorganizations and closures meshed well with the "reinventing government" initiative of the William Clinton administration.[13]

The presidential election of 1992 brought William "Bill" Clinton into office in January 1993 with promises of major policy changes. His centrist administration made few major changes in Corps water resources programs, however, as it continued the emphasis on wetlands preservation and cost constraints of the preceding Bush administration. The most immediate impact of Clinton's administration on Louisville District grew out of Vice President Albert Gore's efforts to "reinvent government" to make it more efficient and less costly. Responding to this initiative, the district's Internal Review office, formerly known as the comptroller's office, applied enhanced auditing standards to district activities, continuing full scope reviews but adding quick reaction audits and consultation services to reduce variable costs to a minimum.[14]

Associated with the "reinventing government" effort was a national reorganization study that proposed reducing the Corps' workforce and eliminating supervisory, high-grade positions. In 1993, Louisville District received a severe limitation on the number of high-grade supervisors it could employ, forcing several divisions to abolish their assistant chief positions and reassign the former assistants to other critical tasks. To encourage cooperation from supervisors with these reductions, they and other Corps personnel were offered a Voluntary Separation Incentive Program, providing benefits to personnel who accepted early retirement. Consequently, forty of the district's most experienced staff members retired in 1994. This proved a costly migration, but it infused the district with total quality staffing opportunities.[15]

URBAN WATERFRONTS

Although the Bush administration's reductions in military programs challenged the district, one highlight of Colonel Harback's command proved to be the advent of urban waterfront renewal projects, starting at the Falls of the Ohio River. Congress, in 1981, had selected the Corps to plan, develop,

and manage the Falls of the Ohio National Wildlife Conservation Area, and this effort neared completion in 1993. The district's real estate managers acquired 914 acres at the Falls to form a wildlife conservation area, and its project managers negotiated agreements with local sponsors, the Indiana Department of Natural Resources and the Clarksville, Indiana, community, to design and build a Falls of the Ohio Interpretive Center. The Indiana legislature also authorized its Department of Natural Resources to develop the George Rogers Clark State Park on land adjacent to the wildlife conservation area, and in 1990 Congress authorized the Corps to share the costs for trails, overlooks, landscaping, and recreational features ancillary to the interpretive center. Construction of these features moved toward completion during 1993.[16]

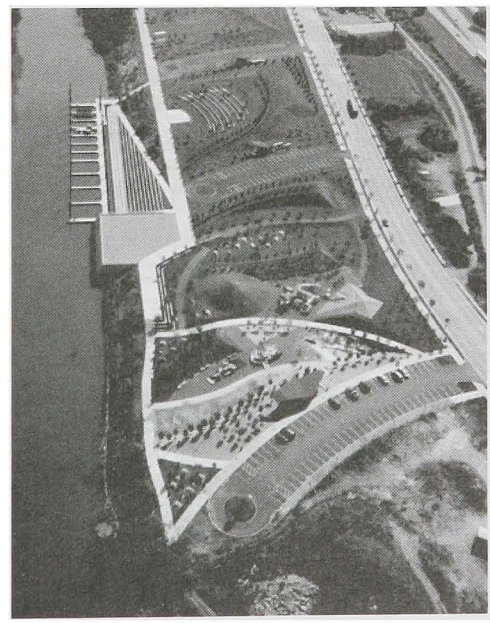
Culminating twelve-years of collaborative efforts, the Falls of the Ohio Interpretive Center opened in January 1994, although one of the largest snowfalls in local history hampered the celebration. A more formal grand opening followed in June 1994, when the 16,000-square-foot interpretive center, containing a million dollars worth of archaeological and historical exhibits was dedicated to education and research. The Falls center quickly became a focus for Ohio River history, and in 2001 Congressman Baron Hill and the National Park Service selected the center to highlight the Lewis and Clark Heritage Trail, featuring reenactment in 2003 of the Lewis and Clark Corps of Discovery's departure from the Falls two centuries earlier for explorations to the Pacific Ocean.[17]

Falls of the Ohio National Wildlife Conservation Area

As Falls development proceeded, the city of Louisville and communities bordering the Falls along the Indiana bank contemplated waterfront developments. Inspired by successful waterfront developments and accompanying downtown revitalization at Baltimore, Maryland, and San Antonio, Texas, many communities throughout the nation sought during the 1980s to restore their waterfronts as a key to downtown revival. In the Ohio River basin, Nashville, Tennessee, and Pittsburgh, Pennsylvania, enjoyed early success in converting their industrial riverfronts into parks and civic centers attracting people to the downtown business sections, and the Louisville metropolitan area joined in this river renaissance initiative.

With Indiana proceeding splendidly with developments along the north side of the Falls, Louisville, during the 1980s, initiated urban waterfront projects on the south side. Louisville formed a Waterfront Development Corporation in 1986, managed by David Karem, seeking combined private and public funding to convert the city's decaying industrial riverfront into a public playground and park. "We averaged over 100 presentations a year in the first five years," Karem recalled, speaking of the development corporation's history: "We went to anybody who would talk to us. If more than two gathered at a street corner, we'd talk to them." Contending the city's forgotten riverfront could be revitalized, the corporation searched out private donors for seed money, and eventually obtained more than $20 million in donations from the Brown Foundation, the Bingham family, and substantial support from civic leaders. With solid private and community support, the corporation secured additional public funding from municipal, state, and federal governments.[18]

The district's crucial role in waterfront development originated in the 1989 Energy and Water Development appropriation act providing $400,000 for the planning and design of riverfront improvements. David French initially led the district's project team managing contracts to prepare schematic plans for a thirty-acre park along the riverfront between the Clark and Kennedy bridges. This involved the design of a connector to open pedestrian access from the downtown Belvedere plaza, high atop the city's riverbank, down sixty feet to the wharf at the river's edge. The city had completed the Belvedere plaza, offering a grand vista of the river during the 1970s, but



Waterfront Park
Louisville, Kentucky

interstate highways, parking garages, and other obstacles blocked access from the plaza to the river below; in fact, no handicapped access existed at all.[19]

The district team and its contractors quickly completed a design in 1989 for the Belvedere connector, using ramps, stairs, and two transparent elevators to link the plaza to the waterfront at estimated costs of $3.5 million. Louisville became the cost-sharing partner for the Belvedere connector and park, and on October 17, 1994, ground was broken for the connector—which the Corps labeled the McAlpine Access Facility. Area engineer David Klinstiver managed construction of this keystone to the $58 million public and private partnership campaign to renew the city's waterfront.[20]

Work on this award-winning connector, providing direct access from the Belvedere to the historic wharf, moved with due speed. The ramps, walkways, and elevators were ready for service by the summer of 1995, and on June 2, the project was dedicated and named the Romano L. Mazzoli Connector in tribute to the congressman who helped arrange the connector's funding. This first phase launched a waterfront park development that continued into the twenty-first century, converting the bank of the Ohio into a civic playground and gathering place for events such as the immensely popular fireworks extravaganza "Thunder Over Louisville."[21]

GREICO'S CHALLENGES

Colonel Ralph Greico managed completion of Louisville's Mazzoli Connector, but much of his command tour at the district involved challenges at other projects, notably in Indiana. Taking command in June 1994, Greico came to Louisville from the Chief of Engineers' office, had excelled in troop and staff assignments, and was a graduate of the universities of Toledo and Illinois. Greico declared he was pleased with the opportunity to command the third largest district in the Corps, managing a workforce of 1200, with more than a thousand contracts in progress and a budget exceeding $300 million. Greico thought his responsibilities as commander exceeded those of a corporate chief executive officer (CEO), because a commander was responsible for the developmental well being of the workforce in addition to the typical CEO's bottom line. "We have an obligation that is above and beyond that of a bottom-line business organization," he remarked.[22]

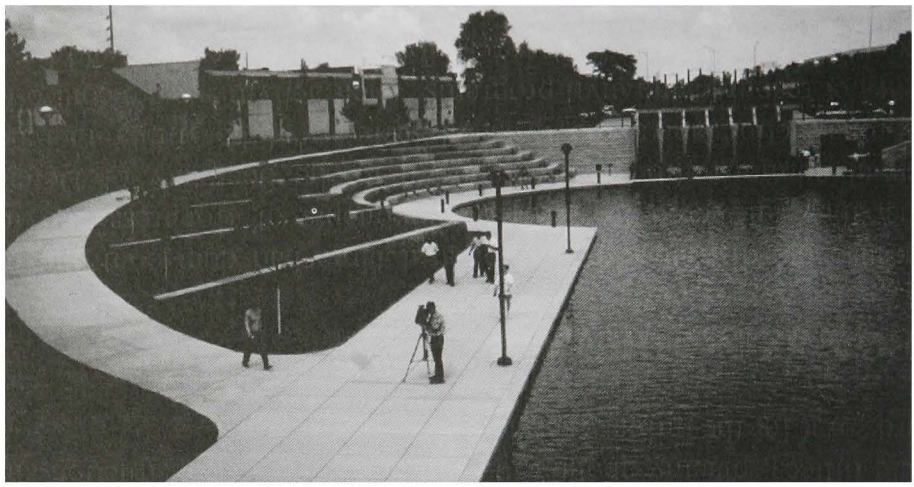
Indiana's riverboat casinos consumed a substantial part of Colonel Greico's time. After launching a state lottery in 1989, Indiana in 1993 authorized riverboat gambling casinos. Casino developments began at Evansville, Rising Sun, Lawrenceburg, and in Harrison County across the Ohio from Louisville. Because

casino boats required mooring facilities at riverside, the Corps became involved as part of its regulatory permit program. The Corps focused on the impacts of casino construction on river navigation and the riverine environment, not on gambling or related matters. Yet, the opponents of state-sponsored gambling vented their complaints at Corps-conducted hearings making the permit actions quite contentious. When casino developers met every requirement presented by the Corps to protect the navigation environment, the district granted the permits, except for a riverboat casino proposed on Patoka Lake, one of the multipurpose flood control reservoirs in southern Indiana. There, environmental concerns arose, and ultimately the district determined it to be an illegal activity on federal land.[23]

Although presiding over the casino permits proved challenging, Colonel Greico considered the hearings to be fair and open opportunities for democratic expressions. Citizens brought forth their concerns publicly, and presented them directly to the decision makers at these hearings. While Greico recognized many citizens did not approve of his decisions for or against permits, he thought the hearings an important contribution. "People appreciate being listened to and at least perceive they are getting their fair opportunity to comment pro or con on the issues," Greico reflected, concluding: "For the most part, we have done fairly well including the public in the decisions."[24]

Although riverboat casino hearings garnered headlines, Indiana gained several new water resource projects during the 1990s, especially after Republicans obtained a House majority during 1994 and Congressman John Myers of Indiana became the new chairman of the subcommittee for water resources. Among the new projects was the Indianapolis Central Waterfront, also known as the Capital City Landing. Indianapolis had under planning, in 1992, a comprehensive redevelopment plan for its downtown area along the White River and canal. The district became involved when the city requested studies of repairing or replacing the deteriorating flood protection works along the river. Although preliminary study in 1993 indicated the deterioration was insufficient to warrant federal funding for repairs, the district's planning division explored the Corps role in master planning for the Indianapolis waterfront, with James Brammell and Roger Setters as study managers. Congressionally added funding became available in 1995 to prepare construction packages for sections of the waterfront master plan—Capital City Landing at White River State Park, an extension of the Indianapolis Canal Walk, and a central stretch of the White River.[25]

Because the Indianapolis, like other waterfront developments, principally served recreational needs, it did not have priority in Presidential budgets, and was initiated and funded as congressional additions to appropriations acts.



White River State Park, Indianapolis, Indiana

At Indianapolis aselsewhere, waterfrontprojects were costshared with local governments on a fifty-fifty basis, after the first $100,000 investment. After planning was completed in cooperation with municipal authorities and a master-planning contractor, the district, in 1997, signed an agreement for cost-shared construction with the city and White River State Park officials. It opened an Indiana Project Office for construction management, with Linda Murphy serving as project manager. Several contractors worked at extending the canal from the capital's central core to the White River and creating a linear park alongside the canal and the White River. As each section's construction was completed and opened, the public thronged onto it, exciting major media attention. Much of the original master plan was in place by 2000, when the plan expanded to include converting an industrial plant site into green park space in the central city. About $113 million had been expended on Indianapolis waterfront development by the end of the twentieth century, and final touches continued into the twenty-first. This unique project transformed a depressed urban area into a recreational community, balancing historic preservation with urban revitalization goals.[26]

THE OLMSTED TESTS

Colonel Greico took pride in participating at the start of the Indianapolis waterfront renewal, and also in initial construction of the Olmsted Locks and Dam. Congress had approved its design and construction in 1988. The district completed real estate acquisition for the project in 1992, and awarded the first construction contract for building a resident engineer's office and access road to the lock. While this preliminary construction progressed in 1993, Philip Hasselwander and the engineering division pursued their dynamic structural analyses for the locks' design, and conducted model studies of several dam configurations at the Waterways Experiment Station at Vicksburg, Mississippi. The engineering division completed plans and specifications for building a

cofferdam around the site for lock construction and removing a landslide, and the District awarded the contract in March 1993. Resident Engineer Richard Schipp moved into the Olmsted office on July 8 and assembled a construction management staff, from Kentucky, Michigan, Iowa, Pennsylvania, and Washington, for on-site direction of the largest civil works project built by the Corps in years.[27]

Olmsted's design was still in flux as early construction proceeded. During preparation of the environmental impact statement, bald eagles were discovered nesting in Kentucky's Ballard National Wildlife Management Area, adjacent to the construction site. This wildlife area was a major wetland refuge for migratory waterfowl, and the expansion of wetlands was a primary goal of the George H. W. Bush and William Clinton administrations. To mitigate impacts of project construction on waterfowl and aquatic life, the district began acquiring a 2,000-acre addition to the Ballard County wildlife refuge.[28]

Designing Olmsted dam presented novel engineering challenges. The original dam design included tainter gates next to the lock, a central section of movable wickets forming a navigation pass, and a fixed weir next to the Kentucky abutment. Concerns about seismic activity at the site resulted in switching to an all-wicket design with no tainter gates. This second design consisted of a 2,200-foot navigable pass, closed by 220 remotely operated hydraulic wickets. These wickets would be much larger and have greater lift than any wickets ever built, and model studies alone of these pioneering wickets did not seem an adequate test. The district and its consultants planned to build a prototype test for these wickets, installing five full-scale wickets near Smithland dam to be raised and lowered many times, simulating years of operation and permitting modifications to wicket designs before they were installed at Olmsted. A $16.5 million contract for building five prototype, hydraulically operated wickets went to Massman Construction Company of Kansas City, which began construction in 1995.[29]

While a contractor built a cellular cofferdam surrounding the future site of Olmsted locks—to permit dry placement of concrete in the lockwalls—the engineering division proceeded with final designs for the dual 1200-foot locks and the proposed dam with piston-maneuvered wickets. During locks design, the engineers decided to redesign and separate the lock approach walls. Lock approach walls, located at the upper and lower ends of locks, guide barges tows and watercraft safely into lock chambers, and traditionally had been constructed of concrete at the lock site. In early 1995, however, the district contracted with INCA Engineers to design floating lock-approach walls that could be built upstream of the locks, and floated by river to the locks for assembly in place. This was an innovative design concept, seldom used before.[30]

At the request of the Lakes and Rivers Division, the district also contracted with the Black and Veatch architect-engineers to prepare life-cycle cost analyses, comparing various configuration and construction methods for Olmsted dam. Because the towing industry, through the Inland Waterways Trust Fund, paid half the Olmsted project's costs, the district presented the life-cycle cost analyses to the industry in April 1995. After review, the industry expressed its preference for using traditional boat-operated wickets, rather than remotely operated wickets. Boat-operated wickets had been used in Ohio River dams for more than a century, while remotely operated wickets had never been tested in service, at least not on the Ohio. Responding to this preference, Brigadier General Albert Genetti, commanding the Division, assembled his experts at the end of May 1995 to again review the proposed dam designs. Concerned primarily about the ability to maintain and repair the hydraulically operated wickets in a safe and timely manner to keep the dam in operation, the experts switched Olmsted dam's design a third time. This final approved design consisted of a five tainter-gate spillway section next to the lockwalls, a navigable-pass section composed of 140 boat-operated wickets in the river channel, and a fixed weir leading to the Kentucky bank.[31]

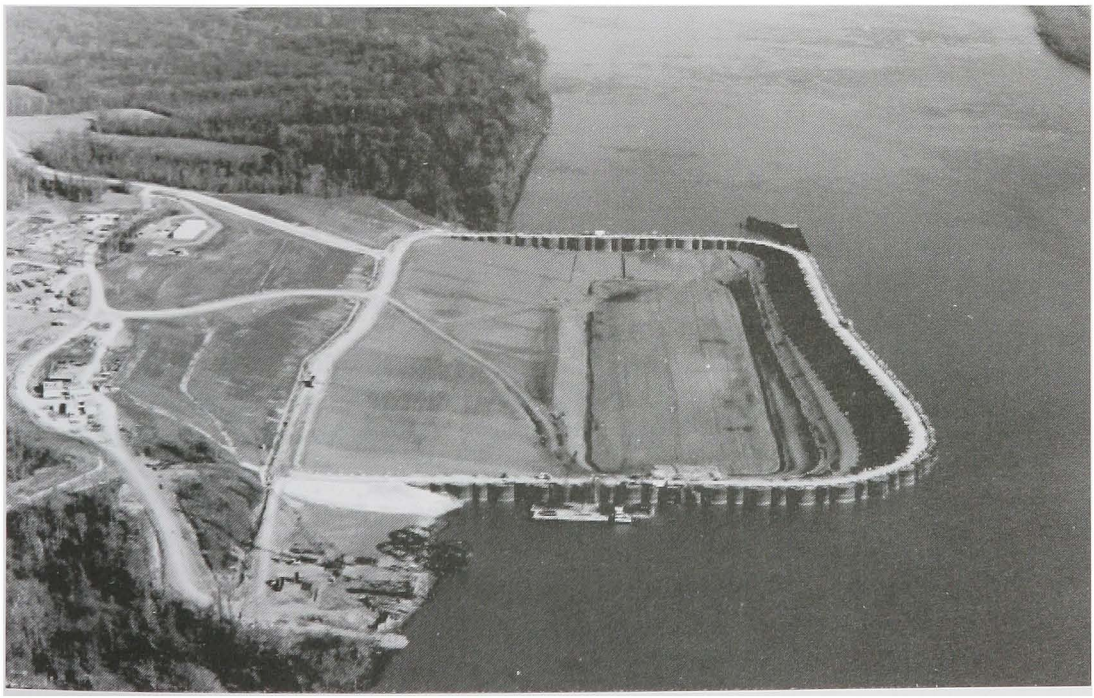
The Corps reached this redesign decision before the full-scale prototype wickets were tested near Smithland dam. The contractor completed installing the five hydraulic-piston operated wickets at Smithland in December 1995 at a cost of $18 million. Testing the prototypes began and continued until August 1996, with each wicket raised and lowered 400 times at varying river stages. One major failure occurred when a wicket malfunctioned, bending its piston rod and locking it in raised position. At these tests, engineers learned many lessons about hydraulic wicket designs, materials, and corrosion resistance, but the prototype testing had little influence over the final design of Olmsted dam.

Groundbreaking ceremony Olmsted Project
Colonel Ralph Greico and Kentucky Senator Wendell Ford in right.

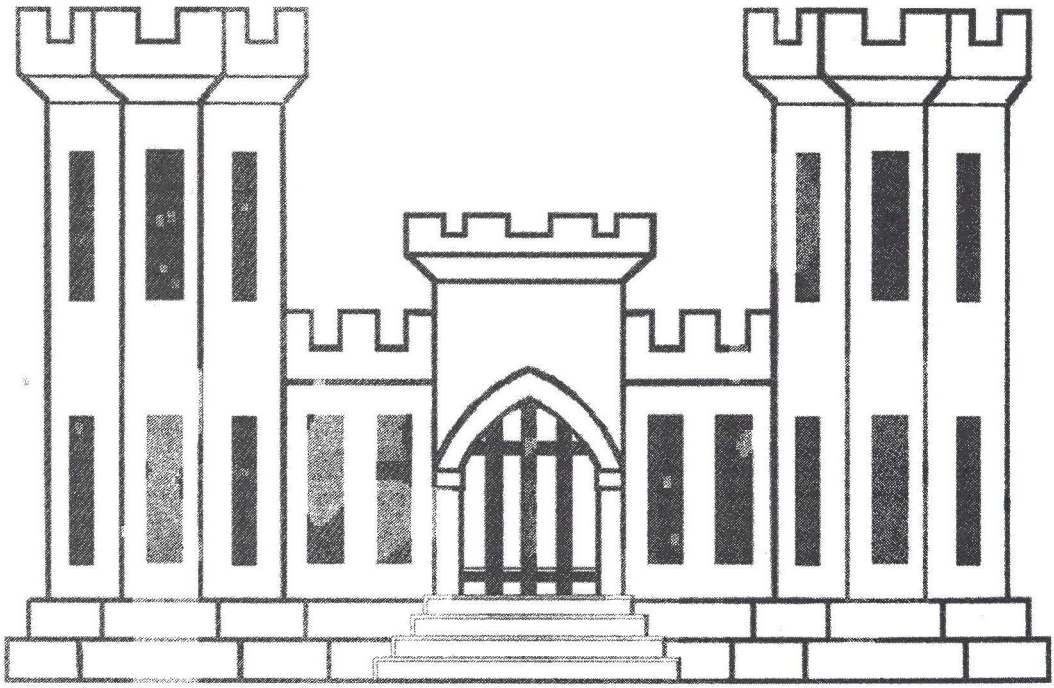
At the testing's conclusion, the prototype wickets were permanently fixed in a raised position.[32]

After difficulties were overcome, the steel sheet-pile cellular cofferdam around the site for construction of Olmsted locks was finished near the end of 1995, and the District awarded a contract for building the two, side-by-side 1200-foot locks to the joint venture contractors, Atkinson-Dillingham-Lane, for $224 million. A notice to proceed went to this contractor, and on April 19, 1996, the district conducted a groundbreaking ceremony at the site. Colonel Ralph Greico, Senator Wendell Ford of Kentucky, and Congressman Glen Poshard of Illinois led a crowd of hundreds who gathered at Olmsted to witness the driving of a "golden pile", signifying the official construction start. Strenuous efforts by project managers David Weyer and Lawrence Bibelhauser kept the Olmsted project on schedule, but its estimated costs had crept upwards. From the $775 million estimate of 1986, it had become by 1996 the "Billion Dollar Project," a first for the District.[33]

With the Olmsted construction started, Colonel Greico elected to retire from the Corps in 1996 and enter private business. Reflecting on his years of service, Greico labeled the Corps as "the Federal Engineers," pointing out that no other national engineering force was active from coast to coast and overseas. The Corps, he argued, would survive to 2000 and beyond because Americans knew how well it could serve the nation, providing waterways transportation and protecting communities from flooding. And the Corps was anxious always to undertake new missions for the future, whether civil or military.[34]



Completed Cofferdam for Olmsted Locks and Dam



8
SPEARHEADING THE DISTRICT

The biggest challenge at the Louisville District is managing change.
Colonel Harry L. Spear

The District evolved further during the late twentieth century, as the 1990s and President William Clinton's administration drew to their close. Just twenty years earlier, Louisville had been a local civil-works-only district, little different from other districts. In 1982, it had added military construction in a five-state area, a regional responsibility. To reduce overhead costs for its customers in the military services, the district's engineering and project management divisions sought to standardize repetitive designs and tasks, developing innovative "Yank-A-Tank" standard delivery contracts and "Kit-of-Parts" modular designs. These cost-cutting standardization efforts took the district into new markets, serving needs of the Army and Air Force Reserve for standardized designs and centralized program management for new facilities. By the end of the twentieth century, therefore, the district filled the needs of the Army Reserve for these nationwide services, and thus it had secured varying missions at the local, regional, and even national levels.

Although the district advanced to the national level in its military programs, its civil works also received intense local attention. It had several local flood reduction projects in progress at the end of the century, including one in 1997 that reimbursed its construction costs even before its completion. The 1990s marked the district's return to navigation improvements after a twenty-year hiatus. Construction of the largest lock and dam in Corps history began at Olmsted near the Ohio's confluence with the Mississippi River, and replacement of the most historic locks in the district began at Louisville. Colonel Harry Spear, who managed these vector shifts, had the pleasure in 1999 of hosting a groundbreaking for the McAlpine Lock Replacement, designed to enhance passage around the Falls of the Ohio.

MANAGING TRANSITIONS

Colonel Harry Spear commanded at Louisville as the twentieth century drew toward its conclusion. A Georgia native and graduate of Auburn University, Spear had served the Corps a quarter century before he arrived at Louisville in the summer of 1996, and found the district in the midst of tumultuous changes. President William Clinton had signed the Water Resources Development Act of

1996, further increasing the non-federal cost-sharing burden for flood reduction and environmental restoration.[1]

The Corps' national leadership changed in 1996 when Lieutenant General Joe Ballard succeeded Arthur Williams as the Chief of Engineers. General Ballard emphasized the Corps' role as an integral component of the Army, joining in Pentagon planning for military mobilization to assure that his engineers would be front and center when the Army deployed abroad. In sweeping moves, he also implemented the preferred reorganization, consolidating the Corps' thirteen division offices into eight.[2]

Ballard's initiatives directly impacted Louisville in several ways. First, when the Bosnian war began in former Yugoslavian states, Spear's deputy, Lieutenant Colonel Michael Hullihan, abruptly departed for Bosnia, leaving information specialist Kenneth Besser acting as deputy commander until Lieutenant Colonel Robert Ball arrived. Management of the former Ohio River Division Laboratory became a district responsibility, with Bruce Murray as its last chief. Consolidation of the military's hazardous toxic and radioactive waste removal mission, previously done by the Nashville, Buffalo, and Chicago districts, at Louisville required reorganization of the engineering division. This new mission came to Louisville chiefly because military customers wanted to deal with a single district rather than several. In response, the district expanded its Environmental Engineering section, forming three sections: Environmental Remediation, Environmental Support for Ohio and Kentucky, and Environmental Support for Indiana, Illinois, and Michigan. The district, in 1996, thus launched into regional environmental restoration projects at both active and closing military bases in five states.[3]

In Colonel Spear's opinion, General Ballard emphasized the fact that the Corps was an Army organization. "He drove home to the culture that mobility and institutional loyalty to the Army are two factors that needed to be reinforced," Spear said, adding: "We're seeing an evolving regional perspective that's going to make the Division the full service resource provider and the districts are going to be executing agents."[4]

Management transitions at regional and local levels paralleled those of the late 1990s at the national level. Major General Hans Van Winkle went to Cincinnati to preside over formative organization of the Great Lakes and Ohio River Division, and the Louisville District's chief of program and project management, Donald Basham, transferred to the Division. Robert Fuller, chief of planning division, acted as Spear's deputy for project management until Dr. Robert Mullins, Jr. received the appointment as the new deputy for project management. Subsequently, Colonel Spear appointed Fuller as the successor

to Kenneth Mathews as chief of the operations division, while Sharon Bond succeeded Fuller as chief of planning and Bruce Murray replaced the retired Philip Hasselwander as chief of engineering. Marvin Ormerod succeeded Steven Butler as chief of the resource management office. The planning division then folded into the project and programs management division as a new branch, and the project, programs, and planning management division thus increased to a staff of one hundred by 1998. This mushrooming division also absorbed military budget analysis programs, previously accomplished in the engineering division. Reflecting later on these swift transitions, Colonel Spear laconically observed: "We had some key leadership changes."[5]

MILITARY TRANSITIONS

The Clinton administration continued to trim the number of military bases, an initiative begun during the Bush presidency. The Base Realignment and Closure Commission (BRAC) had recommended two sets of base closures during the Bush administration, and it continued its work throughout the Clinton years, recommending additional base closures in 1995 and still more later. Colonel Spear and the district during the late 1990s confronted the engineering challenges accompanying multiple base closures, and one of Spear's first assignments as commander involved the deactivation of Fort Benjamin Harrison near Indianapolis. This historic fort, together with Grissom Air Force Base in Indiana, and Rickenbacker Air National Guard Base in Ohio, was among the long list of bases selected for closure by the BRAC task force.[6]

At Fort Benjamin Harrison, and at other bases slated for closure, the District launched an installation restoration program. The district's planning branch conducted field surveys and prepared the required environmental impact statements, while the project management, engineering, and construction divisions initiated the necessary environmental cleanup and remediation work in advance of transfer of the facilities from the Army to other agencies. Accomplished largely by contract, environmental restoration generally involved removing unexploded ordnance (UXO) from firing ranges, and any hazardous, toxic, or radioactive materials from the bases. While conditions at each base differed, depending on the Army's historic uses of each base, the district sought to standardize restoration efforts to the extent possible as a cost-reduction measure.[7]

One of these efforts, for example, the engineers labeled the "Yank-a-Tank" program. At active as well as closing military installations, removing underground storage tanks that had contained petroleum or chemicals became a multi-million dollar program during the 1990s. The Environmental Engineering branch spearheaded this "Yank-a-Tank" design effort, developing standard

job-order-contracts encompassing all the tasks needed to remove, replace, and upgrade underground tanks. This standardized approach eliminated the need for generating costly plans and specifications for the removal of each tank individually, saving customers fifty percent or more on design costs. The district, by the end of the 1990s, had numerous job-order delivery contracts in place to remove storage tanks, and provide other standard engineering-construction services, saving the military services and clients millions of dollars.[8]

As these environmental restoration efforts proceeded at closing bases, the district's real estate division managed the facilities' property disposal. At Fort Benjamin Harrison, for example, the post's utility systems were transferred to municipal and local utility services, while the real estate went to state government for park use, and to the Fort Harrison Reuse Authority for redevelopment. Similar transfers to reuse authorities and local or state governments occurred at many closing bases, a significant change from earlier base disposal actions that commonly had sold the real estate to the highest bidders at public auction.[9]

At Indiana Army Ammunition Plant near Charlestown, Indiana, as another example, the district's environmental investigations revealed contaminants requiring remediation or cleanup before the real estate could be transferred. This installation, occupying about 9,700 acres in Clark County, Indiana, had been constructed during the Second World War as three plants: Indiana Ordnance No. 1, Hoosier Ordnance, and Indiana Ordnance No. 2. Consolidated as the Indiana Army Ammunition Plant, it was in production through the Korean and Vietnam wars until the BRAC recommended its closure in 1995. The district undertook removal of environmental contamination, and made plans for transferring the plant's real estate to Indiana state government for park use and to a local reuse authority for commercial redevelopment.[10]

Colonel Spear admitted it hurt personally when it became necessary to permanently close such historic installations as Fort Sheridan and Fort Benjamin Harrison, but he insisted that the District perform the closures professionally. More closures recommended by the BRAC continued throughout President Clinton's administration, and Spear directed the district to help the custodians of ordnance plants at Ravenna, Ohio, Joliet and Savanna, Illinois, and other installations with advance planning for their closure, cleanup, and property disposal.[11]

Although more than a dozen military installations in the District closed during the late 1990s, its military construction program suffered few disruptions, largely because relocating troops and systems from the closing bases required the construction of new facilities at other bases. In addition, such active bases as Fort Knox and Fort Campbell had continuing, and sometimes urgent, needs

Airfield Paving, Fort Campbell, KY

for new facilities construction to support deployment in Bosnia, Somalia, and Iraq. At Fort Campbell, for example, the major troop deployment, completed during the 1991 Gulf War, contributed to failures in airfield pavements on the base. National security required that pavement repairs be accomplished without blocking air traffic for extended periods, and the personnel managing the repairs therefore worked seven days a week to minimize down time, completing a $14 million repair job ahead of schedule, an achievement valuable to national mobilization requirements.[12]

Less urgent, but more timely, was an off-post railroad connector designed to dramatically improve the 101st Airborne Division's ability to quickly deploy in emergencies from Fort Campbell. While troops at Fort Campbell typically deployed by air, their vehicles and equipment followed on rail to the seacoast and thence by ships overseas. A 1993 army study identified a need to speed mobilization by constructing a new railroad track, connecting the fort with the CSX mainline rail tracks at Hopkinsville, Kentucky. The existing 23-mile-long tracks and switching tracks at Hopkinsville had limited traffic from Fort Campbell to five railcars at a time, when leaving for seaboard debarkation ports. The 1993 study declared that national security demanded the 101st Airborne and associated combat units be able to load and send 1,095 railcars on their way within four days after receiving a notice to mobilize.[13]

Achieving this rapid mobilization goal required building a new five-mile-long railroad linking the fort's rail tracks directly with the CSX line leading to seaboard debarkation ports. The district, in 1996, completed its studies for acquiring a 100-foot-wide corridor for laying rail tracks along various routes through farmlands, and in 1998 its real estate division began negotiating with landowners along the route. They secured the rights of way by 1999, when Kentucky state government elected to extend a highway through the area, forcing revisions in the railroad's alignment to accommodate the new highway location. When the district awarded a contract for building the new railroad line in 1999, its leaders vowed to press the work swiftly in view of its critical impact on the 101st Airborne's ability to respond to emergencies overseas.[14]

ARMY AND AIR FORCE RESERVE PROGRAMS

A major boost to the district's military programs at the national level came through its initiatives in the Army Reserve program. When the district's project management teams formed during the early 1990s, Fred Grant was assigned to coordination of the Army Reserve program, and he became acquainted with Colonel James Dunkelberger, heading a staff that managed Army Reserve facilities worldwide for training the citizen soldiers. Observing that typical Army Reserve centers were outmoded, overcrowded, and costly to maintain, Dunkelberger bluntly advised Congress: "Our soldiers deserve better!" To reduce costs while building better facilities, Colonel Dunkelberger sought centralized project management, and he turned to Fred Grant and the district, which in the 1990s was developing the "Kit of Parts," later dubbed the Modular Design System.[15]

The "Kit of Parts" was a computer-aided design and drafting (CADD) program initially developed in the 1980s for standardizing post offices design. Larry Cozine of the engineering division began investigating this program, which permitted the use of standard designs to generate contract drawings for building modules in 16,000 different combinations. The engineering division then pursued the program's development, and persuaded the Army Reserve to permit its use for designing new U. S. Army Reserve Centers. William Steinbock had a major role in developing the program, and the District also partnered with private software development companies to apply the "Kit of Parts" to Reserve Center designs. This program eventually became the Modular Design System (MDS) that included standard room sizes for offices, classrooms, and assembly halls, allowing the district to simply select the desired facility size and marshal the program to detail the floor plans.[16]

As the Modular Design System became standard for the Army Reserve' program, Fred Grant and the district sought appointment as the Army Reserve centralized design agent and project managers, and they were successful in 1994. Project Management chief Donald Basham then established an Army Reserve Support Team, with Grant as team leader, to

Army Reserve Center

work with Colonel Dunkelberger, defining new methods for handling Reserve design and construction needs. All new Reserve centers also needed furniture, and the district became responsible for purchasing this furniture—its contracting division handled the purchase orders. And when Reserve units went overseas, Colonel Dunkelberger proposed renovating their centers and buildings, while the troops were deployed and the buildings stood empty. The district then initiated a Full Facility Revitalization program to refurbish building interiors and replace worn structural components to welcome the Reserve troops home.[17]

When Grant and the District briefed Corps headquarters, in 1999, on the Army Reserve program, a representative of the U. S. Air Force Reserve urged that a similar program be initiated for his agency. Corps headquarters then approved a memorandum assigning the Air Force program to Louisville, but it differed from the Army Reserve program. For the Army Reserve, Louisville served as both design agent and program manager; for the Air Force Reserve, Louisville worked as the program manager while local districts might serve as design managers, if the Air Force wished. In practice, Louisville designed about three-quarters of the Air Force Reserve projects, and local districts handled the remainder.[18]

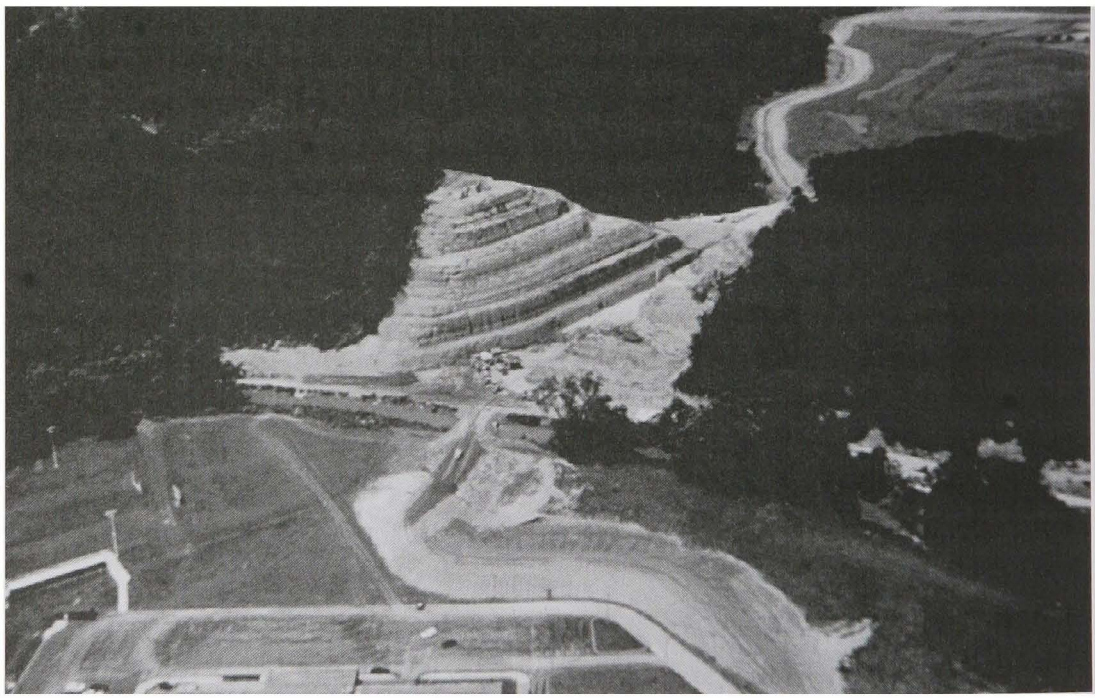
To accomplish this growing workload, the district's Army and Air Force Reserve support personnel grew by 1999 to a team of twenty-six, managing several large delivery contracts for standardized design and construction. They even managed a few Reserve center projects for the Navy and Marine Corps, and several centers for the Army National Guard. They found the scale of Reserve center facilities increasing as a consolidation of reserve units proceeded; moreover, newer centers were apt to include hangars for helicopters or docks for watercraft. "The Army Reserve looks at us as an extension of their staff: if they come up with a requirement, we meet it," Fred Grant bluntly explained: "Sometimes they have a very short-fuse need to get construction awarded and so far we have been able to fill their requirements; this is because we are very customer oriented." Certainly this attitude produced dividends: the Army and Air Force Reserve program grew to approximately $200 million annually by the end of the century, nearly a third of the District's total program.[19]

CIVIL WORKS INITIATIVES

While the district's engineering-construction-management programs for the military expanded to national levels, its more localized civil works mission also expanded. It continued planning and building flood reduction projects, embarked on new urban waterfront designs, and also returned to the traditional navigation improvement projects that had highlighted its early history.

Colonel Spear joined Congressman Harold Rogers at Salyersville, Kentucky, for example, in March 1997, to break ground for a local cost-shared project to divert Licking River floods away from the town. This project consisted essentially of two "cut-throughs" to convey flood waters across river bends and away from the community, together with new highway bridges and spoil disposal areas. Excavation of these "cut-throughs" went swiftly, and was completed in June 1998, with the local sponsor assuming the project's post-construction management.[20]

The district had other local flood reduction projects underway during the late 1990s at Duck Creek and Holes Creek in Ohio, at Pond Creek in Kentucky, and at various Indiana communities. The project receiving the most media attention, however, was at Kentucky's capital, Frankfort on the Kentucky River. There, the South Frankfort floodwall repaid the full costs of its construction during a single flood, the 1997 flood disaster.



Salyersville, KY, Flood Protection Project

The Louisville area received nearly eleven inches of rain in twenty-four hours on March 1, 1997, and resulting flash flooding drowned twenty-one people in Kentucky. The district's lakes stored floodwaters nearly to capacity as designed, and its local flood reduction projects performed satisfactorily, except at Brookport, Illinois, and Lebanon Junction, Kentucky. The Brookport floodwall had a flapgate that did not close properly, forcing evacuations from this little town opposite Paducah, Kentucky, while the staff from the nearby Olmsted project placed sandbags around the outlet to contain the water. At

Lebanon Junction, in the Salt River basin south of Louisville, a flood reduction levee built in the 1960s to protect the town against small floods proved inadequate to hold off the 1997 flooding, which inundated the town. Colonel Spear escorted Vice President Al Gore and Governor Paul Patton to Lebanon Junction on March 8 to review the disaster there, and discuss measures needed to protect against future flooding. Virtually every district office became involved in the emergency and post-disaster recovery efforts of March 1997. From the Federal Emergency Management Agency, the district received directives to assess flood damages, remove debris, and build temporary housing at such heavily damaged communities as Cynthiana and Falmouth on the Licking River.[21]

Flood damages, Falmouth, KY 1997

Although Frankfort on the Kentucky River received more than ten inches of rain during the 1997 flood, it was safely ensconced behind its two floodwalls. Although the floodwall protecting the city's northern sector had been completed in 1971, construction of the South Frankfort floodwall had begun in 1993 and was not entirely completed when the 1997 flood struck. Robert Hess and Steve Hartman of the district's construction division helped city authorities close the gates and start the pumps in the South Frankfort floodwall, affording emergency protection against the flood's assault. Subsequent estimates indicated the project prevented sufficient damages in this single flood to reimburse its entire $12 million construction cost. This, before Colonel Spear formally dedicated the completed project in May 1997.[22]

NAVIGATION ENHANCEMENTS

Olmsted Locks were under construction when the March 1997 flood waters advanced down the Ohio River. The height of the flood forced the Olmsted construction staff to "re-water" the cofferdam, meaning to open gates allowing the flood to enter the cofferdam slowly, rather than pouring over its top. After the flood receded, contractors pumped flood water out from the cofferdam, removed the debris and silt, and resumed construction, driving the piling forming the locks' foundation and placing the concrete. This flood delayed construction

progress, however, for approximately four months. In the meantime, the contracting architect-engineering firms continued their studies of innovative designs and construction methods for building Olmsted dam.[23]

Upriver, the district was beginning construction of the McAlpine Locks Replacement at Louisville. McAlpine Locks and Dam, at the Falls of the Ohio, was the oldest navigation project in the District; indeed, the District had been established to manage the locks and the canal built by a company during the American Civil War. The small locks, built in the 1860s, were still in place during the 1990s, but had not operated since 1973. These historic locks were bracketed by the 600-foot-long Lock 41, built in 1921 as part of the Ohio River canalization, and by the 1200-foot-long McAlpine Lock, completed in 1960. Commercial traffic through McAlpine locks had grown to 54 million tons annually by 1987, and forecasts predicted this total would double by 2020. Historically, marine commerce at the Falls of the Ohio had doubled approximately every fifty years since 1780.[24]

The district completed studies in 1989 proposing to expand the capacity of McAlpine locks by constructing a second 1200-foot-long lock alongside the existing 1200-foot lock. Studies indicated that excavating space for the second lock from Shippingport island, north of the existing locks, would have high fiscal and environmental costs, while building the new lock in the space occupied by the 600-foot lock and the Civil War-era lock would destroy those historic structures. The district elected to accept historical rather than environmental damages, and to remove the old locks and construct the second new lock in their place. Over the objections of local historians and others, Congress approved this plan in 1990.[25]

During the early 1990s, the engineering division proceeded with studies for the 1200-foot lock, focusing on new designs and using intensive model studies to identify ways to reduce costs. The district, for example, placed the filling and emptying culverts longitudinally in the lock-chamber floor, rather than in the lockwalls as done at earlier projects. This made possible the use of roller-compacted concrete, rather than the traditional formed and placed concrete, to reduce the lockwall costs. These design changes aimed to save millions of dollars during construction phases.[26]

Colonel Spear had the honor, in 1996, of presiding at the first contract awarded for the McAlpine Replacement project. This contract provided for constructing new buildings, including a resident office, adjacent to the work site. David Klinstiver became the project's resident engineer with Charles Haddaway III as assistant. They moved into their new office in early 1998, when the district

awarded a second contract, to improve the wharf at the adjacent Louisville Repair Station, providing piers as supports for upright storage of spare lockgates.[27]

When it came time to construct the new lock, closing the two small older locks would become necessary for their excavation and removal. This meant that for five or more years, only the existing 1200-foot-lock would be available to bypass traffic past the Falls of the Ohio. If this 1200-foot lock closed for repairs, all river traffic past Louisville would cease until the repairs were completed. The operations division therefore closed the 1200-foot-lock, in July and August 1997, for thorough repairs—replacing lockgate pintles and bushings, miter and quoin blocks, and other critical components subject to wear. In addition, it received authority to contract for construction of a new heavy lift crane, so powerful it could hoist huge miter gates from the lock chambers and remove them for repairs.[28]

By early 1999, the district's construction plans at McAlpine had been finished. To remove the old 600-foot lock and the smaller historic lock, the middle wall of the 1200-foot lock would be reinforced. Cellular sheet-pile cofferdams would be driven across the upper and lower entrances to the old locks, allowing the removal of the old locks and placement of the new concrete in the dry. The McAlpine Replacement job would be done in two contract phases: first, the cofferdam would be constructed, mitigation would begin of the project damages, and the two older locks would be demolished and removed from inside the cofferdam. In the second phase, foundation rock would be excavated from the new lock site, a new bridge over the canal and locks would be built, and the new concrete lockwalls would be rolled and compacted into place. The latter would be a construction innovation, never before accomplished, at least in the United States.[29]

Steamboat BELLE OF LOUISVILLE and MV MISSISSIPPI in 600' lock for McAlpine Project Groundbreaking.

(L-R) Jane Kiefer and Monica Greenwell "detonate" start of McAlpine Project at the ground-breaking.

Just before he transferred to the Army Engineering Support Center at Huntsville, Alabama, Colonel Harry Spear met with Major General Hans Van Winkle, commanding the Division, to host a groundbreaking for the McAlpine Lock Replacement. Held on June 25, 1999, at the riverbank beside the locks, with the renowned *Belle of Louisville* and motor vessel *Mississippi* in the locks, the groundbreaking attracted a crowd of hundreds to hear Colonel Spear, along with state and local dignitaries, hail this endeavor to improve the passage around the Falls of the Ohio.[30]

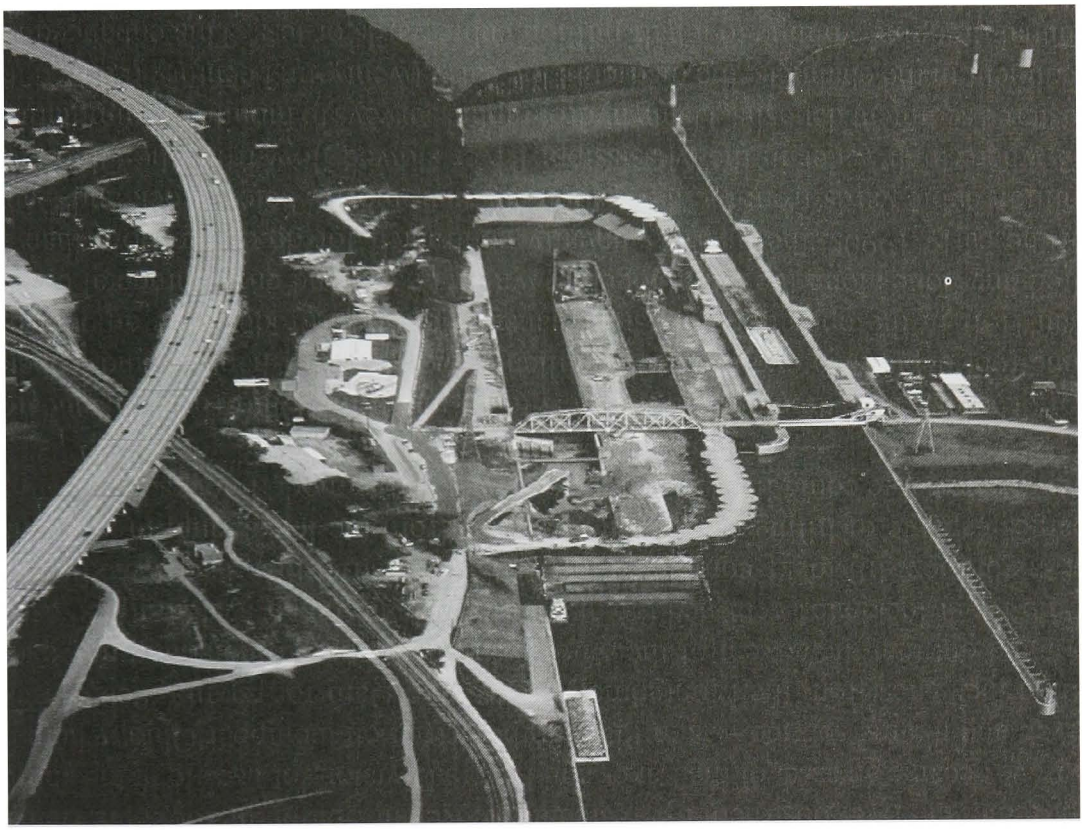
As he departed the district, Colonel Spear reflected thoughtfully on his service at Louisville. He had been surprised by the magnitude of the efforts required to field the Corps of Engineers Financial Management System (CEFMS), a new command-operating-budget computer program.[31] Spear had also been surprised by the public's emotional sensitivity to civil works. Unlike the district's military program, the civil works arena encompassed areas where people lived, worked, recreated, and worshipped. Civil works projects competed in the presidential budgets with all other national agendas, and, Spear observed, "because we are agents of the administration and work with Congress for the American people, each job has political tension."[32]

OBSERVATIONS

"Performance matrix competitive" became bywords of the district as it closed out the twentieth century. It had been a local civil-works-only organization during its early history, but had evolved into a regional military construction agency at the end of the century. Seeking to remain competitive by reducing overhead costs for its customers, the district adopted computer-intensive technology and innovative programs to standardize repetitive designs and tasks. During the 1990s it adopted standard delivery contracts to speed such repetitive services as "Yank-A-Tank" to active, or closing, military bases in need of environmental cleanup, remediation, and restoration. Through participating in the "Kit-of-Parts" modular design system, the district impressed the Army and Air Force Reserve commands with its efficiency, bringing the district challenging new assignments. It became the leader of standardized designs and centralized management for the Reserve programs nationwide. Its commanders described it proudly as a "flagship district."

Its national assignment for military programs did not detract from the district's intense attention to local civil works projects, so important to Congress and the public. By the end of the century, its civil works program included managing construction of the largest lock and dam ever built by the Corps—the billion-dollar Olmsted project on the Lower Ohio River—and the McAlpine

Lock Replacement project, aiming to double lock capacity in the canal around the Falls of the Ohio. This work at McAlpine incidentally forced the district to demolish the historic navigation locks at the Falls, which in the nineteenth century had been a principal reason for creation of the Louisville District.



McAlpine Lock Replacement Project, Louisville, Kentucky

9
ENGINEERING AT THE MILLENNIUM

First, we need a strong military capability to win the war on terrorism and provide for homeland defense; second, we need a strong and vibrant economy.

Colonel Robert Slockbower

At the dawn of the twenty-first century, the nation enjoyed general peace and prosperity resembling the conditions it had seen a century earlier in 1900. Although tensions in Iraq and Kosovo troubled foreign relations in 1999, major domestic concerns had dwindled. For the first time in decades, the nation had full employment, and the Clinton administration and Republican-controlled Congress had balanced the budget to begin retiring the national debt. In this bucolic milieu, Americans had time to worry about Y2K, the Year 2000 fears that computer systems might crash at the millennium, because they had been programmed with only two-digits to identify the years. Dire forecasts of resulting disasters proved inaccurate, and on the eve of 2000, Americans seemed just as optimistic as their grandparents had been in 1900.[1]

The Louisville District—its information management office in particular—during late 1999 worried about Y2K's potential impacts upon its multi-tasked, computer intensive programs. Its new commander, Colonel Robert Slockbower, shared this concern, and was grateful on the first day of 2000 that Y2K's effects had proven negligible. Colonel Slockbower had the good fortune of commanding the district at the millennium with fresh staff. Lieutenant Colonel Gary Gumm served as his deputy commander, with Dr. Robert Mullins, Jr. as the new deputy for project management. Dale Holmes became the new chief counsel, and the chiefs of engineering and operations also were recent appointees.[2]

Before transferring to Louisville, Colonel Slockbower had served in Kuwait and in the Chicago District, and he was well acquainted with Brigadier General Robert Griffin who succeeded General Hans Van Winkle as the Lakes and Rivers Division commander. As the millennium began, these leaders had interesting challenges on their agenda. The Corps and Louisville District were applying bioengineering, to emphasize environmental features of its stream control projects. They adopted novel gate change-out methods to speed maintenance of Ohio River locks and dams, and minimized the dredging of navigation channels to reduce environmental damages. The Corps' aging infrastructure was becoming a concern, as the flood control dams and floodwalls built in the wake of the record 1937 flood marked their first fifty years of service. All of

these concerns moved temporarily to the back shelf, however, when the attacks of September 11, 2001, shocked the nation into a troubled new dimension.[3]

MILLENNIUM PROJECTS

At the eve of the twenty-first century, the Louisville District was embarking on promising civil works endeavors, often involving environmental or ecosystem restoration. One of the first events Colonel Slockbower attended, as Louisville's commander, was a partnership ceremony for the Handy Riparian Habitat Restoration, often referred to as the Handy Bank project. He met there with Senator Mitch McConnell, the Secretary of Agriculture, and leaders of The Nature Conservancy, who had arranged a new partnership for restoring river bottom land downstream of the district's Green River Dam and Lake. The Nature Conservancy, renowned for purchasing land to preserve its environment, had bought land along Green River that was severely eroding, in part as a result of releases from the Green River Dam. Its leaders had met with environmental analyst Michael Turner to urge the district to join them in a cost-shared project to restore the aquatic riparian habitat. The district was willing to enter the partnership, but law then did not specifically accept non-government organizations such as the Conservancy as federal cost-sharing sponsors.[4]

Senator Mitch McConnell, and his colleagues, amended legislation to permit cooperation, thus allowing the Corps to embark at Handy Bank on a partnership with the Nature Conservancy, and the Department of Agriculture, to restore the riparian environment along the Green River. This became the first ecosystem restoration in the nation accomplished through partnership with non-government sponsors. The Conservancy paid a quarter of total project costs, exceeding one million dollars, to restore the eroding riverbank through the application of rock weirs and bioengineering. The revegetation of the stream banks was accompanied by a Department of Agriculture sponsored program to plant the bottomland with hardwoods to help reduce erosion.[5]

Colonel Slockbower announced the unique Handy Bank project had become a national model. "It also includes such initiatives as re-regulation of dam releases to sustain and improve bio-diversity downstream of the Green River Lake," he noted, adding that: "General Griffin has directed that other divisions and districts should look at the model that the Louisville District has moved forward with in working with The Nature Conservancy at the Green River Dam for application at other dams across the nation." Eventually the Nature Conservancy and the Corps signed a nationwide agreement for cooperative ecosystem restoration.[6]

Another novel environmental restoration effort emanated from Congressman Harold "Hal" Rogers' office, through the volunteer Kentucky PRIDE (Personal

Responsibility In a Desirable Environment). PRIDE had organized in 1996 to alleviate water pollution problems affecting the health and quality of life in Eastern Kentucky, and also undermining the region's appeal for businesses and tourists. Congressman Rogers argued that cleaning and restoring the riverine environment would enhance Eastern Kentucky's economic prospects.[7]

The district became involved in PRIDE's programs, thanks to specific authorization granted in 1996. The law allowed it to offer design-construction assistance for water environmental infrastructure projects in Eastern Kentucky. A number of small-scale projects addressing wastewater and water supply were completed, or underway, in Eastern Kentucky by 2000, all cost-shared with local sponsors, and often including innovative solutions to regional water resource needs. These projects implemented Congressman Rogers' catchy watchwords: "Clean Up; Company's Coming."[8]

Another innovative approach to water resource needs involved substituting detention basins for the Corps' traditional methods of reducing flooding, notably at Beargrass Creek in Louisville. The eastern half of Louisville lies within the Beargrass Creek basin, a highly developed urban area with intense runoff from precipitation and resulting flash floods. Here, the district tested risk analysis software to review various flood damage reduction schemes—reservoirs, channel enlargements, floodwalls, and detention basins. The studies found maximum benefits might be obtained through construction of eight detention basins, together with 1900 feet of levees and 2000 feet of channel modifications. Unlike flood control reservoirs, detention basins usually are dry and empty, but they capture water when the stream rises, and slowly release it when flooding subsides. In essence, detention basins function much like the district's flood control reservoirs, but on a smaller scale and without storing water for recreation or other purposes.[9]

The district completed its Beargrass Creek planning, and Congress approved the project in 1999. Louisville's Metropolitan Sewer District entered a partnership as the local sponsor, and construction of the first two detention basins began in 2001. The contractor excavated earth from the basins, constructed earth berms, outlet structures, and concrete spillways, and placed compacted fill at the disposal sites where trees were planted. If funding proved timely, project manager Matthew Schueler expected all eight detention basins, plus a nine-acre wildlife mitigation area, would be in service by the end of the decade, reducing flooding that had frequently disrupted a large portion of Louisville's urban area. This unique Beargrass Creek project presaged the more environmentally sensitive character of the Corps' flood-reduction designs for the millennium.[10]

MILLENNIUM OPERATIONS

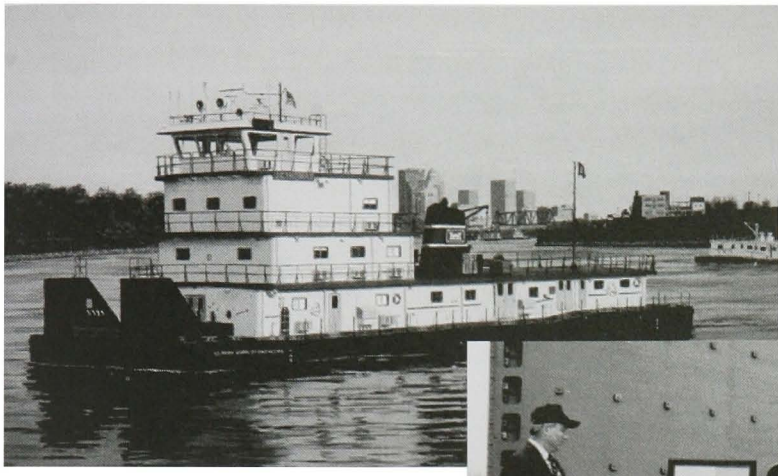
When Robert Fuller assumed Operations Division's leadership in 1998, he found it a well managed organization with a heavy backlog of maintenance at its projects, notably the twenty multipurpose dams and lakes. With experienced managers Gene Allsmiller in charge of locks and dams, and Robert Willis managing technical support, Fuller devoted attention to the district's dams, lakes, and recreational projects. He soon learned that his lake managers could constrain their budgets cheerfully, when they also received funding to upgrade facilities at the lakes.[11]

At the multipurpose dams and lakes, Fuller and his staff replaced forty-year-old components, such as bypass valves, hydraulic lines, emergency generators, and jib cranes in the control towers. They rehabilitated project visitor centers and installed upgraded displays. Thanks to funding through congressional adds, they modernized and expanded recreation areas at several lakes, adding handicapped accessible fishing piers and comfort stations. "This was a great three years, 1999 to 2002," Fuller recalled, "when we were able to do a lot of work."[12]

By 2000, over twenty million visitors per year enjoyed recreation at the district's twenty dams and lakes, generating local economic benefits estimated at a half billion dollars annually. After initial software glitches were solved, a new National Recreation Reservation Service became available, offering visitors toll-free numbers and internet sites for their convenience. More than a million visitors also toured the district's locks and dams each year to fish, picnic, or watch the passing towboats. The recreational features of its projects offered the Corps its principal opportunities for advancing its public relations.[13]

Commercial towing on the Kentucky River ceased in 2002, and the district finally closed the last of its fourteen locks on the Kentucky, leaving only ten operating dams and locks in the district, eight on the Ohio and two on the Green River. Although the district had begun studies of disposing of the long-closed locks and dams on the Upper Green River, navigation manager Peter Frick reported that towing on the lower Green actually increased during the new century's first years, moving coal upriver from Metropolis, Illinois, to a steam plant on the Green River. According to Frick, Green River Locks 1 and 2 had designs similar to the modern Ohio River locks, but on a smaller scale, and generally they were in good condition.[14]

Frick, Fuller, and the operations team leaders were proudest of the district's new floating plant. In 2000, operations received its powerful new towboat, *J. C. Thomas*, named for a retired Corps boat captain, to move its repair barge fleet



(left) MV JC Thomas

(Right) Dedicating the Henry M. Sheve Louisville Repair Station

and cranes along the rivers. And in 2001, it obtained the heavy-lift crane-barge *Henry M. Shreve*. The latter vessel became the key to the gate change-out system developed by the district and Corps for the Ohio River locks.[15]

When the Ohio River Modernization project began in the 1950s—replacing fifty-one navigation locks on the Ohio with higher lift locks—the huge miter gates at the new locks could not be lifted out of the chambers for repairs, because the district did not have a sufficiently powerful crane for the purpose. Maintenance crews from Louisville Repair Station and other maintenance stations jacked the heavy miter gates up inside the locks to repair them, and to refurbish the anchorages on which the gates swung open and closed. These difficult repairs inside lock chambers required days, sometimes weeks, to complete, stalling towboat traffic until the repairs were completed. To reduce these costly traffic delays, the Corps during the 1990s proposed a gate change-out system that would permit lifting gates needing repairs out of the lock chambers and installing spare gates. This required modifying lockgate design to permit lifting them, and building a storage yard to keep stand-by lockgates on hand and to repair damaged gates. The gate change-out system required a crane barge capable of hoisting the huge gates out of a lock chamber, then swinging replacement gates into place.[16]

The district received approval in late 1995 to contract for construction of a powerful gatelifter crane, and the contract went to Vanguard Services of New

Johnsonville, Tennessee. The new 100-foot wide and 300-foot long barge, with a 550-ton crane, arrived at Louisville Repair Station in 2001, and, at the suggestion of Robert Willis and the district historian, was named *Henry M. Shreve*, honoring the Corps supervisor at Louisville in the 1840s, who had invented the snagboats for removing river obstructions. Tested at the Repair Station in 2002, the *Henry Shreve* became an asset of the Lakes and Rivers Division for use along the entire river, and its first service was in Pittsburgh District on the upper Ohio, where it lifted lockgates from the Montgomery Locks and Dam for repairs. Peter Frick pointed out that the advent of the *Shreve*, sturdy enough to hoist and move all Ohio River lockgates, returned the district to the gate-repair system it had used at the old low-lift locks completed in 1929. The district then had owned crane barges capable of lifting eighty-ton lockgates from the locks, and, in 2001, its new crane barge could lift 250-ton lockgates from the modern locks.[17]

The district's dredging of channels to maintain the Ohio River's standard nine-foot depth also evolved at the millennium. William Chapman and Robert Van Hoff in the operations division managed efforts to reduce the amount of dredging done along the Ohio, together with its fiscal and environmental costs. In the early 1990s, the district annually contracted for dredging more than a million cubic yards from the navigation channel, mostly below Lock and Dam 53 where high water in the Mississippi River slowed flow from the Ohio and fostered sediment deposits. Using hydrographic surveys to monitor accumulating sediment in the channels, the district in the early twenty-first century reduced its annual dredging volume to a half million cubic yards or less. This enhanced its campaign to avoid disturbing habitats of endangered mussels (shellfish) and the Least Tern, an endangered bird that nests on sandbars. Indeed, materials dredged from channels were deposited in shallows to create new sandbars attractive for bird nesting.[18]

Colonel Slockbower considered these and related operational advances critical to the national economy. He pointed out that any disruptions of coal shipments along the Ohio River would affect the entire basin. Indeed, if fuel shortages interrupted power production at the coal-fired generating plants along the Ohio, the impacts might be felt nationwide through the power grid network.[19]

AGING INFRASTRUCTURE

Many levee-floodwall projects built at mid-century to protect local areas from flooding on the 1937 scale were reaching the end of their life expectancy, after fifty years of service. The earthfill levees and concrete floodwalls generally survived the years well, but the metal culverts and moving components,

especially the pumps that removed interior drainage, had become worn and obsolete. In some cases, parts for the electric pumps were no longer available. The communities sponsoring these old projects had legally agreed to maintain them after construction, but the estimated costs of replacing worn metal and movable components were exceedingly high. Community leaders contended these repairs involved full project rehabilitation, and exceeded their formal maintenance obligations, if not their fiscal resources. Rehabilitation, they argued, should become in part a federal responsibility.[20]

Agreeing with local sponsors, Congressman Lee Hamilton of Indiana in 1997 became instrumental in obtaining funding for the Corps to begin planning the rehabilitation of Indiana floodwall and levee projects, and entering into cooperative agreements with affected communities. This legislation applied specifically to six local flood reduction projects the district built soon after the record 1937 flood, at Lawrenceburg, New Albany, Evansville, Tell City, Cannelton and Jeffersonville-Clarksville, Indiana. In 1999, the deputy commander, Lieutenant Colonel Gary Gumm, joined local officials and members of Congress at meetings, where they signed local cooperation agreements for the projects rehabilitation.[21]

Congressman Hamilton, and his successor Baron Hill, continued their strong support for rehabilitating Indiana's floodwall projects, and they sponsored additional funding for work. In the meantime, a debate ensued in Washington on the propriety of federal participation in rehabilitating Indiana's projects. Early guidance indicated the district could not proceed, but in the summer of 2004, Louisville received authority to initiate floodwall repairs in Indiana. Whether similar authorization for rehabilitating older flood reduction works in other states would eventually be forthcoming remained an issue for congressional attention.[22]

The aging infrastructure also became apparent at a few of the district's flood control, multipurpose dams constructed years earlier. The District had built Patoka Dam during the 1970s on Patoka River in southern Indiana, and its earth and rockfill dam had held back several floods and reduced damages. After a record-level flood in the spring of 1996, however, Patoka Dam operators found sinkholes developing in the open-cut spillway adjacent to the dam, and the holes were conducting water to a downstream spring. The district quickly installed a temporary levee to isolate the sinkholes, and filled them with concrete, while remediation study proceeded. The study proposed installing a grouted-concrete cutoff wall between the spillway and the dam, and the district awarded a contract for this 1200-foot-long grouted seepage cutoff in 2000. It became the first Corps project ever to use a computer-aided grouting evaluation system (CAGES) to monitor and record the pressure-tested grouting as it progressed. Although the

remediation work encountered challenging limestone solution cavities beneath the spillway, the computerized grouting system helped complete the project on schedule in 2001.[23]

Another infrastructure deficiency developed at Mississinewa Dam, constructed by the district during the 1960s on a Wabash tributary in northeastern Indiana. The dam at its right end (abutment) had sagged, probably because the 8,100-foot-long and 140-foot-high earthfill dam had been built atop glacial outwash on a solutioned limestone foundation. Mississinewa Dam settled over time, forming low spots in its crest, and in the 1990s exploratory borings revealed a fissure, or solution cavity, beneath the area where it had sagged. The district therefore drew down the lake's summer pool level by twenty feet, as a safety precaution, and began repairs. It awarded a contract to a specialist for installing a half-mile-long concrete cutoff wall in a trench extending down through the dam to solid foundation rock. The contractor elected to use unique hydromilling machines to cut open the deep trench, for placing the concrete wall, rather than drilling and installing caissons as had been done at other large dams needing reinforcement.[24]

Challenges greeted project manager George Flickner throughout the Mississinewa Dam remediation efforts. When completing the first 100-foot-long test section, the slurry filling the trench suddenly disappeared, meaning it had slipped into subterranean passages. The contractor then grouted the test section, pumping down a cement mixture to block the passages, thus allowing the placement of concrete panels in the test section. The contractor then pretreated the rock, through grouting, along the entire length of the cutoff wall to avoid further losses of slurry. Once grouting the dam's foundation had been completed, the contractor resumed cutting the trench with hydromills and placing the cutoff wall panels. In the summer of 2004, however, a hydromill broke loose at the bottom of the trench,187 feet below the surface. While efforts to retrieve the mill proceeded, the contractor procured another mill to continue work. These delays troubled nearby communities, because

Mississnewa Dam repair

the precautionary twenty-foot drawdown hampered public recreation at the lake, and reduced the economic benefits of tourism for businesses. Nevertheless, the district's overriding concern was public safety, and the pool could not be raised until repairs were completed. At the end of 2004, it appeared the remediation work would be sufficiently advanced to restore the lake to its normal levels during 2005.[25]

Colonel Slockbower's principal concern, however, lay not with rehabilitation of aging projects, but with the stalled Mill Creek local flood reduction project at Cincinnati. After the Assistant Secretary of the Army for Civil Works suspended the project's construction in 1991, the district studied and restudied means of reactivating the project. During this extended suspension, Section 3—the project section built in 1982—eroded, degrading its flood-carrying capacity. To stabilize stream banks in this section, and deter further erosion, the district adopted environmentally-friendly techniques similar to those used for the Handy Bank restoration along Kentucky's Green River. These minimized the use of rock stabilization, supplanting it with "bioengineering," to curtail erosion by planting native grasses, shrubs, and trees. The novel remedial work, when funded, would prepare Section 3 for eventual operation and maintenance by the sponsoring Mill Creek Valley Conservancy District.[26]

What to do with the uncompleted project sections of Mill Creek remained, Colonel Slockbower observed, a "difficult technical and policy challenge." During the 1990s, the District prepared at least six scopes of work and coordinated them with local sponsors, interest groups, political officials, Corps headquarters, and various Assistant Secretaries for Civil Works. The proposals ranged from terminating the project in its existing state, about 50% completed, to total reevaluation of both the completed and uncompleted sections. In this interim, Ohio Congressmen Rob Portman and Steve Chabot, along with local officials, organized a "Mill Creek Yacht Club," embarking on canoe voyages down the stream to keep the public focused on its challenges; and they also sponsored legislation on the creek's behalf.[27]

A general reevaluation of the Mill Creek project began in 1998, then halted while policy issues were considered. When it resumed in 2000, the Cincinnati metropolitan sewer district proposed a novel solution to the dilemma. To avoid damages done to Mill Creek's riparian environment by channel enlargement and floodwall construction, to avoid digging into potentially hazardous waste landfills alongside the stream, and to eliminate the discharge of combined sewer overflows into the creek, the sewer district proposed drilling an eighteen-mile-long, thirty-foot-diameter tunnel, some 200 or more feet beneath the stream. Floods and sewer overflows would enter the tunnel, which would serve also as

an underground storage area. The stored waste then would be pumped from the tunnel into a water reclamation plant before discharging into the Ohio River, not into Mill Creek. Improved tunneling technology made this concept feasible, and indeed similar tunnels had been drilled, notably a Tunnel and Reservoir Project in the Chicago Engineer District.[28]

Colonel Slockbower recommended that the general reevaluation report on Mill Creek fully consider the proposed subsurface tunnel. If this tunnel design became the preferred plan, however, a new project authorization might be needed from Congress. Cincinnatians, the district, and other interested observers, eagerly awaited publication of the general reevaluation report in 2005.[29]

TWENTY-FIRST CENTURY SHOCK

Major changes came quickly with the advent of the twenty-first century. In the election of 2000, the nation selected a new president and George W. Bush took office in January 2001. The Bush administration plans for tax cuts and extensive policy revisions had scarcely gotten underway, however, when four aircraft used as weapons of terror shattered the domestic tranquillity.

Colonel Slockbower had proposed and approved the installation of television monitors at district headquarters, in early 2001, for conveying daily information on district programs to its personnel. On a peaceful Tuesday morning in September, these proved their value. Like the majority of Americans, the district's staff was stunned by news reports of aircraft slamming into the World Trade Center towers in New York, and subsequently into the Pentagon and a farm field in Pennsylvania. Aghast, district leaders met to consider evacuating the federal building, as possibly a tertiary target, but they rejected the thought of thus contributing to the terrorists' objectives. They continued work through the day and week, as the district's emergency operations managers mobilized for disaster recovery and war. Michael Beaird, the emergency manager, went to New York as a team leader for debris clean up at the World Trade Center. Robert Hess, Henry Melendez-Marrero, Wes Barber, and Jeffrey Burnett deployed to the New York Disaster Response team. A team of district experts on debris removal also went to the Pentagon to serve at that clean up effort. Meanwhile, the staff formed an internal security investigative team to examine all District projects and recommend suitable security enhancements.[30]

As the nation prepared for war in Afghanistan, the district received requests to accelerate several military contracts. The off-post railroad connector at Fort Campbell had been slated for completion at the end of 2001, and the fort's commander asked that this project be rushed to make the railroad quickly

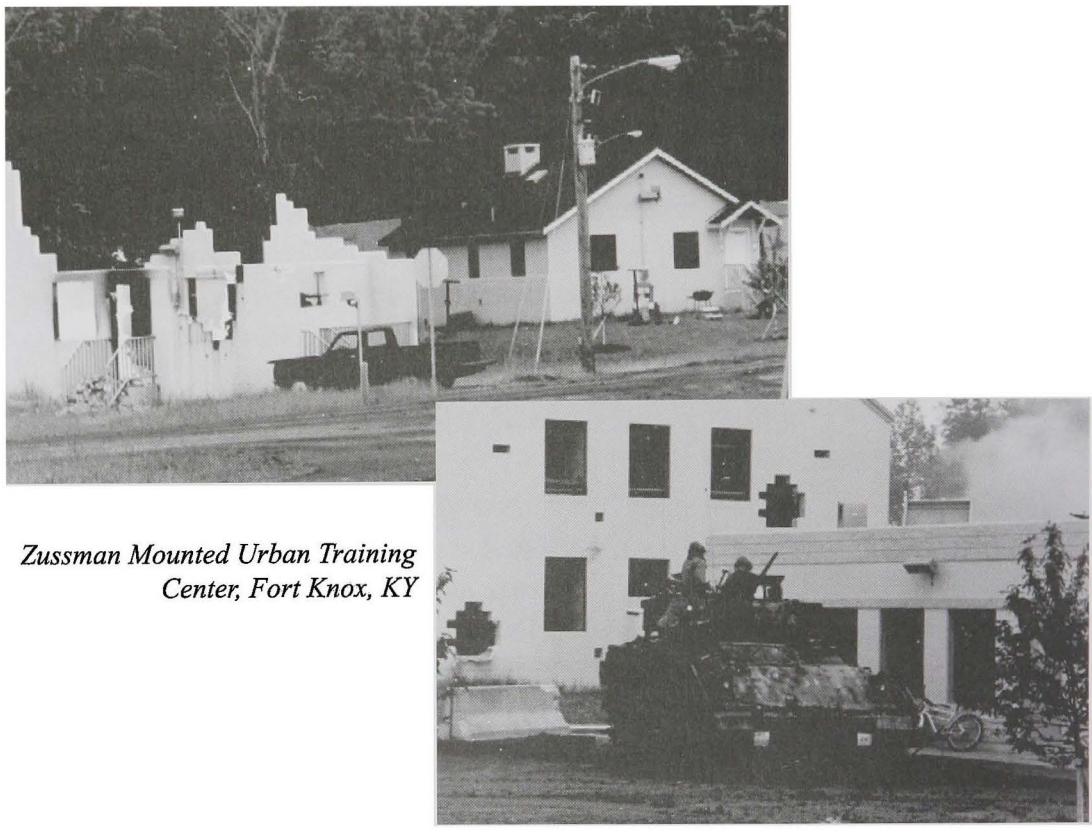
available for troop deployment. The district directed the contractor to finish the mainline track in thirty days, by October 28. Before this connector was completed, deploying Fort Campbell's armor and equipment required breaking 200-car trains at the fort into 5-car units, and shuttling them through switches in Hopkinsville to get them onto the mainline, then move them north another fifteen miles, for assembly into a full train before their departure. Completing the new railroad connector would permit assembling 200-car trains at the fort, to be pulled directly onto the mainline and thence to seaports.[31]

Dedication of Railroad Connector, Fort Campbell, Kentucky

The district and its contractors drove a golden spike marking the completion of the railroad connector on October 28, 2001, as Fort Campbell's commander had requested. Slockbower reported the rail connector was closed in the midst of the 9/11 crisis, and was not scheduled to return to service until the following December. By accelerating the contractor's work, the district got the rail line operational within three weeks, a "tremendous accomplishment" in Slockbower's opinion.[32]

Deployment came immediately as the United States launched attacks on Afghanistan's Taliban government, harboring Osama bin Laden and his terrorist allies. Slockbower took pride in the district's contributions toward training the troops that were dispatched to Afghanistan. Some troops had trained at the two urban-warfare complexes built by the district at Fort Knox and Fort Campbell. At Fort Knox, for example, the district had completed the Zussman Mounted Urban Combat Training center to provide armored units with fighting experience in urban settings. This unique complex included commercial, industrial, and residential buildings for maneuvers, and had multimedia technology to simulate explosions and realistic combat conditions. Its design received awards, and provided superb combat training for the troops. "We have soldiers right now who

are fighting in Afghanistan," Slockbower remarked, "who learned their skills at the Fort Knox training complex."[33]



Zussman Mounted Urban Training Center, Fort Knox, KY

There was a direct linkage of the district's military construction mission to the Global War on Terrorism (GWOT). As the armed forces in Afghanistan toppled the Taliban regime by December of 2001, and subsequently continued their hunt for bin Laden, the district joined with national efforts for improving homeland security defenses against terrorism. President Bush, in November 2001, made Governor Thomas Ridge of Pennsylvania his Director of Homeland Security, and Congress created the cabinet-level Department of Homeland Security. This new department included the U. S. Coast Guard, the district's partner on inland river navigation security issues, formerly administered within the Department of Transportation.

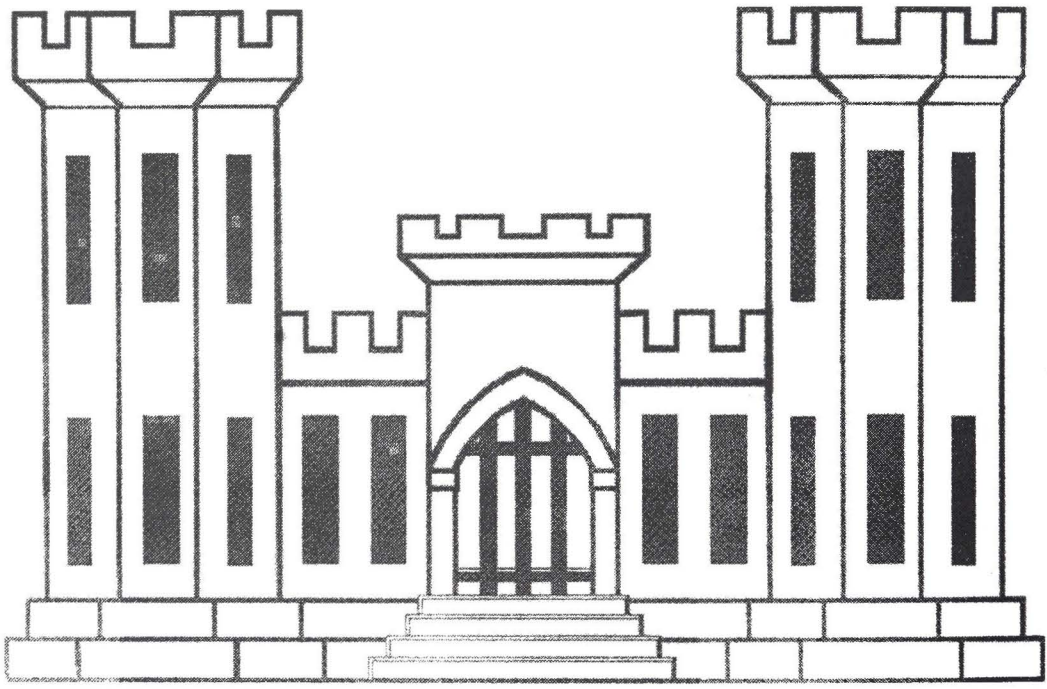
Responding to requirements in the wake of the 9/11 attacks, the district and the entire Corps took measures to insure the security, safety, and integrity of its locks and dams and lake projects. Project personnel monitored traffic in operational areas, and investigated suspicious activities. They placed concrete barriers at service bridges to block vehicular access, and installed motion detectors along with security lighting and fencing. They restricted pedestrian and vehicular access to critical areas, and placed buoys to prohibit boat traffic in the

vicinity of dams. The district assembled an Infrastructure Security Assessment team, from its operations, engineering, and security offices, to survey all projects and recommend additional security measures as appropriate. Although not since WWII had such severe security measures been in effect at Corps projects, the public appeared to accept these restrictions gracefully.[34]

By the time Colonel Slockbower departed Louisville, transferring to Fort Campbell for service, and later retiring and entering the senior executive service with the Southwestern Division, the district's new security measures were in effect. As Slockbower saw the priorities of 2002, the Bush administration had two major goals: a strong military capability to win the war on terrorism and provide homeland defense, and a strong and vibrant economy. In his view, the Corps and District contributed toward those goals through both the military and civil works construction missions, and through its quality-oriented outlook. "The way we actually provide high quality services is through integrated cross-functional teams that includes all the technical and support organizations of the district," he observed: "Therefore, if we're trying to achieve the improvements in quality as measured by schedule, cost, and the intrinsic quality of the product or service provided, these improvements must be achieved through a holistic assessment of our entire project delivery process."[35]

OBSERVATIONS

The district in 2001 was performing a broad, even nationwide, military mission in support of the Army and Air Force during peacetime. It was dealing with aging structures in need of rehabilitation, with navigation facilities needing modernization, and with environmentally-friendly flood reduction programs. Its budget fluctuated with changing national priorities, its staff declined in some divisions while rising in others, and its leadership changed every few years. This pattern changed after September 2001. "As imprinted on all of our minds the horrendous tragedy of the World Trade Center and Pentagon," remarked Colonel Slockbower, "it was the Corps of Engineers and members of the Louisville District who stepped up to the plate to help meet the nation's needs." As the shock of September 2001 amply demonstrated, events outside the purview of the district can affect and change its history, its missions, its personnel.[36]



10
A FLAGSHIP DISTRICT?

District commander, Colonel Robert A. Rowlette, Jr. owned several distinctions. A Kentuckian from Berea and graduate of the University of Kentucky, he was the first "native" commander in the District's history. When a captain in 1982, he also had served at Louisville District on a developmental assignment: just one other officer, Colonel Jack Person, had served the district as a young soldier before later rising to become its commander (1948-50). In addition to his broad command and staff experience, Colonel Rowlette had commanded Charleston Engineer District in South Carolina before his assignment to Louisville. Rowlette thus had highly pertinent experience for commanding at Louisville, where some officers considered it a "flagship" district.[1]

Senior Executive Council 2003

Front Row: Bruce Murray, David Dale, Colonel Robert Rowlette, Robert Fuller, George Jageman; Second Row: Diane Ormerod, Jane Myers, Mike Barter, Colonel Richard Fagan, Denise Klinglesmith, Dianne Hibbs; Back Row: Jerry Batson, Matthew Burg, Ralph Walz, Marvin Ormerod, Mark Yates, Jon Fleshman

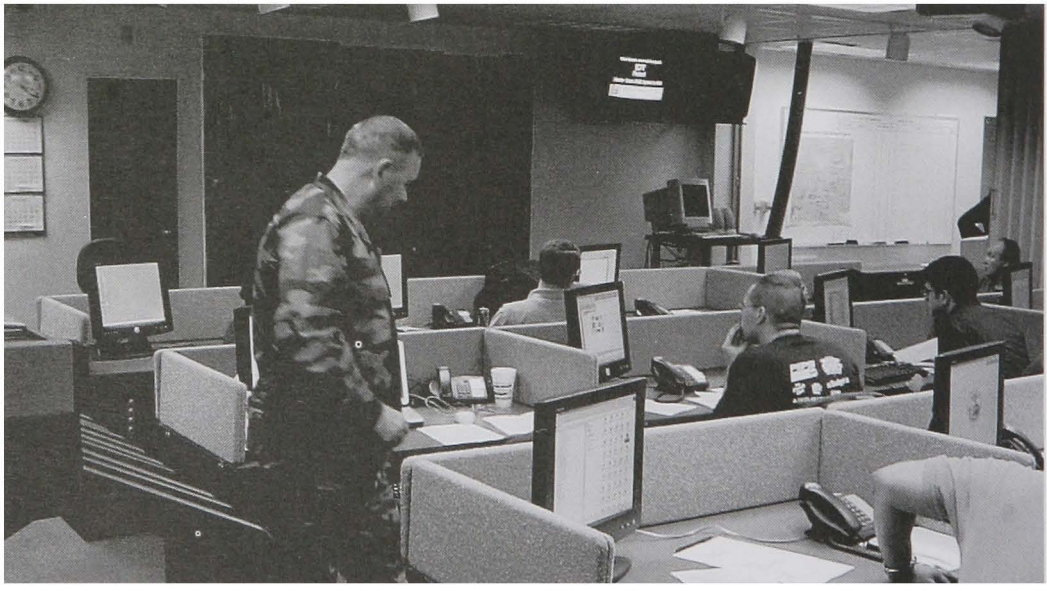
At Louisville, Colonel Rowlette found that, after a decade of frequent leadership changes, the district staff and work force had stabilized. His deputy commander, Lieutenant Colonel Richard J. Fagan, graduate of Kentucky's Murray State University, served at Louisville longer than many other deputies; and very few of the district's civilian executives retired or left during Rowlette's

command. Indeed, the major leadership transition came when Dr. Robert Mullins, Jr. departed in late 2002. Robert Fuller succeeded Mullins as acting project management deputy for several months until David Dale became the new deputy. A University of Kentucky graduate also, Dale was a veteran of the district's construction division, and had managed the materials command complex and other construction at Wright-Patterson Air Force Base. Colonel Rowlette thus enjoyed remarkable stability among the district's leadership and work force until it was disrupted by the onset of war in Iraq.[2]

IRAQ WAR AND LOUISVILE DISTRICT

"We have never been a nation to start wars; we've been a nation to finish wars," said Lieutenant General Robert Flowers, Chief of Engineers, in his comments on the Iraq War of 2003: "But we are facing an adversary today that wants to do away with our way of life, our freedoms, and is very content to kill as many of us as they possibly can and they do so without compunction. When you're facing an enemy like that, prudent preemption is often necessary, but it's very uncomfortable for us." To squelch potential enemies, the United States invaded Iraq in March 2003, and swiftly occupied this dictatorship by May 1.[3]

From Louisville in 2003, officers and personnel serving in national guard and army reserve units deployed to Iraq, where their skills proved especially useful in rebuilding that nation's infrastructure. The urgent



Forward Engineering Support Team

reconstruction mission in Iraq was initially conducted by task forces created to restore Iraq's electrical power and its oil production: Brigadier Generals Stephen Hawkins of the Lakes and Rivers Division commanded task force Restore Iraqi Electricity, and Robert Crear of Southwestern Division headed

Restore Iraqi Oil. Needing expertise in project, contract, and construction management, the Chief of Engineers called for Corps civilian personnel to volunteer for overseas service with Forward Engineer Support Teams (FEST) in support of Operation Iraqi Freedom. His call elicited a gratifying response from Louisville and districts around the Corps.

Steven Rager and the district's emergency managers prepared and equipped the volunteers leaving for Iraq, just as they had earlier equipped volunteers dispatched in response to natural disasters—arranging their travel orders and providing them with portable communication devices. The volunteers for service in Iraq then proceeded to Winchester, Virginia, for a week of intensive orientation on Iraqi culture, Arabic language, first aid, and the combat environment awaiting them in the Persian Gulf. The volunteer teams included mechanical, civil, and electrical engineers, cost estimators, contract managers, and personnel from other disciplines, who donned Army battle dress and went to Iraq. Most volunteers from Louisville participated in the inspection of electrical power lines and generating stations to plan the repair and reconstruction of these vital facilities.[4]

These volunteers were equipped with a unique "reach back," or tele-engineering capability, meaning they had computers and electronic transmission devices they could use to transmit data and photographs back to the district, or to teleconference with engineers anywhere in the stateside Corps, tapping the expertise of 35,000 personnel. The volunteers initially found about 600 destroyed electricity transmission towers and 600 miles of transmission lines down on the ground in war-torn Iraq. All needed rebuilding to transmit electrical power from generating stations out to distribution nodules. Iraq desperately needed its electrical power system restored, in order to return a semblance of stability to its liberated society.[5]

As the volunteer task forces completed their initial inspections and planning, the district, in November 2003, received a mission for awarding contracts necessary to restore Iraq's power plants, substations, and transmission lines to service. Quickly the District assembled and dispatched a contracting team to Washington to meet with Army and coalition government officials handling the contract acquisition. The team soon issued requests for proposals and awarded contracts, scheduling the reconstruction to begin by February 2004. Firms receiving the contracts shipped critical generator parts, transmission towers, and related equipment to Iraq, where contractors began installing them to turn on the lights, air conditioning, and electrical appliances of Iraq.[6]

After surviving close proximity to combat in Iraq, most of the district's original round of volunteers returned at Christmas 2003, and Colonel Rowlette

welcomed them home with an awards ceremony in January 2004. Applauding their services in Iraq as "volunteerism at its finest," Rowlette presented two dozen volunteers from the district with medals and commendations they had earned overseas. The Colonel also announced the Corps would waive day-use and camping fees for personnel on leave from duty in Iraq for the duration of operations there. "The district extends a warm welcome to any of our service personnel who would like to visit our lakes," he said: "We know the value of these sites as places of beauty and serenity."[7]

As the urgent construction began in Iraq, the Chief of Engineers formed a provisional Gulf Engineer Division at Baghdad to conduct military construction and also support the Iraqi government's reconstruction efforts. This temporary Corps division included northern, central, and southern districts, with its Southern District at Basra staffed largely by civilians from the Lakes and Rivers Division, including Louisville's volunteers. These volunteers grappled with large-scale engineering challenges in a harsh working environment, sometimes under hostile fire.[8]

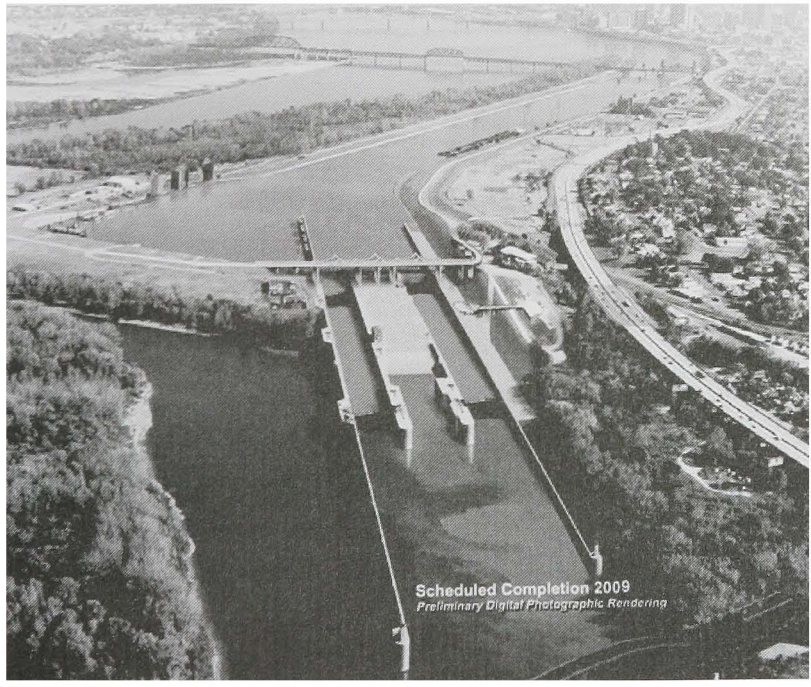
The Gulf Division, activated in January 2004, consolidated management of about $13 million worth of construction in support of Iraqi government and coalition forces. By the summer of 2004, it had restored most of Iraq's power grid, delivering more electric power to the people than had been available before the war. The division also restored Iraqi crude oil production to 2.4 million barrels daily, compared to a 1.8 million-barrel daily average before the war, although sabotage subsequently hampered production. Corps personnel in Iraq typically served as planners, supervisors, and managers of work accomplished largely by Iraqi contractors for training purposes. The Chief of Engineers also activated an Afghanistan Area Office, subsequently an Engineer District, with a staff of sixty-five officers and civilians managing a $350 million construction program. This district built more than two-million square feet of facilities for the Afghanistan army, while supporting United States armed forces and assisting with restoration of community utility services, schools, and hospitals.[9]

By autumn of 2004, the Corps had mobilized more than 1,700 officers and civilian volunteers in the Iraqi and Afghanistan recovery efforts under austere and sometimes dangerous conditions. Mobilization of Louisville District and Corps civilian personnel for action in combat theaters was a novel approach to the Army's reconstruction mission; and it brought the Corps increased respect among other Army elements and within the Defense Department. The Corps' forward deployment of skilled civilian volunteers, with "reach back" capabilities, demonstrated to the Army the practical relevance of civil works project management to the Army's core mission, fighting wars.[10]

NAVIGATION IN THE NEW MILLENNIUM

Although the Iraq War filled headlines in 2003 and 2004, the district continued its efforts to prepare Ohio River navigation for service in the new millennium. In December 2003, Colonel Rowlette welcomed President Bush's acting Assistant Secretary of the Army for Civil Works, John Paul Woodley, Jr. to Louisville and presented him with a tour of the Olmsted and McAlpine Locks and Dams projects, where funding gaps slowed construction progress. At McAlpine, where the district was building a new 1200-foot lock, the contractors and their district partners, George Flickner, David Klinstiver, and Charles Haddaway III, had sped the construction to the point that they were outdistancing the available funding.[11]

In 2002, the first-phase contractor at McAlpine essentially finished driving steel-cell cofferdams around the two older locks, demolishing the old 360- and 600-foot locks, and installing concrete buttresses to support a leaning wall of the existing 1200-foot lock. That year, the engineering division completed its plans for the new 1200-foot lock, together with its approach walls and a new bridge spanning the locks to reach Shippingport Island. The new locks had at least two novel design features. First, culverts to fill and empty the new 1200-foot chamber would be located beneath the lock floor, rather than inside concrete walls alongside the chamber, as had been done at locks built earlier. Second, placing culverts under the lock floor made it possible to build much of the new lockwalls of roller compacted concrete. Roller compacted concrete (RCC) used

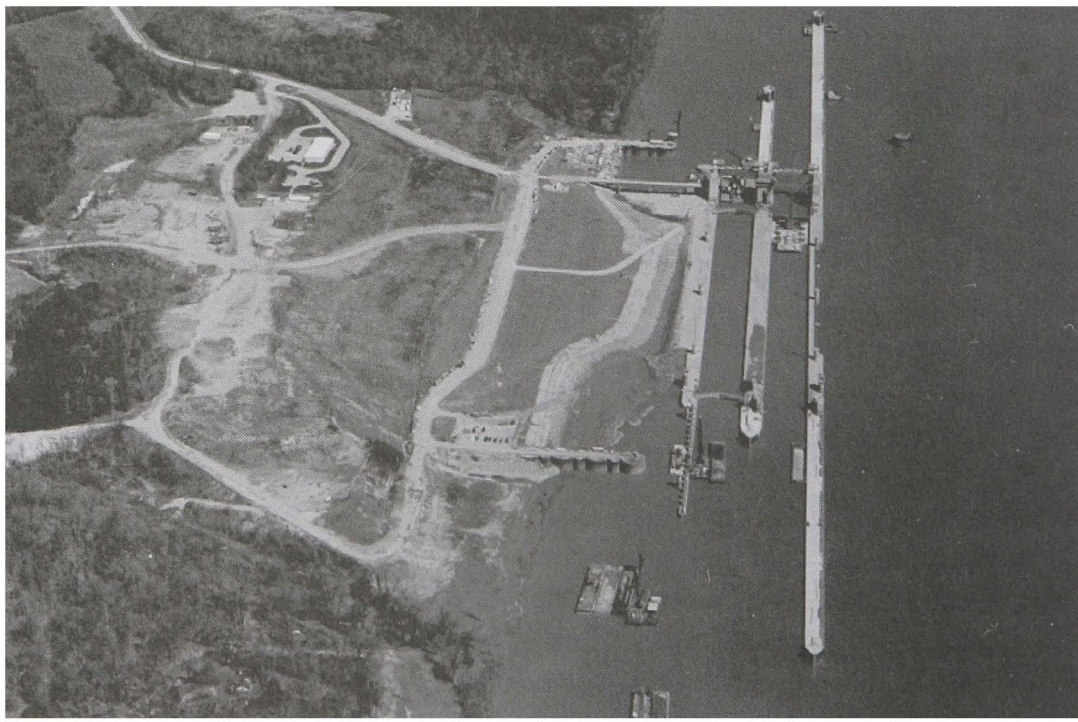


McAlpine Lock Replacement Project

a zero-slump concrete mixture spread with pavers and compacted with vibratory rollers. Compared to conventional methods of placing concrete with buckets into pre-fabricated forms, RCC might produce substantial cost savings, although the savings would be offset at McAlpine by the costs of extensive testing—McAlpine will have the first lockwalls ever built with RCC technology.[12]

The district awarded the contract for building the new 1200-foot McAlpine lock, with its access bridge, in September 2002 to TGM Constructors, a joint venture. For $221.4 million, the contractor agreed to finish the lock construction by 2008. Slowed only by the discovery and investigation of an archaeological site on Shippingport Island, the contractor worked swiftly during 2003, excavating the lock site, and preparing to place the first concrete in the lockwalls and bridge piers. Indeed, so swiftly went the work that the district became aware it lacked sufficient funds to pay for the progress. Colonel Rowlette met with the contracting partners to warn that it might become necessary to suspend work in the spring of 2004, pending the identification of additional funding. He appealed to the Chief of Engineers and the Assistant Secretary of the Army to increase funding for the project in 2005. Fortunately, funds sufficient to keep the contracting partners at work were identified and the contractor's gratifying progress continued.[13]

Thanks to the initiative of David Beatty, Louisville District retiree, and the Louisville chapter of the American Society of Civil Engineers (ASCE), the McAlpine project in December 2003 joined other national landmarks recognized



Olmsted Project, locks completed

by the ASCE as structures of major historical significance. The memorial plaque placed at the site pointed out the canal's historic role in fostering the settlement and growth of the United States, designating McAlpine a National Historic Engineering Landmark.

Construction also progressed four hundred miles downstream of McAlpine, at Olmsted Locks and Dam, built to replace locks and dams 52 and 53. Adverse weather and contracting challenges, however, deterred aggressive efforts by project manager Lawrence Bibelhauser, and resident engineer Richard Schipp, toward achieving record progress at Olmsted. Placing concrete in the twin 1200-foot locks moved ahead, and by 2002 the locks were essentially completed, allowing cofferdam removal. All work at Olmsted thereafter was to be accomplished "in the wet," meaning without cofferdams. This novel construction method had not been used in the district since the nineteenth century, when it had floated small wooden dams into position on the Green and Kentucky rivers.[14]

A contract for building the approach walls, to guide barge tows in and out of Olmsted locks, went in 1999 to Massman Construction, which built a "graving yard" at Paducah, thirty-five miles upstream of Olmsted. There, the contractor assembled eleven concrete pontoons to become sections of the floating approach walls. The contractor used a new impact-pulse echo test to determine the extent of ice damage to the concrete pontoons during winter, while also installing concrete pylons at the locks to anchor the floating walls. Also placed were 145-foot-long steel casings, serving as nose piers and protecting the floating walls from collisions by tows. Alternating high water and low water temporarily delayed movement of the floating walls during the summer of 2004, but towboats finally wrestled the eleven concrete pontoons downriver from Paducah to Olmsted. They steered them into place, forming approach walls that would rise and fall with river levels to guide barge tows into the locks.[15]

As the work proceeded, Sverdrup/Gerwick, an architect-engineer under contract with the district, completed the design and specifications for constructing Olmsted dam by building heavy concrete dam sections, then floating them into place to sink atop prepared underwater foundations. This plan conceived the largest "in the wet" construction effort ever attempted by the Corps. Driving more than 4,000 steel piles and installing the dam's concrete sill to support five tainter gate piers and 140 wickets was to be done without a cofferdam. First, the dam's foundation would be dredged, and the foundation piling would be driven. When the foundation was ready, pre-cast concrete shells manufactured on the river bank would be lifted by floating cranes into place, lowered onto the piling, then filled with concrete to form a sill supporting the tainter and wicket gates.

This innovative plan represented a leap forward for the district, since it would be necessary to accomplish all work below the river surface, entirely blind due to the river's turbid character.[16]

The district expected to award a contract for constructing Olmsted dam early in 2003, but received lukewarm responses from the construction industry—no bids. "This dam contract has been the biggie," admitted project manager Bibelhauser: "Everything else is going along just fine." To reduce the contract risks, the District reissued the construction package as a cost-reimbursable-plus-award-fee contract; and in January 2004 the contract went for $564 million to a joint venture of the Washington Group and Alberici Constructors. Managers expected the dam's construction to be completed in about 10 years, perhaps by 2014, if funding proved sufficient.[17]

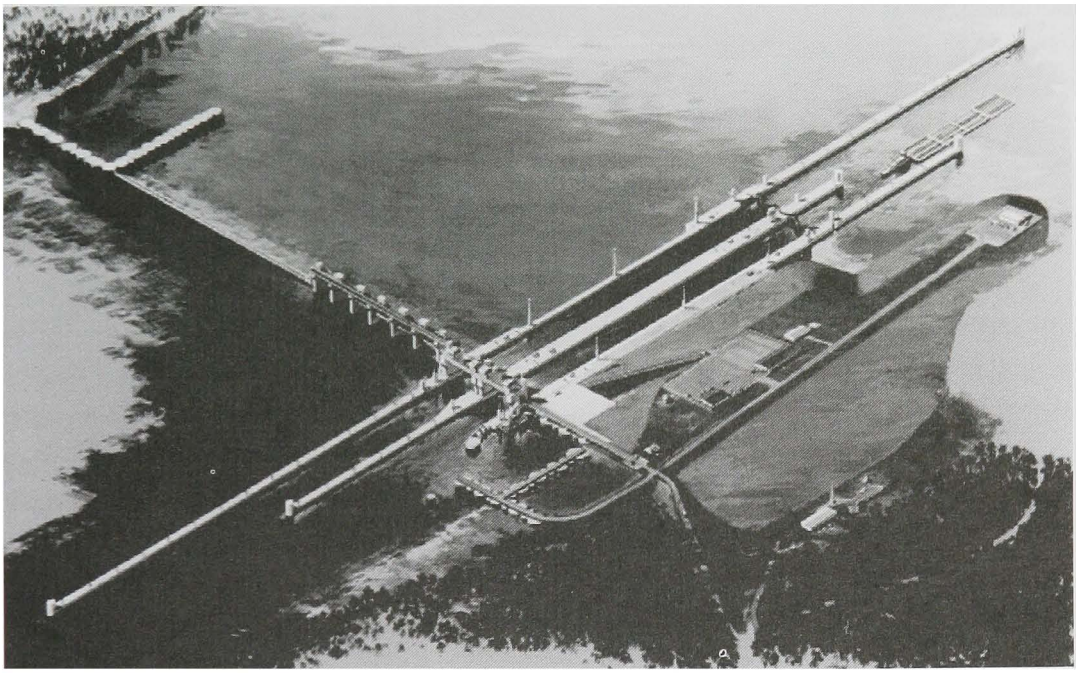
The contractor for Olmsted dam confronted major challenges. Without impeding the river flow, the contractor would drive piling into the riverbottom, and place cages made of steel on the bottom around the piling. On the river bank nearby, the contractor would fabricate concrete shells, measuring about 100 by 125 feet, standing 30 feet tall, and weighing up to 3,700 tons each. "We will build big concrete shells on the shore, like a precast yard, then let them down a ramp like you'd launch a barge," predicted project manager Bibelhauser: "We'll pick them up with catamaran barges and carry these empty, shoebox-like shells out into the river to the place where the piles are, then put this shell over the piles and fill the shell with tremie concrete." Actual placement of dam sections in the river could take place only between June and December of each year, when riverflow was optimal for floating construction.[18]

After all features of Olmsted were completed, perhaps another decade, or longer, old Locks and Dams 52 and 53, serving commerce since 1929, will be removed. This required the district to keep the deteriorating old locks in service until 2014, or perhaps later. This might be difficult. In 2002, a section of Lock 53's guidewall moved out of position, threatening collapse until barge loads of rock dropped along the wall stabilized it. The waterways industry lobbied vigorously to obtain funding sufficient to finish the Olmsted project on its revised schedule. In the meantime, the district initiated planning for preserving historic buildings at Locks 52 and 53, by finding alternative uses for the sites.[19]

Completing Olmsted Locks and Dam will allow the ninety million tons of commodities traveling this busy river stretch each year to pass through from the Ohio into the Mississippi, Tennessee, or Cumberland rivers in just one hour, instead of the five hours typical in 2004. This could reduce transportation costs by $600 million annually. "An efficient modern navigation system benefits the regional vitality of economics," Colonel Rowlette pointed out: "Upgrading

navigation through the Olmsted Project translates into lower costs of goods and services such as electric power for the consumer."[20]

Project manager Lawrence Bibelhauser and his team were eager to start Olmsted dam's formidable challenges: placing steel cages around pilings driven into the riverbottom so concrete shells can be set over the cages and filled, within a capricious river during brief annual construction seasons. He admitted securing adequate funding to pay the contractor on schedule was vital. Although the contract for the dam was awarded in January 2004, little construction could be accomplished that first year because of constrained funding. Rob Vining, program manager for the Chief of Engineers, echoed Bibelhauser's concern, pointing out that downtime at the older locks



Rendering, Olmsted Lock and Dam

was increasing. "Right now," he said, "the funding profile for Olmsted Lock and Dam has that project still seven to eight years out from completion, and there's a real question of whether we can maintain Locks 52 and 53 for that long."[21]

OHIO RIVER MAIN STEM STUDY

Traffic congestion along the Ohio brought forth one of the district's most productive planning studies in years. The Ohio River Main Stem Study began in 1991 at Louisville, when the planning division observed traffic jams developing at John T. Myers (Uniontown) Locks, where growing traffic volume and frequent lock closures had become costly to the towing industry, and ultimately

to consumers. This pioneer study indicated that installing tow-haulage systems or stationing helper boats at the locks offered short-term expedients, and, in the long run, a structural change to increase lock capacity would become necessary as towboat commerce multiplied.[22]

Recognizing that commercial barging delays were occurring at several locks along the Ohio, the Corps in 1992 broadened preliminary assessments to include the entire river, mandating a systems approach to maximizing benefits in the face of funding constraints. This reassessment aimed to identify an efficient, low-cost plan to manage the barge traffic on the river, predicted to double by 2050. This system-wide study involved planners from all concerned districts, which assembled a multi-discipline team. Initially, Steve Vierling of Louisville was technical study leader, John Gribar of Pittsburgh was engineering leader, Dave Weekly of Huntington was economics leader, and Terry Siemsen of Louisville was environmental leader. This team contracted with the Department of Energy's Oak Ridge National Laboratory to develop a navigation investment model, with INCA Engineers reviewing low-cost marine construction technology, and fish and wildlife agencies reviewing environmental impacts.[23]

In early years, the Ohio River mainstem study team aimed to complete its report by 2000, but in 1998 project manager Veronica Rife and the team elected to submit interim reports, one on structural improvements at the highly congested John T. Myers and Greenup (Huntington District) locks, and another on restoring the Ohio River's ecosystem. When released in 2000, both these interim reports had a gratifying reception in Congress, which authorized their recommendations. Congress approved lengthening the 600-foot-long auxiliary locks at Myers and Greenup, thereby gaining a twin 1200-foot lock configuration at each, and adding the faster miter-gate changeout system. Aiming to alleviate traffic delays of the sort that occurred when the Myers' main 1200-foot chamber was closed by accidents or for repairs, the district by 2005 was preparing plans to start lengthening the 600-foot-long auxiliary lock to match the 1200-foot main lock.[24]

Congress, in 2000, also authorized the proposed Ohio River ecosystem restoration program. This would enable the Corps and non-federal sponsors to cost-share efforts to restore and protect aquatic embayments, wetlands, islands, bottomland forests and other ecosystem features. To be accomplished by using various ecosystem restoration methods, formulated within the context of a strategic plan, the Corps would form partnerships with state and federal natural resource agencies, universities, and environmental organizations to monitor, evaluate and manage Ohio River ecosystems. Congress had not funded this plan by 2005, however, nor did the plan ease criticisms from environmentalists.[25]

Veronica Rife, and team leaders Jeff Benedict, Al Remaly, Wes Walker, Mark Hammond, David Schaaf, Tom Swor, Buddy Langdon, and their colleagues, frequently participated in public meetings, where they heard vigorous objections from environmentalists. At a 2001 meeting, for example, when one critic described the Corps as a "rape and pillage agency," responsive only to the towboat industry, Rife responded that the Corps had focused on the environment for a quarter century: "We've evolved as the rest of the nation has evolved." To critics complaining that extending the auxiliary 600-foot lock was a costly and unnecessary redundancy, a representative of Kentucky Congresswoman Anne Northup replied: "If you took the barges off the river, to move those goods would equal putting 13,000 trucks per day on roads 365 days a year: certainly it's important to United Parcel Service in terms of fuel, Louisville Gas & Electric in terms of moving coal, and to Ford Motor Company to get their materials and products to come to Louisville and leave Louisville quickly and efficiently."[26]

By 2005, the Ohio River Main Stem Study had entered final phases. This included preparing an innovative cumulative impact assessment on navigation project environmental effects, along with a system investment plan to determine the river's navigation future. These would become part of the final main stem report of 2005, disclosing the Corps strategy for the Ohio during the ensuing half century. As outlined previously in this history, the Corps, since 1824, has embarked on and completed four successive fifty-year plans for Ohio River navigation, and, if recommendations of the Ohio River Main Stem Study are adopted, it will become the fifth of the Corps historic plans.[27]

UNPLANNED EVENTS

Although the district has planned developments fifty or more years into the future, each commander has typically encountered disruptive challenges, outside the planned environment. Colonel Rowlette's tenure proved to be no exception. Among these incidents were two at the Falls of the Ohio: the collapse of Emery Crossing Lane, and cracks found in McAlpine's lockgates in 2004.

Emery Crossing Lane stretched along the Ohio River Greenway, a developing recreation corridor linking Jeffersonville, Clarksville, and New Albany on the north side of the Falls of the Ohio. In early 2004, a section of this road eroded and collapsed into the river. Some observers thought the erosion a natural phenomenon, while others thought it a result of the district's operation of McAlpine dam. Senators and Congressmen of Indiana insisted the cause was immaterial: the district should make emergency repairs to prevent further erosion, pending a permanent remedy costing an estimated $15 million. The congressmen's argument proved persuasive, and the district prepared to

begin the repairs, when the erosion revealed a prehistoric archaeological site. After delay while archaeological investigation proceeded, the district used its operating funds to began the bank stabilization in August 2004, expecting that Congress would eventually appropriate funding to reimburse costs and make permanent repairs to restore the roadway, thereby assuring the Ohio River Greenway's success.[28]

As the local Emery Crossing Lane crisis unfolded, another with national ramifications began at McAlpine Locks. Divers, during a routine underwater inspection, found cracks in critical members of McAlpine's miter lockgates, and this threatened disaster because the gates might collapse, if not quickly repaired. A full inspection and maintenance of the gates, done in 1999, had not revealed the cracks, which apparently resulted from metal fatigue, or from constant flexing stresses of forty years service. At McAlpine, only the single 1200-foot lock was in service in 2004; because the auxiliary 600-foot lock had been demolished, and construction of its 1200-foot replacement was just beginning. Closing the existing 1200-foot lock meant no towboats and barges would pass Louisville and the Falls until emergency repairs were completed.[29]

Colonel Rowlette, Robert Fuller, and the operations division, had no alternative, because closing McAlpine lock for repairs was imperative. For the first time, they had to plan a deliberate closure of Ohio River commerce past Louisville. Ice, drought, and flooding in the past had occasionally blocked river navigation for a few days, but never before had the river been blocked deliberately by Corps decision. This meant that any commodities passing the Falls during the closure would move either by truck or rail, or not at all. Announcing in May 2004, the Ohio River would be closed at the Falls for about two weeks, Colonel Rowlette advised the public: "We realize the closure will affect industry and recreational boaters, but we are working to minimize those effects. The repairs will be done safely and methodically, and the lock will be open when its structural integrity is sound."[30]

The District negotiated closure dates with the towing industry, and eventually settled on the two weeks starting August 9, 2004. About 56 million tons of commodities, mostly coal, grain, and petroleum products, passed McAlpine Locks each year, typically in fifteen-barge tows. To transport the materials carried in each barge tow would require 225 rail cars or 870 semi-trucks, enough to clog an interstate highway for miles. It became important for the towing industry, in advance of closure, to transit all possible barges and commodities through McAlpine Locks, so their customers would have sufficient supplies on hand to meet needs for two or more weeks. Otherwise, it might become necessary for manufacturers and industries relying on barge transport to curtail production, or shut down entirely.[31]

While towboats raced barges through McAlpine in advance of closure, the district laid elaborate plans to rush the repairs. This required removing water from the lock chamber to allow entry by workers to weld new steel plates onto the gates and seal the cracks. Obtaining reinforcements from other Districts, Louisville marshaled the forces required to speed the work efficiently, and closed McAlpine lock as scheduled on August 9. By working around the clock every day, the district completed these emergency repairs on August 19, three days ahead of schedule, and tows resumed regular passages through the lock. Careful planning and hard work produced dividends in this emergency.[32]

REORGANIZATION CHALLENGES

Like most of his predecessors since 1984, Colonel Rowlette confronted a changing management organization. Two major reorganization challenges in progress during his command were called A-76 and USACE 2012, short notations reflecting significant organizational initiatives.

A-76 referred to Office of Management and Budget Circular Number A-76, first issued in 1966 and regularly revised thereafter. This circular promulgated the principle that government should not compete with its citizens and should rely to the extent possible on commercial sources for its products and services. In early history, the Corps and districts had purchased construction equipment and employed work forces to build its own projects, but in accord with principles mandated by Congress, later outlined in A-76, the Corps generally ceased using hired labor for construction and relied largely on contracts with private construction companies. The extent to which this principle might also be applied to the Corps' internal management and operations remained under discussion over the years, and in 2004 the Chief of Engineers initiated an outsourcing competition to test whether federal employees, or the private sector, could build a "better, more cost effective organization."[33]

In May 2004, the Corps initiated a nationwide competition to test whether work accomplished by its 1300 information technology and management employees could best be performed by its own personnel, or by a contracting work force. Cooperating with the Department of Defense, the Corps issued a single nationwide solicitation for contracting out its total information management and technology services—essentially its computer intensive functions. This national competition would permit Corps-wide analysis of the economics of scale. Promising the competition would be "fair, transparent, and impartial," the Chief expected this test to indicate whether the Corps should continue using its own employees, or contract for its information activities. In

August 2004, the Corps entered a second step, announcing another outsourcing competition for fifty-five positions at its Engineer Research and Development Center Laboratories at Vicksburg, Mississippi and Hanover, New Hampshire. The competitive results would become evident in 2006, perhaps indicating how far the Corps would move toward contracting out its internal activities.[34]

Lieutenant General Robert Flowers, Chief of Engineers, in 2003 initiated the USACE 2012 studies, or reorganization planning for managing the Corps by 2012. Unlike earlier reorganization plans, USACE 2012 did not contemplate closing any field offices, districts or divisions. It aimed to reduce by six percent, or 230 positions, the Corps' managerial workforce at headquarters and in its eight divisions. The Chief's office would shift to regionally focused management, and the divisions would evolve into Regional Business Centers, while Communities of Practice would encourage peer review within specific disciplines (architects, civil engineers, biologists).[35]

General Flowers expected much of the USACE 2012 reorganization to be accomplished through "virtual engineering," meaning through the use of computer-electronic communications to remotely connect teams of experts to solve problems. This would provide the Corps civil works organization with the "reach-back" capability used during the Iraq War, forming project delivery teams through computer aided drafting and design file sharing and data management. Under this concept, the Lakes and Rivers Division, with its seven districts, would be unified electronically into a single region. Instead of eight resource management offices, possibly the region might have just one.[36]

The full evolution of USACE 2012 would not become apparent until 2012, but General Flowers' successor, Carl Strock, expressed his support for the plan. When Lieutenant General Strock became the fifty-first Chief of Engineers, General Flowers, reflecting on his career and his plans for the Corps, predicted: "I suspect that fifty years from now, people will look back and say the Corps of the early twenty-first century made the right choices and the right changes. And they will be inspired by the legacy you created."[37]

HISTORICAL PLANNING

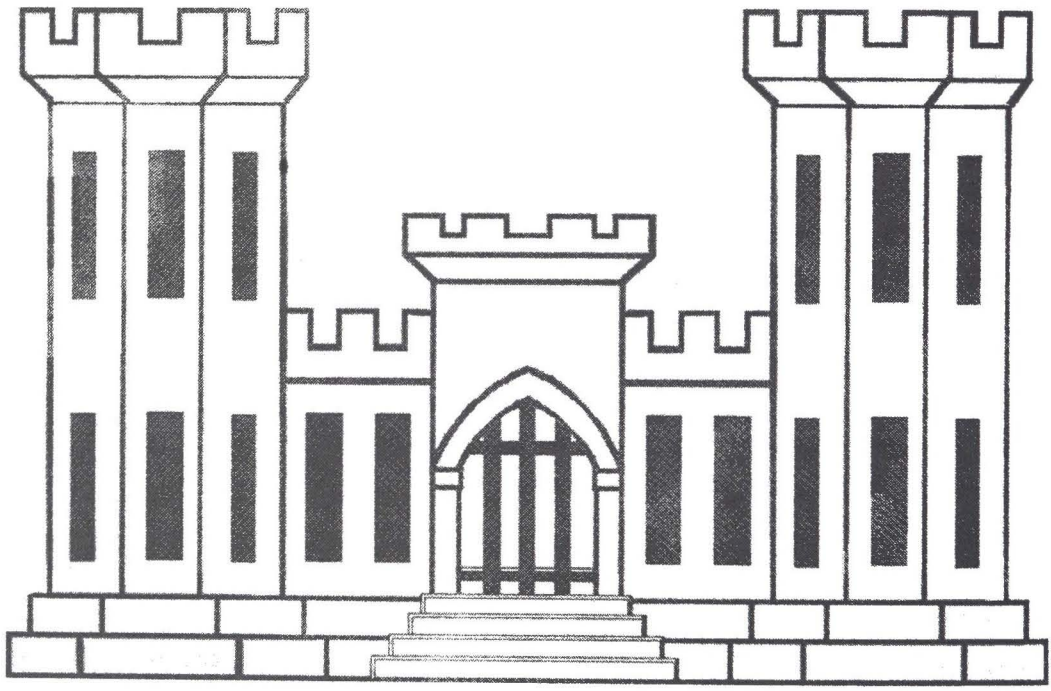
Like General Flowers, Colonel Rowlette took intense interest in his legacy at Louisville. Personally, he contributed to the district a copy of a Don Stiver painting, "The Quiet Professional," picturing the "Old Guard" Third Infantry with their caisson and horses. This painting became a rotating award within the district, presented to an outstanding operations field office every six months. It went first in 2004 to the operations team managing J. Edward Roush Lake (formerly, Huntington lake) in northern Indiana.[38]

Rowlette's service as commander also afforded him opportunities to support several historical legacies. In April 2004, he attended the *Preserve America* initiative conducted by First Lady Laura Bush, together with the Advisory Council on Historic Preservation. Then, Mrs. Bush selected thirty-one Kentucky towns and cities as *Preserve America* communities, honoring their participation in efforts to preserve the national historical and natural heritage.[39]

In September 2004, Rowlette presented checks to Mayor Jerry Abramson of Louisville, for preservation of the U. S. Marine Hospital and development of the Wharf Park in the Portland neighborhood. As mitigation for McAlpine lock's construction impacts on the historic neighborhood bordering the lock, the District agreed to contribute $1,650,000 million. This funding would be used to restore a historic hospital building near the locks, and contribute toward developing a city park at Portland wharf. Portland wharf once had been the head of navigation on the Ohio River, where ascending boats landed to portage cargoes around the Falls. Louisville intended to use the district's contribution to convert the wharf area into a historic park. The U. S. Marine Hospital in Portland had been constructed during the 1840s and 1850s by Colonel Stephen H. Long of the Corps to provide medical services for indigent boatmen. The hospital had closed after a century of service, and had become a storage building. The city of Louisville in 2005 planned to restore and preserve the building for adaptive reuse near McAlpine Locks, expecting this historic preservation effort to help revitalize the Portland neighborhood.[40]

Marine Hospital, Louisville, Kentucky

Colonel Rowlette also initiated and supported production of a history of engineering at the Falls of the Ohio River, and this study of recent district history. "I would like to see the Corps do more to highlight its history, and the history of the areas where its projects are located," he explained. He observed that, although the district installed informational signs at its projects, few citizens knew much of the project history. Making historical publications widely available might contribute to citizen awareness.



EPILOGUE

The wise gather from the past what is to come.
Leland Johnson

When Ronald Reagan became president in 1981, national defense budgets were declining, and it had been more than a decade since Congress had enacted a major civil works construction authorization. Louisville then was a civil-works-only district, completing its last big flood control dam. Its workforce was declining, and it seemed destined to become chiefly an operations district, with few engineering and construction tasks remaining on its agenda. Yet, during the following two decades, the District experienced a renaissance.

This revival began when President Ronald Reagan bolstered national defense during the early 1980s. As the national military design and construction mission increased, the Chief of Engineers, in 1982, reassigned this mission to Louisville. Although the district had declined to 900 personnel in 1981, and its commander expected to lose more in 1982, the military mission's return forced an increase to 1200 personnel by 1983. From a local civil works district, Louisville expanded, during the early 1980s, to perform design and construction in a five-state region for the Army and Air Force. As one military design-construction assignment followed another, the district's military budget surpassed its civil works budget, and it remained its largest engineering-construction workload through following decades.

By 1986, the steep ascent of the military mission slowed, and it again appeared the district's workload would decline. That year, however, Congress ended the impasse over marine fuel taxes and local cost sharing that had stalemated the civil works program. Where local sponsors accepted increased cost sharing, the district found renewed design-construction assignments for flood reduction projects. With cost sharing provided by the towing industry, the district planned expansion of lock capacity at the McAlpine Lock Replacement project, and building the Olmsted Locks and Dam to replace Locks 52 and 53 on the Lower Ohio River. These projects restored the district's active civil works program.

Critics of the 1980s, complained the Corps' functional management had become obsolete, that its projects were too costly and took as long as twenty years to complete. The Corps responded with efforts to develop simultaneous planning review procedures, and to test "design-build" contracts. Rather than making project plans alone, then sending them to authorities for review, the district included review agencies in the early planning process, thus involving

environmental and fish and wildlife agencies in creating the plans. Rather than awarding separate contracts for design and then for construction, the Corps experimented with single contracts including both the design and construction phases. In addition, the Corps revamped its organization.

In 1988, the Corps organized a life-cycle project management system. Each project thereafter would have a single manager, from "cradle to grave," responsible for controlling time and cost growth. At the district, these managers became part of a Planning, Projects, and Programs Division, including all project phases except operations. Starting with a staff of seven, this division grew by 2005 to include more than one hundred personnel focused on controlling budgets and schedules.

With the end of the Cold War, and retrenchment in defense spending of the Bush and Clinton administrations, the district's military construction workload leveled out during the early 1990s. In addition, the Base Realignment and Closure Commission and Defense Department closed several military bases the district had long served. This meant a reduced military mission in the long term, but the district learned the closures actually increased its workload in the short term. The district assisted with base closure and environmental restoration, and it also built new facilities at bases receiving troops and missions from the closing bases. Its military construction workload remained robust.

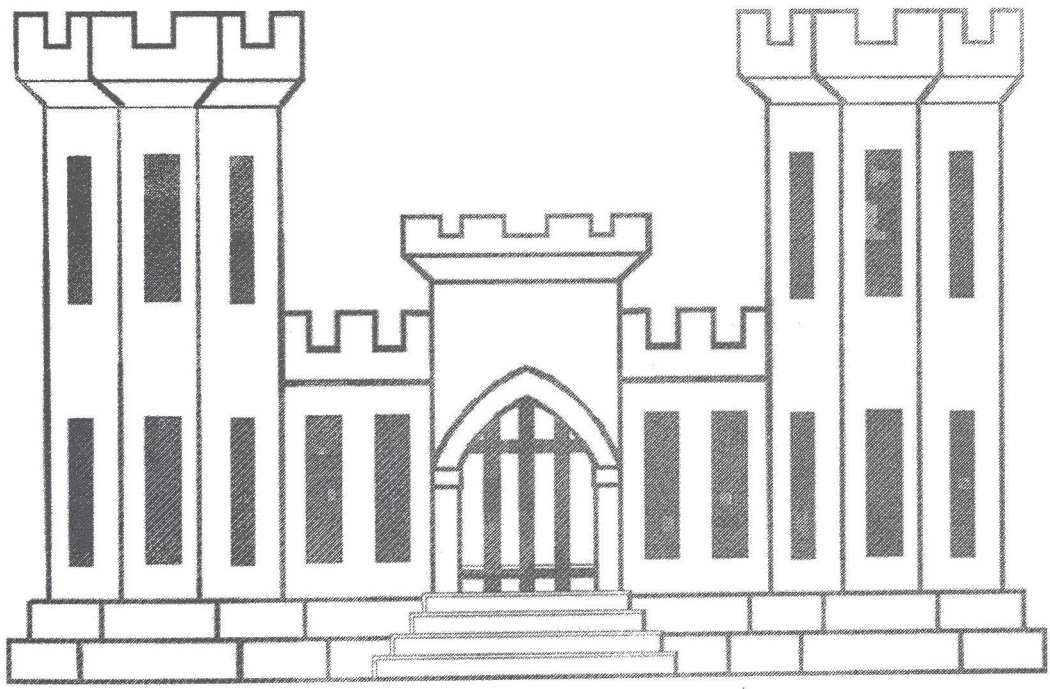
Throughout the 1990s, the district sought greater efficiency and productivity. Reorganization to reduce overhead, cutting the number of Corps division offices from thirteen to eight, in 1993 merged the Ohio River Division with the Great Lakes Division, and thereafter the District reported to the Lakes and Rivers Division. A Total Quality initiative focused the district on the needs of its customers and clients, and a Partnership program sought to consolidate the district's project goals with those of its customers and contractors. Through these programs, the district developed its strategic vision for the twenty-first century.

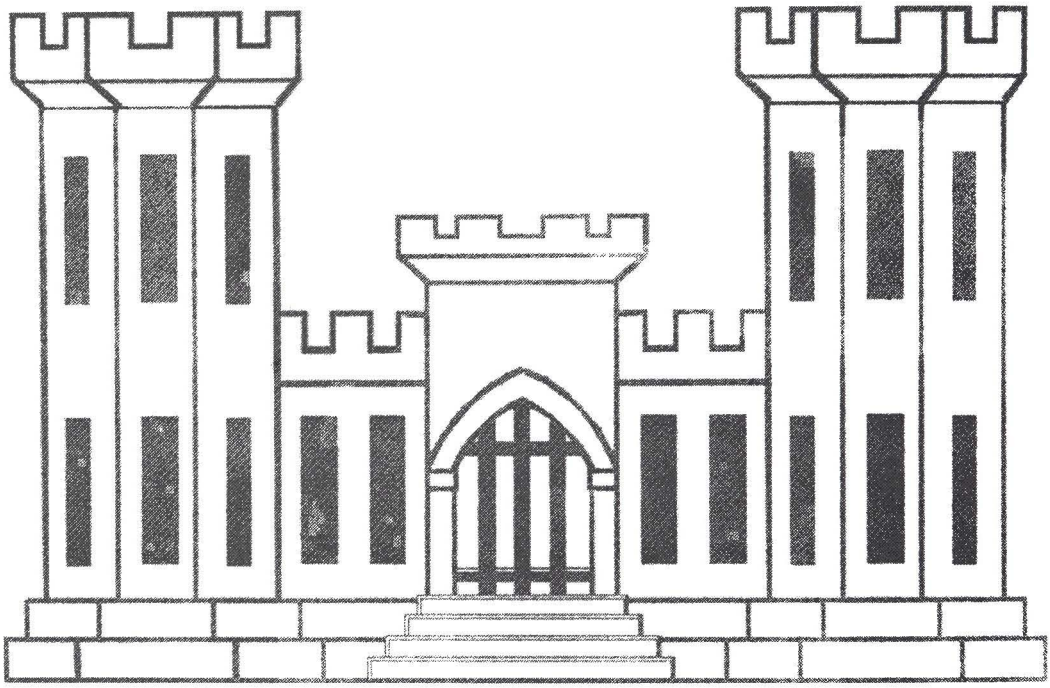
To remain competitive, the district sought to standardize repetitive designs and tasks. It experimented with standard delivery contracts and "Kit of Parts" modular designs, and these cost-cutting efforts took the District into new markets. Serving needs of the Army and Air Force Reserve, for standard designs and centralized program management, brought the District mission assignments that were national in scope.

In the new millennium, the district built local flood reduction, environmental restoration, and navigation projects, conducted a regional military construction effort, and engaged in national design and management programs. Its service to

the Army expanded during the Afghanistan and Iraq wars, beginning in 2003, when its staff volunteered for overseas service, rebuilding infrastructure in the combat theaters.

By 2005, the district perceived itself as an environmental steward of water resources, as a defender of national security, and as a "smart" engineering and management institution. This vision should bring it future missions, perhaps in response to stresses on environmental resources. From 1900 to 2000, the Ohio River basin's population tripled, rising to 33 million citizens. Barring unforeseen events, the basin's population may triple again by 2100, increasing to nearly 100 million people. Such a population density inevitably will stress available water resources, requiring rigorous management of naturally limited resources by the Corps and allied agencies. Never immutable, the district's history will remain dynamic for the foreseeable future.



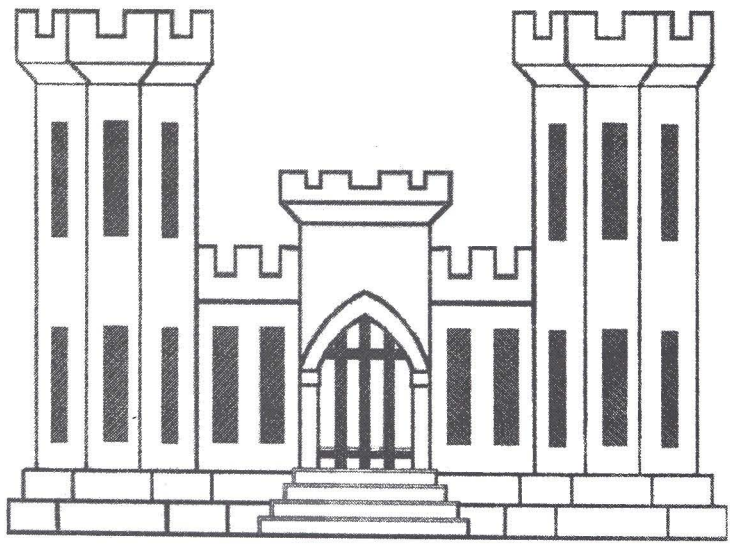


APPENDIX A

Chronology of Command
Louisville District, U. S. Army Corps of Engineers

MG Godfrey Weitzel	1867-1882
COL William E. Merrill	1882-1886
MAJ Amos Stickney	1886-1890
CPT Edward Maguire	1890-1891
COL Garrett G. Lydecker	1891-1893
LT Hiram Chittenden	1893-1893
MAJ Thomas H. Handbury	1893-1894
CPT James G. Warren	1894-1898
CPT George A. Zinn	1898-1900
CPT William L. Sibert	1900-1901
MAJ E. H. Ruffner	1901-1902
MAJ George McC. Derby	1902-1903
CPT Harry Burgess	1903-1908
MAJ Lytle Brown	1908-1912
LTC Henry Jervey	1912-1912
MAJ John C. Oakes	1912-1916
MAJ George R. Spalding	1916-1917
COL William P. Stokey	1917-1918
MR William H. McAlpine	1918-1919
COL George M. Hoffman	1919-1920
LTC G. R. Lukesh	1920-1925
LTC George R. Spalding	1925-1929
LTC Roger G. Powell	1929-1930
LTC William A. Johnson	1930-1933
LTC Gilbert Van B. Wilkes	1933-1936
LTC D. O. Elliott	1936-1937
LTC D. A. Davidson	1937-1939
MAJ Lester F. Rhodes	1939-1940
LTC Henry H. Hutchings, Jr.	1940-1942
COL Henry H. Hannis	1942-1943
LTC Jesse H. Veal	1943-1944
COL Gilbert Van B. Wilkes	1944-1946
COL B. B. Talley	1946-1948
COL John L. Person	1948-1950
LTC Clarence Bidgood	1950-1953
COL William D. Milne	1953-1956
COL Edward D. Comm	1956-1958

COL C. C. Noble	1958-1960
COL James L. Lewis	1960-1963
COL Willard Roper	1963-1966
COL Robert R. Wessels	1966-1969
COL John T. Rhett, Jr.	1969-1972
COL Charles J. Fiala	1972-1975
COL James N. Ellis	1975-1977
COL Thomas P. Nack	1977-1980
COL Charles E. Eastburn	1980-1983
COL Dwayne G. Lee	1983-1986
COL Robert L. Oliver	1986-1989
LTC John F. Langowski, Jr.	1989-1989
COL David E. Peixotto	1989-1992
COL Herbert F. Harback	1992-1994
COL Ralph Grieco	1994-1996
COL Harry L. Spear	1996-1999
COL Robert E. Slockbower	1999-2002
COL Robert A. Rowlette, Jr.	2002-2005
COL Raymond G. Midkiff	2005- 2008



APPENDIX B

Fast Facts

Louisville District Facts and Figures

Geographic Area

Field Offices: 60
Civil: 76,000 sq. miles in states of Ill., Ind., Ky., Ohio and Tenn.
Military: 306,000 sq. miles in states of Ill., Ind., Ky., Mich. and Ohio.

District Budget and Workforce
FY2007
1,005 civilians, 3 military officers
Civil Workload: $258 million
Military Workload: $692 million

FY2008 Projections
1,005 civilians, 3 military officers
Civil Workload: $306.7 million
Military Workload: $1billion

Achievements
ISO 9001:2000 re-certification continues for the Quality Management System in Planning, Design and Construction Management for Civil, Military and Environmental Projects. (Recertification for 2006-2008)

Contract Awards FY2007

A/E dollars	$44.4 million
Construction dollars	$929.8 million
Other Service dollars	$36.3 million
Supply dollars	$4.9 million
Total dollars	**$1 billion**

Lakes
20 flood reduction reservoirs
- 8 in Kentucky
- 8 in Indiana
- 4 in Ohio

Community Service
- District employees pledged more than $91,000 to the Combined Federal Campaign in 2007
- District employees mentored 7th grade students in the Middle School Connection and assisted students through the Every 1 Reads program
- District employees served as State or Chapter Chairmen, Committee Chairmen and competition graders/proctors for MathCounts, a nationwide competition for 6-8 graders
- Donated 21 laptops to the Clark County, IN and Richmond, VA Sheriff's Departments. Donated 120 personal computers to local school systems.

Navigation
Locations:
Ohio River: 8 locks and dams
Green River: 2 locks and dams

How much does a barge carry?
A fifteen-barge tow carries the equivalent of 870 semi-trucks or a train with 225 jumbo hopper cars.

How much tonnage is carried on the Ohio River?
Tonnage in 2006 was approximately 249,000 short tons.

What Louisville District locks locked the most tonnage in 2005?
Locks and Dam 52 locked 96.7 million tons; Locks and Dam 53 locked 87 million tons; and Smithland Locks and Dam locked 85.8 million tons.

Goods carried on the Ohio and percentage of volume:
Coal: 53%
Crude/non-fuel oil: 23%
Petrochemicals: 7%

Food & Farm products: 6 %
Goods: 6%
Chemicals: 3%
Other: 2%

What part of the Ohio River is in Louisville District?

Of the Ohio River's 981 miles, 542 miles are in the Louisville District from above Cincinnati, Ohio, to Cairo, Ill.

Flood Reduction

Damages prevented:
To date: $5 billion
FY06: $57.7 million
FY05: $402.1 million
(FY06 was a considerably drier year than FY05.)
Flood reduction projects include 275 miles of levees; 20 miles of floodwalls; 43 locally maintained protection projects; and 20 flood reduction reservoirs.

FY2007 Recreation Use

Visitors:
Lakes: 17,987,309
Locks: 18,924,069
Over $479 million recreation benefits to states' economies

FY2007 Permit Actions

Permit requests received:	1,817
Individual Permits issued:	87
Individual Permits denied:	1
Letter of Permissions issued:	16
General Permits issued:	345
Nationwide permits issued:	575

Some actions were withdrawn and some required only a jurisdictional determination.

Regulatory Authorities

Section 404, Clean Water Act: Prohibits discharging dredged or fill materials into U.S. waters without a Corps permit.
Purpose: Protection of valuable wetlands that provide natural flood protection, water quality benefits and fish and wildlife habitat.

Section 10, Rivers and Harbors Act, prohibits obstruction or alteration of navigable U.S. waters without a Corps permit.
Purpose: Safety and operational efficiency.

Other Authorities

Disaster/Emergency response actions for FEMA: Public Law 93-288; Emergency flood protection, levee repair: Public Law 84-99.

Currently 28 employees from the Louisville District were deployed in support of Army Corps of Engineers missions to Operation Iraqi Freedom and Noble Eagle. One employee is in Kansas City, MO in support of Dec 07 Ice Storms.

Military Boundaries

- States: Ky., Ind., Ill., Ohio, Mich.
  12 Army Installations
  5 Air Force Installations
  5 DoD site
  6 slated for BRAC
  World-wide support for the Army Reserve Centers
- Major Installations Served:
  Fort Knox, Ky.
  Fort Campbell, Ky.
  Wright-Patterson, AFB, Ohio
  Scott AFB, Ill.
- Formerly Used Defense Sites
  There are 636 properties on inventory with a $18.5 million budget in a six-state region in Indiana, Illinois, Kentucky, Michigan, Ohio and West Virginia.
- Installation Restoration Program
  There are seven installations participating in this program that the district is executing with a FY07 budget of $11.9 million.

January 2008 Edition

For more information:
http://www.lrl.usace.army.mil/

NOTES

PROLOGUE

1. Earlier studies are Leland R. Johnson, *The Falls City Engineers: A History of the Louisville District* (Louisville, KY: U.S. Army Engineer District, 1975), and *The Falls City Engineers: A History of the Louisville Engineer District, 1970-1983* (Louisville, KY: U.S. Army Engineer District, 1985); see also, Leland R. Johnson, *The Ohio River Division, U.S. Army Corps of Engineers: The History of a Central Command* (Cincinnati, OH: U.S. Army Engineer Division,1994).

2. Mission statement and updated figures available at Headquarters, U. S. Army Corps of Engineers website.

3. Hydroelectric power generated at McAlpine Dam is produced by Louisville Gas and Electric Company, but the Corps operates public hydropower dams, notably on Cumberland River in Nashville District. Deep draft harbors are at the nation's seaports, and Louisville is an inland District. Authors Parrish and Johnson also prepared a forthcoming history of the Louisville and Portland Canal and its evolution into the modern McAlpine project.

4. Elaboration of this four-phase thesis is presented by Leland R. Johnson, "Engineering the Ohio," in Robert L. Reid, ed., *Always a River: The Ohio River and the American Experience* (Bloomington, IN: Indiana University Press, 1991), pp. 180-209.

5. Grand Rapids Lock, Wabash River, built in 1885-1894, closed in the early 20th century. Rough River Lock, on a Green River tributary, built in 1890-95, was the Corps' first river lock built of concrete; it closed in the early 20th century. Use of upper Green-Barren River locks ceased in 1965 when Green River Dam 4 washed out. The last of 14 Kentucky River locks closed in 2002; a history of this project is Charles E. Parrish and Leland R. Johnson, *Kentucky River Development: The Commonwealth's Waterway* (Louisville, KY: U.S. Army Engineer District, 1999).

6. Charles E. Parrish, *Annual Historical Report, Louisville District, 1988* (Louisville, KY: U. S. Army Engineer District, 1989), pp. 3-4 (this serial set is cited hereafter as Parrish, *Annual Historical Report*, followed by year of the report).

7. David Dale, Address to Society of American Military Engineers, Louisville, KY, 22 Jan. 2004.

8. Albert C. Costanzo, *A History of the Board of Engineers for Rivers and Harbors* (Fort Belvoir, VA: Board of Engineers for Rivers and Harbors, 1980), passim; see "Civil Works, Congress, and the Executive Branch," on website usace.army.mil/inet/usace-docs/eng-pamphlets.

9. Lt. Gen. Robert Flowers, "USACE 2012 Explained in Plain English," *Engineer Update*, Jan. 2004.

10. Robert Page, interviewed by Martin Reuss, 3 January 1991 (Washington, DC: Research Collection, History Office, U. S. Army Corps of Engineers, Alexandria, VA), p. 5. Page claimed he quoted the environmental community's image of the Corps, rather than expressing a personal opinion.

11. Supreme Court Justice William O. Douglas used the phrase "Public Enemy No. 1" in reference to the Corps when campaigning against the Louisville District's proposed Red River Dam, and subsequently published it in "The Public Be Damned," *Playboy*, July 1969, p. 188. Charles E. Parrish, "Historical Overview: Louisville Engineer District," *Change of Command and Corps Day Agenda, 17 June 1994* (Louisville, KY: U. S. Army Engineer District, 1994), presents the District's view of environmental stewardship.

CHAPTER 1

1. For McAlpine and the Kentucky River project, see Parrish and Johnson, *Kentucky River;* Leland R. Johnson and Charles E. Parrish, "Engineering the Kentucky River: A Disastrous Debut," *Register of the Kentucky Historical Society* 95(Autumn 1997):369-94; and Leland R. Johnson and Charles E. Parrish, "J. Stoddard Johnston Versus the Army Engineers on Canalization of the Kentucky River," *Filson Club History Quarterly* 72(Jan.1998):3-23.

2. Histories of most of the 35 Engineer Districts detail activities of the assistant engineers. Leland R. Johnson, *Addison N. Scott: Kanawha River Canalization, 1875-01*(Huntington, WV: U.S. Army Engineer District, 1979), treats the work of an assistant engineer who was fired in spite his successful project management. Johnson, *The Falls City Engineers* (1975), pp. 215-22, reviews the District's military mission of the Second World War.

3. Johnson, *The Falls City Engineers* (1975), pp. 215-22.

4. Richard Trombley, "All You Really Wanted to Know about Green Suiters," *Falls City Engineer*, Oct. 1987, p. 5. The Engineer School was at Fort Belvoir, VA, until 1989 when moved to Fort Leonard Wood, MO. Changing the title

from District Engineer to District Commander reflected the Corps' desire to place its ranking officers on equal footing with infantry and artillery officers; the descriptive "Command" more accurately describes duties of the officers managing a District who rarely perform the technical engineering implied by the historic title.

5. Ibid. The Colonel had two military deputies, one for civil works and the other for military programs, until 1988 when a civilian became Deputy Commander for Project Management.

6. The Corps' comprehensive basin plans began in 1927 when Congress in House Document No. 308 funded these pioneering studies, later known as "308 Reports." Louisville District planners participated in the Ohio River Basin Survey managed by the Ohio River Division and also performed individual studies for the Wabash, Green, and Kentucky River basins.

7. Robert Fuller was quoted in *Falls City Engineer,* Nov. 1989, p. 14. Colonel John C. H. Lee, Jr. managed Appalachian Water Resource Studies at Cincinnati from 1965 to 1970; the final report is U. S. Army Corps of Engineers, Office of Appalachian Studies, *Development of Water Resources in Appalachia* (26 vols. Cincinnati: U. S. Army Engineer Division, 1969).

8. Succinctly summarizing these events is "Civil Works, Congress, and the Executive Branch," posted on the internet at www. usace.army.mil/inet/usace-docs. Using amortization schedules longer than fifty years can maximize benefits compared to costs.

9. Ibid. Johnson, *The Falls City Engineers* (1984), pp. 10-13, reviewed the 1970 formation of planning division.

10. Neal Jenkins, interviewed by Charles Parrish, 17 Dec. 1997, Louisville, KY.

11. Ibid.

12. *Falls City Engineer*, Aug. 1991, p. 5, quoted McClellan. William E. Kreisle, "Survey Design and Procedures for an Earthfill Dam and Lake," *Civil Engineering*, Feb.1971, pp. 43-46; Connie Thompson, "Satellites Revolutionizing Survey Work," *Falls City Engineer*, Feb.1989, pp. 8-9, reported Frank Fowler and Don Sims applied the new Global Positioning System (GPS) to determine geodetic positions, making Louisville the first Corps District to apply GPS to its work.

13. "Spotlight on Hydrology and Hydraulics Branch," *Falls City Engineer*, Aug.1984, p. 3.

14. Jack Speaker, Joe Keith, Patrick Lankswert, and Byron McClellan were among design team managers in the waning 20th century. "Value Engineering Increasing Emphasis," *Falls City Engineer*, Mar. 1985, pp. 1-2. Susan Toutant, James Skinner, William Easley were leaders of the District's value engineering program.

15. Gerard Edelman, Address to Society of American Military Engineers, 22 Jan. 2004, Louisville, KY; Bruce Murray, Address to Society of American Military Engineers, 22 Jan. 2004, Louisville, KY.

16. Joseph Theobald, interviewed by the Leland Johnson, 8 Feb. 1983, Louisville, KY; *Falls City Engineer,* Apr.1988, p. 14, described James Mackin's retirement. Mackin's predecessors were David Green, Ivan Uland, Hassel Hager, Charles Knosp, and William Pollard.

17. Edward Gowen, "Real Estate, the First Construction Service," *Military Engineer* 66 (September 1974):316-17; U.S. Department of Justice, *Progress, Property and Just Compensation* (Washington, DC: Government Printing Office, 1963); Robert R. Humphreys, interviewed by the Leland Johnson, 24 May 1983, Louisville, KY. Real Estate division chiefs included Clifton Raymer, Fred Morgan, Max Bohrer, Robert R. Humphreys, Wendell Wilkinson, and Michael G. Barter.

18. Account based on observations by the author when employed by construction division at the Tennessee-Tombigbee Divide Cut. Counting piledriver blows permitted calculating pile penetration rate and estimating strata density.

19. Parrish, *Annual Historical Report,1987*, pp. 2-3; Parrish, *Annual Historical Report, 2001*, n. p., lists construction division area and resident offices.

20. With few exceptions, under policies preceding 1986 local governments agreed to acquire rights-of-way, pay damages, and operate and maintain flood protection projects; it was estimated that meeting these requirements amounted to sharing 19% percent of average project costs. On historic flood protection policies, see Martin Reuss and Howard Rosen, eds., *The Flood Control Challenge: Past, Present, and Future* (Chicago, IL: Public Works Historical Society, 1988); and James W. Moore and Dorothy P. Moore, *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy* (Boulder, CO: University of Colorado, 1989). Martin Reuss, "Reshaping

National Water Politics: The Emergence of the Water Resources Development Act of 1986," (Draft, Alexandria, VA; Institute for Water Resources 91-PS-1, 1991), p. 82, noted the Water Resources Council made the 19% estimate for local cost-sharing.

21. Reuss, "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986," pp. 145-46.

22. Johnson and Parrish, *Kentucky River*, relates transfer of the Kentucky River locks and dams. The historic locks and dams listed do not include Rough River Lock and Dam and the Grand Rapids Lock and Dam on the Wabash River that closed early in the 20th century.

23. Lisa Hitchcock, "New Power Barge," *Falls City Engineer*, Apr. 1986, p. 3; Parrish, *Annual Historical Report, 1995,* pp. 39-41.

24. Louisville District, *Information Bulletin*, Mar. 1976; *Evansville Press*, 29 Sept. 1980, quoted William Christman.

25. Norman Gilley, interviewed by Leland Johnson, 29 June 1983, Louisville, KY; Brigadier General Richard S. Kem, interviewed by Leland Johnson, 5 Oct. 1982, Pittsburgh, PA.

26. Maj. Gen. E. R. Heiberg III to Brig. Gen. Richard S. Kem, 3 June 1981, Louisville District Historical Files.

27. Edward C. Rapp, "Preparedness is Protection," *Engineer Update*, June 1982, p. 1; "Readiness," *Falls City Engineer*, Jan. 1983, p. 1; "Ohio Valley Regional Conference,"
Military Engineer 75(Jan. 1983):53-54.

28. Kem interview; Brigadier General R. S. Kem to Lt. Gen. Joseph Bratton, 2 July 1981, Louisville District Historical Files; "Milcon Returns," *Falls City Engineer*, Feb. 1982, p. 1.

29. Charles Eastburn, "Remarks to Louisville Chapter of Federally Employed Women," 6 July 1982," and "Speech to Fort Knox Rotary Club," 15 Apr. 1982, Louisville District Historical Files.

30. John J. Speaker, interviewed by Leland Johnson, 25 May 1983, Louisville, KY; Gordon M. Stevens, interviewed by Leland Johnson, 9 Feb. 1983, Louisville, KY; Robert R. Humphreys, interviewed by Leland Johnson, 24 May

1983, Louisville, KY; Lawrence R. Link, Jr. interviewed by Leland Johnson, 24 May 1983, Louisville, KY.

31. History Office, U. S. Army Corps of Engineers, *Engineer Memoirs: Major General Richard S. Kem* (Alexandria, VA: History Office EP870-1-65, 2002), p. 191, commented on relationships between perception and reality.

CHAPTER 2

1. Louisville *Courier-Journal*, 20 Mar. 1981; *Cincinnati Post*, 24 June 1981; Lewis H. Blakey, "Balancing Environmental and Economic Concerns," *Military Engineer* 74(July 1982):270-73; David C. Harrison, "Institutional Barriers to National Water Policy," *Water Spectrum* 14(Spring 1982):6-7.

2. *Washington Post*, 5 Nov. 1981; *Engineer Update*, June 1982, p. 10. Parrish, *Annual Historical Report, 1990,* noted in 1990 the District received 630 applications, issued 163 formal permits and denied 13, while 988 activities were verified as authorized under general permits. General permits contain conditions to ensure individual and cumulative environmental impacts are minimal. Many applicants design a project's environmental impacts to meet the minimal impact level of a general permit

3. Brig. Gen. R. S. Kem to Lt. Gen. Joseph K. Bratton, 12 Nov. 1981, Louisville District Historical Files; Johnson, *Falls City Engineers* (1984), p. 235, prints photograph of Gianelli inspecting Louisville Repair Station. See also, United States Army Corps of Engineers, History Office, *Water Resources People and Issues: An Interview with William R. Gianelli* (Alexandria, VA: History Office EP870-1-24, 1985).

4. Louisville District, *Information Bulletin*, Oct. 1977; U. S. Army Corps of Engineers, Ohio River Division, *Ohio River Basin Erosion Study* (Cincinnati, OH: U. S. Army Engineer Division, 1977), passim; Louisville *Courier-Journal*, 3-4 Dec. 1980; Col. Dwayne Lee to Brig. Gen. Peter J. Offringa, 23 July 1985, Louisville District Historical Files.

5. Col. Richard C. Bennett," Opposition Testimony: FY 1980 Appropriations," 25 Apr. 1979, Box 1153, Records Management Office, U. S. Army Engineer District, Louisville, KY; Col. Thomas P. Nack to Maj. Gen. Harry A. Griffith, 30 May 1980, Louisville District Historical Files; Stevens interview.

6. Taylorsville, KY, *Spencer Magnet*, 15 May and 17 July 1980, and 1 July 1982.

7. Johnson, *Falls City Engineers* (1984), pp. 139-42.

8. Ibid.; Col. Charles Eastburn, "Briefing to Honorable William R. Gianelli," Nov. 1981, Louisville District Historical Files; Col. Charles Eastburn, "Brief for Lt. Gen. Bratton," 2 Mar. 1981, Louisville District Historical Files; U. S. Army Corps of Engineers, Louisville District, *Olmsted Locks and Dam: General Design Memorandum* (Louisville, KY: U. S. Army Engineer District, 1989), p. 3.

9. William R. Gianelli, "Funding Water Development Projects," *Military Engineer* 75(July 1983):332-43; *Engineer Update*, July 1983, p. 2.

10. Congress mandated cost sharing for water supply and recreation at multipurpose lakes. The "a-b-c" requirements for local governments to provide real estate, damage payments, and operations with maintenance also were law, but total contributions from local agencies varied from project to project. The 19% estimate of total local contributions was made by the Water Resources Council according to Reuss, "Reshaping National Water Politics: The Emergency of the Water Resources Development Act of 1986," p. 82.

11. *Evansville Courier*, 21 June 1961; *Evansville Press*, 12 May 1961, 29 July 1970, 25 May and 31 July 1976; U. S. Army Corps of Engineers, Louisville District, *Project Maps and Data Sheets* (3 vols. Louisville, KY: U. S. Army Engineer District, 1995), 3:122.

12. *Project Maps and Data Sheets,*3:122; *Evansville Courier*, 23 Mar. 1977, 20 Aug. 1978, 20 Aug. 1981; *Evansville Press*, 11 Feb. 1982.

13. "Chaplin River Channel Improvement," *Falls City Engineer*, Mar. 1986, pp. 1-3; Charles E. Parrish, memorandum to Leland Johnson, 25 Feb. 2004. The Perryville project in 1986 received a national award for design excellence.

14. U. S. Army Corps of Engineers, Louisville District, *Flood Plain Information: Ohio River, Jefferson County, Kentucky* (Louisville, KY: U. S. Army Engineer District, 1973), passim; Louisville *Courier-Journal,* 28 Oct. 1973.

15. Louisville District, *Information Bulletin*, Feb. 1974; *Project Maps and Data Sheets*, 3:228.

16. Col. James N. Ellis to Brig. Gen. E. R. Heiberg III, 4 Dec. 1974 and 4 June 1976, Louisville District Historical Files.

17. *Falls City Engineer*, May and Nov. 1977; Louisville *Courier-Journal*, 19 Aug.1977.

18. University of Kentucky, Department of Anthropology, *Excavations at Four Archaic Sites in the Lower Ohio Valley, Jefferson County, Kentucky* (2 vols. Lexington, KY: University of Kentucky, 1979), passim; Brig. Gen. E. R. Heiberg III to Col. Thomas P. Nack, 26 Sept. 1977, Louisville District Historical Files; Donald Ball, "Floodwall Construction Modified to Preserve Archeological Sites," *Falls City Engineer*, Oct.1989, p. 9.

19. Valley Station, KY, *Valley Station Advertiser*, 10 Dec. 1980; *Project Maps and Data Sheets*, 3:228; *Falls City Engineer*, Mar. 1987, pp. 1-8. Levee section 1 was completed in 1976, Section 2 in 1978, Section 3 in 1980, and sections 4, 4A, and 5 were planned for completion by 1989.

20. U. S. Army Corps of Engineers, Louisville District, *Final Environmental Impact Statement: Mill Creek Local Protection Project, Cincinnati, Ohio* (Louisville, KY: U. S. Army Engineer District, 1974), pp. 8-11; Johnson. *Falls City Engineers* (1975), pp. 256 and 266.

21. U. S. Army Corps of Engineers, Louisville District, *Interim Survey Report on Mill Creek* (Louisville, KY: U. S. Army Engineer District, 1970), passim; *Cincinnati Post,* 2 Feb.1974.

22. William Leegan to Chief of Engineering Division, 3 Mar. 1975, Box 1153, Louisville District Historical Files; *Cincinnati Enquirer,* 24 Apr.1981; Col. Charles Eastburn to Brig. Gen. R. S. Kem, 29 May 1981, Louisville District Historical Files; Donald Basham, interviewed by Charles Parrish, 6 Aug.1998, Louisville, KY.

23. Johnson, *Falls City Engineers* (1975), pp.121-36; *Falls City Engineer*, Apr. 1983.

24. U. S. Department of the Interior, National Park Service, *The Falls of the Ohio: Study of Alternatives* (Washington, DC: National Park Service Midwestern Region, 1981), pp. 1-10; U. S. Army Corps of Engineers, Louisville District, *McAlpine Locks and Dam, Study Report Revised* (Louisville, KY: U. S. Army Engineer District, 1979), pp. 1-5; *Falls City Engineer*, Oct. 1982 and Apr. 1983.

25. Parrish, *Annual Historical Report,1987,* p. 7.

26. Judge Edward Johnstone, U. S. District Court, 13 July 1987 decision in *U. S. v. Alice H. James, et. al.*, copy in Louisville District Historical Files; Carl Platt, memorandum to Charles Parrish, 28 Aug. 2001; John E. Kleber, ed., *The Encyclopedia of Louisville* (Lexington, KY: University Press of Kentucky, 2001), pp. 773-74.

27. Brig. Gen. R. S. Kem to Lt. Gen. Joseph Bratton, 21 Jan. 1982, Louisville District Historical Files.

28. U. S. Army Corps of Engineers, Louisville District, *Kentucky River and Tributaries, Upper Kentucky River Navigation Project, Situation Report* (2 vols. Louisville, KY: U. S. Army Engineer District, 1980), passim; Dwayne G. Lee, interviewed by Leland Johnson and Charles Parrish, 5 June 1986, Louisville, KY; Morgantown, KY, *Green River Republican*, 29 Apr. 1981; Bowling Green, KY, *Daily News*, 10 May 1981; Parrish and Johnson, *Kentucky River,* pp. 162-63.

29. *Falls City Engineer*, Apr. 1984 and Aug. 1984; Lee interview; Col. Dwayne Lee to Brig. Gen. Peter J. Offringa, 24 Jan.1985, Louisville District Historical Files.

30. Lee interview.

31. Stevens interview.

32. Ibid.; Col. Christopher P. Tate, "Military Briefing to Lt. Gen. Joseph K. Bratton, Wright-Patterson Air Force Base," 27 May 1983, Louisville District Historical Files.

33. Tate, "Military Briefing to Lt. Gen. Joseph K. Bratton," n. p.; Robert L. Oliver, interviewed by Charles Parrish and Leland Johnson, 16 Dec. 1988, Louisville, KY.

34. Stevens interview; Joseph Theobald, interviewed by Leland Johnson, 8 February 1983, Louisville, KY.

35. Speaker interview; Stevens interview.

36. Humphreys interview; Link interview; Col. Charles Eastburn, "Speech to SAME Post, Detroit, Mich.," 6 Dec. 1982, Louisville District Historical Files.

37. *Falls City Engineer*, Jan. 1983, quoted Hoagland.

38. *Falls City Engineer*, Mar., July, Oct. 1982; Stevens interview; Speaker interview.

39. Col. Charles Eastburn, "Speech to SAME Post, Detroit, Mich.," 6 Dec. 1982, Louisville District Historical Files; *Falls City Engineer*, Jan. 1983.

40. Dayton, OH, *Dayton Daily News*, 11 Jan. 1982; "Wright Patterson Air Force Base," *Falls City Engineer*, May 1984, pp. 1-8.

41. "WPAFB Medical Complex—A Complex Undertaking," *Falls City Engineer*, Apr. 1984, pp. 2-3.

42. Ibid.; Oliver interview.

43. "New BEQs at Ft. Ben Harrison," *Falls City Engineer*, May 1986, p. 6.

44. Ibid.; Lee interview. Brief history of Pan Am games is found at website www.aafla.org/8saa/PanAm1panamhistory.htm.

45. Lee interview; *Falls City Engineer*, June 1987, p. 15.

46. Lee interview; Col. Dwayne Lee to Brig. Gen. Peter J. Offringa, 23 July 1985, Louisville District Historical Files.

CHAPTER 3

1. See Pan American games history at website www.aafla.org.

2. "New BEQs at Ft. Ben Harrison," *Falls City Engineer*, May 1986, p. 6; *Falls City*
Engineer, May and June 1987.

3. Parrish, *Annual Historical Report, 1987*, pp. 2-3; Charles M. Haddaway III to Leland Johnson, 17 Mar. 2004.

4. Connie Thompson, "Harrison Village Renewal," *Falls City Engineer*, Aug. 1988.

5. *Falls City Engineer*, Sept. 1989, p. 1; Larry Bibelhauser to Leland Johnson, 15 Mar. 2004.

6. *Falls City Engineer*, Sept. 1987, p. 9; Robert Ralston, "Construction

Continues at Fort
Sheridan," *Falls City Engineer*, Apr. 1988, p. 4.

7. Robert Ralston, "Fort Sheridan Receives Two New Barracks," *Falls City Engineer*,
Sept. 1988, p. 10; *Falls City Engineer*, June 1989, p. 1.

8. Parrish, *Annual Historical Report, 1996*, pp. 33-43.

9. John Holler, "Louisville District Providing Military Support," *Falls City Engineer*,
Mar. 1988, pp. 1-14.

10. John Holler, "Wash Facility to be Built at Fort Campbell," *Falls City Engineer*, Oct. 1988, p. 4.

11. "802 Housing—Ft. Campbell Gets Congressional OK," *Falls City Engineer,* Oct. 1988, p. 2.

12. Marlin Keller, "Fort Knox Opens New Child Care Facility," *Falls City Engineer*,
Sept. 1988, p. 9; Charles M. Haddaway III, "From Dreams to Reality," *Falls City Engineer*, Jan. 1992, pp. 14-15; *Falls City Engineer*, Sept. 1987, p. 1-4.

13. David Diedrich, "The Corps in Motown?" *Falls City Engineer*, Sept. 1987, p. 8.

14. *Falls City Engineer*, Nov. 1986, p. 3.

15. *Falls City Engineer*, Aug. 1991, p. 11.

16. Charles E. Parrish, "Looking Back, Chanute Air Force Base," *Falls City Engineer*,
July 1988, p. 7; *Falls City Engineer*, May 1987, p. 8.

17. Lt. Col. Michael Calnan, interviewed by Charles Parrish, 8 July 1992, Louisville, KY.

18. *Falls City Engineer*, June 1988, pp. 4-16; Parrish, *Annual Historical Report, 1989*, pp. 18-20.

19. "Communications Command Headquarters, Scott AFB," *Falls City Engineer*, Oct. 1988, p. 2; Parrish, *Annual Historical Report, 1989*, pp. 18-20.

20. Parrish, *Annual Historical Report, 1992,* pp. 13-19; Calnan interview.

21. Calnan interview.

22. "WPAFB Medical Complex—A Complex Undertaking," *Falls City Engineer,* Apr.
pp. 2-3; Connie Thompson, "Wright Pat Hospital Enhancing Quality of Life," *Falls City Engineer*, Dec. 1988, p. 1-5.

23. "Wright-Patterson Receives Computer Operations Center," *Falls City Engineer*, July
pp. 4-9.

24. Dennis M. Gassert, "Air Force Museum Opens at Wright-Patterson," *Falls City*
Engineer, Aug. 1988, p. 6.

25. Mike Flanagan, "Newark Air Force Base Receives Radiac Laboratory," *Falls City*
Engineer, Aug. 1988, p. 2.

26. Jenkins interview.

27. Ibid.; *Engineer Update*, Aug. 1983; Louisville *Courier-Journal*, 20 Apr. 1980

28. *Falls City Engineer*, Apr. and Dec. 1978; Charles Eastburn, "Speech to Ft. Knox
Rotary Club," 15 Apr. 1982, Louisville District Historical Files.

29. Parrish, *Annual Historical Report, 1989,* p. 21; Parrish, *Annual Historical Report, 1990,* p.16.

30. Parrish, *Annual Historical Report, 1990,* p.16.

31. Calnan interview.

CHAPTER 4

1. *Falls City Engineer,* Apr. 1988, p. 1, quoted Heiberg on customer care.

2. For early history of Kentucky River, see Johnson and Parrish, "Engineering the Kentucky River: A Disastrous Debut," *Register of the Kentucky Historical*

Society 95(Autumn 1997):369-94; and Johnson and Parrish, "J. Stoddard Johnston Versus the Army Engineers on Canalization of the Kentucky River," *Filson Club History Quarterly* 72(Jan.1998):3-23.

3. Parrish and Johnson, *Kentucky River,* outlined the project history.

4. Ibid., pp. 163-63.

5. Ibid.; Lee interview.

6. Ibid.; Col. Dwayne Lee to Brig. Gen. Peter J. Offringa, 23 July 1985, Louisville District Historical Files.

7. Parrish and Johnson, *Kentucky River,* pp. 165-68.

8. Lee interview; David Beatty, interviewed by Charles Parrish, 6 Dec. 1997, Louisville, KY. Colonel Lee retired at the Waterways Experiment Station and eventually became project manager for Parsons.

9. Lee interview. Officially the Balanced Budget and Emergency Deficit Control Act of 1985, the Gramm-Rudman-Hollings Act was struck down by the Supreme Court in 1986. Congress enacted a revised version in 1987, but it failed to curb budget deficits. Prosperity and business growth of the 1990s generated sufficient tax revenues to reduce federal deficits and, indeed, provided the first budget surpluses in decades.

10. Lee interview.

11. Lee interview; Col. Dwayne Lee to Brig. Gen. Peter J. Offringa, 24 Jan. 1985, Louisville District Historical Files.

12. Colonel Robert Oliver, interviewed by Leland Johnson and Charles Parrish, 16 Dec. 1988, Louisville, KY; Parrish, *Annual Historical Report, 1987*, pp. 10-12.

13. Fred Huelson, "Anatomy of a Heart Attack," *Falls City Engineer*, Sept. 1987, p. 12; *Falls City Engineer*, April 1987, p. 6.

14. Parrish, *Annual Historical Report, 1989,* p. 2; Ralph Walz, "Spotlight on Resource Management Office," *Falls City Engineer*, Oct.1984, p. 3.

15. Oliver interview.

16. *Falls City Engineer*, Feb. 1987, p. 3; *Falls City Engineer*, Oct. 1987, p. 7; Parrish, *Annual Historical Report, 1988*, p. 19.

17. Parrish, *Annual Historical Report, 1988*, p. 1; Oliver interview; *Falls City Engineer*, Aug. 1989, p. 4.

18. Parrish, *Annual Historical Report, 1987,* p. 10.

19. *Engineer Update*, July 1983, p. 1; Brig. Gen. Peter Offringa to Lt. Gen. E. R. Heiberg III, 19 Feb. 1985, Louisville District Historical Files.

20. U. S. Army Corps of Engineers, *Information Systems Planning Implementation Report: A Prescription for Change* (Washington, DC: Office of the Chief of Engineers, 1985), foreword; U. S. Army Corps of Engineers, Ohio River Division, *Information Systems Plan* (Cincinnati, OH: U. S. Army Engineer Division, 1985), pp. 1-14.

21. *Falls City Engineer*, Nov. 1986, pp. 1-11; Parrish, *Annual Historical Report, 1987,* p. F-1; "Spotlight on ADP—Automatic Data Processing," *Falls City Engineer*, Apr. 1984, p. 10; *Falls City Engineer*, Mar. 1988, p. 10; Parrish, *Annual Historical Report, 1989*, p. 40.

22. Parrish, *Annual Historical Report, 1991,* p. 43. The authors observed this life cycle and a similar cycle for the District's technical library. The library formed during the 1970s to consolidate smaller reference libraries located within several offices and to provide quiet study space for the engineers and technicians. Well managed by Douglas Blunk and Wanda Stoffregen, the library fell victim to computer technology in the late 1990s and is sorely missed by historians and professionals who know that internet websites offer inadequate reference and research sources.

23. Sandra Cumbea, "Logistics Management," *Falls City Engineer*, May 1989, p. 16; *Falls City Engineer*, Mar. 88, p. 3; Parrish, *Annual Historical Report, 1988*, p. 25.

24. *Falls City Engineer*, Feb.1988, p. 2. Parrish, *Annual Historical Report, 1997*, indicates the transition to GSA fleet was not completed until 1997.

25. Commander's comments in *Falls City Engineer,* Oct. 1987, p. 2, and Dec. 1988, p. 2.

26. Johnson, *Ohio River Division*, pp. 344-36; Reuss, "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986," passim.

27. U. S. Congress, House, Committee on Appropriations, *Energy and Water Development Appropriations for 1987,* House Report No. 99-1013, 99th Cong., 2d Sess., 1986, pp. 195-96.

28. U. S. Congress, House, *Water Resources Development Act of 1986*, H. Report. No. 99-1013, 99th Cong., 2d Sess., 1986, passim; Michael Light, "President signs Mammoth Water Resources Bill," *Sierra Club National News Report* 18(17 Dec.1986):4.

29. Reuss, "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986," p. 82.

30. Peter Hoffman, "Heiberg Leads Corps into New Era," *Engineering News-Record* 218(23 Apr.1987):24-26.

31. Reuss, "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986," p. 199; "Water Resources Bill Oked," *Engineering News-Record* 217(23 Oct. 1986):11.

32. Col. Robert Oliver to Col. James Ward, 22 July 88, Louisville District Historical Files; *Falls City Engineer*, Aug. 1986, p. 1.

33. *Falls City Engineer*, Oct. 1987, pp. 1-13.

34. Reuss, "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986," passim.
35. Oliver interview.

36. Reuss, "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986," p. 185; Parrish, *Annual Historical Report, 1989,* Appendix A.

CHAPTER 5

1. History Office, U. S. Army Corps of Engineers, *Memoir of Lieutenant General Richard S. Kem,* passim; Johnson, *Ohio River Division*, pp. 336-38.

2. Robert Page, interviewed by Martin Reuss, 3 January 1991 (Research

Collection, History Office, U. S. Army Corps of Engineers, Alexandria, VA), pp. 5-8.

3. Ibid., pp. 23-24.

4. Ibid., pp. 28-35.

5. Ibid., pp. 41-48.

6. Ibid., pp. 23-24.

7. Robert Whistine, "Water Resource Projects Initiative," *Falls City Engineer*, July 1988, p. 6; Lt. Gen. Henry J. Hatch, "Implementation of Project Management," Oct. 1991, Louisville District Historical Files.

8. Col. Robert Oliver to Col. James Ward, 22 July 1988, Louisville District Historical Files; Parrish, *Annual Historical Report, 1989*, App. A.; Col. Robert Oliver to Col. Paul Chinen, 26 Jan. 1989, Louisville District Historical Files; Todd Hornback, "Project Management Staff Supervises Projects," *Falls City Engineer,* Jan. 1989, p. 1-6; Lt. Col. John Langowski, Jr., "Commentary—Life Cycle Project Management," *Falls City Engineer*, Jan. 1989, p. 2.

9. Todd Hornback, "Project Management Staff Supervises Projects," *Falls City Engineer,* Jan. 1989, p. 1-6.

10. *Project Maps and Data Sheets*, 3:229; Neill Tyler, memorandum to Leland Johnson, 19 Apr. 2004.

11. Parrish, *Annual Historical Report, 1989*, p. 3.

12. *Falls City Engineer*, Nov. 1989, p. 14; Robert Fuller, interviewed by Leland Johnson, 5 Mar. 2004, Louisville, KY.

13. Fuller interview.

14. Ibid.; Parrish, *Annual Historical Report, 1999*, Construction Division report.

15. U. S. Army Corps of Engineers, Louisville District, *Master Plan, FY 88-92* (Louisville, KY: U. S. Army Engineer District, 1987), p. 1.

16. Parrish, *Annual Historical Report, 1987*, p. 1; U. S. Army Corps of Engineers, Louisville District. *Master Plan, FY 88-92,* passim.

17. U. S. Army Corps of Engineers, Louisville District. *Master Plan, FY 88-92,* passim;
Col. Robert Oliver to Col. Ernest Harrell, 1 Feb. 1988, in Parrish, *Annual Historical Report, 1988,* Appendix B.

18. Johnson, *Ohio River Division,* p. 353-55.

19. Col. Robert Oliver to Col. James Ward, 22 July 1988, Louisville District Historical Files.

20. Charles Schumann, "Louisville District Responds to Drought '88," *Falls City Engineer*, Oct, 1988, pp. 1-12; U. S. Army Corps of Engineers, Louisville District, *Drought '88: The Long Dry Summer* (Louisville, KY: U. S. Army Engineer
District, 1989), p.1.

21. Page interview, pp. 93-94.

22. U. S. Army Corps of Engineers, Louisville District, *Drought '88: The Long Dry Summer*, p.1.

23. "The Swelling Rivers," *Falls City Engineer*, Mar. 1989, p. 8-9. U. S. Army Corps of Engineers, Louisville District, *Interim Reconnaissance Report: Salt River Basin, Kentucky* (Louisville, KY: U. S. Army Engineer District, 1991), passim.

24. "Sec. Page Visits District to Review Flood Situation." *Falls City Engineer*, Mar. 1989, p. 1.

25. *Falls City Engineer*, Dec. 1988, p. 6, Oct. 1989, pp. 1-15, and Nov. 1989, p. 10.

26. Col. Robert Oliver to Col. Paul Chinen, 26 Jan 1989, in Parrish, *Annual Historical Report, 1989*, Appendix A; "Col. Oliver Bids Farewell to District," *Falls City Engineer*, Feb. 1989, p. 1-10.

27. Parrish, *Annual Historical Report, 1987*, p. 1; Calnan interview.

CHAPTER 6

1. Colonel John F. Langowski, Jr. is quoted from interview by Leland Johnson and Charles Parrish, 3 May 1989, Louisville, KY. On the Corps' response

to turn-of-the-century criticism of its management, see Johnson, *Ohio River Division,* pp. 46-48.

2. Brig. Gen. Ernest Harrell is quoted from "MFR. Navigation Projects Executive Review Committee, 1st Quarterly meeting, 20 April 1987," attached to Louisville District, *Olmsted Locks and Dam: General Design Memorandum* (Louisville, KY: U. S. Army Engineer District, 1989).

3. Langowski interview.

4. The District completed its Lower Ohio River Navigation Feasibility Study in April 1985, conducted public meetings in May, and finalized its study in August 1985. The Board of Engineers for Rivers and Harbors received the report in October 1985 and sent its review in December to the Chief of Engineers, who transmitted it to states and other agencies for a ninety-day review. When they concurred in the report, the Chief delivered it to ASACW on 20 August 1986. In August 1987, ASACW sent the report to the Office of Management and Budget, which advised ASACW a month later that it had no objection to its submission to Congress. On 26 October 1987 ASACW sent the feasibility report to Congress, which approved project construction in the Water Resource Development Act of 17 November 1988. See Lt. Col. John F. Langowski, Jr. to Ohio River Division Engineer, 30 Mar. 1989, printed in U. S. Army Corps of Engineers, Louisville District, *Olmsted Locks and Dam: General Design Memorandum* (Louisville, KY: U. S. Army Engineer District, 1989).

5. Langowski interview.

6. Ibid.; Louisville District, *Olmsted Locks and Dam: General Design Memorandum*, pp. 1-2.

7. Connie Thompson, "Satellites Revolutionizing Survey Work," *Falls City Engineer*, Feb. 1989, pp. 8-9; *Falls City Engineer*, Aug.1991, p. 5.

8. Louisville District, *Olmsted Locks and Dam: General Design Memorandum*, passim.

9. Ibid.

10. Johnson, *Falls City Engineers* (1984), p. 42.

11. Louisville District, *Olmsted Locks and Dam: General Design*

Memorandum, passim. Leland R. Johnson, *The Headwaters District: A History of the Pittsburgh District* (Pittsburgh, PA: U. S. Army Engineer District, 1979), p. 248, and Johnson, *Ohio River Division*, pp. 125-28, reviews history of tainter gates and their applications on the Ohio.

12. Johnson, *Falls City Engineers* (1975), pp. 160-64; Leland R. Johnson, *The Davis Island Lock and Dam, 1870-1922* (Pittsburgh, PA: U. S. Army Engineer District, 1985), passim.

13. Fatalities and injuries to maneuverboat crews occurred at Ohio River Lock and Dam No. 1; see Johnson, *Davis Island Lock and Dam*, p. 112; and fatalities occurred during wicket maneuvers at all three Ohio River Districts: Pittsburgh, Huntington, and Louisville.

14. Louisville District, *Olmsted Locks and Dam: General Design Memorandum*, pp. 6-10.

15. "MFR: Navigation Projects Review Committee, 5th quarterly meeting, 12 May 1988," attached to Louisville District, *Olmsted Locks and Dam: General Design Memorandum.*

16. Ibid.; "MFR. Navigation Projects Executive Review Committee, 1st Quarterly meeting, 20 April 1987," attached to Louisville District, *Olmsted Locks and Dam: General Design Memorandum.*

17. Parrish, *Annual Historical Report, 1990,* p. 9.

18. Parrish, *Annual Historical Report, 1989,* p. 12.

19. Geri Cozine, "District Begins Base Closure Process," *Falls City Engineer*, June 1989, pp. 1-14.

20. Ibid.

21. Ibid.; *Falls City Engineer*, Sept 1987, p. 9; Charles Parrish, "Looking Back, Fort Sheridan," *Falls City Engineer*, May 1988, p. 7.

22. Parrish, *Annual Historical Report, 1989*, p. 47; *Falls City Engineer*, Jan. 1990, p. 6. For description of 1942 real estate challenges, see Leland R. Johnson, "Mobilization at Morganfield, Camp Breckinridge, KY" (Manuscript report, U. S. Department of Justice, 2004), passim.

23. Parrish, *Annual Historical Report,1993*, p. 9.

24. Langowski interview.

25. Ibid.; Parrish, *Annual Historical Report,1989*, p. 2.

26. Ibid.; *Falls City Engineer*, June 1989, p. 2.

27. *Falls City Engineer*, Sept. 1990, p. 2; Todd Hornback, "Project Management Staff Supervises Projects," *Falls City Engineer,* Jan. 1989, p. 1-6; U. S. Army Corps of Engineers, Louisville District, *Implementing Procedures for Life Cycle Project Management System in Louisville District* (Louisville, KY: U. S. Army Engineer District, 1989), passim; Parrish, *Annual Historical Report,1990,* p. 41.

28. Parrish, *Annual Historical Report,1991*, pp. 16-20.

29. *Falls City Engineer,* Sept. 1990, p. 2.

30. Parrish, *Annual Historical Report,1990,* pp. 17-18; Parrish, *Annual Historical Report, 1991,* p. 21.

31. *Falls City Engineer,* Sept. 1990, p. 1.

32. *Falls City Engineer,* Oct. 1989, pp. 1-15; *Falls City Engineer,* July 1990, p. 10.

33. *Falls City Engineer,* Mar. 1987, pp. 1-8, Oct. 1989, pp. 1-9, and Mar. 1993, p. 1.

34. Louisville District, Planning Division, "Draft Environmental Assessment, Repair of Section 7A, Sharon Enterprises, Mill Creek Local Flood Protection Project," File 1110-2-1150A; "Mill Creek Local Protection Project," *Falls City Engineer*, July 1984, p. 2; U. S. Army Corps of Engineers, Louisville District, *Mill Creek, Ohio: Bridging Document* (Louisville, KY: U. S. Army Engineer District, 2001), passim.

35. U. S. Army Corps of Engineers, Louisville District, *Mill Creek, Ohio: Bridging Document*, passim.

36. Parrish, *Annual Historical Report,1991,* p. 2.

37. *Falls City Engineer,* Jan. 1991, p. 2.

38. *Falls City Engineer,* Jan. 1991, p. 7; Parrish, *Annual Historical Report,1991,* p. 2.

39. *Falls City Engineer,* Feb. 1990, p. 2; Parrish, *Annual Historical Report,1991,* p. 2.

CHAPTER 7

1. Harback's quotation is from "Let's Talk," *Falls City Engineer*, Mar. 1992, passim; see also Herbert F. Harback, interview by Charles Parrish, 6 May 1994, Louisville, KY. A history of Bush-Cheney defense programs is available at website www.defenselink.mil among biographies of the Secretaries of Defense.

2. Harback interview; Parrish, *Annual Historical Report,1991,* p. 2.

3. Harback interview; "Change of Command, Louisville District," *Falls City Engineer*, Jan.1992, p. 1-6. Parrish, *Annual Historical Report,1992,* Appendix. Harback took District command on 3 Jan. 92 at Macauley Theater. A history of total quality management is available at website www.hrzone.com/topics/tqm.

4. George J. Jageman, Jr., interviewed by Leland Johnson, 6 Aug. 2004, Louisville, KY.

5. Ibid.; Carroll Winslow, interviewed by Leland Johnson, 5 Aug. 2004, Louisville, KY.

6. Jageman interview; Parrish, *Annual Historical Report, 1992,* pp. 2-3.

7. Parrish, *Annual Historical Report, 1992,* pp. 2-3; Jageman interview.

8. "The New Corps of Engineers," *Reorganization Wrap-Up,* 19 Nov. 1992 (inhouse District newsletter).

9. Ibid.

10. Ibid.

11. Ibid.

12. Ibid.; Gary Chisholm, interviewed by Leland Johnson, 30 Apr. 2004, Louisville, KY; Johnson, *The Ohio River Division,* relates the division's history to the date it became part of the Great Lakes and Ohio River Division.

13. Parrish, *Annual Historical Report, 1994,* p. 63; Ralph Grieco, interviewed by Charles Parrish, 8 July 1996, Louisville, KY.

14. Parrish, *Annual Historical Report, 1994,* pp. 57-58, 82.

15. Ibid., p. 64.

16. Parrish, *Annual Historical Report, 1992,* p. 22; U. S. Army Engineer District, Louisville, *Falls of the Ohio Master Plan Design Memorandum No. 1* (Louisville, KY: U. S. Army Engineer District, 1984), passim.

17. Parrish, *Annual Historical Report, 1994,* pp. 2, 5, 22; Parrish, *Annual Historical Report, 2001,* Operations Division.

18. *Falls City Engineer,* Aug. 1989, p. 14; Parrish, *Annual Historical Report, 1989*, p. 4; Sheldon Shafer, "Over the Years, Project Transformed Riverfront," Louisville *Courier-Journal*, 21 July 2003.

19. Parrish, *Annual Historical Report, 1989*, p. 4; Parrish, *Annual Historical Report, 1992*, p. 5.

20. *Falls City Engineer,* Aug. 1989, p. 14; Parrish, *Annual Historical Report, 1993,* pp. 5 and 20; Parrish, *Annual Historical Report, 1995*, p. 29.

21. Shafer, "Over the Years, Project Transformed Riverfront," Louisville *Courier-Journal*, 21 July 2003; Parrish, *Annual Historical Report, 1995*, p. 29.

22. Parrish, *Annual Historical Report, 1995,* pp. 5-7; Grieco interview.

23. Parrish, *Annual Historical Report, 1996,* p. 51; Lee Anne Devine, interviewed by Leland Johnson, 4 Mar. 2004, Louisville, KY; K. Doug Shelton, Jr., interviewed by Leland Johnson, 4 Mar. 2004, Louisville, KY.

24. Grieco interview.

25. Fuller interview; Parrish, *Annual Historical Report,1992,* p. 29; Parrish, *Annual Historical Report,1995*, p. 48.

26. Parrish, *Annual Historical Report, 2000,* Construction Division; Col. Robert Slockbower, interviewed by Charles Parrish and Jon Fleshman, 4 June 2002, Louisville, KY.

27. Grieco interview; U. S. Army Engineer District, Louisville, *Final Environmental Impact Statement Supplement for the Replacement of Locks and Dams 52 and 53* (Louisville, KY: U. S. Army Engineer District, 1993), passim; Parrish, *Annual Historical Report,1993,* pp. 11 and 19.

28. U. S. Army Engineer District, Louisville, *Final Environmental Impact Statement Supplement for the Replacement of Locks and Dams 52 and 53*, passim; Parrish, *Annual Historical Report,1993,* p. 32.

29. Parrish, *Annual Historical Report, 1994,* pp. 7 and 12; Parrish, *Annual Historical Report, 1995,* p. 10.

30. Parrish, *Annual Historical Report, 1995,* p. 10; Parrish, *Annual Historical Report, 1996,* p. 14.

31. Parrish, *Annual Historical Report,1995*, pp. 10, 18, and 40.

32. Parrish, *Annual Historical Report,1996*, p. 23; Rick W. Schultz, "Results of the Olmsted Hydraulic Operated Wicket Dam" (2000 Manuscript, Engineering Division Files, Louisville, KY), passim.

33. Parrish, *Annual Historical Report,1995*, p. 18; Parrish, *Annual Historical Report, 1996*, p. 23.

34. Parrish, *Annual Historical Report, 1996*, p. 1; Grieco interview.

CHAPTER 8

1. Harry Spear is quoted from interview by Charles Parrish, 15 July 1999, Louisville, KY.

2. Spear interview.

3. Ibid.; Parrish, *Annual Historical Report,1996*, p. 76; Parrish, *Annual Historical Report, 1997*, p. 1.

4. Spear interview.

5. Ibid.; Parrish, *Annual Historical Report, 1996*, p. 76; Parrish, *Annual Historical Report,1997*, p. 1.

6. Parrish, *Annual Historical Report, 1996,* p. 1; Parrish, *Annual Historical Report,1999*, Engineering Division.

7. Parrish, *Annual Historical Report,1996,* pp. 21-28, 33-34.

8. Ibid.; Parrish, *Annual Historical Report,1993,* p. 9.

9. Parrish, *Annual Historical Report,1993,* pp. 28-32.

10. U. S. Army Corps of Engineers, Field Activities Weekly Update, 23 July 2004; Alex Davis, "Big Expansion Set at Charlestown Park," Louisville *Courier-Journal*, 19 July 2004.

11. Spear interview.

12. Parrish, *Annual Historical Report, 1991,* p. 8-15; Parrish, *Annual Historical Report, 1993,* p. 18.

13. Parrish, *Annual Historical Report,1998,* Real Estate Division; Colonel Robert Slockbower, interviewed by Charles Parrish and Jon Fleshman, 4 June 2002, Louisville, KY.

14. Slockbower interview.

15. "Statement by Colonel James W. Dunkelberger, U. S. Army Reserve Engineer," Readiness and Management Support Subcommittee, Senate Armed Services Committee, First Session, 107th Congress, on Infrastructure Readiness, 21 Mar. 2001.

16. Fred Grant, interviewed by Leland Johnson, 30 Apr. 2004, Louisville, Kentucky; "Kit of Parts," *Falls City Engineer*, Apr. 1990, pp. 2-3.

17. Grant interview; Dale interview.

18. Dale interview.

19. Grant interview; Dale interview.

20. Parrish, *Annual Historical Report,1997,* p. 1; *Project Maps and Data Sheets*, 3:197.

21. Parrish, *Annual Historical Report, 1997,* Engineering Division; "Flood '97 Edition," *Falls City Engineer*, Mar. 1997, passim.

22. "Flood '97 Edition," *Falls City Engineer*, Mar. 1997, passim; Parrish, *Annual Historical Report, 1997,* Construction Division.

23. Parrish, *Annual Historical Report, 1997,* Construction Division.

24. Robert Whistine, "Water Resource Projects Initiative," *Falls City Engineer*, July 1988, p. 6.

25. *Falls City Engineer,* Jan. 1990, pp. 1-3.

26. Parrish, *Annual Historical Report, 1996,* Engineering Division.

27. David Klinstiver, interviewed by Leland Johnson, 6 Aug. 2004, Louisville, KY; Charles M. Haddaway III, interviewed by Leland Johnson, 6 Aug. 2004, Louisville, KY.

28. Parrish, *Annual Historical Report, 1997,* Operations Division.

29. Parrish, *Annual Historical Report,1999,* Engineering Division; Haddaway interview.

30. The authors attended the McAlpine groundbreaking.

31. Spear interview.

32. Spear interview.

CHAPTER 9

1. Quotation at head of chapter 9 is from Slockbower interview.

2. Ibid.; Parrish, *Annual Historical Report,1999,* Information Management.

3. Slockbower interview; Parrish, *Annual Historical Report,1999*, Executive Office.

4. Mike Turner, "Corps of Engineers Partners with Nature Conservancy," *The Corps Environment*, Oct. 2002, p. 13.

5. Carol Baternik, "Louisville District and The Nature Conservancy Join Hands on $1.02 Million Handy Tract Project," *The Corps Environment,* Apr. 2002, p. 14.

6. Slockbower interview.

7. Ibid.; Spear interview.

8. Ralph Walz to Eileen Utz, 16 Feb. 1999, Significant Activities Report, Louisville Engineer District; see also, www.kypride.org website.

9. Neill O'Leary, "Risk-Based Analysis of Beargrass Creek, KY," on website www.hec.usace.army.mil/publications.

10. Parrish, *Annual Historical Report, 2002*, Construction Division; *Louisville Courier-Journal,* 5 Nov. 2003.

11. Fuller interview.

12. Ibid.; Parrish, *Annual Historical Report,1999,* Operations Division; Parrish, *Annual Historical Report,* 2001, Operations Division.

13. Parrish, *Annual Historical Report, 2002,* Operations Division.

14. Peter Frick, interviewed by Leland R. Johnson, 5 Mar. 2004, Louisville, KY.

15. Ibid.

16. Ibid.; Greg Werncke, "Miter Gate Changeout System" (Power point manuscript, Engineering Division files, Louisville, KY, 2001); Parrish, *Annual Historical Report, 2000,* Engineering Division.

17. Frick interview; *What's New,* 28 May 2004 (District intranet website); Slockbower interview; Parrish, *Annual Historical Report,2002,*Operations Division.

18. Parrish, *Annual Historical Report, 2001,*Operations Division; Robert Van Hoff, interviewed by Leland Johnson, 4 Mar. 2004, Louisville, KY.

19. Slockbower interview.

20. Ibid.

21. Ralph Walz to Eileen Utz, 25 Oct. 1999, Significant Activities Report, Louisville District; Field Weekly Activities, "CERL: Ohio River Flood Protection, Indiana Shoreline," 13 Dec. 2003.

22. Field Weekly Activities, "CERL: Ohio River Flood Protection, Indiana Shoreline," 13 Dec. 2003; Slockbower interview.

23. Parrish, *Annual Historical Report, 1996,* Operations Division; Parrish, *Annual Historical Report, 2000,* Construction Division; George Flickner, interviewed by Leland Johnson, 30 Apr. 2004, Louisville, KY.

24. Flickner interview; Kenneth Henn III, "Mississinewa Dam Settlement Investigation and Remediation," FY01 Infrastructure Systems Conference, Geotechnical and Dam Safety Section files, Louisville District, Louisville, KY:

25. Flickner interview; Parrish, *Annual Historical Report, 2002,* Value Engineering; Field Weekly Activities, "CERL: Mississinewa Dam Repair," 17 Sept. 2004.

26. Slockbower interview; Louisville District Planning Division, Civil Works Project Fact Sheet, Mill Creek, Ohio, Flood Damage Reduction Project, Aug. 2003; Louisville District, *Mill Creek, Ohio: Bridging Document*, passim.

27. Slockbower interview; Louisville District Planning Division, Civil Works Project Fact Sheet, Mill Creek, Ohio, Flood Damage Reduction Project, Aug. 2003; "Ex-Mayor Leads Mill Creek Fight," *Cincinnati Enquirer,* 27 July 2003.

28. Slockbower interview; Parrish, *Annual Historical Report, 2000,* Programs and Project Management.

29. Field Weekly Activities, "CERL: Mill Creek, OH, Flood Damage Reduction Project," 23 July 2004; Slockbower interview.

30. Parrish, *Annual Historical Report, 2001,* Construction Division; Charles E. Parrish was the District's public affairs officer on 9/11-2001 and participated in the emergency.

31. Slockbower interview; Parrish, *Annual Historical Report, 2001,* Construction Division.

32. Slockbower interview; Parrish, *Annual Historical Report, 2001,* Construction Division.

33. Slockbower interview; Parrish, *Annual Historical Report, 2001,* Construction Division.

34. Parrish, *Annual Historical Report, 2001,* Operations Division.

35. Slockbower interview; Parrish, *Annual Historical Report, District, 2002,* Executive Office.

36. Slockbower interview.

CHAPTER 10

1. Colonel John Person worked for William McAlpine in 1926-28 building the Falls dam and hydroelectric plant (later rebuilt as McAlpine Dam); later at his retirement, he remained in Louisville as director of its Metropolitan Sewer District.

2. Parrish, *Annual Historical Report,2002,* Executive Office; Dale interview; Fuller interview.

3. *Waterways Journal*, 29 Dec. 2003, quoted Gen. Flowers.

4. *What's New*, 13 Jan. 2004; Steven W. Rager, interviewed by Leland Johnson, 5 Mar. 2004, Louisville, KY.

5. Rager interview; U. S. Army Engineer District, Nashville, *District Digest,* Dec. 2003.

6. Robert Pessalano, interviewed by Leland Johnson, 29 June 2004, Louisville, KY; *Engineer Update,* Feb. 2004, p. 8; Field Weekly Activities, "CELRD: Iraq Electrical Contracts Acquisition," 28 Nov. 2003.

7. *What's New*, 13 Jan. 2004.

8. *Engineer Update*, Feb. 2004, pp. 1-2, 8.

9. Ibid.; Louisville *Courier-Journal*, 25 Apr. 2004.

10. *What's New*, 4 June 2004; Dale interview.

11. Field Weekly Activities, "CELRD: ASA(CW) Visit to LRD," 28 Nov. 2003; Field Weekly Activities, "CELRD: McAlpine Lock Replacement Project," 13 Dec. 2003.

12. Klinstiver interview; Haddaway interview.

13. Field Weekly Activities, "CELRD: McAlpine Lock Replacement Project," 13 Dec. 2003; Parrish, *Annual Historical Report, 2002,* Construction Division. Observing McAlpine's construction in 2004, this historian considered its progress "blazing speed."

14. Parrish, *Annual Historical Report, 2002,* Construction Division. Parrish and Johnson, *Kentucky River*, pp. 105-07, described 19th century construction of Kentucky River timbercrib dams "in the wet."

15. Parrish, *Annual Historical Report, 1999,* Engineering Division and Construction Division; Carbondale, IL, *The Southern Scene,* 22 July 2003.

16. United States Army Corps of Engineers, Huntington District, *Great Lakes and Ohio River Navigation Systems Commerce Report, 2002* (Cincinnati, OH: Great Lakes and Ohio River Division, 2003), pp. 55-56; Parrish, *Annual Historical Report, 2001,* Engineering Division.

17. *Waterways Journal,* 21 Sept. 2003.

18. Ibid.

19. Parrish, *Annual Historical Report, 2002,* Construction Division.

20. Louisville *Courier-Journal,* 9 Aug. 2004; Nashville *Tennessean*, 22 Sept. 2003.

21. *Waterways Journal*, 21 Sept. 2003 and 10 Oct. 2004.

22. Parrish, *Annual Historical Report, 1996,* Engineering Division, pp. 24, 57-58.

23. Ibid.

24. Parrish, *Annual Historical Report, 2000,* Engineering Division; Parrish, *Annual Historical Report,2001,* Project Management.

25. Louisville District News Release, "U. S. Army Corps of Engineers Ohio River Ecosystem Restoration Program Moves Forward," 30 Oct. 2000; Louisville District, *Ohio River Ecosystem Restoration: Integrated Decision Document* (Louisville, KY: U. S. Army Engineer District, 2000), passim.

26. Parrish, *Annual Historical Report, 2000*, Project Management; Kimberly Hefling, "Environmentalist Vocal at Ohio River Hearing," Louisville *Courier-Journal*, 13 July 2001; Louisville *Courier-Journal*, 20 Mar. 2004.

27. Parrish, *Annual Historical Report, 2002*, Engineering Division.

28. Louisville *Courier-Journal* 30 Apr. 2004; Field Weekly Activities, "CELRL: Emery Lane Bank Stabilization," 23 July 2004.

29. Field Weekly Activities, "CEECW-LRD: McAlpine Lock Main Chamber Scheduled Emergency Closure," 23 July 2004

30. *What's New,* 28 May 2004; Nashville *Tennessean,* 27 May 2004.

31. Brett Barrouquere, "Businesses Expect Minimal Interruptions During River Shutdown," Louisville *Courier-Journal*, 9 Aug. 2004; *Waterways Journal*, 2 and 8 Aug. 2004.

32. Field Weekly Activities, "CERL: McAlpine Lock Re-Opens Ahead of Schedule," 20 Aug. 2004; *Waterways Journal*, 2, 8, 12, and 26 Aug. 2004.

33. *What's New*, 30 July 2004; *Engineer Update*, Aug. 2004, p. 8.

34. *What's New*, 28 May 2004; *Engineer Update*, Aug. 2004, p. 8.

35. "It's Really Happening this Time, Folks!" *Engineer Update*, Nov. 2003, pp. 1-3; *Engineer Update,* Mar. 2004, pp. 2-3.

36. *Engineer Update,* Mar. 2004, pp. 2-3.

37. *What's New*, 9 July 2004, quoted Gen. Flowers.

38. *What's New,* 21 May 2004.

39. Field Weekly Activities, "CERL: Preserve America Event," 20 Apr. 2004.

40. Louisville District, News Release, 28 Sept. 2004; Louisville District, Public Affairs Office, Draft of Colonel Rowlette speech, Marine Hospital Presentation, 28 Sept. 2004.

BIBLIOGRAPHY

BOOKS

Baskin, John. *New Burlington: The Life and Death of an American Village.* New York: W. W. Norton and Company, 1977.

Biemer, Martin E., and H. J. Schardein, Jr. *50 Years of Service: A History of the First Half-Century of the Louisville and Jefferson County Metropolitan Sewer District.* Louisville, KY: Metropolitan Sewer District, 1998.

Center of Military History, U. S. Army. *The U. S. Army and the Lewis and Clark Expedition.* Washington, DC: Center of Military History, 70-75-1, 2003.

Costanzo, Albert C. *A History of the Board of Engineers for Rivers and Harbors.* Fort Belvoir, VA: Board of Engineers for Rivers and Harbors, 1980.

Custer, Jack E., and Sandra Miller Custer. *The Ohio River Lock and Dam System's Commercial and Industrial Impact.* Louisville, KY: Steamboat Masters & Associates, Inc., 2000.

Frost, Sherman L., and Wayne S. Nichols. *Ohio Water Firsts.* Columbus, OH: Water Resources Foundation of Ohio, 1985.

Hays, Samuel. *Conservation and the Gospel of Efficiency.* Cambridge, MA: Harvard University Press, 1959.

History Office, U. S. Army Corps of Engineers. *The History of the U. S. Army Corps of Engineers.* Washington, DC: Office of the Chief of Engineers, 1998. .History Office, U. S. Army Corps of Engineers. *Engineer Memoirs: Lieutenant General Richard S. Kem.* Alexandria, VA: EP 870-1-65, 2002.

Johnson, Leland R. *The Ohio River Division, U.S. Army Corps of Engineers: The History of a Central Command.* Cincinnati, OH: U.S. Army Engineer Division,1994.

_____. *The Headwaters District Roundtables: An Eyewitness History of the Pittsburgh District, U.S. Army Corps of Engineers.* Pittsburgh, PA: U.S. Army Engineer District, 1989.

_____. *The Davis Island Lock and Dam, 1870-1922.* Pittsburgh, PA: U.S. Army Engineer District, 1985.

_____. *The Falls City Engineers: A History of the Louisville Engineer District, 1970- 1983*. Louisville, KY: U.S. Army Engineer District, 1985.

_____. *The Headwaters District: A History of the Pittsburgh District.* Pittsburgh, PA: U.S. Army Engineer District, 1979.

_____. *Men, Mountains and Rivers: A History of the Huntington District.* Huntington, WV: U.S. Army Engineer District, 1977.

_____. *Addison N. Scott: Kanawha River Canalization, 1875-1901.* Huntington, WV: U.S. Army Engineer District, 1979.

_____. *The Falls City Engineers: A History of the Louisville District.* Louisville, KY: U.S. Army Engineer District, 1975.

_____, and Charles E. Parrish, *Kentucky River Development: The Commonwealth's Waterway.* Louisville, KY: U.S. Army Engineer District, 1999.

_____. *Engineers on the Twin Rivers: A History of the Nashville Engineer District*. Nashville, TN: U.S. Army Engineer District, 1978.

_____. *The 1977 Southwestern Pennsylvania Flood, a 500 Year Flood.* Pittsburgh, PA: U.S. Army Engineer District, 1977.

_____. *Tropical Storm AGNES: After Action Report*. Pittsburgh, PA: U.S. Army Engineer District, 1972.

_____. *Sandia National Laboratories: A History of Exceptional Service in the National Interest.* Albuquerque, NM: SAND97-1029, 1997.

_____, and Daniel Schaffer. *Oak Ridge National Laboratory: The First Fifty Years.* Knoxville, TN: University of Tennessee Press, 1994.

Kleber, John E., ed. *The Kentucky Encyclopedia*. Lexington, KY: University Press of Kentucky, 1992.

_____. *The Encyclopedia of Louisville.* Lexington, KY: University Press of Kentucky, 2000. Kramer, Carl E. *Visionaries, Adventurers, and Builders: Historical Highlights of the Falls of the Ohio.* Jeffersonville, IN: Sunnyside Press, 2000.

Little, Charles E. *Greenways for America*. Baltimore, MD: Johns Hopkins University Press, 1990.

Moore, James W., and Dorothy P. Moore. *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy.* Boulder, CO: University of Colorado, 1989.

Munro-Leighton, Judy, Andrews, Natalie, and Bill Munro-Leighton. *Changes at the Falls: Witnesses and Workers, Louisville and Portland, 1830-1860.* Portland, KY: Portland Museum, 1982.

Parrish, Charles E., and Leland R. Johnson. *Kentucky River Development: The Commonwealth's Waterway.* Louisville, KY: U.S. Army Engineer District, 1999.

Portland Museum. *The Tarascon Mill: Shippingport's Great Mill Reconstructed in Words, Pictures and a Model.* Portland, KY: Portland Museum, 1981.

Powell, Richard L. *Geology of the Falls of the Ohio River.* Bloomington, IN: Indiana Department of Natural Resources, 1970.

Reid, Robert L. ed. *Always a River: The Ohio River and the American Experience*. Bloomington, IN: Indiana University Press, 1991.

Reuss, Martin, and Howard Rosen, eds. *The Flood Control Challenge: Past, Present, and Future.* Chicago, IL: Public Works Historical Society, 1988.

Shallat, Todd. *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers.* Austin, TX: University of Texas Press, 1994.

Shepard, Alicia C. *Narrowing the Gap: Military, Media and the Iraq War.* Chicago, IL: Robert McCormick Foundation, 2004.

Thomas, Samuel W. *Views of Louisville Since 1766.* Louisville, KY: Courier-Journal Company, 1971.

Yater, George H. *Two Hundred years at the Falls of the Ohio: A History of Louisville and Jefferson County.* Louisville, KY: Filson Club,1987.

ARTICLES

Abbott, Edwin E. "Design for a New Ohio River." *Civil Engineering* 32(October 1962):46-49.

Ball, Donald. "Floodwall Construction Modified to Preserve Archeological Sites." *Falls City Engineer*, October 1989, p. 9.

Barrouquere, Brett. "Businesses Expect Minimal Interruptions During River Shutdown." Louisville *Courier-Journal*, 9 August 2004

Baternik, Carol. "Louisville District and The Nature Conservancy Join Hands on $1.02 Million Handy Tract Project." *The Corps Environment,* April 2002, p. 14.

Bates, Alan L., Striegel, Martin C., and Nugent, Victoria L. "Falls Cities Ferries: A Note." *Indiana Magazine of History* 95(September 1999):255-83.

Blakey, Lewis H. "Balancing Environmental and Economic Concerns." *Military Engineer* 74(July 1982):270-73.

Bruce, James W., Keller, Dwight W., and James A. Neill. "Modern Facilities for Ohio River Navigation." *Journal of the Waterways and Harbors Division, American Society of Civil Engineers* 83(May 1957): No. 1239.

Calnan, Michael B. "Military Program Developments." *Falls City Engineer*, March 1989, p. 2.

"Cannon Voyage '88." *Falls City Engineer*, August 1988, p. 1.

"Change of Command, Louisville District." *Falls City Engineer*, January 1992, pp. 1-6.

"Chaplin River Channel Improvement." *Falls City Engineer*, March 1986, pp. 1-3.

"Col. Oliver Bids Farewell to District." *Falls City Engineer*, February 1989, p. 1-10.

"Computers Ease Camp Registration." *Falls City Engineer*, March 1989, p. 11.

"Corps, City of Owensboro Sign Agreement." *Falls City Engineer*, September 1988, pp. 1-16.
Cozine, Geri. "District Begins Base Closure Process." *Falls City Engineer*, June 1989, pp. 1-14.

Cumbea, Sandra. "Logistics Management." *Falls City Engineer*, May 1989, p. 16.

Davis, Alex. "Big Expansion Set at Charlestown Park." Louisville *Courier-Journal*, 19, July 2004.

Diedrich, David. "The Corps in Motown?" *Falls City Engineer*, September 1987, p. 8

Douglas, William O. "The Public Be Damned." *Playboy*, July 1969, pp. 143, 182-188.

"Drought '88." *Falls City Engineer*, August 1988, p. 8.

"Ex-Mayor Leads Mill Creek Fight," *Cincinnati Enquirer,* 27 July 2003.

Flanagan, Mike. "Newark Air Force Base Receives Radiac Laboratory." *Falls City Engineer*, August 1988, p. 2.

Gassert, Dennis M. "Air Force Museum Opens at Wright-Patterson." *Falls City Engineer*, August 1988, p. 6.

Gianelli, William R. "Funding Water Development Projects." *Military Engineer* 75(July 1983):332-43.

Gowen, Edward. "Real Estate, the First Construction Service." *Military Engineer* 66 (September 1974):316-17.

Gregory, Lisa. "Lock Operators Save Crewman." *Falls City Engineer*, March 1993, p. 1.

Haddaway, Charles. "From Dreams to Reality." *Falls City Engineer*, January 1992, pp.14-15.

Hall, C. Ray. "What Does Louisville's Riverfront Want to be When It Grows Up?" Louisville *Courier-Journal*, 10 January 1988.

Hanchey, James R. "The Historical Development of the U.S. Inland Waterways System." *Constructor* 68(June 1986):25-27.

Harrrison, David C. "Institutional Barriers to National Water Policy." *Water Spectrum* 14(Spring 1982):6-7.
Hefling, Kimberly. "Environmentalist Vocal at Ohio River Hearing." Louisville *Courier-Journal*, 13 July 2001.

Heulson, Frederick. "Anatomy of a Heart Attack." *Falls City Engineer*, September 1987, p. 12;

Hill, Bob. "The Rise of the Falls." Louisville *Courier-Journal*, 13 November 1988.

Hitchcock, Lisa. "New Power Barge." *Falls City Engineer*, April 1986, p. 3.

Hoffman, Peter. "Heiberg Leads Corps into New Era." *Engineering News-Record* 218(23 April 1987):24-26.

Hornback, Todd. "Corps Lakes: An Affordable Opportunity for Relaxation." *Falls City Engineer*, June 1986, pp. 4-11.

_____. "Newburgh Lock Chamber Valves Inspection." *Falls City Engineer*, November 1988, p. 8.

_____."Corps Lakes: An Affordable Opportunity for Relaxation." *Falls City Engineer*, June 1986, pp. 4-11.

_____. "Project Management Staff Supervises Projects." *Falls City Engineer,* January 1989, p. 1-6.

_____. "Military Timber Sales Harvest Good Return." *Falls City Engineer*, April 1989, p. 3.

_____. " Archeologists Excavate Remains at Mississinewa Reservoir." *Falls City Engineer*, July 1990, p. 8.

_____. "Flood Fight." *Falls City Engineer*, January 1991, pp. 1-5.
Holler, John. "Louisville District Providing Military Support." *Falls City Engineer*, March 1988, pp. 1-14.

_____. "Wash Facility to be Built at Fort Campbell." *Falls City Engineer*, September 1988, p. 4.

"Industry Awaits Results of Corps Navigation Studies." *Waterways Journal,* 22 September 2003.

Johnson, Leland R. "Aaron Burr: Treason in Kentucky?" *Filson Club History Quarterly* 75 (Winter 2001):1-32.

_____, and Charles E. Parrish. "Engineering the Kentucky River: A Disastrous Debut." *Register of the Kentucky Historical Society* 95(Autumn 1997):369-94.

_____, and Charles E. Parrish. "J. Stoddard Johnston Versus the Army Engineers on Canalization of the Kentucky River." *Filson Club History Quarterly* 72(January 1998):3-23.

_____. "United States Army Corps of Engineers." *Tennessee Encyclopedia of History and Culture.* Nashville: Tennessee Historical Society, 1998.

_____. "Engineering the Ohio." In Robert Reid, ed., *Always a River: The Ohio River and the American Experience.* Indianapolis: Indiana University Press, 1991.

_____. "Frontier Father--Prosperous Child." *Great Rivers* 1(Summer 1984): 20-25.

_____. "An Army Engineer on the Missouri, 1867." *Nebraska History* 53(Summer 1972):253-91.

_____. "The Contest of 1824." *Military Engineer* 65(May 1973): 166-71.

_____. "The Contract of 1824." *Military Engineer* 65(July 1973): 252-57.

_____. "Origins of Federal Waterways Engineering." American Society of Civil Engineers, *Rivers '76.* Fort Collins, CO: ASCE, 1976.

_____. "The Davis Island Lock and Dam." *Military Engineer* 71(July - September 1979):256-58, 338-40.

_____. "Waterways: Fourth Pillar of Defense." *Military Engineer* 72(November 1980):404-08.

_____. "The Fourth Pillar of Defense: Waterways," in Institute for Water Resources. *National Waterways Roundtable Proceedings: History* (Fort Belvoir, VA: Institute for Water Resources, U. S. Army Corps of Engineers, 1980), pp. 27-39.

_____. "The Doyle Mission to Massac, 1794." *Journal Illinois State Historical Society* 73 (Spring 1980):2-16.

_____, and Carl Becker. "History at the Bar: Navigability of the Great Miami River." *Journal of Transport History* 12(September 1991):148-68.

_____. "Rivers and Lakes." *Encyclopedia of Southern Culture*. Chapel Hill: University of North Carolina Press, 1989, pp. 357-59.

_____. "Army Engineers on the Cumberland and Tennessee." *Tennessee Historical Quarterly* 31(Summer 1972):149-69.

_____. "Muscle Shoals Canal, Tennessee River." *Military Engineer* 63(July 1971):260-65.

_____. "The Johnstown Flood Disaster." *Military Engineer* 66(January 1974):42-45.

_____. "Sword, Shovel and Compass." *Military Engineer* 68(May 1976): 159-65.

_____. "An Engineer District Mobilizes: Lessons Learned, 1941-42." *Military Engineer* 78(July 1986):366-70.

Keller, Marlin. "Fort Knox Opens New Child Care Facility." *Falls City Engineer*,
September 1988, p. 9.
"Kentucky Continues Operating River Locks." *Land, Air and Water* 6(Spring 1994):17.

"Kit of Parts." *Falls City Engineer*, April 1990, pp. 2-3.

Kreisle, William E. "Survey Design and Procedures for an Earthfill Dam and Lake." *Civil Engineering*, February 1971, pp. 43-46.

Langowski, John F., Jr. "Commentary—Life Cycle Project Management." *Falls*

City Engineer, January 1989, p. 2.

Langowski, John F., Jr. "Commentary." *Falls City Engineer*, May 1989, p. 2.

Light, Michael. "President signs Mammoth Water Resources Bill." *Sierra Club National News Report* 18(17 December 1986):4.
Lipp, Mary Jo. "Operations & Readiness Division." *Falls City Engineer*, February 1989, p. 12.

Luttrell, Cara, Katie Boyd, Charles Jones, and Gerald Courtney. "Are the Kentucky River's Locks Worth Saving?" *Frankfort State Journal Spectrum*, June 22, 1980.

Matz, John E. "The Day the Computer Fell Off the Truck." *Falls City Engineer*, March 1986, p. 6.

"McAlpine Lock Construction Project Moves Forward." *Waterways Journal* 115(17 September 2001):6-9.

"Milcon Returns." *Falls City Engineer*, February 1982, p. 1.

"New BEQs at Ft. Ben Harrison." *Falls City Engineer*, May 1986, p. 6.
Nord, Thomas. "Big, Slow Ohio River is a Commercial Superhighway." Louisville *Courier-Journal*, 16 August 1999.

"Ohio River Division Personnel Office Consolidation." *Falls City Engineer*, November 1984, p. 2.

"Ohio Valley Regional Conference." *Military Engineer* 75(January 1983):53-54.

Parrish, Charles E. "Looking Back." *Falls City Engineer,* March 988, p. 5.

_____. "Looking Back, Chanute Air Force Base." *Falls City Engineer*, July 1988, p. 7.

_____. "Looking Back, Fort Sheridan." *Falls City Engineer*, May 1988, p. 7.

_____. "Historical Overview: Louisville Engineer District." *Change of Command and Corps Day Agenda, 17 June 1994*. Louisville, KY: U.S. Army Engineer District, 1994.

_____. "Navigation Development on the Kentucky River." *The Army Engineer* 3(March-April 1993):17-20.

_____. "Building the Dam at Beattyville." *Kentucky Explorer* 11(April 1997):25.

_____, and Leland R. Johnson. "Engineering the Kentucky River: A Disastrous Debut." *Register of the Kentucky Historical Society* 95(Autumn 1997):369-94.

_____, and Leland R. Johnson. "J. Stoddard Johnston Versus the Army Engineers on "Canalization of the Kentucky River." *Filson Club History Quarterly* 72(January 1998):3-23.

_____. "Navigation Mission is Old, Continuing." *Engineer Update* (Corps of Engineers newsletter), February 2001, p. 1.

Porter, David. "Congressman Rogers Fights Eastern Kentucky's Battles in Washington." *Kentucky Explorer* 12(October 1997):32-35.

Ralston, Robert. "Construction Continues at Fort Sheridan." *Falls City Engineer*, April 1988, p. 4.

_____. "Fort Sheridan Receives Two New Barracks." *Falls City Engineer*, September 1988, p. 10. Raque, Lynn. "Partnering: Acquisition Management Complex." *Falls City Engineer*, March 1993, p. 9.

Rapp, Edward C. "Preparedness is Protection." *Engineer Update*, June 1982, p. 1.

"Readiness." *Falls City Engineer*, January 1983, p. 1.

"Sec. Page Visits District to Review Flood Situation." *Falls City Engineer*, March 1989, p. 1.

Schumann, Charles. "Louisville District Responds to Drought '88." *Falls City Engineer*, October 1988, pp. 1-12.

Shafer, Sheldon. "Over the Years, Project Transformed Riverfront." Louisville *Courier- Journal*, 21 July 2003.

Smith, Mary E. "Hard Work and Education Key to Black Success." *Falls City Engineer*, May 1986, pp. 1-12.

"Spotlight on ADP—Automatic Data Processing." *Falls City Engineer*, April 1984, p. 10.

Stevens, David Ross. "Shippingport: An Island Facing Change." Louisville *Courier- Journal*, 24 August 1975.
Taylor, Mike. "I Think That I Shall Never See." *Falls City Engineer*, May 1986, p. 11.
Taxpayers for Common Sense. "Emerging Threats: Ohio River Navigation System Expansion." *Crossroads*, March 2004, n.p.

"The Air Force Program." *Falls City Engineer*, January 1986, p. 7.

"The New Corps of Engineers." *Reorganization Wrap-Up,* No. 1, 19 Nov. 1992.

"The Swelling Rivers." *Falls City Engineer*, March 1989, p. 8-9.
Thompson, Connie. "First Women L&D Operators Training at McAlpine." *Falls City Engineer*, January 1988, pp. 1-8.

_____. "Section Nears Completion at Mill Creek." *Falls City Engineer*, June 1988, pp. 8-9.

_____. "Pond Creek Pumping Station." *Falls City Engineer*, July 1988, p. 8.

_____. "Harrison Village Renewal." *Falls City Engineer*, August 1988, pp. 1-11.
_____. "Wright Pat Hospital Enhancing Quality of Life." *Falls City Engineer,* December 1988, pp. 1-5.

_____. "Satellites Revolutionizing Survey Work." *Falls City Engineer*, February 1989, pp. 8-9. Trombley, Richard. "All You Really Wanted to Know about Green Suiters." *Falls City Engineer*, October 1987, p. 5.

_____. "Louisville District Involved in Design-Build Contracting." *Falls City Engineer*, January 1988, pp. 5-7. Turner, Kimberlee. "Joliet's Bioremediation Facility Receives Award." *The Corps Environment*, April 2002, p. 2.Turner, Mike. "Corps of Engineers Partners with Nature Conservancy." *The Corps Environment*, October 2002, p. 13.

Walz, Ralph. "Spotlight on Resource Management Office." *Falls City Engineer*, October 1984, p. 3.

"Water Resources Bill Oked." *Engineering News-Record* 217(23 October 1986):11.

Whistine, Robert. "Water Resource Projects Initiative." *Falls City Engineer*, July 1988, p. 6.
"WPAFB Medical Complex—A Complex Undertaking." *Falls City Engineer*, April 1984, pp. 2-3.

"Wright Patterson Air Force Base." *Falls City Engineer*, May 1984, pp. 1-8.

"Wright-Patterson Receives Computer Operations Center." *Falls City Engineer*, July 1988, pp. 4-9.

LOUISVILLE DISTRICT PUBLICATIONS

Harza Engineering Company. *Economic and Financial Analysis for Non-Federal Hydroelectric Development, Ohio River.* Louisville, KY: U. S. Army Engineer District, 1986.

Parrish, Charles E. *Annual Historical Report, Louisville District, U. S. Army Corps of Engineers*. Louisville, KY: U. S. Army Engineer District, 1987-2002.

Sasaki Associates, Inc. *Central Indianapolis Waterfront Concept Master Plan.* Prepared for Louisville District, U. S. Army Corps of Engineers, 1994.
United States Army Corps of Engineers, Louisville District. *Interim Survey Report on Mill Creek.* Louisville, KY: U. S. Army Engineer District, 1970.

_____. *McAlpine Locks and Dam: Report on Caving Bank Conditions.* Louisville, KY: U. S. Army Engineer District, 1973.

_____. *Flood Plain Information: Ohio River, Jefferson County, Kentucky.* Louisville,
KY: U. S. Army Engineer District, 1973.
_____. *Final Environmental Impact Statement: Mill Creek Local Protection Project, Cincinnati, Ohio*. Louisville, KY: U. S. Army Engineer District, 1974.

_____. *McAlpine Lock and Dam Study Report Revised.* Louisville, KY: U. S. Army Engineer District, 1979.

_____. *Kentucky River and Tributaries, Upper Kentucky River Navigation Project, Situation Report.* 2 vols. Louisville, KY: U. S. Army Engineer District, 1980.

_____. *McAlpine Interim Study Reconnaissance Report.* Louisville, KY: U.

S. Army Engineer District, 1984.

_____. *Falls of the Ohio Master Plan Design Memorandum No. 1.* Louisville, KY: U. S. Army Engineer District, 1984.

_____. *Fairfield, Ohio: Local Flood Protection Project, Pleasant Run, Reevaluation Report.* Louisville, KY: U. S. Army Engineer District, 1985.

_____. *McAlpine Locks and Dam: Tainter Gate Operation Study.* Louisville, KY: U. S. Army Engineer District, 1986.

_____. *Ohio River Main Stem Study: McAlpine Interim Navigation Feasibility Report.* 4 vols. Louisville, KY: U. S. Army Engineer District, 1986.

_____. *Master Plan, FY 88-92.* Louisville, KY: U. S. Army Engineer District, 1987.

_____. *Report on Civil Works Activities, 1987.* Louisville, KY: U. S. Army Engineer District, 1988.

_____. *Drought '88: The Long Dry Summer.* Louisville, KY: U. S. Army Engineer District, 1989.

_____. *Implementing Procedures for Life Cycle Project Management System in Louisville District.* Louisville, KY: U.S. Army Engineer District, 1989.

_____. *Interim Reconnaissance Report: Duck Creek, Little Duck Creek.* Louisville, KY: U. S. Army Engineer District, 1989.

_____. *Olmsted Locks and Dam: General Design Memorandum.* Louisville, KY: U. S. Army Engineer District, 1989.

_____. *Project Management Plan: Olmsted Locks and Dam.* Louisville, KY: U. S. Army Engineer District, 1990.

_____. *Initial Project Management Plan: Uniontown Locks and Dam.* Louisville, KY: U. S. Army Engineer District, 1991.

_____. *Environmental Assessment: Closure of Pontiac Storage Activity, Pontiac, Michigan.* Louisville, KY: U. S. Army Engineer District, 1991.

_____. *Interim Reconnaissance Report: Salt River Basin, Kentucky.*

Louisville, KY: U.S. Army Engineer District, 1991.

_____. *Ohio River Mainstem Navigation Study Interim Reconnaissance Report, Uniontown Locks and Dam.* Louisville, KY: U. S. Army Engineer District, 1991.

_____. *Proposed Cutoff Wall: Special Study.* Louisville, KY: U. S. Army Engineer District, 1992.

_____. *Initial Assessment Report: Owl Creek, West Carrollton, Ohio.* Louisville, KY: U. S. Army Engineer District, 1992.

_____. *Final Environmental Impact Statement Supplement for the Replacement of Locks and Dams 52 and 53.* Louisville, KY: U. S. Army Engineer District, 1993

_____. *Relocations Feature Design for Salyersville, Kentucky.* Louisville, KY: U. S. Army Engineer District, 1994.

_____. *Project Maps and Data Sheets.* 3 vols. Louisville, KY: U. S. Army Engineer District, 1995.

_____. *Interim Feasibility Report: Pond Creek Flood Protection Project.* Louisville, KY: U. S. Army Engineer District, 1994.

_____. *Reconnaissance Report: Brevoort Levee, Indiana.* Louisville, KY: U. S. Army Engineer District, 1995.

_____. *Detailed Project Report: Beech Fork, Bardstown, Kentucky.* Louisville, KY: U. S. Army Engineer District, 1996.

_____. *Ohio River Mainstem Study: Workshop Documentation, March 18-22 1996.* Louisville, KY: U. S. Army Engineer District, 1996.

_____. *Olmsted Prototype Hydraulically Operated Navigable Pass Wicket Dam Final Report.* Louisville, KY: U. S. Army Engineer District, 1997.

_____. *Final Environmental Impact Statement: Ft. Campbell, Kentucky, Rail Connector.* Louisville, KY: U. S. Army Engineer District, 1997.

_____. *Final Feasibility Report: Beargrass Creek Basin.* Louisville, KY: U. S. Army Engineer District, 1997.

_____. *Winter Flood '97: After Action Report.* Louisville, KY: U. S. Army Engineer District, 1997.

_____. *Detailed Project Report: Rolling Fork River, Lebanon Junction, Kentucky.* Louisville, KY: U. S. Army Engineer District, 1998.

_____. *Olmsted Locks and Dam: Design Memorandum No. 8, Dam Construction, Feature Design Memorandum.* Louisville, KY: U. S. Army Engineer District, 1999.

_____. *Interim Feasibility Report: J. T. Myers and Greenup Locks Improvement.* Louisville, KY: U. S. Army Engineer District, 1999.

_____. *Ohio River Ecosystem Restoration: Integrated Decision Document.* Louisville, KY: U. S. Army Engineer District, 2000.

_____. *Mill Creek, Ohio: Bridging Document.* Louisville, KY: U. S. Army Engineer District, 2001.

GOVERNMENT PUBLICATIONS

Louisville, KY. Metropolitan Sewer District. *50 Years of Service: A History of the First Half-Century of the Louisville and Jefferson County Metropolitan Sewer District.* Louisville, KY: Metropolitan Sewer District, 1998.

Kentucky. Department of Natural Resources. Division of Water Resources. *The Floods of April.* Frankfort: Division of Water Resources, 1977.

Kentucky River Authority. *Annual Report, 1995.* Frankfort: Kentucky River Authority, 1996.

Kentucky River Task Force. *Final Report of the Kentucky River Task Force.* Frankfort:

Legislative Research Commission, 1993.

National Park Service, *The Falls of the Ohio: Study of Alternatives.* National

Park Service Midwestern Region, 1981.
Planning Assistance Team. *Wright-Patterson AFB, OH.* Dayton, OH: Planning Assistance Team, 1989.

United States Department of Justice. *Progress, Property and Just Compensation.* Washington, DC: Government Printing Office, 1963.
United States Department of the Interior. National Park Service. *The Falls of the Ohio: Study of Alternatives*. National Park Service Midwestern Region, 1981.

United States Army Corps of Engineers. *Annual Report of the Chief of Engineers.* Serial set. Washington, DC: Government Printing Office, 1867-1994.

United States Army Corps of Engineers. *Information Systems Planning Implementation. Report: A Prescription for Change*. Washington, DC: Office of the Chief of Engineers, 1985.

United States Army Corps of Engineers. History Office. *Water Resources People and Issues: An Interview with William R. Gianelli*. Alexandria, VA: History Office EP870-1-24, 1985.

United States Army Corps of Engineers. *Ready Today: A Corps Employees Guide to Mobilization.* Washington, DC: Engineer Publication 500-1-4, May 1982.

United States Army Corps of Engineers, Office of Appalachian Studies. *Development of Water Resources in Appalachia.* 26 vols. Cincinnati: U. S. Army Engineer Division, 1969.

United States Army Corps of Engineers, Great Lakes and Ohio River Division. *Great Lakes and Ohio River Navigation Systems Commerce Report, 2002.* Huntington, WV: U. S. Army Engineer Division, 2003.

United States Army Corps of Engineers. History Office. *The History of the U. S. Army Corps of Engineers.* Washington, DC: Office of the Chief of Engineers, 1998.

United States Army Corps of Engineers. History Office. *Engineer Memoirs: Major General Richard S. Kem.* Alexandria, VA: History Office EP870-1-65, 2002.

United States Army Corps of Engineers. History Office. *Engineer Memoirs: Lieutenant General John W. Morris*. Alexandria, VA: EP 870-1-63, 2000.
United States Army Corps of Engineers, Huntington District. *Great Lakes and Ohio RiverNavigation Systems Commerce Report, 2002.* Cincinnati, OH: Great

Lakes and Ohio River Division, 2003.

United States Army Corps of Engineers, Ohio River Division. *Ohio River Basin Erosion Study.* Cincinnati, OH: U. S. Army Engineer Division, 1977.

_____. *Information Systems Plan.* Cincinnati, OH: U. S. Army Engineer Division, 1985.

_____. *Report of Ohio River Division Lock Closure Study Committee.* Cincinnati, OH: U. S. Army Engineer Division, 1990.

University of Kentucky, Department of Anthropology. *Excavations at Four Archaic Sites in the Lower Ohio Valley, Jefferson County, Kentucky.* 2 vols. Lexington, KY: University of Kentucky, 1979.

WPAFB Historic Preservation Officer. *Wright-Patterson Air Force Base: Historic/Cultural Resources Report.* Dayton, OH: Base Preservation Officer, 1990.

UNPUBLISHED MANUSCRIPTS

Ball, Donald B., and Hemberger, Jan Marie. "Results of an Archaeological Recnnaissance of Locks and Dams No. 1-4 on the Kentucky River, Kentucky." Louisville: U.S. Army Engineer District, Planning Division, 1987.

Brooks, Carolyn. "Life along the Ohio: Recreational uses of the Ohio River in Jefferson County, Kentucky." 1997 manuscript. Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

"Design/Build: Olmsted Miter Gate Storage Yard at Smithland L&D." Power point manuscript, Engineering Division files, Louisville, KY, 2002.

Feger, Kathy. "Finite Element Analysis of Concrete Lock Wall Monoliths, McAlpine Lock Replacement Project." Power point manuscript, Engineering Division files, Louisville, KY, 2002.

Flaherty, Timothy L. "Patoka Lake Seepage Remediation." Manuscript, Engineering Division files, Louisville, KY, 2001.

Foster, Kevin J. "Mayor Andrew Broaddus Life-Saving Station: National Historic Landmark Study." 1989 draft. Public Affairs Office, Louisville Engineer District, Louisville, KY

Henn, Kenneth E. "Mississinewa Dam Settlement Investigation and Remediation." Manuscript, Engineering Division files, Louisville, KY, 2001.

Kreisle, William E. "History of the Navigation Improvements at the Falls of the Ohio." Draft, 1987. Historical Files, Louisville District, Louisville, KY.

O'Leary, Neill. "Risk-Based Analysis of Beargrass Creek, KY." Internet publication atwww.hec.usace.army.mil/publications.

Reuss, Martin. "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986." Draft. Alexandria, VA: Institute for Water Resources 91-PS-1, 1991.

Schaaf, David M. "Ohio River Mainstem Navigation System." Power point manuscript, Engineering Division files, Louisville, KY.

Schaaf, David M., Patev, Robert C., and Randy L. Jones. "Markland Locks and Dam Major Rehabilitation." Power point manuscript, 2001 Engineering Division files, Louisville, KY.

Schaaf, David M., and Robert C. Patev. "Engineering Reliability and Economic Analysis of Major Lock Components." Power point manuscript, 2002, Engineering Division files, Louisville, KY.

Schaefer, Jeffrey A., and Troy S. O'Neal. "Approach Wall Foundations: Olmsted Locks and Dam Project." Manuscript report, 2001, Engineering Division files, Louisville, KY.

Schipp, Richard J. "History of the Olmsted Locks Dam Project." Manuscript, 2001. Olmsted Resident Office, Construction Division, Olmsted, IL.

Schultz, Rick W. "Olmsted Locks Wash Down Barge." Power point manuscript, 2002,Engineering Division files, Louisville, KY.

_____. "Results of the Olmsted Hydraulic Operated Wicket Dam." Manuscript, 2002,Engineering Division Files, Louisville, KY.

Ward, James A. "Drought 88 After Action Report." Draft report. Cincinnati, OH: U. S. Army Engineer Division, 1989.

Werncke, Greg. "Miter Gate Changeout System." Power point manuscript, 2001, Engineering Division files, Louisville, KY.

Werncke, Greg, and Dale Berner. "Tainter Gate Lower Dam Stilling Basin Dewatering Bulkhead." Power point manuscript, 2001, Engineering Division files, Louisville, KY.

INTERVIEWS

Basham, Donald. Interviewed by Charles Parrish, 6 August 1998, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Beatty, David. Interviewed by Charles Parrish, 5 December 1997, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Bellis, Oren. Interviewed by Charles Parrish and Leland Johnson, 6 June 1986, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Bennett, Virginia. Interviewed by Charles Parrish, 29 November 1995. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Besser, Kenneth. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Bleidt, John. Interviewed by Charles Parrish and Leland Johnson, 17 July 1990, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Bohrer, Max. Interviewed by Charles Parrish and Leland Johnson, 30 July 1991. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Calnan, Michael. Interviewed by Charles Parrish, 8 July 1992. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Campbell, William. Interviewed by Charles Parrish, 26 June 1995. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Chisholm, Gary. Interviewed by Leland Johnson, 30 April 2004, Louisville, KY.

Cook, James. Address to Nashville District Retirees, 17 March 2004, Nashville, TN.

Dale, David. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Dale, David. Interviewed by Leland Johnson, 30 April 2004, Louisville, KY.

Decker, Charles. Interviewed by Charles Parrish and Leland Johnson, 20 April 1987, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Devine, Lee Anne. Interviewed by Leland Johnson, 4 March 2004, Louisville, KY.

Dowell, Eugene A. Interviewed by Leland Johnson, 4 March 2004, Louisville, KY.

Edelman, Gerard. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Eisenbeis, Katie. Interviewed by Charles Parrish, 1 August 1996, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Flickner, George. Interviewed by Leland Johnson, 30 April 2004, Louisville, KY.

Frick, Peter. Interviewed by Leland Johnson, 5 March 2004, Louisville, KY.

Fuller, Robert. Interviewed by Leland Johnson, 5 March 2004, Louisville, KY.

Gatton, Delbert. Interviewed by Charles Parrish and Leland Johnson, 31 July 1991, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Gilbertson, Rosemary. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Gilley, Norman. Interviewed by Leland Johnson, 29 June 1983, Louisville, KY
Grant, Fred. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Grant, Fred. Interviewed by Leland Johnson, 30 April 2004, Louisville, KY.

Grieco, Ralph. Interviewed by Charles Parrish, 8 July 1996, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Haddaway, Charles M. III. Interviewed by Leland Johnson, 6 August 2004, Louisville, KY.

Hall, Cathy. Interviewed by Leland Johnson, 30 June 2004, Louisville, KY.

Hammer, Doyle. Interviewed by Charles Parrish and Leland Johnson, 12 July 1989, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Harback, Herbert. Interviewed by Charles Parrish, 6 May 1994. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Hayhurst, George. Interviewed by Charles Parrish, 23 January 1996. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Holmes, Dale. Interviewed by Leland Johnson, 29 June 2004, Louisville, KY.

Humphreys, Robert R. Interviewed by Leland Johnson, 24 May 1983, Louisville, KY.

Jageman, George J., Jr. Interviewed by Leland Johnson, 6 August 2004, Louisville, KY.

Jenkins, Neal. Interviewed by Leland Johnson, 26 Aug. 1983, Louisville, KY.
Jenkins, Neal. Interviewed by Charles Parrish, 17 December 1997. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Johnson, Jeff. Interviewed by Charles Parrish, 30 December 1997. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Karlen, Roy. Interviewed by Charles Parrish and Leland Johnson, 18 July 1990, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Kem, Richard S. Interviewed by Leland Johnson, 5 October1982, Pittsburgh, PA.

Klinstiver, David. Interviewed by Leland Johnson, 6 August 2004, Louisville, KY.

Langowski, John F. Interviewed by Leland Johnson and Charles Parrish, 3 May 1989, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Lee, Dwayne G. Interviewed by Charles Parrish and Leland Johnson, 5 June 1986, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Lewis, Marilyn. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Louden, Harry. Interviewed by Charles Parrish, 15 March 1995. Cincinnati, OH. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Loveland, Preston. Interviewed by Charles Parrish and Leland Johnson, 17 July 1990. Jeffersonville, IN. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Matz, John. Interviewed by Charles Parrish and Leland Johnson, 15 June 1992. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Mitchell, James. Interviewed by Leland Johnson and Charles Parrish, 15 June 1992. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Morgan, Fred. Interviewed by Leland Johnson and Charles Parrish, 11 July 1989, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Murphy, Linda. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Murray, Bruce. Address to Society of American Military Engineers, 22 January 2004, Louisville, KY.

Nunn, Ann. Interviewed by Leland Johnson, 29 June 2004, Louisville, KY.

Oliver, Robert. Interviewed by Leland Johnson and Charles Parrish, 16 December 1988. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Page, Robert. Interviewed by Martin Reuss, 3 January 1991. Washington, DC. Research Collection, History Office, U. S. Army Corps of Engineers, Alexandria, VA.

Peixotto, David. Interviewed by Ralph Waltz and Charles Parrish, 27 December 1991. Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Pessalano, Robert. Interviewed by Leland Johnson, 29 June 2004, Louisville, KY.

Presser, Howard. Interviewed by Charles Parrish, 14 December 1992. Uniontown, IN. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Rager, Fred E. Interviewed by Charles Parrish and Leland Johnson, 6 June 1986, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Rager, Steven W. Interviewed by Leland Johnson. 5 March 2004, Louisville, KY.

Rudd, Robert. Interviewed by Leland Johnson, 29 June 2004, Louisville, KY.

Serke, Gary. Interviewed by Leland Johnson, 30 April 2004, Louisville, KY.

St. Ledger, Hershel. Interviewed by Charles Parrish, 20 December 1994, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Shelton, Denver. Interviewed by Charles Parrish, 7 December 1998, Olmsted, IL. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Shelton, K. Doug, Jr. Interviewed by Leland Johnson, 4 March 2004, Louisville, KY.

Slockbower, Robert. Interviewed by Charles Parrish and Jon Fleshman, 4 June 2002, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Smallwood, Robert S. Interviewed by Leland Johnson, 4 March 2004, Louisville, KY.

Spear, Harry. Interviewed by Charles Parrish, 15 July 1999, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Stoll, C. W. Interviewed by Charles Parrish and Leland Johnson, 22 April 1987, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Theobald, Joseph. Interviewed by Leland Johnson, 8 February 1983, Louisville, KY

Thomas, James. Interviewed by Leland Johnson and Charles Parrish, 16 June 1992, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Van Hoff, Robert. Interviewed by Leland Johnson, 4 March 2004, Louisville, KY.

Vanzant, Leonard. Interviewed by Leland Johnson and Charles Parrish, 31 July 1991, Louisville, KY. Oral History Collection, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

Waller, Ronald C. Interviewed by Leland Johnson, 5 March 2004, Louisville, KY.

Williams, Roger. Interviewed by Leland Johnson, 30 June 2004, Louisville, KY.

Winslow, Caroll. Interviewed by Leland Johnson, 5 August 2004, Louisville, KY.

CONGRESSIONAL DOCUMENTS

U. S., Congress, House. *Water Resources Development Act of 1986.* H. Report. No. 99-1013, 99th Cong., 2d Sess., 1986.

U. S., Congress, House. *Disposition of Kentucky River Locks and Dams*. House Document No. 99-49, 99th Congress, 1st Session, 1990.

U. S. Congress, House, Committee on Appropriations. *Energy and Water Development Appropriations for 1987,* 99th Cong., 2d Sess., 1986.

ARCHIVAL SOURCES

Alexandria, VA. U. S. Army Corps of Engineers. Office of History. Historical Collection.Chicago, IL. National Archives. Great Lakes Federal Regional Records Center. Record Group 77. Records of the Office of the Chief of Engineers.

Dayton, OH. Federal Regional Records Center. Record Group 77. Records of the Office of the Chief of Engineers.

East Point, GA. Southeastern Federal Regional Records Center. Louisville District Holding Records.
Cincinnati, OH. Ohio River Division Historical Files. U. S. Army Engineer Division.

_____. Hamilton County Public Library. Inland Rivers Library.
Louisville, KY. Louisville District Historical Files. U. S. Army Engineer District.
_____. Louisville District Planning Branch Library. U. S. Army Engineer District. Washington, DC. National Archives. Record Group 77. Records of the Office of the Chief of Engineers.