HISTORY OF THE SOUTH ATLANTIC DIVISION OF THE US ARMY CORPS OF ENGINEERS, 1945-2011



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Rob Holland worked tirelessly to turn General Walsh's ideas into reality. Rob spent many hours discussing ideas with us to help develop the themes necessary to organize and understand the missions and operations of the South Atlantic Division.

We also want to acknowledge the tremendous help we received from current and retired Corps officials, both military and civilian. We interviewed Generals and Colonels, and senior civilian officials from SAD as well as from the districts. All of these individuals were unfailingly generous with their time and helpful in explaining many of the complex programs administered by the agency. Their recorded and transcribed interviews are now part of the historical record of SAD.

PERSONS INTERVIEWED FOR THIS WORK

Division Engineers
Gen. Philip Anderson
Gen. Robert Bunker
Gen. Ernest Edgar
Gen. Carroll LeTellier
Gen. Ralph Locurcio
Gen. Peter Madsen
Gen. John Sobke
Gen. Michael J. Walsh
Gen. Todd Semonite

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Sharon Haggott-Wilmington District-Project Manager-Wilmington Harbor Project
Wayne Bissette-Wilmington District- Project Manager-Beach Erosion and also knowledge of Wilmington Harbor Project
Charles Harbin-Charleston District-Project Manager for Savannah River Site
James Hadden-Charleston District-Project Manager-Regulatory Special Projects
David Hubbard-Charleston District-Project Manager- Cooper River Rediversion Canal
Lincoln Blake-Charleston District-Project Manager-Chas Harbor Projects
Col. C. Hilton Dunn-Mobile District-District Engineer
Doug Nestor-Mobile District-DTOS Director of Operations

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FOREWORD

The U.S. Army Corps of Engineers South Atlantic Division was formally established in 1929 with headquarters in Richmond, Virginia, but Corps of Engineers service to the southeastern United States extends back to the founding of the nation. This history covers the modern period, from the end of World War II to the end of 2010.

This period has been an extremely active one for the South Atlantic Division. It was legislation passed after the war that jump-started the rapid growth and modernization of the southeastern region. The massive multiple-purpose reservoirs that provide hydropower, flood risk reduction, navigation, water supply and recreation to the people of the region were built in the 1950s and '60s, and contributed significantly to the economic development of the southeast. At the same time, the South Atlantic Division was providing design, construction, and real estate support to the high concentration of military facilities in the region.

The post-war period also encompasses the story of the rise of environmental consciousness in the nation and the region, and the changing perceptions and policies as the public gave increasing credence to environmental concerns. From water resources development aimed primarily at promoting growth, the nation and the Corps moved to a more balanced philosophy that includes environmental values and benefits. The Kissimmee River Project and Everglades Restoration are two of the groundbreaking environmental projects in the South Atlantic Division. Military projects also share in this sea-change, with most construction shaped by a commitment to sustainability and green characteristics.

Now, as the South Atlantic Division moves confidently toward the new challenges of the twenty-first century, we can build on the successes chronicled in this volume to continue providing world-class engineering services to the Army and Air Force and to the people of the southeast.

Major General Todd T. Semonite
Commander, South Atlantic Division
April 2012

CHAPTER 1 – THE BIG PICTURE

At the end of the year 2010, several generations of South Atlantic Division engineers, environmental planners, and senior managers could look back with great pride at over a half century of accomplishments. The South Atlantic Division (SAD) of the US Army Corps of Engineers coordinates five well-established Corps districts in the southeastern states. Between 1945 and 2010, SAD and its districts designed and constructed Army posts and Air Force bases throughout the Southeast. They designed and built unique facilities for NASA, including assembly and launch complexes at Cape Canaveral. SAD also built much of the South's modern non-military infrastructure during this period. These civil works produced electrical power, provided water for cities, farming, and industry, controlled floods, and created jobs in many sectors of the South's economy. This history tells the story of the South Atlantic Division and its role in serving the citizens of the South.

How did the South Atlantic Division of the Corps manage to accomplish all this construction? Assembling, directing, funding, and contracting thousands of engineers of many kinds, scientists, and managers is a massive job. How did SAD carry this out? What kinds of problems did they have to resolve, and what issues will SAD need to face in the future?

This history of the South Atlantic Division (1945-2011) covers an important period in American history—the emergence of the Modern South from the New South. The New South was the era of the region's reorganization and slow rebuilding after the Civil War. In the 1930s, Southern members of Congress, through the seniority system, strengthened their political power. They encouraged Franklin D. Roosevelt's administration to increase federal aid to the South. SAD was an agency perfectly positioned to implement federal grants and development projects due to their long history with military engineering, as well as flood protection, navigation improvements, and harbor maintenance.

The twentieth century, especially after the 1930s, was a period of extensive growth for the South. The region transitioned from an agriculturally-based 'backwards' region to an economic and political powerhouse. One of the major stimuli for this growth was the influx of federal money. Historian David R. Goldfield reports that during World War I, the federal government chose Southern cities and their environs as likely locations for shipyards and military bases. These installations were often temporary in nature, but were an early illustration of the influx of federal money that would intensify during the New Deal, World War II, and the Cold War.[1]

The massive federal expenditures for civil works of the New Deal, as well as the military buildup during World War II, truly altered the economy of the South. Between 1933 and 1939, New Deal agencies sent nearly $2 billion to the Southern states. New schools, parks, government buildings, as well as dams, lakes, and rural electrification were the results. The relaxed pace of life began to change. Unemployed mill workers and struggling sharecropper farmers were thankful for the government jobs. Historian Carroll Van West summarized the New Dealers' goal for the South was to "modernize the public improvements as they also reformed citizens to function better in a modern world."[2] Modernization began to seem possible, and World War II moved the South even further economically.

OVERVIEW OF THE ORGANIZATION OF THE CORPS OF ENGINEERS AND SAD

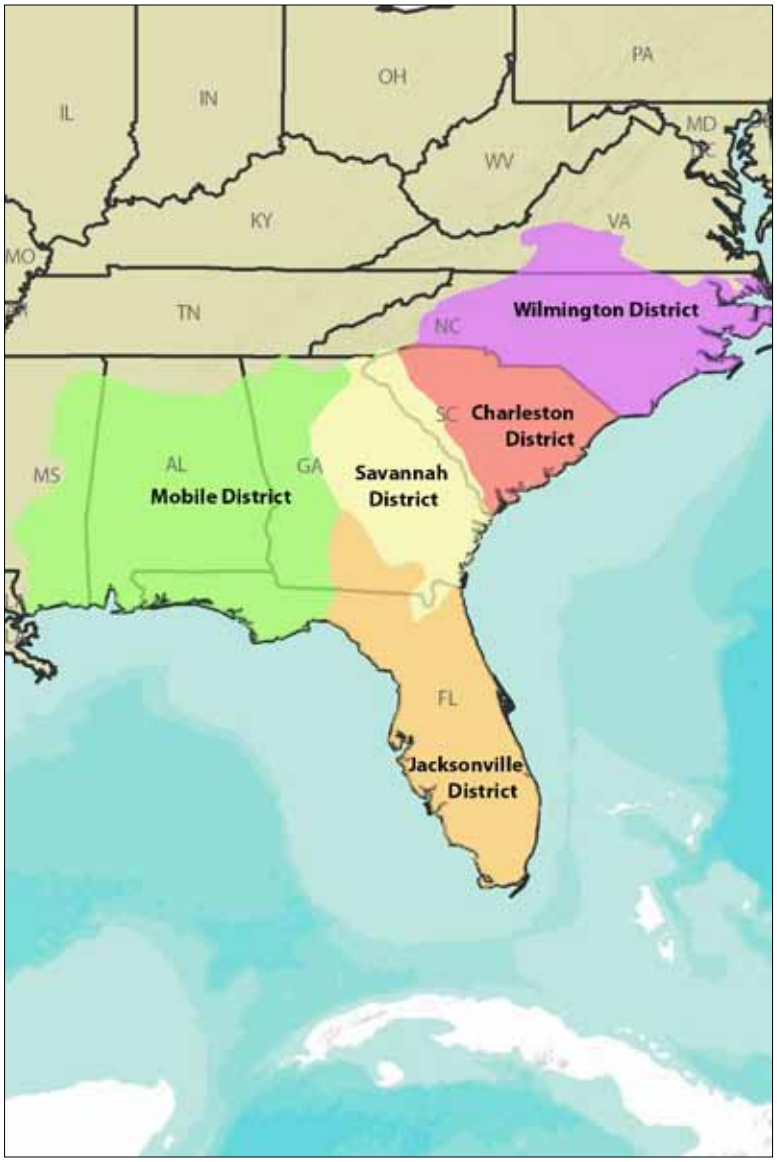
The Corps of Engineers is the primary engineering branch of the US Army. The Corps traces its origins to the Revolutionary War, when the Continental Congress organized the Army and provided for a Chief Engineer and two assistants to supervise the design and construction of batteries and fortifications for General Washington.[3] Today the Corps contains nine administrative, regional subdivisions (eight divisions and one provisional division). Forty-two geographically-related districts comprise the various divisions.[4] The Corps names the districts for the city in which the district office is located, and typically these cities developed at a significant harbor or along a major waterway. There is no standard number of districts within a division. The divisions also sometimes manage special project offices and technical centers. The South Atlantic Division consists of five Southeastern districts: Wilmington, Charleston, Savannah, Jacksonville, and Mobile. Other districts have been created within SAD, and later closed; and some districts have been moved in and later out of SAD (or out and later back in).

Divisions of Corps of Engineers in the lower 48 states.

The Corps of Engineers was established by the Continental Congress to assist General Washington's army. It remains today as part of the US Army. It is a decentralized Army agency, and has historically emphasized its districts over the divisional (regional) offices and national headquarters. This district-level emphasis, unusual for a military organization, allows each district to respond flexibly and efficiently to problems at the local level.[5] An added benefit of this decentralization is that the districts are allowed to maintain a closer

dialogue with citizens of the area and issues important to them.[6] A history of SAD thus involves detailed study of the districts to understand their central governing entity.[7]

Each district is responsible for all Corps of Engineers civil work within its boundaries. Watersheds near the district city usually define a district's civil works boundaries, but there are exceptions. US Territories Puerto Rico and the Virgin Islands are serviced by the Jacksonville District, and since SAD has been also tasked with international responsibilities, it has assigned international assistance projects and programs to two of its districts. Mobile District has responsibility for all civil work in Central and South America except Mexico. Jacksonville District has responsibility for international assistance programs in the Caribbean.



SAD districts cover parts of eight southeastern states.

Civil works and especally military support boundaries of the districts have been adjusted by SAD throughout the post-World War II period. Changes in these boundaries were made for efficiency in building strong cadres of planners, engineers, and construction managers. Also considered strongly, however, are needs to balance work load among the five politically-anchored districts. Programs for design and construction of military facilities have also been focused by SAD to maximize experience and expertise. Instead of each of the SAD districts having a military support area, two districts, Mobile and Savannah, have now been assigned responsibility for military construction at posts and bases in the Southeast. Mobile manages Army and Air Force construction in Mississippi, Tennessee, Florida, Alabama, and all military construction in Central and South America, as well as in the Caribbean. The Savannah District has similar responsibilities in Georgia, South Carolina, and North Carolina. In recent years, some military work has been assigned to the division's two smallest civil works districts, Charleston and Wilmington. Accomplished under Major General Todd Semonite, this was intended to help balance workload among the districts.

As regulatory programs have developed over the last thirty years, another set of boundaries have been defined. In SAD, each of the district offices considers Clean Water Act permit applications within its state boundaries, with a few exceptions.

In addition to civil work and military construction at lands and bases within its districts, SAD also offers engineering, construction, water management, and emergency management support to a variety of other in-country and overseas US agencies, international organizations, and agencies of other nations under specific treaties and assistance programs. This program was known as "Support For Others" or SFO, and later as Interagency and International Services (IIS). The Division's IIS projects have been undertaken in Latin America, the Caribbean, and the Middle East as international requirements have arisen. One of the major IIS missions is disaster relief and emergency management. SAD and Mobile District direct the Corps' Emergency Management Office for the eastern US. SAD was an early leader in coordinating emergency services among its districts. Its management system was used as the model for the national program of cooperation and support for the Federal Emergency Management Agency. [8]

PREVIOUS HISTORIES OF SAD

No work of history stands completely alone. The historian normally builds on what others have done, and then carries the story forward. Here, we are building on three manuscript histories of the South Atlantic Division prepared since the 1970s. In the mid-1970s, Edgar Maynard assembled the first "South Atlantic Division History."[9] Although he was not a professional historian, Maynard served as Controller of the Division for more than 30 years, and was thus in an excellent position to observe directly many of the changes from 1940 through 1970. Maynard's manuscript contains many details. In some ways, it is more an extended organizational memoir in style than a formal historic treatment with consideration of the contemporary context and management patterns in the nation, the Army, the Corps. One of the major technical issues with Maynard's document is that it contains no footnotes, making it very difficult for a historian to reexamine the primary sources to verify and explore further Maynard's observations. Even with these limitations, Maynard's history is a valuable document. It has archived numerous tables, charts, and photographs. Maynard gives a great deal of information about the inner workings of the Division, including leadership personalities and decision-making considerations.

Edgar Maynard wrote the first SAD history, but it was never published. His keen insight and observation of events helped later historians complete the task of chronicling the current history (USACE photo).

Soon after Maynard's work, L. Morgan and Gene C. Brown developed a second manuscript history that relied heavily on Maynard's work, actually using several portions of Maynard's manuscript verbatim. The Morgan-Brown document, however, also lacked a professional historian's critical view of the events or the placing of them in a larger context.

A third history was written by Lorne McWatters in the late 1980s, and was a completely new manuscript. As a trained historian, he

brought to the document a larger view of the events and placed them in a larger context. McWatters' work is particularly good at providing a Southern regional context. McWatters did utilize Maynard's document, but also conducted primary research and documented his sources. His work was written for a general audience, but it is professionally sound. McWatters did not have the opportunity to complete his manuscript, and the narrative ends with a discussion of civil works after World War II.

METHODS

In compiling this history of the South Atlantic Division, we have focused on SAD relationships with Corps headquarters, with other Corps divisions, and with the SAD districts, as well as with a host of other political and private entities. We reviewed existing literature, including the three unpublished draft manuscripts about SAD and several district histories. We conducted primary research at the division and at the districts where the majority of files related to the projects are located. We also visited the Corps of Engineers Office of History in Washington, D.C. to examine materials there, and to discuss the project with experienced Corps historians. Finally, we conducted research in Record Groups 77 and 338 at the National Archives Records Administration office in Morrow, Georgia.

Many of the important leaders of the South Atlantic Division are retired and still live in the region. Their observations and knowledge of SAD history were invaluable. We conducted 35 interviews with past SAD commanders and other military officers and non-military employees of the Division or its various districts. These interviews focused on specific periods in the careers of active duty of now retired engineer officers or civilian employees, and followed procedures outlined in *Oral History: Techniques and Procedures*.[10] These were particularly helpful in supplying perspectives not always present in the archival documentation. The oral histories were meant to add meaning and depth to issues in the narrative, but not take the place of archival research. Portions of these oral interviews have been extracted as "In Their Own Words" sidebars within the chapters.

THEMES FOR THIS HISTORY

Four major themes, Military Support, Civil Works, Environmental Protection and Restoration, and Management Leadership, form the framework for this story of the South Atlantic Division over the last 50 years. Within each of these topical areas there were major challenges for the Division and its districts between 1945 and 2010. Accomplishments dominate the story, but there are missteps in each area. We learn from historical description of the accomplishments of course, but we need also to study the processes that did not succeed so well. These themes are presented briefly below. Succeeding chapters describe in more detail the programs and the role of the South Atlantic Division.

The South Atlantic Division and its districts carried out major Cold War roles in supporting Army and Air Force facilities - engineering, construction management, and environmental review. SAD coordinated and supervised this support. Construction of military facilities had almost stopped toward the end of World War II, but the sudden

United States entry into the Korean Conflict led to rapid rehabilitation of mothballed and closed bases, and to new construction. After the Korean cease fire, Cold War tensions forced additional military base construction. In the period of 1945-1950, the Division and its districts together appropriated an average of about $21 million per year for military support. This average increased to about $150 million per year through the 1950s and $200 million per year in the 1960s. Military design and construction supervision has been the largest sector of work for the Division since World War II, and this support has continued with the new Army and Air Force missions of the post-Cold War period.

Support for the United States space program was also an important and successful program for the South Atlantic Division. Jacksonville District designed and oversaw early 1960s construction at Cape Canaveral, Florida. To meet the demanding needs of the National Aeronautics and Space Administration (NASA) for the Titan III and Apollo programs, the South Atlantic Division formed the Canaveral District to work closely with NASA and the Air Force. The Canaveral District was closed at the end of the Apollo program, with remaining work being managed within the Mobile District. The South Atlantic Division also managed Mobile District's very considerable work at the Mississippi Test Facility for rocket engine evaluations, the rocket testing facilities at Redstone, Alabama, and at Arnold Engineering and Development Center at Tullahoma, Tennessee. SAD helped obtain this engineering and construction work for Mobile and the other districts, and helped guide the programs through to completion.

South Atlantic Division reservoirs provide flood control and thus protection of farmlands, towns, and cities. Hydroelectric facilities at the dam sites supply electricity to power homes and industries. Significant boating, fishing, and other recreation activities are enjoyed by the citizens. Canals, locks, and harbor dredging make water transportation go and economies grow. The water supplies provided by SAD reservoirs allowed the industrial, commercial, and urban development of the South since World War II and have increasing importance today.

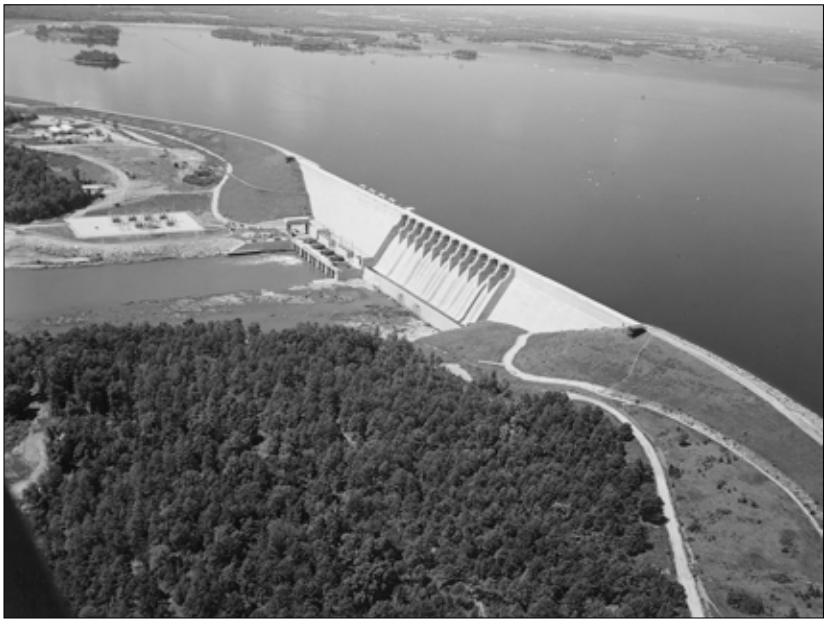
Civil works water projects grew steadily during the five years after World War II. This growth accelerated during the 1950s and 1960s. The largest water project in SAD, the Tennessee-Tombigbee Waterway, started in the 1970s. This massive project turned out to be one of the last major civil works project for the South Atlantic Division; economic and environmental concerns that had been emerging since the 1960s focused on this project.

Benefit-cost issues became a concern in two ways. First, the sites along major rivers in the South with the best opportunity for benefit (flood control, hydroelectric generation, water supply, and navigation improvement) had already been developed by the mid-1970s. The remaining potential sites for dams and waterway improvements had fewer potential benefits and greater development costs in engineering, construction, and operation.

Adverse effects to the environment resulting from the development of proposed water projects began to be discussed in the 1960s. Issues grew in the 1970s as citizens became more aware of the impacts of past projects. Environmental effects began to be seen as project costs, further tipping the benefit-cost ratios against new development. While operation of the large projects continues, and is a very significant role for SAD and the districts, development of new facilities is rare. Several of the largest SAD engineering and

construction undertakings started in the last 20 years have been designed to repair and restore unintended environmental damages related to past projects of the Corps, state authorities, and other organizations.

The Corps began overseeing navigation issues for the nation's rivers and harbors in 1899.[11] Now, under the Clean Water Act, Corps districts regulate all actions (except agriculture) that might impact the waters of the US, including wetlands on private property.[12] SAD has worked closely with districts to acquire and develop staff with environmental expertise, and to produce clear protocols to protect and enhance waters and marshlands in the context of considering overall public benefit. Individuals and organizations that wish to develop in, or in some way affect, wetlands or waterways, now must obtain a permit from the appropriate Corps district. Protection and enhancement of clean water and wetlands, while considering other national policies, now form a major mission of the Corps and the South Atlantic Division.



The Hartwell Dam and Reservoir was the first of three large multipurpose projects completed by SAD districts in the post-World War II period on the Savannah River (USACE photo).

Over the last 30 years, the Corps has developed a number of programs nationwide to assist communities in emergencies. SAD districts maintain equipment and trained staff to track storms and to respond to damage from hurricanes and other disasters, including the September 11, 2001 terrorist attacks in New York City, Washington, DC, and rural Pennsylvania.

The Corps and SAD especially are now also deeply involved in a significant new mission: Environmental Restoration. Early projects to renourish beaches, maintain harbors, and restore vegetation in spoil disposal areas have evolved into major programs of wetland and wildlife enhancement. The Everglades restoration project, managed by SAD and the Jacksonville District, is the largest such environmental restoration program ever undertaken.

The management organization and the relationships among the South Atlantic Division office and the five SAD districts have evolved over time. By the mid-twentieth century, the requirements of World War II design and construction created large and capable district organizations within the Division. The districts had gained considerable autonomy, but SAD maintained its mission of organizing the districts for most efficient use of staff and expertise, making the case to Headquarters and Congress for important projects, and providing guidance, coordination, and review functions.

As SAD and the districts were called to design and build complex projects on tight time schedules in the 1970s, they noted that efficiencies were needed in the standard hierarchical system of review and control. SAD has been a national leader in new approaches to management of projects and programs; in the 1980s and 1990s, SAD demonstrated the effectiveness of the Project Management team approach, leading its districts in moving away from the more traditional 'stove pipe' style of planning, designing, and constructing massive projects. Over the last ten years, the South Atlantic Division has made use of modern computer and networking systems to develop increasingly efficient regional interaction with its districts, and to support modern management of a multi-operational, multi-centered enterprise.

Since 1945, the South Atlantic Division has seen a large number of reorganization plans, and several of them have been put into place. New districts were created and later deactivated (e.g., Canaveral District, Tullahoma District). The Tullahoma District of Tennessee, a single project district with a mission to build the Arnold Engineering and Development Center, was part of the South Atlantic Division, and later was reassigned to the Ohio River Division (now the Great Lakes and River Division). Various programs have been moved from one district to another to distribute workloads more evenly, to take advantage of the experience and capability of districts and work groups, and to maintain expertise for the future in a specific district. Many times, proposed reorganizations to increase efficiency (especially by closing district offices or shifting significant programs), were withdrawn when confronted with public and Congressional criticism.

South Atlantic Division leaders and staff have been in the middle of these reorganization efforts over the last 50 years, sometimes proposing new plans, and sometimes working against them. A number of the reorganization plans were successfully implemented, especially the creation of special purpose districts. Other plans put into effect were less successful, and were corrected with later changes.

The South Atlantic Division has been working in recent years to develop organizational processes that lead to efficient and effective program planning, assignment of project responsibilities, review of projects, and staff training. Much of this ongoing effort grew out of the"2012" program and its concern with best practices and modern program management. The aim has been to develop 'communities of practice' with interaction and communication among programs, and to move away from the 'stove pipe' internal organization where program groups tend to be static and narrowly focused.

NEED FOR FUTURE WORK

Currently, the South Atlantic Division lacks a formal published history from 1888 through 1945. Taken together, the three earlier referenced manuscripts provide a solid foundation for such a future work. An early-period history could elaborate on the founding of the South Atlantic Division and its predecessor, the Southeast Division. Topics could include the emphasis on navigational improvements; the emergence of flood control as a mission; early regulatory responsibilities; the role played by the Corps in the Spanish American War and World War I; the impact of the Corps during the Depression and the New Deal in the

South; and the military construction program of World War II.

The most important future work, however, will be for scholars to carry on from where this history leaves off. In final chapters we discuss possible paths forward for the Corps and the South Atlantic Division. Will continued improvements in technology, communication, and analysis allow increased effectiveness in carrying out its missions? Can customer service and management organization continue to be improved in a government and a military agency? Will the missions of today be the missions of the next 50 years? The future historian's job will be to interpret the strategies, failures, and accomplishments of the South Atlantic Division of the future.

ENDNOTES

1 Deborah K. Cannan, Leo Hirrel, Katherine E. Grandine, Kathryn M. Kuranda, Bethany M. Usher, Hugh B. McAloon, and Martha R. Williams, *National Historic Context For Department Of Defense Installations, 1790 – 1940. Volume I of IV* (Frederick, Maryland: R. Christopher Goodwin & Associates, Inc, 1995), 51-55, War Department, *Annual Reports*, (1898), 164-165; (1899), 263-269.

2 Carroll Van West, *Tennessee's New Deal Landscape: A Guidebook* (Knoxville: the University of Tennessee Press, 2001), 5.

3 "The History of the Corps of Engineers." Office of History, US Army Corps of Engineers, (Honolulu: University Press of the Pacific. 2004 reprinted from the 1998 edition), 17.

4 South Atlantic Division US Army Corps of Engineers Web page: http://www.usace.army.mil/who/#Organized (accessed January 31, 2007).

5 For a brief discussion on how the Corps is organized see Jeffrey K. Stine, *Mixing the Waters: Environment, Politics, and the Building of the Tennessee-Tombigbee Waterway*, (Akron, Ohio: University of Akron Press, 1993).

6 This close proximity to local citizens and US Representatives has also elicited substantial criticism. For an excellent study of how the Corps interacts with local citizenry see, Daniel Mazmanian and Jeanne Nienaber, *Can Organizations Change: Environmental Protection, Citizen Participation, and the Corps of Engineers* (Washington DC: The Brookings Institute, 1979).

7 Corps of Engineers has continued to justify this "bottom up" emphasis because of the success they have had in mobilizing for emergencies and war. Corps leadership has continued to point out that the successful Corps of Engineers completion of the construction programs passed to them in 1940–1941 was a direct result of having remained active throughout the 1930s, with civil projects that prevented them from "becoming rusty."

8 The other division containing an Emergency Management Office is the South Pacific Division. The Sacramento District has the western office of the Emergency Management Office.

9 Edgar Maynard, "History of the South Atlantic Division," an unpublished manuscript located in the archives of the South Atlantic Division, Atlanta, Georgia, (n/d but pre. 1977), Chapter II, 3-4.

10 Stephen Everett, *Oral History: Techniques and Procedures* (Washington, DC: US Army Center of Military History, 1992).

11 Rivers and Harbors Appropriations Act of 1899 (33 US Code 403, section 9).

12 The Clean Water Act is officially the Federal Water Pollution Control Amendments of 1972 (33 US Code 1341-1345) P.L. 92-500, passed October 18, 1972.

CHAPTER 2 – BEGINNINGS: SOUTH ATLANTIC DIVISION PRIOR TO 1945

In the Southeast, the Appalachian Mountains outline and separate the region from the north and the northwest.[1] The Appalachians cross every state of SAD except Florida.[2] The river systems run roughly northwest to southeast and drain into the Atlantic Ocean or north to south into the Gulf of Mexico. There are also a number of coastal rivers that are short and have relatively small basins. The Southeast is, however, characterized by the long rivers; they begin in the Appalachians, run more than 300 miles to the ocean, and form large watersheds. The Cape Fear, Pee Dee-Waccamaw, Santee, Edisto, Savannah, and Ocmulgee rivers all flow into the Atlantic Ocean. The Apalachicola-Chattahoochee-Flint, Tombigbee-Black-Warrior, and Alabama-Coosa-Tallapoosa river systems flow into the Gulf. Florida is physiographically unique; the St. Johns River runs from south to north, reflecting the slightly higher land in the middle of the peninsula.

Though the Appalachians can reach to more than 6,000 feet, much of the wide coastal plain is less than 50 feet above sea level, and all of Florida is less than 300 feet. There are large swamps or lowland areas in all the states, especially along the coasts. The largest of these are the Everglades and Big Cypress Swamp in southern Florida and the Okeefenokee Swamp in south Georgia. The Outer Banks of North Carolina ring two large, shallow inland bays. There are a number of excellent natural harbors in the region including Pascagoula, Mobile, Pensacola, Tampa, Jacksonville, Brunswick, Savannah, Beaufort, Charleston, and Wilmington.

Behind the Coastal Plain is the Piedmont physiographic province, a wide band of rolling hills bordering the Appalachians. Many of the reservoirs built by the Corps since 1945 are located in the defined valleys of the Piedmont. Several of the largest cities in the Southeast (outside of Florida) are located in this Piedmont region: Atlanta, Birmingham, Charlotte, Greenville-Spartanburg, and Raleigh-Durham.

The Southeast is subtropical in climate and generally temperate, but temperatures regularly range above 100°F in the Coastal Plain in summer and below 10°F in the higher elevations of the Appalachians in winter. The region has high precipitation, averaging 40-60 inches of rain a year. Parts of the lower Southeast seldom see snow, but snow has been recorded in the Appalachians in every month but August.

The Southeast generally has good soil, deeply developed under forests. With the abundant rainfall, mild climate, and long growing season, the Southeast is a rich agricultural region. Its long reliance on the great agricultural potential, and the economic effects of the Civil War, delayed the South's industrialization and urban growth in the 1800s and 1900s.

The geography, the water resources, the climate, and the social history of the South together formed a set of conditions and needs that the Corps of Engineers could address. Navigation assistance for rivers and harbors, flood control, power generation, water supply for growth, and jobs to fuel economic prosperity could be brought to the region by Corps of Engineers programs as they developed in the twentieth century. The South was ready for the Corps.

THE SOUTHEAST DIVISION 1888–1929

Prior to 1888, the Corps of Engineers was divided strictly by districts with all District Engineers reporting to the Chief of Engineers in Washington. By the 1880s, the organization was becoming too large for one office to manage effectively. On November 8, 1888, the Secretary of War created a new intermediary reporting engineer, Division Engineer. Shortly afterward, he also divided the continental United States into five areas of responsibility and placed each district under one of the new Division Engineers. Thus, all District Engineers reported to one of the Division Engineers, who in turn reported to the Chief of Engineers.

Colonel, later General, William P. Craighill, first Southeast Division Engineer.

By this time, river and harbor work expenditures in the Southeastern states were reaching nearly $20 million annually.[3] The districts of these states were placed into the Southeast Division with headquarters in Baltimore, Maryland.[4] The first Southeast Division Engineer was Colonel William P. Craighill. He was based in the Baltimore district, and served as both the District and Division engineer. He was allowed a single clerk.

The Division responsibility stretched from southern New York to northern Florida and covered the states of Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida, with district offices in their port cities. The District of Columbia also had a district office, and the Southeast Division also contained parts of Pennsylvania, West Virginia, and New York.

In the decades that followed the creation of the Southeast Division, the Chief of Engineers moved various districts into and out of the Division as workload necessitated. The Mobile District was moved into the Division in 1895 and out again in 1901. The Baltimore District moved out of the division in 1906 and into the Chesapeake Division. Because of the importance of the Gulf Coast ports, the Jacksonville District was transferred to the Gulf Division in 1928. The Division Engineer's headquarters moved from Baltimore to Savannah in 1906, and moved to Charleston in 1925.[5]

Until World War I, Southeast Division responsibilities focused on navigational and coastal fortification improvements. To compete with the growing ports in the northern states, Southeast Division constructed harbor improvements, cleared inland rivers of obstructions and, in some cases, erected locks and dams to aid in navigation and stimulate economic growth.[6] Some improvements, such as the locks and dams on the rivers near Birmingham, afforded shippers substantial decreases in their freight costs and saw a corresponding increase in use.

At the end of the century, Congress gave the Corps authority through the Rivers and Harbors Act of 1899 to regulate dumping and building in or over the nation's waterways. Nineteenth-century legislators were not concerned with the effect of pollution on the waters, but with navigational impediments. In fact, Congress expressly exempted liquid runoff from "streets and sewers" from the legislation. Nonetheless, Corps responsibility

for regulating building or dumping on or over waters of the US was firmly established, and remains the basis for most Corps regulatory authority.

There was major flooding in the early decades of the twentieth century, and, because of the increased development that had taken place in low-lying areas, there was great destruction and loss of life. Congress passed the Flood Control Act of 1928.[7] This statute gave the Corps of Engineers and the Federal Power Commission funding for a series of "308" studies of watersheds with potential flood problems. In the decade that followed, the Corps studied more than 200 river systems to determine the feasibility of levees, reservoirs, dams, locks, and canals to meet the needs of the citizenry. These studies formed a "reservoir of specific emergency relief projects" to be funded by Congress during the Great Depression, and were the foundations of reservoir planning in the next five decades.[8]

Military Construction by the Corps of Engineers in the decades prior to 1940 focused on strengthening US coastal fortifications. In the early twentieth century, key issues facing coastal defenses were the protection of the new US Navy vessels with their deeper-draft ships and the development of long-range guns on potential attacking ships. The issues led to concerns about channel depth, and about location and protection of long-range shore batteries.

Flooding on the Yadkin River in Elkin, North Carolina in 1940 (USACE photo).

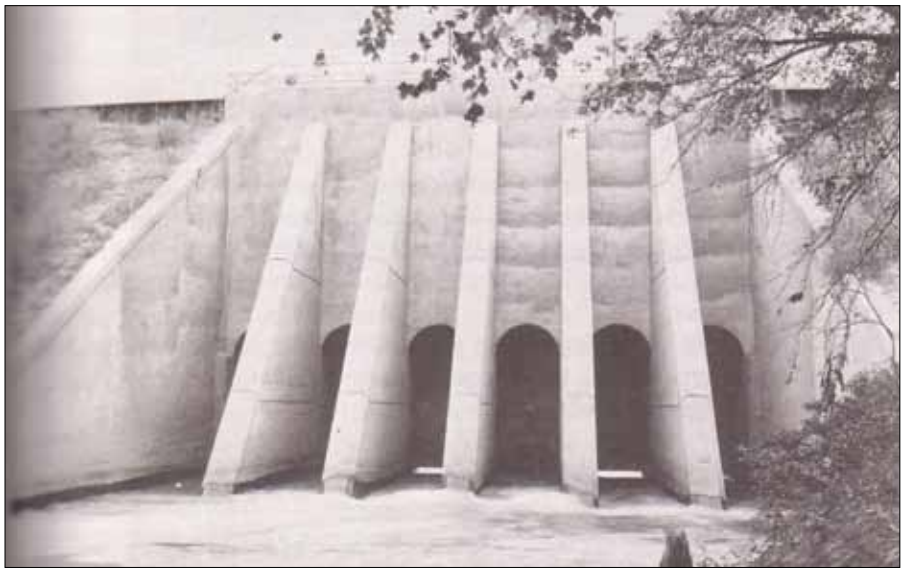
During World War I, the Corps of Engineers provided engineering support, but the Quartermaster Corps constructed the Army and National Guard training bases. In the 1920s, a bureaucratic struggle left all the non-combat construction of the Army in the hands of the Construction Service of the Quartermaster Corps.[9]

1929–1945: THE SOUTH ATLANTIC DIVISION IS FORMED, FACES THE DEPRESSION AND SUPPORTS THE WAR EFFORT

In 1929, newly elected President Herbert Hoover ordered his Secretary of War to reduce the number of Corps of Engineer divisions on the Atlantic coast to two, and on October 27, the South Atlantic Division was formally titled. SAD assumed authority from the Southeast Division, which was dissolved. From district offices in Savannah, Charleston, Wilmington, Norfolk, and Washington, D.C., Norfolk was selected to house the Division headquarters.[10]

Formation of SAD coincided with the stock market crash of 1929; appropriations for Civil Works declined from $6 million in fiscal year 1930 to $3 million in fiscal year 1933.[11] President Franklin D. Roosevelt's New Deal program pumped new life into Corps work, and SAD appropriations grew to $13.5 million by 1940. Much of this work was a direct result of new legislation, as Congress overcame the Corps' preference for levees, and authorized (instructed) the agency to study and build multi-purpose flood control projects via the Flood Control Act of 1936.[12]

The fall of most of Western Europe to the Germans in the spring of 1940 awakened Congress from isolationism. Heeding President Roosevelt's "call to arms," Congress passed the first peacetime draft in August 1940. The nation's mobilization for World War II produced radical and permanent changes in SAD. In the decades prior to 1940, the Corps of Engineers had not been actively engaged in military construction except for maintenance on the coastal fortifications. The first change in this policy came on October 18, 1940, when the Secretaries of Commerce and War agreed to reassign construction of the Civil Aeronautics Administration (CAA) airports to the Army Corps of Engineers. Overnight, the Division's budget for



Sibley Levee in Augusta, Georgia. This was a WPA project taken over by the Corps in 1940 (USACE photo).

construction jumped $40 million per year—nearly three times its most recent Civil Works annual budget.[13]

In an even more radical move, less than a month later, in November 1940, the Secretary of War moved all Quartermaster Corps Army Air Corps construction to the Army Corps of Engineers. This added an additional $40 million to SAD's growing responsibility. In just one month, the SAD, which had been primarily responsible for Civil Works with a budget of $13.2 million, found itself on a war footing with two large agreements that expanded responsibilities to $97 million, an in increase of more than 500 percent! By late 1941, SAD districts had accepted another $70 million, bringing the Air Corps (now designated the Army Air Force) and CAA work to nearly $150 million.[14]

SAD underwent a dramatic transformation. In preparation for the changes, on December 31, 1940, the Chief of Engineers removed the Baltimore and Washington, D.C. Districts from SAD and transferred them to the Mid-Atlantic Division. Two weeks later, on January 15, 1941, he ordered the Gulf Division dissolved and transferred the Mobile District back into SAD.[15] Meanwhile employment inside the division office swelled from 22 to 50 by February 1941.

CAA Florence Municipal Airport Under Construction, Florence, S.C. (USACE photo).

Finally, in November 1941, Secretary of War Henry L. Stimson, President Roosevelt, and Undersecretary of War Robert Patterson agreed to transfer the entire Quartermaster Construction program to the Corps of Engineers. The Quartermaster Corps had difficulties managing the workload, and the Corps of Engineers had shown remarkable speed and efficiencies in overcoming the obstacles with the CAA and Army Air Force work. On December 1, 1941, Congress passed and the President signed the order that transferred all military construction for the US Army to the Army Corps of Engineers.[16]

The Corps had little time to contemplate their new responsibility, for six days later, on December 7, 1941, the Japanese attacked Pearl Harbor, and the US officially entered World War II. On December 17, Congress appropriated $1.25 billion for hospitals, training camps, air bases, ammunition docks, regulating depots, and a variety of other related facilities. Before the end of 1942, that amount would triple.[17] The construction program "assumed acute urgency." Between January 1941 and December 1942, the Corps spent $2 billion of the $11 billion Army and Army Air Force construction budget allocated by Congress for the entire war.[18] By January 1943, the Corps had built or enlarged 482 Air Corps facilities, 389 ground force facilities, 149 industrial facilities (ordnance, chemical warfare, and aircraft assembly plants), 164 storage and shipping facilities, and hundreds of miscellaneous installations.[19]

Holston Ordnance Works in Kingsport, Tennessee (USACE photo).

The Corps leadership has successfully argued over the years that involvement in Civil Works allowed them to maintain a nationwide engineering organization-in-place that gave the US a great advantage for unpredicted times of need. Additionally, they claimed that the "traditional decentralized flexible organization of the agency meant that it would always be capable of immediate expansion or contraction in accordance with varying workloads, whether in peace or war."[20] In the decades to come, Corps leadership would point to the successful mobilization of this time to justify their continued involvement in Civil Works.

SAD's role in the military construction of World War II was unlike anything the Division had ever encountered. In 1942 and 1943, expenditures exceeded $750 million per year. By 1944, SAD had been allocated $5 billion of the entire $11 billion Army and Army Air Force military construction budget. The Division purchased and leased property; it also coordinated district design and engineering, the awarding of contracts, and the supervising of construction. SAD made sure raw materials were obtainable, speeded up production, and kept projects on their time schedules.[21]

As the war progressed, the role of the Division evolved. In 1941–1942, it concentrated on building troop training and other facilities. In 1943–1944, SAD supported the supply and movement of troops overseas. Finally, in 1945, Division members worked to provide for the production of basic materials such as ship steel, lumber, and specialty products.[22]

SAD military construction boundaries were adjusted for war support expediency. Prior to the war, the military support boundaries of the Division were identical to the Civil Works watersheds. To simplify the organization, in March 1942, the Chief of Engineers transferred the Norfolk District to the Mid-Atlantic Division, and the SAD office was re-established in Atlanta, Georgia. Additionally, in December 1942, military construction in the states of Mississippi and Tennessee was given to the Mobile District.

To acquire the large amount of land for construction, a division real estate office was established in Atlanta. During the war, the Real Estate Division of SAD acquired 17,000 tracts encompassing 5,000,000 acres of land at a cost of $72 million. Additionally, the real estate office leased some 4,000 facilities costing $8.5 million annually.[23]

Manpower to meet the construction deadlines increased more than 9,000 percent in the Division staff. Divisional office strength grew from 22 in Richmond in October 1940 to 1,950 in Atlanta by May 1943.[24] Total Division strength grew to 21,500 in September of 1942. Additionally, the districts of the Division managed some 20,000 contract personnel.[25] Edgar Maynard noted that new work changed the SAD "from a relatively small operation into a sizable and versatile force capable of directing an important part of the Nation's mobilization effort."[26]

In April 1943, the Office of the Chief of Engineers closed the Pan-American Division and transferred two of the district offices to SAD. The Miami and Recife, Brazil, Districts were responsible for Corps work in Latin America and the Caribbean. These districts erected 37 airbases in nearly every country of Central and South America.[27] The Allied campaigns in North Africa and Southern Europe depended on the fast transfer of short-range fighter planes from the bases in the southern US via the South and Central American airfields throughout the war. With the completion of the Latin American bases in December 1944, the Recife and Miami Districts were dissolved and their responsibilities transferred to SAD headquarters.

US Army airfield at Camp Rucker, Alabama (USACE photo).

Even before the war was over, SAD planners were already looking ahead to their role in the demobilization of millions of troops. By 1944, after four full years of constant growth, the districts and divisions began to gear themselves toward peacetime employment. The contraction of SAD after 1943 became nearly as radical as the expansion for the war. The Division had come a long way since 1929. Just the organizational change alone was a remarkable feat. To give some scope of the financial investment: SAD spent about $3 million almost entirely on Civil Works[28] in 1933. In 1942, nine years later, they spent $750 million almost entirely on military construction. The impact on the Division and the South in particular was dramatic. The effect was not lost on the politicians or the communities of the region, for the Corps continued to be a major source of federal investment in the region long after demobilization began in 1944.

South Atlantic Division officers and officials, 1945 (USACE photo).

ENDNOTES

1 Tennessee is within SAD boundaries for military construction work. All civil work in that state is managed out of the Nashville District of the Lakes and Rivers Division. Tennessee is omitted for purposes of this discussion.

2 David C. Roller and Robert W. Twyman editors, *The Encyclopedia of Southern History*, (Baton Rouge: Louisiana State University Press, 1979), 51-52, 242-243, 1062-1063.

3 McWatters, "SAD," Chapter II, 4.

4 A copy is located in the Archives of the Office of History, US Army Corps of Engineers, Fort Belvoir, Virginia, (Archives OH) General Files Box 25, File 16. Reprinted in Chestnut, Chapter II, 4.

5 Maynard, 11.

6 D. Gregory Jeane, *A History of the Mobile District Corps of Engineers, 1815–1985*, Prepared for the US Army Corps of Engineers, Mobile District (Mt. Pleasant, South Carolina: Brockington and Associates, 2002), 67; Chestnut, "SAD," Chapter II, 32, 42. The statute defined the Corps of Engineers' regulatory responsibility over the nation's navigable waterways. The Act outlawed "any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty or other structures," in any "port, roadstead, haven, harbor, canal, navigable river, or other water of the United States," without the prior consent of the secretary of war. Additionally, it banned all excavations, dredging, and filling that would "alter or modify the course, location, condition, or capacity of any waterway." The act became known as the "Refuse Act" because it made unlawful to throw, discharge or deposit, or cause, suffer or procure to be thrown, discharged or deposited…any refuse matter of any kind or description, whatever into any navigable water of the United States. (Purcell and Willingham, "Regulatory Responsibilities," 16-18).

7 The 1927 floods were particularly devastating, drowning some 264 people, 165,000 head of cattle, and doing at least $364 million in damage to homes, farms, and businesses. See McWatters, "SAD," Chapter II, 22.

8 Corps leadership continued to be pessimistic about multi use reservoirs. Most of the intransigence by the Corps was based on long held beliefs about the cost sharing and technical concerns from many engineers about operating multi-use reservoirs. Walker and Reuss, *Water Resources*, 29-30.

9 *Ibid*, 74.

10 In the Corps restructuring, the Southeast Division became the SAD. There was no change in boundaries or districts at that time. Maynard, "History," p. 10-12. Charleston claims the distinction as the divisional birthplace. The Division headquarters was located in the Charleston District when the South Atlantic Division was formulated. Headquarters was moved to Norfolk in November of 1929.

11 Maynard, "History," 14.

12 L. Morgan and Gene C. Brown, "SAD History," an unpublished manuscript in the archives of the South Atlantic Division, Atlanta, GA. (pre.1975), Chapter I, 4. See also Flood Control Act, 1936, 74th Congress. 2nd sess. CHS. 651,688. June 20, 22, 1936.

13 Maynard, Chapter III, 1.

14 McWatters, "SAD," Chapter III, 8, 15.

15 The Mobile District absorbed the Montgomery District in 1933.

16 The bill is sometimes referred to the "Madigan Bill" and is Public Law 326, 77th Congress, 1st session, Morgan and Brown, "SAD History," Chapter III, 12. Additionally, Fine and Remington dedicate an entire chapter to the transition in *Corps of Engineers*, pp.440-472. Stimson's reference to the traditional role of the Corps as the construction agent for the Army was not exactly accurate. In the War of 1898 and again in World War I, the Quartermaster Corps planned and built the Army's training camps in the US. The Corps of Engineers did traditionally handle all the combat-related construction.

17 Fine and Remington, *Corps of Engineers*, 479; and Chestnut, "SAD," Chapter II, 11.

18 Maynard, "SAD History," Chapter III, 3.

19 McWatters, "SAD," Chapter II, 12.

20 Ibid, 9.

21 Ibid, 12.

22 Ibid.

23 Maynard, "SAD History," Chapter III, 3.

24 The presence of a supply division at the Atlanta office temporarily increased the numbers at the Division office. Later this division was dissolved and many of the personnel, who had transferred in with the Quartermaster Corps, were transferred to other districts or left the service.

25 Maynard, "SAD History," Chapter III, 11 and McWatters, "SAD," Chapter III, 23.

26 Maynard, Chapter III, 27.

27 Maynard, Chapter III, 51.

28 Ibid.

CHAPTER 3 – THE WAR IS OVER! NEW MISSIONS, NEW APPROACHES

NEW MISSIONS ARE DEFINED

As World War II came to an end, SAD planners knew that civil works programs would resume, but they thought that military construction would quickly diminish as a Corps program. As it turned out, military construction continued as a major mission of the Corps and SAD. Meanwhile, the planned-for civil works program became much more massive than anticipated at the war's end. The biggest surprise, though, was the development of the nation's space exploration program, and SAD's role in designing and building its infrastructure.

In August 1945, the South Atlantic Division released a report "War Behind the Battlefronts: A Resume of the Yearly Activities of the South Atlantic Division, Corps of Engineers, 1945." The 26-page publication included 25 pages about military construction activities that had been carried out, but only a single page of civil works.[1] Civil works activities throughout the division had been limited to maintenance of harbors, waterways, and other navigation projects where such maintenance was essential to the war effort. SAD and its districts had developed a large and effective program focused on engineering and building the bases and facilities necessary for World War II.

SAD planners, however, had been active during the war, especially during its last two years. They produced a series of project reports and major river basin studies in preparation for the cessation of military activities and resumption of civil works.[2] The large civil works programs across the nation, managed by the Corps and other federal agencies, had shown that it was possible to control costly and deadly flooding, and national planners were advocating reservoirs to meet water needs of the coming decades.[3]

The Division faced a substantial effort in converting from military engineering and construction to planning, building, and operating large civil works projects. While SAD had planned for a transition from military to civil works projects, only the most prescient Corps leaders could have been prepared for the virtual explosion in civil works in the 1950s. The Corps became a national leader in water resources development and management. The Corps' long history in working with navigation aspects of rivers, and more recently with flood control, positioned it at the forefront of water resources development in the United States.[4] Civil works continued to grow in number, size, and complexity; there was a change in the type of water projects. New water projects tended to be the large, very expensive dams designed for multiple purposes. Thus, SAD found its civil works mission after World War II to be every bit as significant as its military activities were during the War.

Military planning and engineering in the immediate years after World War II became limited to closing and disposing of unneeded defense sites. These tasks did not require large teams of specialists, and the Division, like the rest of the military services, cut back personnel. Division Headquarters reduced its staff from 700 in June 1946 to 305 by June 1947, a cut of 57 percent. Division Controller Edgar Maynard observed the "curious paradox that while military men in SAD were anxiously counting the days until their discharge, civilian employees were desperately hoping to avoid personnel cutbacks."[5]

The beginnings of the Cold War in 1948, however, brought a dramatic change to this force decline. The Berlin Airlift of 1948, the Marshall Plan efforts in Europe, and especially the outbreak of the Korean War led Congress to reopen and redevelop World War II bases and begin to plan new facilities. The cost of military construction in the South Atlantic Division in the 1950s grew rapidly to over $1.5 billion for the decade ($150 million/year). The 1960s witnessed continuing growth, to about $200 million per year.[6] SAD districts supervised engineering and construction at numerous Army posts and Air Force bases; this included advanced runway, missile launch, and signal facilities, as well as administration buildings, barracks, and roadways.

During this same period, SAD districts took on one of the most ambitious projects in US engineering history, designing and constructing the Kennedy Space Center at Cape Canaveral, Florida. For the $500 million Apollo launch facility construction program, the Chief of Engineers office created a new SAD district, the Canaveral District, in 1962. By the end of the 1960s, SAD officials had created one of the largest, military-space complexes in the world. Launch Complex 39 at Cape Kennedy alone included more than 500,000 identifiable, interdependent activities in the construction "critical path." SAD districts also constructed large multi-million dollar rocket test complexes in Tennessee, Mississippi, and Alabama. [7]

SAD'S MANAGEMENT APPROACHES

The South Atlantic Division in the post-War period was assigned a very complex, very massive job. This job involved significant military responsibilities in protecting the physical security of the nation and advancing its global interests. Flood control, power generation, and navigation projects were of great economic importance to the South, and often had life or death effects for citizens in the paths of storms and floods. Space exploration was, of course, related in its technology aspects to a number of military needs, but the space program itself became of great symbolic significance to the American people. The space program was seen by the nation as a critical race with the Soviets that depended on Americans' collective intelligence, work ethic, patriotism, and bravery. SAD's role in the space program was crucial.

To take on these responsibilities, the Corps relied on the traditional military method of management: people were organized around important tasks and, in the Corps and in SAD, these functional groups were placed in branches, sections, and divisions. Major divisions (in districts and at SAD) were Planning, Engineering, and Construction. These functional divisions were also in place at Corps headquarters in Washington. Branches, sections, and especially divisions had evolved by mid-century to be independent. Communication moved, for example, from the planning division in the district, to the planning division at SAD, and finally to the planning division at Headquarters. When the planning divisions at all levels were satisfied with the 'plan,' it was given to the engineering division at the district to start the design tasks. After all engineering work was completed, the project was forwarded to the district's construction division to begin its work.[8]

Day-to-day work at SAD would involve reviewing proposals, plans, and modifications from one of the districts, and sending comments back to the district for additional consideration. When a task or project completed SAD review, it was sent up to the appropriate division at Headquarters. Review there might send the task or project plans back down to SAD. This process might involve telephone calls, letters, and mailed engineering plans to and from the appropriate divisions at each level. Plans and proposals were moving constantly in all functional divisions, as were budget requests, cost estimates, and accounting information. Also moving were approvals, denials, comments to be addressed, questions, recommendations, answers, additional information, justifications, and, of course, final study reports.

Some scholars of management have called this the 'stove pipe' means of authority. Stove pipe culture stresses a "narrowly defined set of responsibilities, with output and feedback moving along a set path in the chain of command." The stove pipe culture emphasized clear lines of authority, individual accountability, results-oriented production, top-down management, and single-discipline specialization. This type of management process had a long history in the Army, and in 1945, it was well established in American industry. It has great advantages when time and cost are not the most significant concerns. Large and very important projects, such as harbors, canals, locks, levees, and dams are significant undertakings requiring very careful planning and rigorous quality control. The stove pipe culture provides this careful planning and a high level of quality control.

In retrospect, however, this process becomes laborious and time consuming. Costs tend to increase because staff time is spent in numerous reviews correcting various pieces of a project created by the stove pipes (planning, engineering, construction, operations, budgeting, etc.) that did not fit. Stove pipe management creates an organizational focus on internal functions instead of client needs. Additionally, the stove pipe management method often fosters turf wars, limited communication, and a blaming, mistrusting environment. Throughout the post-war period, Corps officials battled increasing costs, unplanned delays, and expensive lawsuits in both civil and military projects. A Corps of Engineers writer, looking back, noted that, "the functional approach discourages people from seeing the whole problem ... [and makes it] much less likely they will think beyond what they are given to do."[10] Thus, costs escalated as officials spent large sums reworking problems.

Through the 1960s and 1970s, American business began to rework this traditional stove pipe management system. They hired technical specialists, and put people from different disciplines and functions together as projects were first planned. These people continued to work together as a team throughout the project's life. In the Corps, and in SAD and its districts, the traditional management process was slower to change. Engineers filled most management positions, even those that required expertise in other disciplines. Executive authority in the Corps was, of course, invested in upper level military officers; these majors, colonels, and generals were trained in a traditional, authority-based management style that was doctrine for war-fighting units. Thus, the Corps of Engineers was slow in moving away from traditional, authority-based, functionally-separated management approaches.

BALANCING THE WORK, BALANCING THE DISTRICTS

While the South Atlantic Division was faced in the period 1945 to 1970 with responsibility of building large and complex infrastructure projects of many kinds, and of building them with safety, high quality, and cost effectiveness, the Division also had other management requirements. SAD needed to balance the workload among its resources; particularly, the Division needed to balance the workload of the districts. This balancing has long been a part of the mission of Corps divisions. Throughout the twentieth century, the South Atlantic Division, like other divisions of the Corps, has been expanded and contracted by adding and subtracting districts. Boundaries of districts have been adjusted, both their civil works boundaries, and their military support boundaries. Changing boundaries would cause new projects to flow to districts with less planning, engineering, or construction work projected for the near future. Even without changing boundaries, SAD often assigned major projects (such as a dam and reservoir project or a military base) to one district when the project remained in the boundary of another district.

To balance district workloads, SAD assigned the engineering and construction of West Point Dam and Lake to Savannah District, although it lay within Mobile's jurisdictional boundaries (USACE photo).

SAD saw this balancing process as having a number of benefits. First, balancing work would maintain expertise in districts that need key, well-trained, and experienced engineers, but might lose them because of short-term lower levels of work. For example, in the 1960s the Savannah District was assigned the engineering and construction program for the West Point Dam and Lake project, even though that project was within Mobile District boundaries. SAD decided Savannah District needed to maintain its engineering capacity to build the Trotter Shoals (now Russell) Lake on the upper Savannah River in the 1970s. After its completion, West Point was assigned to be operated by Mobile District.

Second, designing and building a limited number of large projects usually resulted in dramatic force level fluctuations at the district level. Without balancing of workload (by moving boundaries, adding new districts, or moving projects), district officials and staff would be reduced, then built up again as large projects went through cycles from initiation to completion. Similarly, use of office and laboratory space, as well as equipment, could fluctuate greatly. SAD decided to address this inefficiency in personnel, facility, and

equipment fluctuations by balancing work among the districts.

Finally, SAD came to understand that balancing the workloads among districts and thus maintaining force level stability within districts were also political issues. The economic impacts of the district offices and the projects in each state were recognized by citizens, businesses, and political leaders. While it remained very important to develop water resource projects to solve flood control problems, to produce power, to supply drinking water, and to provide recreation, the economic value of the district office itself and the jobs it provided became significant. This was true for the relatively high paying positions of Corps engineers and other officials and staff, but also for a large variety of contractors in the district that worked steadily on small and large projects. State and Congressional political leaders worked closely with the Corps and with senior officials in all Presidential administrations to initiate new projects and maintain work levels in their districts. These forces encouraged SAD officials to work hard at maintaining workload balances among districts, while at the same time meeting the overall goals of high quality and cost effectiveness.

The most extreme workload balancing procedure would be to close districts with relatively small workloads, building up the remaining districts, and making them more stable in workload. Closing the small Charleston District was a frequent idea in reorganization plans in the post-War period. Wilmington District, also a small district in terms of workload, was also considered for closing several times. The Charleston District was involved in several reorganization plans in the post war period, most especially in plans developed by SAD Division Engineers Major General Alvin C. Welling, Major General George H. Walker, and Major General T. J. Hayes, III between 1965 and 1967. Examples of the difficulties of making dramatic workload balances within a political context can be seen in two examples, first, the encouragement given to the Charleston District by Congressman Mendel Rivers, Representative of that area of South Carolina, and second, the protection of the Savannah District by Georgia leaders.

Since 1952, Congressman Rivers, a member of the House Armed Services Committee, had written into each year's military construction bill the requirement that the armed services select either the Corps of Engineers or the Navy's Bureau of Yards and Docks to complete their military work. However, when Rivers became chairman of the committee in 1964, his support of the Navy took work away from the Army. Rivers believed the Navy to be more cost-effective and less unwieldy than the Corps. In 1964, Rivers championed a bill that required all Air Force bases in South Carolina, along with Keesler Air Force Base in Mississippi, to be reassigned from the Savannah and Mobile districts to the Bureau of Yards and Docks, as part of a national plan to reallocate 20 percent of Air Force construction to the Navy. When the Air Force offered its 1965 construction at Charleston Air Force Base to the Savannah District, Rivers protested to Secretary of Defense Robert McNamara, who bent under the pressure and transferred construction at all Air Force bases in South Carolina, Mississippi, and other states to the Navy. This occurred despite an earlier concession in 1964, in which all overseas construction was reallocated between the Corps and the Navy and all military construction in Puerto Rico was assigned to the Navy. Historian Edgar Maynard, Comptroller at SAD at the time, reports that it was commonly thought that Rivers' actions

in favor of the Navy were almost certainly influenced by his annoyance over recent Corps efforts to abolish the Charleston District.[11] The Charleston District is, of course, still open at this time.

SAD Division Engineer Major General Alvin C. Welling had long considered and proposed reorganizing the SAD districts and their assignments to achieve more efficient workload. On the day of his retirement in 1965, Welling gave a scathing critique of the SAD district structure in which he expressed serious concern about the uneven distribution of both civil works and military construction in the Division. Because he predicted that almost half the Division workload would potentially end up in Mobile, Welling wished to shift military construction in the Carolinas from Savannah to Charleston, to transfer the Chattahoochee and Flint rivers in Georgia from Mobile to Savannah, and to reestablish in Wilmington the design capability withdrawn from the District in 1961. Georgia politicians, however, protested the change on the table, fearing the loss of jobs if military construction was taken from Savannah. Senator Russell, the powerful chairman of the Senate Armed Services Committee, pressured Welling's successor, Major General George H. Walker, and later Major General Hayes to abandon the reorganization.[12]

Major General Alvin C. Welling served in the China-India-Burma Theater during World War II and played an important role in building the Ledo Road and the "Hump" airfields. As Division Engineer, his proposed re-organization efforts of SAD were rebuffed by powerful southern politicians (US Air Force photo).

Construction of the Allatoona Dam between 1946 and 1955 by the Mobile District in Georgia led Division Engineers to be concerned about future unequal distribution of the civil workload. The District Engineers observed that the Mobile District, overseeing a number of large and complex river systems, and the Savannah District, looking forward to projects on the Savannah River, would construct most of the civil works projects in the years ahead. As it turned out, Mobile dominated civil works in the 1950s, receiving almost half of SAD civil works funding, or $17.8 million of $40 million in 1955; $21 million, or over half of the $38 million in 1956; and $27.2 million of $48 million, or 57 percent, in 1957.[13]

Inequity had been built into the structure of SAD in its formative years, when district offices and boundaries reflected the early Corps emphasis on development of major harbors. Edgar Maynard notes that the SAD Division Engineers he worked with after World War II "always seemed amazed" that four of the Division's districts (Wilmington, Charleston, Savannah, and Jacksonville) were located close together along a 500-mile stretch of the Atlantic coast.[14] Although most accepted this arrangement as "an historical accident not worth the political hazards inherent in reform," some did not.[15]

As early as August of 1946, SAD Division Engineer Brigadier General James B. Newman expressed his concern about the unequal distribution of the civil works load

among SAD's five districts, and proposed to abolish both Charleston and Wilmington districts and create a new Charlotte District to replace them. However, Newman's request was not supported in Washington, and the Office of the Chief of Engineers informed the commander, "conditions at this time are not favorable for making extensive revisions in district boundaries," mentioning only the cost involved in such a change.[16]

The Chief of Engineer's office was facing the reality that powerful regional politicians were simply unwilling to see good paying government jobs leave their districts.[17] Separate proposals for changes from Division Engineers General Robinson in 1949 and General Wilson in 1952 once again considered the relatively small workloads of the two small districts, Charleston and Wilmington, and proposed closing them. Neither proposal produced results. A year later in 1953, efficiency concerns in the Eisenhower administration led to new proposals by then Division Engineer General Charles Holle to reduce the number of districts in SAD. However, Holle, who had addressed Newman's similar request several years earlier, met with fierce resistance from citizens and politicians in North Carolina and South Carolina. He requested the Chief of Engineers to consolidate the Wilmington and Norfolk districts at Norfolk, and bring the new Norfolk District into the South Atlantic Division. He also proposed to merge the Charleston District with the Savannah District. Maynard suggested that President Eisenhower's need for conservative Southern support in balancing the budget that year may have led to the Chief of Engineers' decision to table any reorganization of the districts.[18]

Allatoona Dam and Lake north of Atlanta, Georgia was one of the first reservoir projects after World War II (USACE photo).

Reorganization plans created tensions within SAD, both at the Division and district offices. Early in 1951, for example, President Truman's apparent intention of consolidating the civil functions of the Corps of Engineers and the Bureau of Reclamation into a new Department of Civil Works produced great anxiety at SAD offices in Atlanta.[19] Other criticisms and proposals had been expressed in special commissions and in various journals in the late 1940s and early 1950s, and SAD employees evidently believed Congress would not stand in Truman's way. The 'crisis' subsided when Truman withdrew his proposal 60 days after making it, but many employees had been seeking new jobs and at least one had transferred to the Bureau of Reclamation.[20]

The most dramatic reorganization of SAD occurred in 1961, and affected both military and civil works construction. Plans began as early as 1957, culminated in 1961, and resulted in the turnover of military construction in both the Wilmington and Charleston districts to the Savannah District. At the same time, both of the smaller districts became "operating districts," thereby losing some of their technical and administrative responsibilities and personnel. Savannah transferred its military construction in the Nashville District to the Mobile District. Wilmington District, however, was partly "compensated" for the change when the Roanoke River headwaters in Virginia were transferred from the Norfolk District. This change placed the John H. Kerr and Philpott Reservoirs, constructed after the War by the Norfolk District, under Wilmington's supervision. While district employees in Wilmington and Charleston considered working within an operating district somewhat repugnant, Maynard asserts, they seemed to recognize it as a better alternative than abolition of their districts, as had been proposed, and as the only practical compromise under the circumstances.[21]

Balancing workload among districts and balancing district boundaries remained a delicate but essential duty for SAD leaders throughout the post-War period. It remains a major goal today, and it is being addressed in an entirely new fashion.

ENDNOTES

1 South Atlantic Division, "War Behind the Battlefronts: A Resume of the Yearly Activities of the South Atlantic Division, Corps of Engineers, 1945," 1-26, also quoted in Lorne McWatters, "SAD History" An unpublished manuscript on file at SAD office, Atlanta, Georgia, Chapter 6, 1.

2 McWat ters, "SAD History," Chapter 6, 1.; South Atlantic Division, "SAD News, September 1945," 3.

3 For more information on pre war Federal water policy and planning see Martin Ruess, Coping with Uncertainty: Social Scientists, Engineers, and Federal Water Resources Planning, *Natural Resources Journal*, Vol. 32 (Winter 1992), 101-135, and Jamie Moore, *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy*, University of Colorado, Institute of Behavioral Science, Boulder, Co.

4 Edgar Maynard, "SAD: The Story of the South Atlantic Division, US Army Corps of Engineers, 1929–1974," unpublished manuscript on file at the SAD office, Atlanta, Georgia, 74.

5 Ibid.

6 Ibid.

7 Maynard, 196.

8 Interview with John Russell interview, November 6, 2005 and July 5, 2006.

9 Wordspy.com. the Website is found at http://www.wordspy.com/words/stovepipeorganization.asp

10 Stephen E. Browning, "PM It's more than a name change, *Engineering Update* 22 (February 1998).

11 Maynard, 163-164.

12 Maynard, 134-143.

13 Mobile District, US Army Corps of Engineers, "Mobile District: Missions and Workload" (1957) in South Atlantic Division Office, Atlanta, Georgia, Public Affairs Office, Box 228-10, Installation Historical Files (hereinafter cited as SAD, IHFs, 228-10], File: Mobile District, charts.

14 Maynard was calculating the distance from the Virginia/North Carolina State line to Jacksonville, a distance of about 500 miles.

15 Maynard, 122-127.

16 Ibid.

17 Newman's letter and the response from Colonel Charles Holle are located in the FARC, East Point, 75-2093, RG 77, Box 103, File: SAD 323.3, #1. Interestingly, Holle became Division engineer of the SAD from 1953–1955.

18 Maynard, 122-27.

19 Maynard, 110.

20 Ibid., 110-12. Also, see footnote 3 for sources on criticisms and defenses of the Corps's civil works mission.

21 Maynard, 136-46. This consolidation is discussed in more detail in Chapter 4.

CHAPTER 4 – SAD SUPPORTS THE COLD WAR MILITARY

Although scholars debate the exact cause of the Cold War, geopolitical developments and tensions that arose during World War II were indications that the United States and the Soviet Union were headed for conflict after the war.[1] The power vacuum left in Europe by the weakening of Great Britain, Germany, and France; the introduction of atomic warfare; and the conflicting economic systems and ideologies of communism and capitalism resulted in a geopolitical landscape ripe for conflict, open or covert. The Cold War resulted in the development of a massive military-industrial landscape in both the United States and the Soviet Union.[2]

With the end of World War II, SAD found its military responsibilities scaled back considerably as many projects and facilities were deactivated. Limited military support continued, such as building barracks and support facilities at what were considered to be more permanent posts. Overall, however, construction budgets shrank quickly. For example, in 1946, nearly 80 percent of SAD's work had been military construction. By 1948, civil works had overtaken the military construction budget, and Controller Edgar Maynard concluded that SAD was becoming a civil works organization. Even SAD's newly created Military Construction Branch of the Engineering Division had only three employees!

SAD had been receiving custodial management directives for many facilities, and orders to dispose of hundreds of others. In 1946, it received control of 227 camps, forts, plants, and bases to manage; at the same time, it was disposing of 465 other former bases and plants. Like the rest of the nation, the South Atlantic Division was trying to demobilize. The massive World War II buildup was being erased. With NSC Memorandum 68, the erasure would halt, and SAD would again be called on to perform a massive construction effort for the US military.

During the late 1940s, President Truman's policy for containing the spread of Communism began to take shape through the Containment Policy, the Marshall Plan, the Truman Doctrine, and the establishment of the North Atlantic Treaty Organization. In addition, Congress authorized the $1.5 billion Mutual Defense Assistance Program to provide military support for European allies. This military assistance provided by the US strongly indicated to the Soviets that America was prepared to rebuild its military forces and those of its allies. The Mutual Defense Assistance Program encouraged European cooperation and promoted the NATO military alliance between the United States and the western European countries.[3]

China became communist in 1949, and the Soviets first tested atomic weapons the same year. In response to these world events, Truman ordered the Departments of State and Defense to review the nation's defensive strategy. The policy paper resulting from that review, NSC Memorandum 68, was one of the most important early Cold War documents. It laid out plans for "an immediate and large-scale buildup in our military and general strength and that of our allies with the intention of righting the power balance and in the hope that through means other than all-out war we could induce a change in the nature of the Soviet system."[4] Although NSC 68 described a strategy of combating the Soviet Union without open conflict, President Truman realized the buildup would require a huge

change in national policy, one requiring the enlargement of the peacetime military in an unprecedented manner.[5]

SAD KOREAN WAR CONSTRUCTION

As part of the settlement agreements reached at the end of World War II, the Allies divided the Korean peninsula into two separate countries, with a Soviet-supported Communist government in North Korea and a United States–supported democratic government in South Korea. The Soviets allowed North Korea to invade South Korea on June 25, 1950, in an effort to extend their government over the entire peninsula. United Nations forces, led by Americans, rushed to South Korea to turn back the North Korean Communists. American forces, however, were ill trained and ill equipped and were quickly in retreat until General Douglas MacArthur, commander of the UN forces, changed the tide of the war with a daring amphibious invasion behind enemy lines at the South Korean port of Inchon.[6]

After the victory at Inchon, UN forces began to push the North Korean forces back to the vicinity of the Chinese border. In November 1950, the Chinese army attacked the UN forces, again sending them in retreat to the south. By mid-1951, the Korean War was essentially in a stalemate, with neither side making any true gains. Although peace talks began that year, a truce was not signed until 1953.[7]

SAD Division Engineer Bernard L. Robinson knew immediately after the invasion of South Korea that the need for military construction would skyrocket. He ordered the Division staff to study mobilization plans and requirements, and he changed the military construction borders to follow the state lines. This would enable districts to share all responsibilities equally. All North Carolina military construction went to the Wilmington District. All South Carolina work except Fort Jackson went to Charleston. Savannah District took on Fort Jackson and received all of Georgia except Fort Benning and Lawson Air Force Base. The Mobile District received all of Alabama and Mississippi, Fort Benning and Lawson Air Force Base in Georgia, all of Tennessee west of Nashville, as well as Holston Ordnance Works and Cambria Range. On April 1, 1951, the Nashville District received responsibility for construction in Tennessee and was placed in SAD.

To examine how the districts and SAD mobilized for Korea, we should look at the Mobile District, which was responsible for a large section of the Southeast. Mobile District had a large group of highly experienced engineers; many had gained valuable extensive experience in military construction during World War II. This expertise gave Mobile an advantage over neighboring districts, particularly in areas of real estate acquisition and management, rehabilitation of existing structures, and new construction.[8]

One of the first actions by real estate divisions in all districts was to halt private sector leases in all government-owned facilities that might have military usefulness. In Mobile District, negotiated leases at Redstone Arsenal in Alabama and the Milan and Holston arsenals in Tennessee were revoked as the nation was placed on standby alert. In addition, the real estate divisions began acquiring new land for military construction. Rehabilitation of existing structures was fraught with problems, mostly associated with normal deterioration. Many buildings had been hastily constructed as temporary facilities for World War II and

Barracks at Fort Benning, Georgia.

were now greatly deteriorated. In many instances, little was salvageable except the site itself.[9]

Rehabilitation was accomplished when possible, however. The Mobile District carried out refurbishing at Fort Benning, Georgia; Fort McClellan, Alabama; Wolf Creek Ordnance Plant and Holston Ordnance Works, Tennessee; and Camps Gordon and Stewart in Georgia. The prohibitive cost of rehabilitating some of the old ordnance facilities led to the construction of new ones such as the Anniston Ordnance Depot in 1951. A Remote Receiver and Transmitter Building was constructed at Tyndall Air Force Base, Florida, and equipment was placed at Apalachicola Air Force Base. Coast Guard buildings at Biloxi were renovated, and work was under way on the Veterans Administration Hospital in Birmingham.[10]

The Mobile District was also responsible for the specialized engineering involved in the design of radio and radar navigational aids for a number of Air Force installations:

- Brookley Field in Mobile;
- Columbus Airport and Keesler Air Force Base Mississippi;
- Craig and Maxwell Air Force Bases in Alabama; and
- Eglin and Tyndall Air Force Bases in Florida.[11]

Additionally, new work was done at Fort Rucker, Alabama, where improvements were made to Cairns Army Airfield (at the time the Army's most completely instrumented field), and to Hanchey Army Airfield, which ultimately became the largest heliport in the world. The district also built specialized structures, including an electronics laboratory at Keesler Air Force Base, new assembly lines at Holston Ordnance Works, and rocket research facilities at Redstone Arsenal.[12]

Mobile District became very busy in 1950 and 1951 with a wide variety of engineering, rehabilitation, and new construction. Each of the other districts were similarly pressed into action, and SAD was an active hub of coordination, review, approval, budgeting, and liaison work with the Army and Air Force commands in the Southeast.

The Korean War also brought other changes to SAD. In December 1950, SAD's operations division was created, thus removing the engineering division's supervision of military and civil works. This was the first of many changes to the traditional Corps management pattern. The operations division was responsible for all staff assistance to the Division Engineer in SAD construction activities.

The Korean War brought about an immediate halt to the demobilization of the US military, followed by a program of rapid, massive construction. Within weeks of the start of the conflict, SAD engineers had prepared estimates for over 3000 buildings and other plans to restore World War II installations. For example, Camp Stewart, Georgia, was operated on a limited basis during the late 1940s after serving as a Signal Corps training center during World War II. In 1950, the Savannah District refurbished the camp as a basic training center and later as an armor training site. By 1955, the Camp was upgraded to Fort status. This kind of operation and planning illustrated how SAD used its resources and the lessons it learned from World War II to meet the challenges of the Korean War. The construction activities were handled by SAD and its core of World War II personnel, who had experience in rush work. Few SAD officials realized, however, that after this Korean War emergency work was completed, that there would be 30 years of additional planning, engineering, construction to support America in the Cold War.

THE 1950S

The Korean War, often referred to as a "Police Action" by the United Nations, represented an important change in US military strategy. The Eisenhower presidency developed another shift in strategy. This strategy, laid out in a document known as NSC 68, moved away from reliance on both nuclear weapons and a large army, to a strategy almost completely dependent on nuclear weapons.[13] This was referred to as the Massive Retaliation strategy, and was expected to deter the Soviets and the Chinese from both large and small attacks. Eventually, as the Soviets obtained and deployed nuclear weapons themselves, Massive Retaliation by both sides evolved to become known as the Mutually Assured Destruction (MAD) policy, a concept that peace between the US and the Soviet Union could be achieved by obtaining a balance in the nuclear arms race, thereby creating a stalemate between the two nations. As long as both sides had enough nuclear weapons to survive an attack and launch a counterstrike, neither nation would be willing to initiate the first strike. The mounting escalation in nuclear arms by the two nations promoted an uneasy peace.[14]

Although all of the districts in SAD carried out demanding construction work during the Korean War, much of it was temporary in nature, e.g., training areas, ranges, mess halls, and barracks. The middle and late 1950s brought more permanent facilities to the Army posts and Air Forces bases. For example, Fort Benning received a new nine-story, 500-bed hospital, Martin Army Hospital, at a cost of $6 million. SAD also oversaw the construction of the Kelly Hill area at the base. With eight 326-man barracks costing $45 million, the area represented a new concept in battalion living, which included all the living and support facilities in one area.[15]

In addition to the troop barracks, SAD supervised the construction of 4,978 family housing units at a cost of $76 million in the middle and late 1950s. This included 1,500 units at Fort Bragg; 1,000 at Fort Benning; 461 at Fort Stewart; 300 at Fort McClellan; 880 at Fort Rucker; 837 at Fort Campbell; and 330 units in the Panama Canal Zone.[16]

As the military emphasis switched from ground troops to more technical aspects of warfare, so did SAD's construction activities. In 1957, it supervised the construction of

Moncrief Hospital at Fort Jackson, S.C. (Savannah District).

a tracking station for the Vanguard satellite system at Fort Stewart. SAD's support of the Air Force highlighted its ability to build bases. As it had at the Army posts in the Southeast, SAD constructed new housing, barracks, and other support facilities at Dobbins Air Force Base, Hunter Air Force Base, and Turner Air Force Base. At other bases, it constructed larger runways and installed NIKE anti-aircraft missile systems to protect them.[17]

During the late 1940s and 1950s, SAD used its expertise from World War II to first demobilize, and then remobilize, many military bases in the Southeast. This work was accomplished primarily by the staff that had maintained its institutional knowledge. But it also learned new lessons and management techniques. SAD constructed a wide range of facilities, both temporary barracks and high-tech missile sites. New technologies in building were adapted to military construction. The post-World War II American lifestyle changes were incorporated where possible (for example, in housing and mess halls). Nuclear weapons, large jet bombers, missiles, and more sophisticated electronics led to revolutionary engineering and construction needs. There were new ideas throughout the districts and SAD.

THE 1960S AND THE VIETNAM WAR

Following his inauguration, President John F. Kennedy began applying his own policies. Although he still stressed the importance of nuclear weapons, Kennedy also offered a "Flexible Response" defense policy that critics of the Eisenhower policies had advocated. Under this new strategy, conventional forces were again expanded, thus offering the military a variety of options other than the use of nuclear weapons.[18]

Vietnam was a prime location to try the Flexible Response policy, and Kennedy introduced small numbers of Special Forces to stabilize South Vietnam in face of a North Vietnam guerrilla campaign. After Kennedy's assassination, President Lyndon Johnson continued US involvement. In 1965, the United States became solidly involved—184,000 troops were stationed in Vietnam following the Viet Cong killing of eight and wounding of 126 Americans at Pleiku in February. US involvement in a full-scale war commenced at this time; it continued until 1973.

As in previous armed conflicts, SAD's primary role during the Vietnam War was to provide construction support for the buildup of military bases. Unlike the quick buildup during World War II and the Korean War, the slow escalation of the Vietnam War resulted in different building environments and different management problems. The major military construction was a mix of permanent construction (barracks and housing) and special needs, for example, jungle-like training areas and mock-POW camps.

SAD's military work during the Vietnam era is well illustrated by the work of the Savannah District. By the late 1950s, Fort Benning, Georgia, had become the Army's primary infantry school, and in 1958, Congress funded the construction of a single large building to house the academic program. Begun in 1962 and eventually named Infantry Hall, an $8 million, H-shaped structure covering twelve acres was erected to house the Infantry Center and the Infantry School. In 1965, the Hall won the first "Distinguished Architectural Achievement Award" in an Army Corps of Engineers competition for the best-designed military structure.[19]

Infantry Hall at Fort Benning, Georgia (USACE).

Fort Jackson, in Columbia, South Carolina, became the support responsibility of the Savannah District in the 1961 SAD reorganization. A new $40 million barracks program was begun in the early 1960s, but since the installation was an important induction center for the Army, the 1965 escalation of the Vietnam War led to additional barracks and utilities, a new brigade headquarters building, family housing units, and even new chapels. By fall 1965, the military draft was expected to reach 35,000 men a month and to increase the Army to over 1.2 million troops. Troops began to arrive in large numbers at Forts Jackson, Benning, Gordon, Stewart, and Bragg; these forts were among the most important in the nation. The Savannah District soon led the Corps with the highest value of military construction in the United States;[20] and Savannah became recognized as the Corps' leader in design and construction of barracks.

Construction at Fort Gordon, Georgia, included a Signal School complex, a 3,200-man barracks, bachelor officers' quarters, family housing, new target ranges, and a variety of utilities. One of three in the US, the Fort Gordon Signal School included ten barracks complexes, an electrical distribution system, roads, bridges, a spur railroad, and storm

drainage, all of which greatly increased the importance of the installation as an Army base.

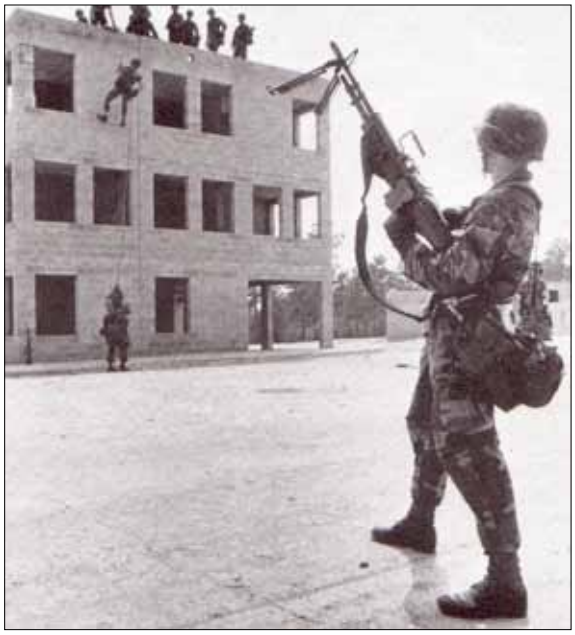
At Fort Benning, an especially important project involved remodeling one of five large Quartel buildings constructed before World War II as bachelor officers' quarters. Quartel buildings have been described as "the largest US army billet under one roof." Since the outside perimeter of one Quartel is one mile, tearing down the structure would have cost much more than renovation.

Especially extensive was a project to extend and strengthen the runways at Fort Benning's Lawson Field to accommodate the Air Force's largest and fastest troop-carrying jets. Lawson Field was an important base for rapid troop deployment. The engineering and construction complexity is indicated by the materials used: 132,444 yards of concrete poured up to 18 inches thick, 46,818 pounds of steel reinforcing bars, and 45,000 square yards of overlay pavement.[21]

A very important Army installation during the Vietnam conflict was Fort Stewart, Georgia, already a training base for tank warfare and the National Guard. In 1966, Fort Stewart became a support training base for the Army Aviation School at Fort Rucker, and the Savannah District designed supervised construction of new runways and special landing strips to train Army pilots for missions in Vietnam. The importance of helicopters in Vietnam produced an order from the Department of Defense to train 50 percent more helicopter pilots in 1966. In 1967, Fort Stewart and Hunter Army Air Field were designated the US Army Flight Training Center for the accelerated helicopter training program, and a wide variety of new facilities were designed and built to accommodate the education of the new pilots. Helicopter facilities were also constructed at Forts Rucker, Bragg, Benning, and Gordon. Altogether, in the period between 1965 and 1968, construction to support Vietnam resulted in roughly $100 million for SAD projects. This included about $25 million for troop training facilities and $70 million to rehabilitate ammunition facilities.[22] In Tennessee, for example, under the Southeast Asia Support program, the Mobile District rehabilitated TNT lines at the Volunteer Ordnance Works and the production facilities at Holston Army Ammunition plant at a cost of $70 million.

The Savannah District built a number of novel facilities specifically required for the demands of the Vietnam War. In its Clarks Hill Lake area, for example, the District participated in a test called "Rat Hole," in which powdered aluminum was blown into underground tunnels and then ignited, in hopes of destroying the tunnels. Although the test worked in Georgia, in Vietnam the Vietnamese simply abandoned the tunnels when the aluminum was applied, and the flames blew back at the American soldiers. A major project at Fort Bragg was the JFK Special Warfare Training Center, a complex of specially designed buildings utilized by Special Forces "Green Beret" troops for guerrilla and paratroop training recreating Vietnamese conditions. The Center won the Corps of Engineers Architectural Award for 1966.[24]

Ironically, the expansion of the war in 1965 eventually resulted in less military construction in SAD. In December 1965, Secretary of Defense Robert McNamara announced that an additional $89 million would be taken from the Corps nationally to support the war effort. SAD learned that the deferral of funds would last for an indefinite period, and that



Urban Warfare Center at Fort Benning, Georgia (Savannah District).

greater reductions would follow in 1967 and 1968.

Both Army and Air Force construction during the Vietnam escalation were facilitated by the fact that the Savannah District, like the Mobile and Jacksonville districts, was much better prepared for military crash programs than it had been at the outbreak of the Korean War. The years between 1950 and 1970 served as a transition from the temporary to the permanent, from the demobilization of the immediate post–World War II era to a permanent war economy.

The expansion of the army for Vietnam was influenced by the 1961 national reorganization of the Corps, which involved the reapportionment of military construction from thirty-one districts to nineteen. The Nashville District was moved to the Ohio River Division. The change resulted in the net loss of 400 employees in SAD. Districts without military construction assignments became known as "operational districts." Charleston District and Wilmington District in SAD were thus redefined.

In summary, SAD completed $1.8 billon in military work from the start of the Korean War to 1961, a figure roughly equivalent to its entire World War II construction. During the Vietnam War, SAD's primary role was to provide construction of training facilities at military bases. Unlike the quick buildups during World War II and the Korean War, the slow escalation of the Vietnam War resulted in different management issues. No longer was the Corps overseeing the emergency construction of temporary bases in this period. The major military construction was a mix of permanent construction and special needs. The Vietnam period resulted in the modernization of SAD's construction methods and management, and allowed it to meet the needs of the Army during this limited war.[25]

ENDNOTES

1 Several excellent works describe and analyze the US military, and the Army in particular, during the Cold War. For a better understanding of the context, the reader should consult the US Army's official history, *American Military History* (Center of Military History 1989). The author also recommends *Rise to Globalism: American Foreign Policy Since 1938* (Ambrose 1997) for a standard history of the time.

2 F. J. Shaw, Jr. and T. Warnock, *The Cold War and Beyond: Chronology of the United States Air Force, 1947-1997* (Maxwell Air Force Base, Alabama: USAF Museum Program, 199), 8.

3 Ibid., 106-107

4 Ibid., 113

5 Ibid., 114

6 Ibid., 117-121

7 Ibid., 116-131

8 Jeane, *A History of the Mobile District*, 72

9 Ibid.

10 Ibid. 392.

11 Ibid.,392

12 Ibid, 392.

13 Ibid.,133-135

14 Ambrose, *Rise to Globalism,* 138; Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington: Indians University Press, 1973), 403-404

15 McWatters, Chapter IV, 27.

16 Ibid, 25-27.

17 Ibid, 28

18 Wrigley, *The American Way of War*, 445-446

19 Henry E. Barber and Allen R. Gann, *A History of the Savannah District: US Army Corps of Engineers* (Savannah GA: United States Army Corps of Engineers, 1989), 298-300, 309.

20 Barber and Gann, 312, 319, 329.

21 Barber and Gann, 310- 311

22 Barber and Gann, 202

23 Barber and Gann, 313-315.

24 Barber and Gann, 312-313.

25 Ibid.

CHAPTER 5 – SAD AND THE RACE FOR SPACE

After World War II, the United States and the Soviet Union entered into a contest for political, military, and economic superiority. One arena in which they fought was space. Dr. Wernher von Braun's group had developed the V-2 rocket in Nazi Germany. At the end of World War II, von Braun and his team surrendered to the US military and relocated to the United States as part of Operation Paperclip.[1] For the next ten years, they served as the nucleus of the US Army's missile program; during the same time, von Braun continued to promote manned space flight.[2]

The American public's attention seriously turned to space flight on October 4, 1957, when the Soviets launched the first artificial satellite, *Sputnik*, beating the US into space. Proud of their perceived technological primacy, Americans were shocked by this jump forward by the Soviets. Senator John F. Kennedy won the presidency in 1960 partly on fears of a missile gap.

The framing of the space race as a contest between American and Communist ideals is useful. The historiography of the political aspects of the space race is immense.[3] Some politicians and the media saw *Sputnik* as a symbol of the lack of clear national goals for America in the Cold War.[4] Many historians argue that President Kennedy saw the space program as a way for the nation to undertake a challenge and complete it. They see him turning his attention to the space race after the 1961 Bay of Pigs debacle as a way to get the nation focused. The space race was more than another battle to stop Soviet aggression. It allowed America to continue its eminence in the realm of technology.[5]

SAD in general—and the Jacksonville, Mobile, Tullahoma, and Canaveral districts specifically—played an important role in the support of the US space race through their management of the construction of four major sites: the Arnold Engineering Development Center, in Tullahoma, Tennessee; Redstone Arsenal/Marshall Space Flight Center in Huntsville, Alabama; the Mississippi Test Facility, near Bay St. Louis, Mississippi; and Kennedy Space Center/Cape Canaveral Air Station, in Cape Canaveral, Florida. These four sites have served as the nucleus of the US space program from the 1950s until the present. Each of these construction projects called on SAD districts to design and manage the construction of unique, never before developed, buildings and structures, as well as support buildings (e.g., administrative facilities and barracks) in a very short amount of time. The support of the space program also required SAD to develop standardized plans and management techniques to minimize the amount of time needed for construction of massive launch sites. NASA utilized the Corps as its chief land agent and contract manager because of its ability to respond to the needs of a large project and to utilize resources in an effective manner. Also, the Jacksonville, Canaveral, Tullahoma, and Mobile districts developed skilled staff and relationships with many specialized engineering firms that could assist in the design and construction of the aerospace infrastructure.

ARNOLD ENGINEERING DEVELOPMENT CENTER

The first installation in the South for the support of the space race was begun in the 1940s as the Air Engineering Development Center in Tullahoma, Tennessee.[6] As World War

II was ending, the Army Air Forces Air Staff saw the need to study the potential of new weapons and to formulate a new strategic vision for the Air Force. In 1944, General Henry "Hap" Arnold created a Scientific Advisory Group to study rocketry, guided missiles, and jet propulsion.[7] This group included prominent American scientists, along with a German émigré to America (in 1930), Theodore von Karman. Von Karman had been working with the Army Air Force on advanced projects since 1938. After the addition of von Braun and his team, and captured aerospace testing equipment from the Hermann Goering and Wilhelm Kaiser Institutes of Brunswick and Gottingen, Americans had a good start for developing a space program.

Arnold Engineering Development Center, 1958 (USACE photo).

In December 1945, the Air Technical Service Command proposed the creation of an Air Engineering Development Center. The center would be a complete research hub, with static rocket test stands, ramjet test facilities, wind tunnels, and various electronics laboratories. Its primary purpose would be to insure that the American military maintained a technical advantage over the rest of the world's air forces. Congress approved and allocated $100 million for the construction of what became known as the Arnold Engineering Development Center (AEDC). In November 1948, the Air Force announced that the AEDC would be located at Camp Forrest, Tennessee, a former World War II training camp.

The new US Air Force was still a young military service (created after the war, in 1947), and the Air Staff turned to the Corps to oversee the design and construction of the aerodynamics testing complex at the AEDC. In 1949, the Corps established the

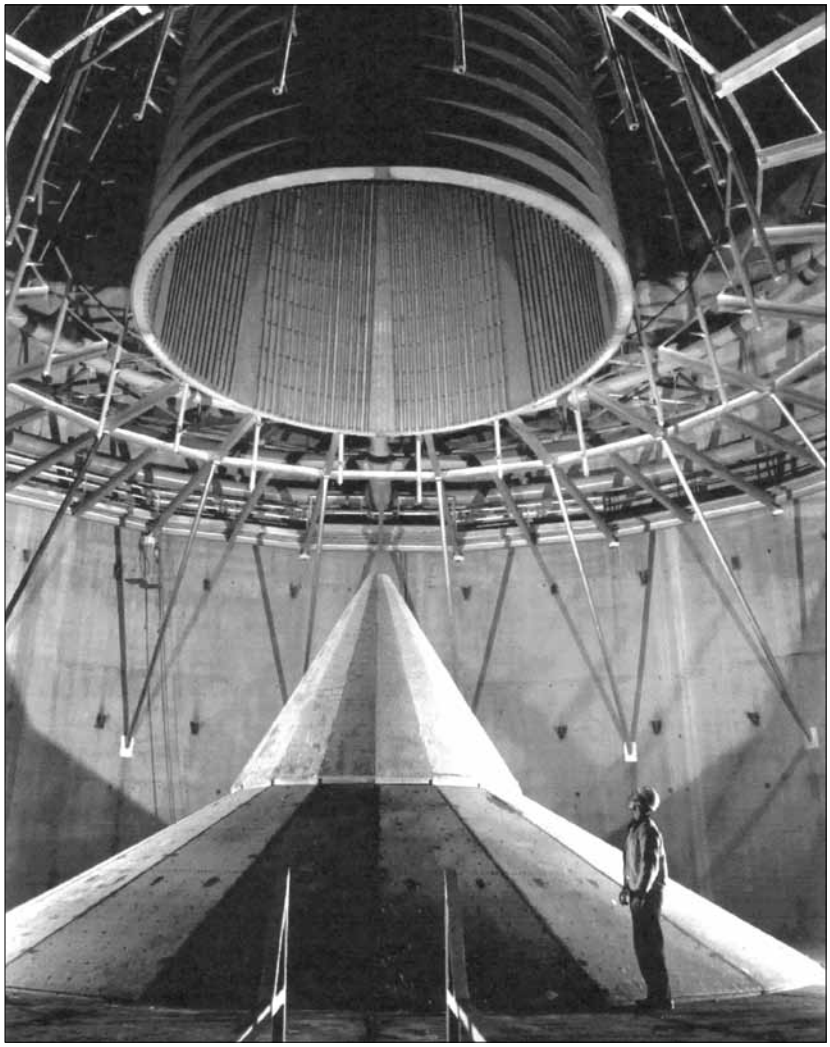
Tullahoma District, which reported directly to the Office of the Chief Engineer, to oversee the construction. The Corps' first tasks at the site were the designing of a cooling water dam, managing land acquisitions, and the establishment of administration activities. The engineering firm of Sverdrup and Parcel, under contracts managed by the Tullahoma District, handled the construction of the primary technical facilities. Sverdrup and Parcel constructed the initial test facilities, which included the Engine Test Facility, the Gas Dynamic Facility, and the Propulsion Wind Tunnel.

As the Corps's attentions turned to supporting the Korean War mobilization effort, the Tullahoma District was placed under SAD in 1951.[8] In 1960, during reorganization, the Tullahoma District became an area office of the Nashville District. The next year, SAD moved support for the AEDC to the Mobile District as part of Mobile assuming military construction responsibilities from Nashville.[9] Through its work at AEDC, SAD developed valuable experience in managing aerospace projects. Cadres of engineers were formed at the Mobile and Tullahoma districts. These engineers and managers, with help from their contractors, would supervise the construction of later space-related projects.

One of the major projects constructed at the AEDC with the support of SAD and the Mobile district was the development of the J-4 test facility, initiated in 1961. Because of the development of larger rockets for military and civilian uses, the engineers hoped to construct a cell whereby a complete missile, with engines installed and operating, could be tested in an upright position. The dynamic phenomena occurring in the course of a missile's flight through the stratosphere could thus be studied without loss of the missile itself. As the engineering design and construction agent for the project, the Mobile District had to design a facility capable of withstanding thrust pressures of 500,000 pounds at a simulated altitude of 100,000 feet, and projected future thrust capabilities of 1.5 million pounds. Conceptual design became reality by 1964, when the chamber was approved for operation. The underground test chamber was 250 feet deep and 100 feet in diameter. The development of this facility highlighted the growing ability in the Mobile District to oversee large, unique designed test facilities.[10]

The majority of the testing at AEDC was conducted by the Air Force; however, the facilities there were very useful to NASA. AEDC tested the early Mercury spacecraft for NASA.[11] AEDC also tested the Grand Central solid-fuel rocket motor used to propel the Mercury spacecraft escape system as well as two Thiokol retrorockets for the Mercury spacecraft.[12] The relationships between the military support and the civilian space program were already apparent.

To assist in the testing of larger aircraft in the 1960s, the Air Force requested the construction of the Aerospropulsion Systems Test Facility (ASTF) at the AEDC. During the development of engines for the massive C-5 cargo aircraft, it had become apparent that the Air Force lacked adequate test facilities for large-scale engines. The C-5 engine had to be tested in the air, risking men and machinery. The ASTF would double the sea-level static thrust testing capacity at AEDC.[13] In 1972, the Air Force, with the Corps as the contracting agent, contracted with Daniel, Mann, Johnson, and Mendehall (DMJM) of Los Angeles to construct the $625 million ASTF. DMJM had worked with SAD to design the Atlas space launch complex at Cape Canaveral in the 1960s.[14] The construction and design



The J-4 Test Cell, Large Rocket Facility, Arnold Engineering Center, 1966 (USACE photo).

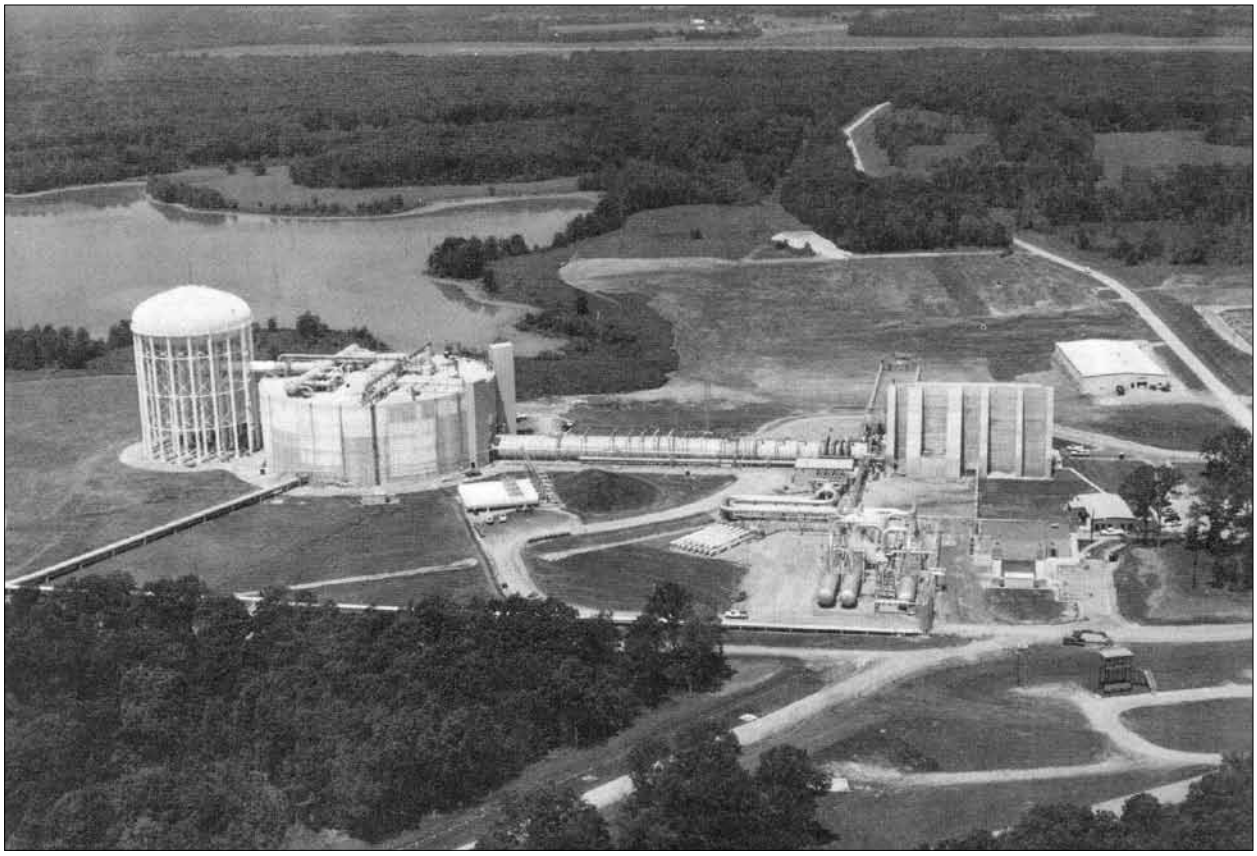
of the ASTF project proved more difficult than planned. Over 750 changes in the original designs occurred, and the wind tunnel facility included stainless-steel air ducts large enough for tractor-trailer rigs to drive through; compressor lines over 100 meters long, and the construction of the world's largest single butterfly valve to control the wind.[15] Even with these problems, the ASTF was completed in July 1984 and became operational in September 1985.[16]

To further assist the AEDC in testing new technologies, Congress approved, in 1986, construction of the J-6 Large Rocket Test Facility at AEDC. The $100 to $200 million project was designed to test solid propellant rocket motors that generated 500,000 pounds of thrust. This was an important project for SAD and the Mobile District, as it "bolster[ed] the military design and construction program."[17]

Overseeing the construction of the test facilities at the AEDC provided SAD and the Mobile District with valuable experience in the designing and building of large, unique, high-tech facilities. SAD implemented new management techniques and relationships for J-6 that would serve as the groundwork for development of more efficient team approaches to other military and civil works projects.

REDSTONE/MARSHALL SPACE FLIGHT CENTER

The Marshall Space Flight Center, established in 1960 and named in honor of General George C. Marshall, was integral in the designing and testing of the rockets used in the manned space program. The Center, within the Redstone Arsenal, was created with the transfer of buildings, land, space projects, property, and personnel from the US Army to NASA. More important than the buildings was the transfer of Dr. Wernher von Braun and his rocket team.[18] Marshall's first major program was the development of the Saturn rockets, the first booster designed originally for civilian space travel. From the start, the Army (through the



J-6 Testing Facility, Arnold Engineering Development Center (USACE photo).

Corps) assisted in the development of test equipment at Redstone and later at Marshall. In 1951, the Army constructed the Static Test Tower (facility number 4572). It conducted 487 tests involving the Army's Jupiter missile. The test stand contained two test positions, and because of its appearance was sometimes called the "T-Tower." It was designed to test rocket systems with a maximum thrust of 500,000 pounds. As the need for testing of larger rockets emerged, the test stand was modified in 1961 to permit static firing of the Saturn I and Saturn IB stages, which produced a total thrust of 1.6 million pounds. In 1984, the stand was modified again to permit structural tests on the space shuttle solid rocket booster.[19] Corps engineers early on learned that their designs would have to be functional yet flexible enough to adapt to the new needs of the space race.

One of the largest and most important construction projects at Marshall was overseen by SAD's Mobile District. The Saturn V Dynamic Test Stand, constructed in 1964 and used in 1966–1967 for ground vibration testing of the Saturn V launch vehicle and the Apollo spacecraft, provided dynamic testing of the complete Saturn V launch vehicle to evaluate structural strengths and to assure decoupling from the vehicle control system. This test stand allowed the engineers to evaluate various flight configurations in a safe setting. After the Saturn V was developed, NASA used the test stand to structurally qualify the Skylab orbital workshop and the meteoroid shield deployment for Skylab. The facility was modified in 1977 to perform vibration tests on the mated space shuttle using the orbiter *Enterprise*.[20]

SAD's support of activities at Marshall enabled the design and building of important testing facilities. Because of its management practices, SAD could adapt to customers as diverse as the Air Force and NASA. The Mobile District used the projects at Marshall to continue training its specialized engineers to work in tandem with outside engineering and construction firms. The lessons learned at Marshall served SAD well as it tackled the construction of a larger test facility.

THE MISSISSIPPI TEST FACILITY

One of the major problems with the early space program was the question of how best to land on the moon. After much debate, NASA decided to use the orbital rendezvous method, which would require a large booster to propel the elements of the mission into orbit to join for the trip to the moon. The German rocket scientists at Marshall had championed the development of the massive Saturn V rocket, and it had been selected. Although Marshall was able to test elements of the Saturn rocket, not all needed tests could be carried out there. The Saturn was being constructed at NASA's Michaud Assembly Facility near New Orleans, Louisiana. Realizing that it would be beneficial to build the test stand nearby, in 1961, NASA selected a site in a rural area of south Mississippi, on the East Pearl River, near Bay St. Louis. The site became known to everyone as the Mississippi Test Facility (MTF).[21]

Like many of the NASA facilities, the site for the MTF was chosen because of its water access, very effective for transporting large, heavy rocket stages, components, and loads of propellants. Also, the government was able obtain the 13,500 acres needed for the test facility as well as the 125,000 acres needed for the sound buffer with relatively few relocations of residents. As it had done before at the AEDC, SAD directed the Mobile District to oversee the real estate, engineering, and construction of the MTF. At the time, this was the largest construction project in the state of Mississippi and the second largest in the United States. It also served as a good example of the techniques learned by SAD from previous construction at the AEDC, Marshall, and Kennedy. From 1961 until the MTF project became operational in 1966, the Mobile District was continuously involved in developing the site. After that time, the District's responsibility tapered off until the MTF project office was phased out in 1970.[22] After most of the major construction was completed, District employees performed routine "housekeeping chores" like digging wells, laying water lines, and constructing or repairing shops and other maintenance buildings. The Corps provided all services and support for its clients at these space-related facilities, not just the glamorous jobs.

Unlike the Marshall projects, all land for the MTF was newly acquired; the real estate division of SAD and Mobile District had embarked on a massive and demanding land buying program. Although public attitudes toward NASA and America's space program were generally very favorable in the 1960s, the land acquisition process faced some hurdles. Acquiring land from rural owners was difficult, and the Corps was forced to deal with over 700 court-contested condemnations. Overall, however, land acquisition for the site progressed smoothly between January 1962 and the closing of the real estate office in Bay St. Louis in late 1965.[23] The expertise gained in the massive World War II mobilization served the Corps' land agents well in this project.

During the land-acquisition process, one of the most difficult decisions SAD made was to end the life of the small town of Gainesville. This Mississippi community had served as a former county seat and commercial center in the nineteenth century. The town had declined as railroad interests shifted to more lucrative routes, but, ironically, the railroad returned after the community's demise. A Southern Railway branch line from Nicholson, Mississippi, was constructed to bring supplies to the new test site's first construction project, the Gainesville Lock.

Gainesville was not the only town affected by the development of the MTF. Other towns that disappeared were Log Town, Napoleon, Santa Rosa, Westonia, Flat Top, and Bayou La Croix. Some private estates held by the same families for over a century were relinquished. Though not a historic property, the retirement home of Colonel and Mrs. John A. Wheeler in Napoleon was one example. The gardens of Parade Rest, as the home was called, were one of Mississippi's major tourist attractions. The gardens, along with a historic wisteria bush in Gainesville, were preserved. Other public properties, such as schools, churches, and cemeteries, were affected. Several large cemeteries were removed from the five-square-mile test site. Cemeteries and churches in the buffer zone could remain, though concerns

Artist's Concept of Lift Lock and Bascule Bridge at NASA Mississippi Test Facility. Barge transportation potential was important in selecting the site location.

The first stage of the huge Apollo Saturn V moon rocket is lifted by crane for installation into the B-2 test stand at the Mississippi Test Facility, 1967.

were voiced about maintenance because people could no longer live in the area. Most churches resolved these issues without Corps involvement. Again, SAD personnel used examples from TVA dam construction and their own dam projects to relocate citizens and their important institutions as smoothly as possible.

One of the first construction projects overseen by SAD was the creation of an elaborate canal system to connect the Michaud plant with the test facility so that barges could carry the rocket sections. The lock operation covered 180 acres. The Saturn boosters entered the canal from the East Pearl River and were carried to the test site, where large cranes lifted them onto the firing stands. After the canal was dug, water to fill it was pumped overland from the Pearl River via a system of low head pumps, a technique cheaper than constructing a reservoir.[24] The MTF Lock is similar in design and dimension to the Demopolis Lock on the Tombigbee River, and existing plans for the Demopolis Lock were adapted for the test site. Expertise in this facet of engineering had served SAD personnel well: They could adapt what they had already designed and solve another problem. In addition to purchasing real estate, clearing the site of people and structures, and constructing a transport canal and water system to support it, the Corps oversaw the construction of several testing stands at the MTF. [25]

The introduction of the space shuttle required the adaptation of the facilities for a new craft. In June 1975, the Space Shuttle Main Engines were tested at the MTF. All the engines used to boost the space shuttle into low-Earth orbit were tested on the same stands used to

test-fire all first and second stages of the Saturn V in the Apollo and Skylab programs. In May 1988, the Mississippi Test Facility was renamed the John C. Stennis Space Center in honor of US Senator John C. Stennis for his support of the nation's space program.

KENNEDY SPACE CENTER AND CAPE CANAVERAL AIR STATION

No one spot captures the American imagination about space flight more than Kennedy Space Center at Cape Canaveral. As it is the site of all American manned launches, millions of Americans view the launch gantries and buildings there as "the space program." Like Marshall, the Kennedy Space Center grew out of a military rocket mission. Responsibility for constructing facilities to support a growing US missile and space research program logically fell to the Corps of Engineers in the months following World War II. The country needed a long-range testing and proving ground for implementation of all of the designs von Karman, von Braun and others were developing. In 1950, the Air Force selected Cape Canaveral as the test range, and the first construction for missile launch capability was initiated under the supervision of the Jacksonville District. To manage the contract, Jacksonville District set up an area office at Patrick Air Force Base, a former Navy facility taken over by the Air Force near Cape Canaveral.[26]

Flight testing of fully assembled rockets was done at the Florida complex. As the space race grew, the number of tests grew steadily, increasing pressure for facilities to handle the expanding missile and space program. Between 1950 and 1963, the Jacksonville District handled the military and new civilian needs. New demands, however, surfaced in January 1963, when Cape Canaveral was designated to handle launching for NASA's Apollo program and the Air Force Titan III program. The Chief of Engineers decided that a separate district office was needed to successfully manage the various programs. The Cape Canaveral District was formed on May 1, 1963.[27] The creation of the new district illustrated the strength in the organizational structure of the Corps of Engineers. With its national network of division and district offices, the Corps had the ability to rapidly expand or retract in size based on the demand for its services.

One of the early projects that Jacksonville District oversaw illustrated the usefulness for the early space program to develop unique structures and later to adapt them to new needs. In 1951, the Jacksonville District constructed a 7,000-foot-long, 300-foot-wide landing strip for the SM-62 Snark at Patrick for $637,500. The Snark was an interim, air-breathing intercontinental weapon produced during the early 1950s when intercontinental ballistic missiles were still being perfected. It carried a nuclear warhead and could be launched from a mobile platform by two booster rocket engines. During the testing of the Snark, the missiles landed at Patrick. However, with the availability of large numbers of ballistic missiles in the early 1960s, the Snark became obsolete and was removed from service. However, in 1955, the skid-strip was lengthened to 10,000 feet, with a 1,000-foot overrun at each end, to create an all-weather airfield. In keeping with the theme of adaptation, the Corps spent approximately $2.8 million to reconfigure the skipway from a specialized landing site to an all-weather runway that would later be used for landings by the space shuttle fleet. [28]

Another early Jacksonville District project illustrated its speed in constructing structures for the space race, the need for standardization, and the development of high-tech structures. This was the construction of the Redstone launch complexes 5 and 6. The Redstone complexes were different from the German structures used to launch the V-2. The new gantry was more "economical and versatile,"[29] and the new structure was

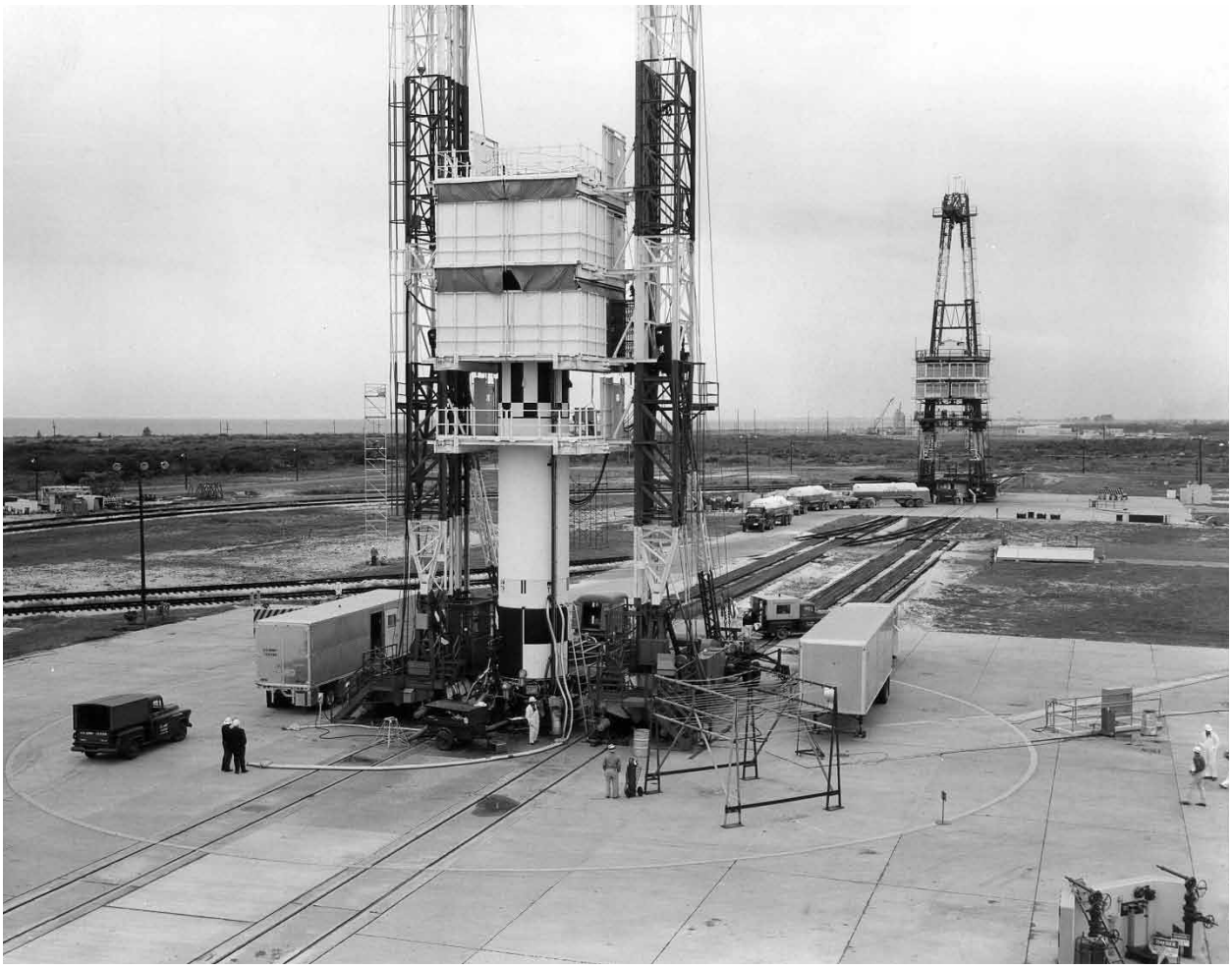
> a reclining type of single-mast structure with cantilevered access platforms capable of encircling the missile. An "A" frame mast, as the backbone supporting the cantilevered access work platforms, towered 140 feet above the launch pad. The mast was supported by a large structural steel base mounted on railway tracks and capable of moving under its own power to and from the missile. Elevators traveled up and down the mast, with stops at various works-levels, to a 150-ton hammerhead crane mounted at the top of the structures.[30]

Based on the open-faced masts used in oil fields, the Redstone service tower was built by Noble Company of Oakland, California. It was transported to the Cape in 14 railroad cars and assembled by seven men in five days.[31] Pad 6 supported its first Redstone launch on April 20, 1955. Three months later the US government accepted the complex. Pad 5 supported its first Jupiter A launch on July 19, 1956. In addition to Redstone and Jupiter launches, the complex supported Explorer and Pioneer missions and all six Redstone/ Mercury suborbital flights.

The burgeoning construction of new space and missile facilities was well accomplished by SAD, and it was rational and prudent to continue to make effective use of the division to accomplish new national goals.[32] This experience allowed the Patrick Area Office to develop standardized specifications in "respect to force-loads on pad, launch thrust load, flame bucket requirement, communication construction criteria, specifications for blockhouses, missile assembly buildings and a host of related needs."[33] To assist in the speedy construction at the Cape Canaveral Air Station, Jacksonville District engineers oversaw the standard design of igloo-shaped bastions located 750 feet from the launch pads and the development of 21 missile assembly buildings. These buildings were based on the standard design of aircraft hangars, with modifications such as trenches for instrumentation circuits and other technical equipment. The design of uniform launch facilities helped to reduce the cost and time that was required to test the ballistic missiles during the 1950s and 1960s.[34]

Another important job of the Corps in the 1960s, very important at least to personnel stationed at Patrick, was overseeing the construction of new barracks, office buildings, a commissary, chapel, medical center, and other support buildings. Just like at any other military base, the Corps oversaw the construction of the standard support facilities, and that made life easier for the personnel.[35]

With the arrival of NASA and the pressures of the moon race, the new Canaveral District worked to convert military rocket technology for use by the manned space program. For example, Pad 19 was converted to a Titan II launch facility for the Gemini space program. This launch facility had been used to test Titan I, but conversion to handle



Pre-Launch ABMA Jupiter AM-30, Pad 6.

Titan II as a space vehicle required many changes.[36] However, by now, engineers who had worked within the various districts of SAD were familiar with these problems.

For the massive construction of the facilities needed to support the Apollo program, the Canaveral District directed the construction of some of the largest, most complex structures in history.[37] These included:

- The Vehicle Assembly Building, large enough to house four Saturn V Rockets
- A launch control center with four firing rooms
- Three 46-story mobile launchers
- A 40-story mobile service structure
- Two transporters for moving the mobile launchers
- A crawlway capable of handling the load
- Two launch pads
- A communications network
- A complex of offices and technical shops[38]

By the mid-1960s, the construction workload for the Canaveral District began to decline at the Kennedy Space Center (in 1963, the Cape Canaveral Space Center was renamed Cape Kennedy in honor of President John F. Kennedy). All of the major facilities for the space program were completed by 1967, and the waning construction demands called for a greater economy of scale.[39] SAD reduced the 1963 work force of 340 people to 120 by 1970. In early 1970, the Jacksonville District managed personnel services for the Canaveral District; in August of that year, SAD transferred management to the Mobile District, along with responsibility for other functions, including safety and the Office of Counsel and Administration.[40] The Canaveral District was ordered by SAD to be discontinued effective June 30, 1971. By July, the replacement Florida Area Office was part of the Mobile District, with responsibility for supervising construction not only at the space complex but also at Homestead, MacDill, and Patrick Air Force bases.[41]

When the Canaveral District was created, SAD and the new Division Engineer drew not only on the Jacksonville District office but also on a wide range of Corps locations—including headquarters in Washington—for the best personnel available.[42] When the workload began to decrease in the late 1960s, SAD reassigned valuable engineers and managers to other districts. A number of the engineers were transferred to the new Huntsville District, which had been created out of Mobile District territory to serve Redstone Arsenal and Marshall Space Flight Center.[43] Mobile District's long time involvement in the missile program research and development at Redstone gave the Mobile District office a closer link with operations in the Canaveral District. From an organizational standpoint, the Mobile District was better prepared to manage the necessary construction. Furthermore, all military construction was transferred from the Jacksonville District to Mobile in 1970, including that for the Panama Canal Zone and Central America.[44]

The emergence of the space shuttle brought new construction and new hurdles for SAD. One of the chief projects in the post-Apollo space program was the rehabilitation of the Solid Motor Assembly Building for the Shuttle Payload Integration Facility (SPIF). The original building was used for the "stacking and mating of solid rocket motors to the Titan Air Force heavy launch vehicle."[45] Like buildings and structures at other space centers, it was converted for new support activities. In the 1960s, payload and booster integration originally took place at the launch pad. The complexities of the space shuttle program checkout procedures, plus the security and environmental protection required by the Air Force for the Titan program, could no longer be handled at the launch site. Therefore, rehabilitation was necessary. Because the work was critical to the rapidly evolving shuttle program, the project received priority rating on July 17, 1981. The job required gutting the twenty-two-story tower and its flanking sixteen-story wings.[46] The completed project provided the Air Force with the largest radio-frequency-shielded "clean room" in its inventory. The Mobile District completed this massive undertaking on time to meet Air Force requirements.[47]

SUPPORTING MILITARY SPACE

In addition to the civilian space race, SAD also supported military space programs in the 1960s. Because of the Army's responsibility for anti–ballistic missile (ABM) defense and the design expertise developed within SAD's districts from its NASA and Air Force projects, the

Corps received the design and construction for the various facilities needed to test the ABM program. One of the projects under the Special Defense Projects Section was the Nike-Zeus project. Mobile District supervised the construction of test facilities for the project, which stretched from Ascension Island in the South Atlantic to Kwajalein Island in the Pacific.[48] The high-tech facilities included an intercept site with special radar and other sophisticated tracking equipment. Success of the operation was confirmed on July 19, 1962, when a Nike-Zeus fired from Kwajalein Island intercepted an Atlas-D ICBM fired from Vandenberg Air Force Base, California, 4,800 miles away.[49] The interception marked a milestone in the evolution of the entire system, and SAD's Mobile District played a key role from the start. In the early 1970s, President Richard Nixon negotiated the effective end of the ABM program. However, several specialized engineers would later be used in the development of the Reagan administration's Strategic Defense Initiative ("Star Wars").

During the space race, SAD oversaw the construction of four important installations. Construction projects at these facilities were engineering marvels. SAD engineers oversaw and supervised their funding, design, contracting, and construction. At Kennedy, SAD engineers assisted in the designing and construction of the first launch facilities. NASA and the Air Force were able to rely on the Corps's expertise in civil works as well as military construction as they created new installations. Additionally, SAD developed a skilled staff and relationships with many specialized engineering firms that could assist in the design and construction of the aerospace infrastructure. Although SAD did not build any of the rockets or spacecraft or train the astronauts, its managing of the construction projects was, and is, an essential part of the nation's very successful space program. The expertise of the Corps and its ability to provide flexible and skilled results assisted in the nation realizing President Kennedy's goal of landing on the moon by the end of the 1960s.

Aerial view of Missile Row, Cape Canaveral Air Force Station, looking north.

ENDNOTES

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6 Several histories have been written about AEDC. The official history is *The United States' Arnold Engineering Development Center* (Arnold Air Force Station, TN: The Center, 1986). Also an excellent history of the development of the center is located in Karen J. Weitze, *Keeping the Edge: Air Force Materiel Command Cold War Context (1945-1991). Volume II: Installations and Facilities* (EDAW, Inc., 2003).

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13 Marin J. Kudroff, "The Aerospropulsion Systems Test Facility," *The Military Engineer*, 67 (May-June 1974), 143.

14 Weitze, *Keeping the Edge,* 26.

15 McWatters, "SAD History, Chapter IV, 58.

16 Weitze, *Keeping the Edge*, 26.

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19 Andrew J. Dunar, and Waring, Stephen P. *Power to Explore: A History of Marshall Space Flight Center, 1960-1990* NASA SP-4313, (Washington, DC: NASA, 1999), 315-317.

20 Ibid., 314.

21 The naming of the MTF is a bit confusing. NASA officially adopted the name "Mississippi Test Operations" on December 18, 1961. However, it was still referred to unofficially as the "Mississippi Test Facility," particularly by headquarters and MSFC offices. On July 1, 1965, MSFC announced the official re-designation , "Mississippi Test Facility."

22 Interview with Willis E. Ruland, Chief, Environmental Branch (Ret.), Mobile District Office, 25 September 1984.

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45 Winnie L. Smith, "SPIF Nears Completion: $24 Million Project Supports Space Program," *Mobile, US Army Corps of Engineers, Mobile District*, Vol. 5, No. 6 (June 1983), 4. Quote is from William W. Brubaker, area engineer for the project.

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CHAPTER 6 – THE END OF THE COLD WAR AND OPERATIONS IN THE MIDDLE EAST: MILITARY CONSTRUCTION IN SAD SINCE 1973

Since support for the US Army and Air Force remains the Division's primary mission, a warming of relations between the US and the USSR during the early 1970s portended a slowdown in military support work. Called Détente by the press, this easing of the Cold War tensions was initiated by President Nixon and was well-received by the Soviet Union. During the 1970s, Presidents Nixon, Ford, and Carter negotiated Strategic Arms Limitation Treaties (SALT Agreements), which set limits on nuclear weapons construction by the US and the Soviet Union. An end to the 25-year-old Cold War seemed to be in sight. Fighting in Vietnam was concluded in 1975, and the US military studied its organization and its future missions. The advent of the all-volunteer Army also led to changes in installation needs. To maintain committed volunteers, the Army saw that barracks must be made more livable, and other amenities on installations improved. Despite the reduction in troop strength and the perception that the Cold War might be thawing, military construction in SAD grew. The Army had consolidated forces into new commands in 1973, such as Training and Doctrine Command (TRADOC) and Forces Command (FORSCOM). Several older and smaller bases were closed, and others were enlarged for use by consolidated troop units.

During this time, SAD reorganized its Military Construction boundaries and gave Jacksonville District's area of responsibility to Mobile District. Thus, Mobile District's Military Construction responsibilities covered the states of Alabama, Mississippi, Tennessee, Florida, the Caribbean, and all of Latin America except Mexico.[1] During the 1970s and 1980s, Savannah District became a lead Military Construction district inside the Corps with major building projects at Forts Stewart, Gordon, and Benning, as well as Hunter Army Air Field and Warner Robbins Air Force Base in Georgia, Fort Jackson and Charleston Air Force Base in South Carolina, and Fort Bragg and Pope Air Force Base in North Carolina.

As the 1980s approached, events turned precipitously. In 1979, Cuban sponsored Sandinista insurgents seized control of Nicaragua in Central America, and the Soviet Union, taking advantage of political chaos in Iran, invaded neighboring Afghanistan. In response, President Jimmy Carter ended support for a second Strategic Arms Limitation Treaty (SALT II) with the USSR and reinstituted selective service (draft) registration (but not the draft). He also provided US weapons and advisors to the military government of El Salvador in January 1981, which was facing a Nicaraguan-supported guerilla war. A new Cold War began.

In early 1981, newly elected President Ronald Reagan began a policy of containment of Communism that translated into a buildup of US military strength. Congress gave the President funding that authorized Corps districts to continue improving existing bases and to expand military support for friendly governments around the globe, especially in Central America. This latter initiative gave the Mobile District the opportunity to expand their Military Construction work into several Central American countries, though not without a degree of political controversy.

Fortunately, the new Cold War did not last, and in the later 1980s breathtaking events overwhelmed US strategic planners. A new Soviet leader, Mikhail Gorbachev, sensed his country's collapsing economic and social leadership and its waning world influence. He initiated new policies of economic restructuring (*perestroika*) and more free and open discussion (*glasnost*). Winning the support of the leaders of Western democracies with his friendly personality and ideas about change, he began to allow open dissent and negotiated an end to the nuclear arms race with Reagan in 1986.

Further, by 1989, Gorbachev withdrew Soviet troops from Eastern bloc countries and allowed these nations to open their borders to the West. In the greatest celebration in Europe since the end of World War II, East and West Germans tore down the hated Berlin Wall that separated them for 28 years in November 1989. By 1991, every Communist government in Europe, including the former Soviet Union, was replaced with a freely elected one. Meanwhile, the end of the Cold War brought to a close many of the revolutionary movements in Central America as the governments negotiated a stop in hostilities and a commitment to democratize their nations. Unfortunately, a student-led democracy movement intent on peacefully bringing a change to the Peoples Republic of China was crushed by the Chinese Army in June of 1989.

The US Congress took advantage of the peace and passed several Base Realignment and Closure Acts (BRAC) beginning in 1988. Essentially, the acts scaled back US military bases at home and abroad, and arranged for permanently closing and disposing of many of the antiquated facilities. Although Congress focused on reducing military spending, the law also included realigning commands and operations, and thus provided opportunities for construction projects at several consolidated posts and bases. SAD, using the Mobile and Savannah District engineers, expanded several installations in their areas of responsibility. During this time, Mobile District was also building sophisticated structures at Redstone Arsenal, Arnold Engineering and Development Center, and Cape Kennedy Space Center.

During these dramatic changes, both SAD military districts, Savannah and Mobile, implemented Life Cycle/Project Management. The efforts paid off in efficiencies, cost reductions, better delivery times, and a team atmosphere. The J-6 testing facility in Tullahoma provided an impressive example for more effective management of large construction projects and helped move the Project Management program into the mainstream of Division practice. The districts of the Division experimented with new types of contractual and partnership agreements and engaged new technologies both as an aid to the construction process and as a major component of new structures being built by the Division.

SAVANNAH AND MOBILE DISTRICT WORK IN THE MODERN ARMY PERIOD

Savannah and Mobile districts carried out significant Army and Air Force construction support during the 1980s and 1990s. New conditions of potential warfare in the world led to force changes in the military; these required new facilities for training, housing, and family support of troops and their missions.

When SAD Major General R. H. Free removed Military Construction from Jacksonville District in 1970, only two districts in SAD, Savannah and Mobile, still held military support responsibility. Savannah District controlled work at all bases in Georgia and the Carolinas. Mobile District supported the military in other SAD states.

In the early 1970s, several SAD supported installations were slated for closing, among them both Hunter Army Airfield in Savannah and Camp Stewart in nearby Hinesville. The Airfield closed in the summer of 1973. In only two years, the two bases were reactivated and became the headquarters of the 24th Infantry (Ranger) Regiment. Both bases, along with Fort McPherson near Atlanta and Fort Bragg in North Carolina, were designated Army FORSCOM bases.

Improvements at Stewart and Hunter were similar to those going on at many posts nationwide as the Army implemented its Modern Volunteer Army concepts. These efforts were in part designed to attract recruits; work involved rehabilitation of existing living quarters and building new ones to resemble college dormitories. Soldiers' living suites provided more privacy, while the interior and exteriors were improved to be more aesthetically pleasing. Mess halls were made to look like English pubs or German beer gardens, while shopping malls, community centers, and family living quarters were made to mimic suburban communities.[2]

Work at Fort Stewart and Hunter Army Airfield typified work done by both Savannah and Mobile districts during this period. To house a full regiment, the Army built barracks complexes for 3,700 Rangers for $46 million, and added family housing, recreational complexes, a chapel, and a family shopping center by 1979. In that year alone, Military Construction work at the two bases totaled more than $62.8 million and overall appropriations in four years since reactivation in 1975 totaled more than $200 million.[3] The Army showcased the complex as an example of its modernization and upgrading efforts nationwide.[4]

Construction continued through the early 1980s as Reagan's military buildup provided funds for a new Winn Army Community Hospital at Fort Stewart. The hospital was unique in that it not only replaced an older, World War II era wooden hospital with a modern design, but it obtained power through a wood-burning plant that consumed discarded waste wood. Not only did the small plant provide energy directly to the hospital but also supplied 95 percent of the base's power needs.[5]

Winn Hospital at Fort Stewart was completed in 1983.

SAD encouraged partnerships with local

communities; Savannah District construction continued in 1984 at Fort Stewart with a new sewage system for the post that incorporated both Army and local funding. This permitted the Savannah District to expand the sewer lines beyond the base to serve Hinesville and Liberty County residents, many of whom were officers and civilian staff at the post. Savannah District stayed closely involved with Fort Stewart and Hunter Army Air Field, designing and building new tactical equipment repair and maintenance shops, a flight simulator, wash stations for vehicles, and dining facilities for both.[6]

Meanwhile, the Savannah District's real estate division was busy acquiring leases on local land for extended Army maneuvers at several posts. A series of Army maneuvers in the middle and late 1980s demanded that real estate agents acquire temporary use of hundreds of thousands of nearby acreage for use by infantry and mechanized forces. At Forts Stewart and Bragg (North Carolina), several million acres of timberlands were temporarily rented so the Army could perform maneuvers. In 1989, Savannah District temporarily managed more than seven million acres around the two bases.[7]

Mobile and Savannah districts also supported the growth and training of the Rapid Deployment Force by designing new construction at both Fort Bragg and Warner Robbins Air Force Base. In the first half of the 1980s, Fort Bragg saw a surge in Military Construction, including new buildings for the US Special Operations Command (SOCOM) and Special Forces (Green Beret) facilities. New schools, commissary additions, dining facilities, barracks, and family housing all reflected the new look of the volunteer Army[8] Additionally, SOCOM needed a new operations complex, urban warfare training center, administration buildings, an anti-armor and sniper ranges and a new Special Forces support facility.

The Savannah District received a number of awards for their work at Fort Bragg, including the Honor Award for a childcare center in 1985, the Army's "Excellence in Real Estate" award in 1989, and official recognition as the best installation support district in the Corps in 1988.[9]

SAD WORK IN CENTRAL AMERICA IN THE 1980S

President Jimmy Carter's foreign policy in the first years of his presidency (1977-79) focused on bringing peace and human rights to Latin America. He negotiated with the President of Panama to return the Panama Canal, and when the popular Marxist-led Sandinistas took control of Nicaragua after a decade of guerrilla warfare in 1979, he refused to support the Nicaraguan dictator, Antonio Somoza, which previous US presidents had done. Additionally, he refused arms to support a rightist military dictatorship in El Salvador when they seized control of the government to prevent a Nicaraguan-style rebellion in 1979. However, President Carter changed this policy in the fall of 1980 when it became known that Cuban military arms were being funneled through Nicaragua to El Salvador rebels in the fall of 1980. In addition, US efforts to normalize relations with Nicaragua stopped. In the last weeks of his presidency, Carter authorized US arms and advisors to support the El Salvador regime when the rebels launched an offensive in early January 1981. A new Cold War front had developed.

When Ronald Reagan became President later that same month, he immediately pushed Congress to finance military training and operations centers in three countries that surrounded Nicaragua: El Salvador, Honduras, and Costa Rica. As part of Reagan's policy of insurgency containment, the Corps of Engineers was tasked by the Secretary of Defense to build the bases. Corps Headquarters assigned the work to SAD, and Mobile District. The district designed and managed construction of these facilities through most of the decade.

The Latin American work in the 1980s helped the Mobile District to adopt more rapidly the management changes occurring in the Corps of Engineers. Work in foreign lands required a close-working, diverse team to coordinate with architectural/engineering firms, contractors, local military and civilian counterparts, transportation networks, planners, and representatives in the district office in Mobile.[10] SAD encouraged this management style by Mobile District teams in Central and South America. The Mobile District officials brought their Latin American experience back with them, and as they filtered into other areas of the District and the Division, they convinced their colleagues that cross-disciplinary teams could benefit a government agency.[11]

Although Military Construction in Central America in the 1980s varied, nearly all of it concentrated on military support for countries surrounding Nicaragua. In Honduras, the Mobile District upgraded Honduran naval and air force facilities near the border with Nicaragua. In El Salvador, they provided training and medical centers. In Costa Rica, where many of the Contras initially located, the District erected training bases, expanded airfields, and built roads and bridges.[12] Guatemala was also targeted to receive aid, but the Guatemalan government's human rights record was so bad that Congress refused most military aid in the first half of the 1980s. By 1985, US construction spending in the region had increased

Central American Nations Assisted by the Corps in the 1980s.

to $38.5 million per year, and by the end of 1986, the Division's Mobile District had field offices in El Salvador, Honduras, and Costa Rica.[13]

A typical example of construction support for El Salvador was the National Basic Training Facility at La Union in 1985. Archives indicate that the funds were used for building and upgrading an existing facility and purchasing training equipment such as weapons, ammunition, and other military hardware. The Mobile District team built a vehicle maintenance facility, warehouses, classrooms, bunkers, a target range, and wells and water purification facilities. The training included live-fire infiltration techniques, explosives use, ambush techniques, and obstacle courses. The site had a perimeter, with guard towers and barracks for handling up to 6,500 recruits per year. The total cost was $18.4 million.[14] Among other projects in El Salvador, the Mobile District team managed the building of a new heliport at San Miguel; operations, maintenance, and storage facilities at Punta Ruca Naval Base in La Union; and numerous other brigade-level army, navy, artillery, and air force training centers throughout the small country.[15]

The Civil Guard center at Murcielago, built in 1986, was typical of the small bases in Costa Rica. The Civil Guard base was a 350-man barracks complex complete with full sanitary facilities, constructed of concrete block walls, a poured concrete floor pad, and cement asbestos shingles. The project included night lighting and a perimeter fence, with a total cost of $500,000. Project engineer Major Andy Hamlin noted that the Corps wrote the specs "using local standards, hardware and construction techniques customized to the [local] situation while maintaining our own safety standards and policies."[16]

Honduras became the largest US customer in Central America in the 1980s. The Mobile District oversaw work at the Puerto Cortes Naval Facility, the 15th Infantry training ground at "Camp Dakota," and work at Palmerola and La Mesa air force bases. Work included construction and repair of runways, hangars, and barracks, as well as infrastructural work on roads, sewage facilities, water lines, and small boat docks and ramps.

Most of the funding for the Mobile District work in Central America came through the Supplemental Military Assistance Program, using money from foreign military sales.[17] Congress was very concerned that US involvement in Central America would deepen into another Vietnam. As a result, the Senate Appropriations Subcommittee on Military Construction kept close oversight of the construction activity.

Senator James Sasser of Tennessee, head of the Senate Subcommittee on Military Construction, made several trips to Palmerola Air Force Base in Honduras in the mid-1980s. In 1986, Sasser became concerned that permanent, concrete, pre-formed buildings were replacing the temporary wood and canvas structures initially built to house US advisers. SAD defended the work, noting that the pre-formed structures could be broken down and removed if the US decided to evacuate the area**.** US Southern Command maintained that the US troops doing the training needed stronger buildings since they were often posted in the region for up to 18 months.[18]

Detractors challenged the need for more stable structures. Congressional leaders asked the Army why the structures were built to last 15 years if US troops were there only temporarily? Further, some went on, nowhere in the paperwork was the Army

Palmerola AFB in Honduras.

noting the change to more permanent structures. An adviser acknowledged, "SOUTHCOM now has in its tactical intelligence center [at Palmerola] the capability to monitor and run the war in Central America."[19]

The threat from Congress did not go unheeded; in future work at Palmerola, Mobile District officials inserted in the planning report "a basic requirement of this contract is that the operations, troop quarters, and administrative facilities be relocatable structures."[20] Nonetheless, Congress continued to criticize the administration's methods in the region, especially when it was discovered that national security advisers had established a secret plan to illegally funnel funds to the anti-Sandinista guerillas called "Contras." The leak of the plan provoked a yearlong investigation that became known as the Iran-Contra scandal.

By the end of 1986, most bases planned for Central America were constructed, and the combination of warming relations between the USSR and the US and the Iran-Contra scandal limited funding for maintenance and essential support. The fall of the Soviet Union in 1990 forced the guerillas and the governments of the region to negotiate a settlement, and in 1990, a freely elected government took office in Nicaragua.

PROJECT MANAGEMENT AND THE J-6 LARGE ROCKET TEST FACILITY AT TULLAHOMA

The J-6 project built a test facility for the Air Force to test horizontally the upper stage large booster rockets in simulated altitude conditions. The contract was to last three years, with a budget of $178 million dollars. The facility would be capable of testing the nation's intercontinental ballistic missiles, such as the Minute Man and Peacekeeper. The facility had to have the capability of simulating atmospheric conditions to an altitude of 100,000 feet. It also had to be able to absorb and measure the test fires of solid rocket propellant with up to 500,000 pounds of thrust (the equivalent of detonating 100,000 pounds of TNT). [21]

SAD and the Mobile District proposed using their experienced engineers and managers to design and construct this massive facility for the Air Force. The problem for SAD, and the Mobile District in particular, was their history in building J-4 and J-5. Built in the late 1960s and early 1970s, both facilities were impressive engineering and construction feats, and both worked well at their intended testing work. However, the Air Force was

reluctant to initiate a massive new project with SAD; their previous (J-5) program had gone well over budget, and it was completed much later than scheduled. Construction had safety issues, and there was an unpleasant multi-million dollar contractor claim at the end.[22] By the mid 1980s, the Air Force was no longer mandated to use the Corps of Engineers and was strongly considering avenues other than SAD. Making the project more urgent, the J-5 test cell had been destroyed in an accident in November 1985, and the Air Force needed the J-6 facility immediately.[23]

Division Engineer Brig. General Forrest Gay consulted personally with Air Force officials, proposing that SAD would make revolutionary changes in its management approach. He assured the Air Force that SAD and Mobile District would move away from what was referred to as "stove pipe" culture, where various agency units (e.g., planning, engineering design, and construction management) worked alone and in sequence, and were often concerned with guarding their "turf." This system would be replaced from the beginning with a project team consisting of representatives from all technical disciplines; Air Force officials and contractor representatives would be full partners from the beginning. Problems and issues in various technical areas would thus be recognized earlier, and plans to resolve them could be developed and managed more efficiently. This new approach was referred to as Life Cycle Project Management.

A major management innovation within this approach was to involve expert contractors in early planning and decision-making. A significant change in contracting was required. Traditionally for projects of this magnitude, SAD used the three-part design/bid/build method of construction. Under this method, the Corps or an architect/engineering contractor designed the structure and wrote all the specs "down to the last bolt," using Corps manuals and approved methodology. Not only did this keep trusted engineers, estimators, and designers in charge, but it gave SAD and the district total control over the specifications. Alterations could, unfortunately, be lengthy and change orders difficult to obtain (perhaps there was a culture of distrusting contractors). The method often led to communication breakdown, finger pointing, and lawsuits.[24]

The new contracting procedure had two stages, Design, and Build. In the initial Request for Proposals, the partnering clause read, "The government is willing to form a cohesive partnership with the contractor and its subcontractors. This partnership would strive to draw on the strengths of each organization in an effort to achieve a quality project done right the first time, within budget, and on schedule."[25]

The Air Force, SAD, the Mobile District, AEDC, and later the contractor formed a project management team that worked together to meet the delivery and funding goals of the project. Division Engineers Brig. General Forrest Gay and later Major General Ernest Edgar, as well as the Division Engineers that followed, sat on the Senior Advisory Group (SAG) with a member of the Headquarters Air Force Systems Command, Headquarters AEDC, as well as the project management team members. They met monthly to discuss criteria, design, construction status, funding, claims and changes, safety, and a variety of other issues. They conferred directly with the day-to-day management team, called the Program Management Group (PMG). A primary goal of the teams was to ensure that communication flowed freely from a variety of necessary disciplines into the project from the very start, to minimize misunderstandings.

The PMG quickly learned to rely on contractors during the bid stage. Five contractors responded to the initial Request for Proposals. All five bids far exceeded the $145 million in the first fund allocation. In an unprecedented move, the PMG went back to the contractors and asked them for help in meeting the budget. "This was unheard of in Corps history," stated Michael Abeln, Mobile District Project Manager and PMG member.[26]

In the past, Mobile District procedure would have been to reanalyze the project or go back to Congress for more money. Since neither time nor funding was available, the PMG approached the bidders and asked them to assess the project, and show SAD and Mobile District engineers how to cut costs. Abeln acknowledged that this was one of the best decisions of the project. "We already agreed that if we were going to be partners, we had to be honest, frank, and admit we needed help."[27]

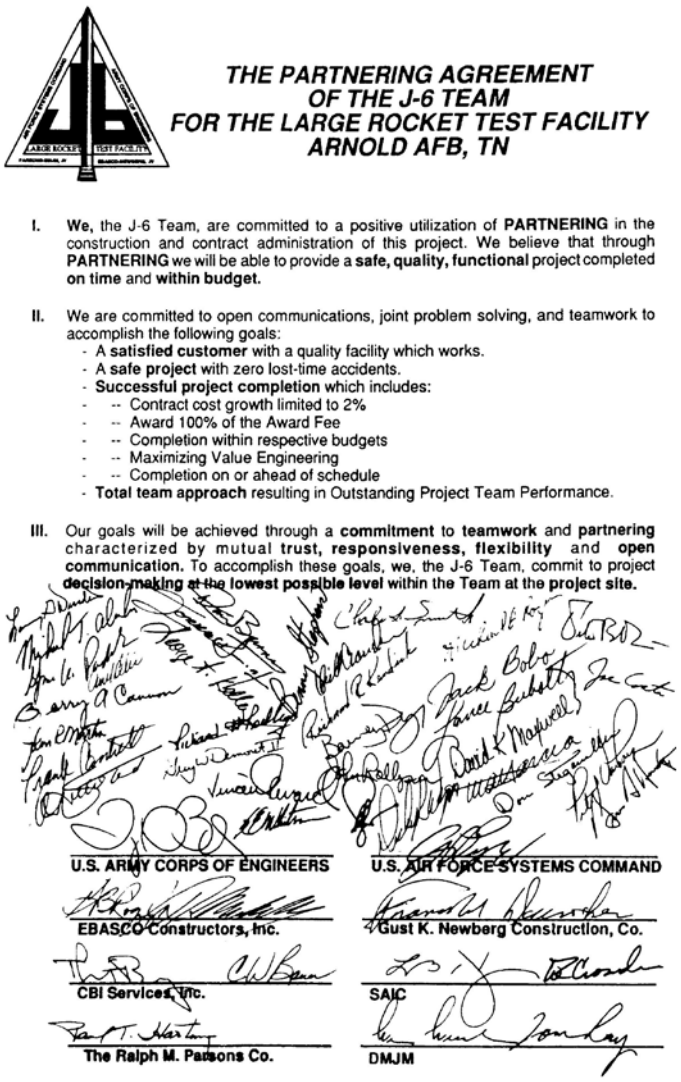
After a thorough review of the specifications with each of the contractors, and after agreeing with them on many of the changes, the Mobile District re-bid the project. The award was based on "technical merit and experience in addition to cost." The second bids were very competitive. In the end, the Corps selected the highest bidder, Ebasco/Newberg.[28]

A partnership agreement was entered into by the PMG and SAG that committed all the agencies and the contractor to teamwork, partnering, flexibility, open communication, mutual trust, and lowest level decision making possible.[29] The Division Engineer helped guide the operations by working closely as a team member. This leadership provided an example, and led to addressing conflicts and resolutions, bottlenecks, safety issues, and potential problems openly.[30] Further stimulating the contractor was a substantial bonus offered for quality, safety, delivery, efficiency in change orders.

On January 11, 1990, the contracts were signed to build the J-6 facility at Tullahoma and to do it within a fixed price and a specified time. A charter was developed and formalized in writing. To maintain open communications at all levels of the organization, both sides agreed there had to be a "willingness to shed the traditional protective rhetoric and to develop trust to objectively address issues within the framework of the partnership." Work conferences were initiated immediately, and the PMG spent time working on group interaction skills together.[31]

By 1991, Life Cycle Project Manager Charles Smith had J-6 moving along so well that inspectors were looking at using the project program as a model for the future.[32] The efforts paid off handsomely when the project finished on budget, 114 days early, with only four lost days due to accidents in over 2.7 million man-hours worked, one of the safest multi-year projects in Corps history. Additionally, the contractor won nearly the entire $3 million award bonus for meeting goals set by the SAG and the PMG.[33] Without question, it proved to be one of the most successful projects ever built in SAD. The joint venture won the Contractor of the year award from the South Atlantic Division and Headquarters for the US Army Corps of Engineers. J-6 was one of the safest multi-year projects in Corps history—four accidents in 2.7 million man-hours of work.

Nearly the entire $3 million bonus was eventually awarded to Ebasco/Newberg. The Air Force, SAD, and the Mobile District were satisfied that their testing facility was completed early and under budget. The designers, Parsons/DMJM, displayed their satisfaction at the annual Directorate of Engineering and Housing/Base Civil Engineer Conference in May



THE PARTNERING AGREEMENT OF THE J-6 TEAM FOR THE LARGE ROCKET TEST FACILITY ARNOLD AFB, TN

I. **We,** the J-6 Team, are committed to a positive utilization of **PARTNERING** in the construction and contract administration of this project. We believe that through **PARTNERING** we will be able to provide a **safe, quality, functional** project completed **on time** and **within budget.**

II. We are committed to open communications, joint problem solving, and teamwork to accomplish the following goals:
- A **satisfied customer** with a quality facility which works.
- A **safe project** with zero lost-time accidents.
- **Successful project completion** which includes:
  - -- Contract cost growth limited to 2%
  - -- Award 100% of the Award Fee
  - -- Completion within respective budgets
  - -- Maximizing Value Engineering
  - -- Completion on or ahead of schedule
- **Total team approach** resulting in Outstanding Project Team Performance.

III. Our goals will be achieved through a **commitment** to **teamwork** and **partnering** characterized by mutual **trust, responsiveness, flexibility** and **open communication.** To accomplish these goals, we, the J-6 Team, commit to project **decision-making at the lowest possible level** within the Team at the **project site.**

U.S. ARMY CORPS OF ENGINEERS
U.S. AIR FORCE SYSTEMS COMMAND
EBASCO Constructors, Inc.
Gust K. Newberg Construction, Co.
CBI Services, Inc.
SAIC
The Ralph M. Parsons Co.
DMJM

J-6 Partnership Agreement.

1993. A special event closed out the first day. Parsons/DMJM made a presentation to the District Engineer, Colonel Robert H. Griffin. A plaque, presented by the firm, stated that both Parsons/DMJM and Ebasco/Newberg, "concurred that J-6 has been the best-managed project that either firm had ever worked on."[34]

In summary, the J-6 project provided a marked departure from a lingering "stove pipe" culture to the team-organized Life Cycle Project Management approach. Corps planners, design engineers, and construction supervisors worked intimately together from the beginning, not only with each other but also with their counterparts in the other agencies and the contractor. Additionally, contract engineers and construction managers were brought into the team right from the start as part of a design/build contract. This tremendous success of Life Cycle Project Management provided a major push for its use in the Mobile District and throughout SAD.

MEAPO AND CONSTRUCTION FOR AMERICA'S ARAB ALLIES

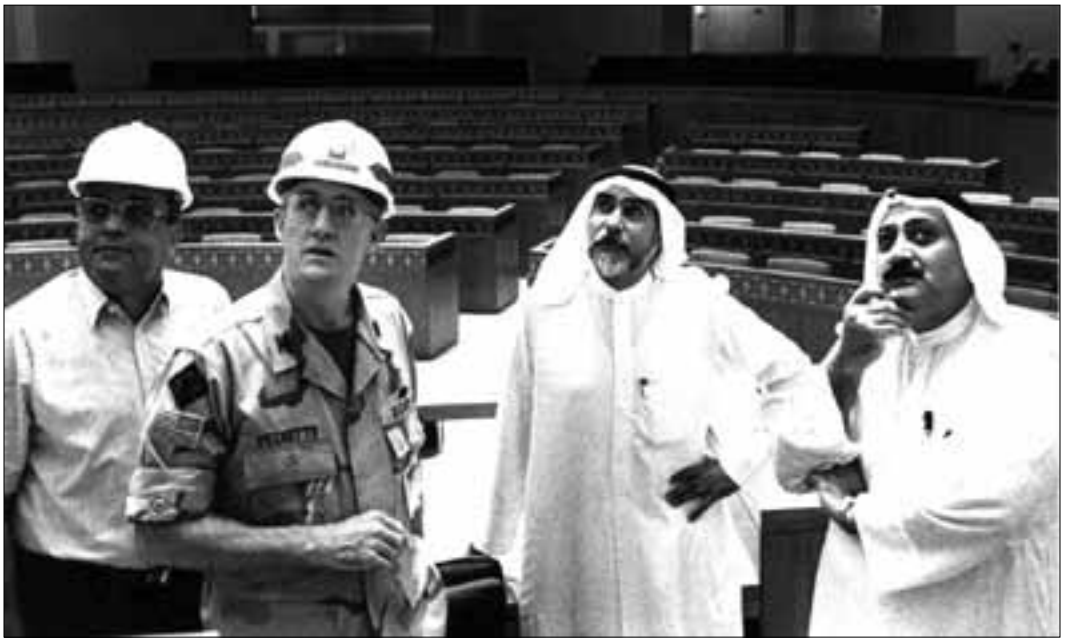
Since World War II, the Middle East has been an important region to the US foreign policy.[35] Corps Headquarters established the Middle East Division to support US allies in the region. Middle East Division was very successful in its missions from the 1950s through the 1980s.

While the Middle East Division was very successful, the end of the Cold War and the completion of the major projects in the Middle East in the late 1980s brought change to the Division. Corps Headquarters transformed the Middle East Division into the Middle East/Africa Projects Office (MEAPO) and placed it under SAD. As a Corps office within SAD, MEAPO continued to operate as the primary agent for engineering and construction services for foreign defense forces in the Middle East, and it maintained its own branch offices in several Middle Eastern nations. MEAPO headquarters was relocated to Winchester, Virginia. SAD planners soon learned that the experience of MEAPO personnel in working in Saudi Arabia and the bonds of trust with Saudis developed over twenty years of projects were helpful during the coming crisis with Iraq and its invasion of Kuwait.[36]

On 2 August 1990, Iraq invaded Kuwait.[37] The reaction of the US government was swift. Fearing the Iraqi army would continue into Saudi Arabia and gain control of a large portion of the world's oil supply, President George H. W. Bush opened immediate talks with the Saudi government to provide a defensive force. In addition, the US and other nations led the United Nations to condemn the invasion. After high-level negotiations, the Saudi government allowed the US military into their nation, and Operation Desert Shield began.[38]

Parsons/DMJM presentation to Col. Griffin.

Over the rest of the fall and winter of 1990, the US military and its allies attempted to dislodge the Iraqis through diplomacy as they built up a large military force in the region. Finally, in January 1991, Desert Shield became Desert Storm, as the allied forces began a massive military campaign to remove the Iraqi military from Kuwait as well as to remove Iraq as a military threat from the region. By the end of February 1991, Kuwait was returned to the ruling family, and the Iraqi military lay in defeat.



MEAPO supported US Allies in the Middle East.

Colonel William Miller, MEAPO Commander on lessons learned working in the Middle East

When I worked in the Mediterranean Division in the 1970s, I traveled to Saudi Arabia a lot and made personal acquaintances with many of the Saudi military officers. When I went back in 1990, I met a number of those same officers who were now Colonels and Generals in the Saudi military. I found that to be very helpful to have that personal connection in what we had to do in Desert Storm. It was certainly a foot in the door, but it was also a personal trust that we shared. Many of the officers were trained in the US as far as their college degrees, so they were Westernized. They understood the Americans, they understood our culture, and I think because of the fact that the Corps had worked there so many years, we understood their culture too." (William Miller interview, 2005.)

On the same day that Iraq invaded Kuwait, MEAPO and SAD both activated their emergency operations centers. Col. William Miller, commander of MEAPO, drew from contingency plans developed earlier. Lt. Col. Charles Cox, the deputy commander, and Ben Wood, a project management chief, prepared to deploy with the Third Army (CENTCOM's Army element). They took with them "generic construction designs, mapping data on Saudi Arabia and Bahrain; engineer data files; and lists on construction contractors, construction material suppliers, architect engineers, geotechnical firms, surveyors, and well drillers in Saudi Arabia and Bahrain."[39] Realizing the importance of coordination and to ensure that CENTCOM staff knew MEAPO's capabilities, Miller also dispatched Cliff Longfellow to CENTCOM headquarters to serve as a liaison to MEAPO and SAD. Historian Janet McDonnell argues that experience Cox gained while handling recovery operations for Hurricane Hugo as well as the expertise of his senior staff in Middle Eastern affairs resulted in his creation of a flexible organization that deployed to support CENTCOM's operations.[40]

In the early phase of Desert Shield, Army commanders did not see the need for USACE assistance in the war effort. Army commanders wanted to place as many combat forces in the theatre as possible before worrying about logistics, and Third Army staff and planners did not see the immediate need for the MEAPO personnel. This resulted in few engineering units in the initial deployments, making MEAPO's work even more important, although it was not recognized.[41] Military historians Frank N. Schubert and Theresa L. Kraus wrote that during the early stages of Desert Shield, the primary problem of the deployment was the logistics planners "identifying the many separate units needed to support a large force, among them water purification companies, tactical petroleum terminal units, engineer real estate detachments, and medium truck companies."[42] This type of support was just what MEAPO could provide the Army.[43]

Major General John Sobke, Division Engineer 1990-1992, on the uniqueness of the MEAPO organization.

The Corps had a huge presence in Saudi Arabia until 1986. [As soon as the war started in 1990], headquarters turned to us for contract construction support for the deployment and mobilization of the fighting force in Saudi Arabia. Colonel Miller was in charge of MEAPO at the time, and I sent him to Saudi to head up that effort. Then we started to populate the forward deployment of engineer effort with people from across the Corps of Engineers here in the United States. (General John Sobke interview, 2005)

To support CENTCOM'S military campaign, MEAPO served as the Corps representative. On 11 August, Forces Command (FORSCOM) ordered a five-person team to provide the necessary construction and real estate expertise in the region, and dealing with locals allowed it to provide the engineering support CENTCOM needed to push Hussein's army out of Kuwait. On 14 August 1990, Lt. Col. Charles Cox, MEAPO Deputy Commander, and four Corps civilian team members with experience in project management and real estate drawn from MEAPO, Mobile and Savannah districts deployed to Dhahran, Saudi Arabia to establish a Corps forward operating element to support US forces in the Persian Gulf.[44] By September, MEAPO had acquired 34 leases worth more than $42 million for such necessary buildings as hospitals, living quarters, offices, warehouses, and storage areas.[45] Col. Miller explained that real estate support was the first main job for MEAPO because the Saudis required that the leases for buildings, airfields, etc. were formal.[46]

One of the first problems Cox encountered in the theatre of operations was the lack of basic infrastructure for the soldiers and equipment. For example, helicopters sat in the sun and grew too hot to work on. Most of the troops lived in tents or other temporary buildings, and there were not adequate latrines and showers for the troops. Cox awarded the first MEAPO contract for the construction of latrines and sunshades on 20 August 1990.[47] Because of the success with the latrines and the need for real estate services, Major General William Pagonis, deputy chief of staff for logistics for CENTCOM, authorized the deployment of a 30-person team from MEAPO.[48] MEAPO reported to Pagonis as the theatre operational control in Southwest. As their mission grew in size, the Corps established the Dhahran Area Office (DAO) in support of the CENTCOM. Pagonis later stated, "we found out how essential it was to have MEAPO in the flow early."[49] The growing importance of MEAPO's activities led SAD to deploy Col. Miller personally to ensure that the unit did not "get lost" in the CENTCOM command structure. In August, Miller opened a Corps office in Riyadh in support of CENTCOM.

> **Col. William Miller, Commander, MEAPO, 1989-1991 (Desert Shield and Desert Storm)**
>
> We staged several people in Theatre just to get a place to live and make our presence. A couple of weeks later, we sent my deputy [Cox], who was a Lt. Colonel, and he spent a couple of weeks just finding an office and making contacts. During that period, nobody knew who we were or what we were there for; even General [William "Gus"] Pagonis questioned that. We said we're here to help you do your job and here's what we can do: real estate, construction and so forth. We were in a position of having to prove ourselves. [The General] slowly started giving us work and as we showed we could do things it just built up from there. We ended up with over 200 people there. (Colonel Miller interview, 2005)

In addition to its real estate and construction duties in Saudi Arabia, MEAPO assumed full responsibility for recruiting Corps personnel for Desert Shield, and processing all Corps personnel deploying to the Middle East. More than 700 Corps members in 65 career categories volunteered to serve in Saudi Arabia. These were new missions for MEAPO, and the staff had to develop several procedures. For example, at MEAPO headquarters in Virginia, they established a deployment program for all volunteers that included area and safety orientations, NBC (Nuclear, Biological, and Chemical) training, and medical exams. The program was so successful that it was, at the time, considered the model for civilian deployments. Like the regular troops, MEAPO established a family assistance program to serve as a link between those deployed and the families at home.[50]

By the end of September 1990, MEAPO was handling 13 contracts totaling $35 million. This included the construction of field showers, latrines, washstands, temporary buildings, and aircraft shades for the tens of thousands of troops in the theatre of operation.[51] At the beginning of November, the Corps had completed 97 lease actions totaling more than $90 million. It was at the same time that President Bush announced deployment of additional US forces, changing the focus of the mission from defense to possible offensive action. On 29 November 1990, The UN Security Council authorized the use of force against Iraq unless it withdrew from Kuwait by 15 January 1991.

As soon as the war started, MEAPO's mission slowed and changed. In the last days before the offense started, MEAPO was assisting in the last minute preparations of heliports, POW camps, and supply points for the army. As soon as the hostilities started, MEAPO began supporting the next phase of the war.[52] Savannah District Engineer Colonel Ralph Locurcio became the commander of the Kuwait Emergency Recovery Office (KERO).[53] KERO was set up along the lines of a Corps district, with separate offices for project management, emergency operations, engineering services, and contracting and support. He also utilized the latest technology—laptop computers—to be more productive.[54]

Japan Contributes to a War Effort for the First Time Since 1945

As the costs of the operations grew and several allied nations pledge finical support, CENTCOM tasked MEAPO to develop a cost reimbursable contract to be awarded by the Government of Japan/Gulf Peace Fund for engineering and construction services to support Operation Desert Storm. This was a way for the Japanese government to assist in the war effort because their constitution forbade the sending of troops overseas; however, they could send money. They established a fund with hundreds of millions of dollars that MEAPO drew on during the war effort. This was the first time Japan contributed toward military operations outside of their country since the end of World War II in 1945 (McDonnell, 1996).

Brigadier General Ralph Locurcio, SAD Division Engineer, 1994-1996, and KERO Commander, 1991-92

”

My tour in Savannah District was truncated because I was sent to lead the reconstruction of Kuwait after the First Gulf War. I believe that I was selected for that because of my background. I set up in Kuwait the same system that we used in the post engineer job. We decided to run Kuwait using the project management system.

However, in Kuwait, we had a problem. The problem was that none of the Kuwait ministers would commit to prioritizing the projects because they didn't want to handle the political football [of offending someone in their ranking]. So I put a project manager in charge of each of the eleven ministries.

The project manager's responsibility was to prioritize each project and then interface with the minister and the ministry to keep them advised of progress on all of these projects. We used Excel spreadsheets and set up the first ever Local Area Network in the Corps, right there in Kuwait. Each project manager updated his spreadsheets on Thursday over the LAN. Then, the chief of Project Management would assemble all of those documents, by ministry, and then update each of the eleven Kuwaiti ministers by giving them a set of the project sheets on their area of responsibility with all the numbers and information. That is how we controlled the operations through the entire Kuwait operation.

MEAPO Assisted Kuwait in Rebuilding after the Gulf War.

After the crushing defeat of the Iraqi forces, the US military began the long process of redeployment. Because the agreement with Saudi Arabia stated that the US forces would not remain in the country any longer than necessary, the US military wanted to get the soldiers home as soon as possible. MEAPO also assisted in the huge redeployment of US forces back to the United States just as it helped in finding places for the troops that came to the desert. MEAPO constructed bases at the major ports to allow the rapid cleaning and inspecting of vehicles and equipment before loading in the cargo ships. They also ensured there was housing and warehouses at the ports and airports for the troops and equipment.[55]

During its work in the Middle East, the Corps was working on reorganization of MEAPO that reflected the changing worldview. The European Division became the European District and merged with MEAPO; together, they became the new Transatlantic Division under SAD. [56] Later, the Transatlantic Division reported directly to Headquarters.

Historians argue that Desert Storm was the war that showed that the US had finally gotten out of the malaise of Vietnam. Many of the leaders of the US forces had seen the mistakes of Vietnam and worked to recreate the US military so that those mistakes would not happen again. The leaders preached a doctrine of flexibility and professionalism. MEAPO characterized that doctrine. The lead personnel had worked in the region and knew the area, had developed working relationships, and understood the culture. They also knew how to adapt to the changing situations and make do with what they had. At first CENTCOM did not see the need for these civilian engineers, but as the deployment progressed, the value of the special skill sets of the personnel became apparent. By the end of the war, the Corps, mostly through MEAPO, had supervised $298.7 million worth of new construction in Saudi Arabia. They assisted all elements of the military mission. Col. Cox stated, "the success of Desert Shield and Desert Storm resulted from a total team effort, the best I've ever seen," and MEAPO was an important part of that team.[57]

MAKING WAY FOR THE MODERN MILITARY: BRAC AND MILCON TRANSFORMATION

With the end of the Cold War, the Department of Defense was left with a tremendous amount of aging military infrastructure to operate and maintain. Moreover, the military was changing to accommodate post-Cold War missions and new enemies. The existing military footprint and inventory needed to be rehabilitated or removed. For infrastructure, this was accomplished in two ways. First, in 1988, the Federal government initiated the Base Realignment and Closure (BRAC) Commission to provide recommendations to the Congress and DoD. BRAC rounds in 1989, 1991, 1993, and 1995 resulted in the closure (or realignment) of hundreds of military properties, from large bases such as Fort McClellan in Anniston, Alabama to the smaller US Army Reserve centers across the country. [58]

In 2005, the BRAC Commission issued its most substantial recommendations to date. The recommendations included closure of 25 major installations, 24 installations were

selected for major realignments, and there were 764 smaller actions. In all, more than 800 installations were affected. According to the Commission, the recommendations were designed to posture the modern US military for the strategic and operational requirements of the twenty-first century, and over time, reduce the costs associated with an unnecessarily large infrastructure footprint. Within SAD's boundaries, a few major installations were recommended for closure, including Forts McPherson and Gillem in Georgia. However, other installations, including Forts Stewart and Benning in Georgia, Fort Bragg in North Carolina, and Fort Jackson in South Carolina, were set to absorb new missions realigned from various installations across the country.

Secondly, in 2006, the DoD established Military Construction (MILCON) Transformation, with the goal of completing high-quality construction projects 30 percent faster and 15 percent cheaper than previous standards. Centers of Standardization (COS) were a key component of the Corps' MILCON Transformation implementation strategy. This was the idea that certain facilities throughout the Army's new building inventory should share the same design standards, with flexibility for exterior architectural variety. By using standardized designs, the Army can lower costs and expedite construction. SAD was positioned to support both MILCON Transformation and BRAC within its boundaries. Savannah District was the COS for six design types, Company Operations Facilities, Tactical Equipment Maintenance Facilities, Brigade Operations Complexes, Brigade/Battalion Headquarters, Command and Control Facilities, and Deployment Facilities. Mobile District was the COS for Aviation-Vertical Construction, 4-Star Headquarters, and National Guard Armories.

The combination of BRAC and MILCON transformation changed Corps business practices. Because BRAC 2005 required all closures and realignments to be completed by September 2011, letting construction contracts efficiently was vital to the process. The Corps instituted a new bidding process, called Military Transformation Request for Proposal, or MTRFP, in which the Corps evaluated contractors' past performance (best value) as the basis for awarding contracts. In addition, US military installations had long been individually designed and built through a multi-step process that was subject to delays in construction to accommodate unanticipated but required design changes, all of which added to the cost of the project. To reform and streamline this system, DoD leadership mandated standard designs, requiring all types of facilities to be site-adapted for specific situations. As such, the Corps no longer provided designs; rather it supplied a list of criteria based on best practices in private industry. These changes, along with designating Centers of Standardization for the design review phase, allowed the Corps to construct buildings at a lower cost and more quickly. The Corps also required all new designs to meet LEED standards for environmental sustainability. The streamlined processes saved money, and design and construction budgets were compressed across the board by 15 percent to capture the savings up front.[59]

Of note, over 50% of the national BRAC impact fell within SAD boundaries. Two districts, Savannah and Mobile, managed most of the design and construction at 20 US Army installations and 17 US Air Force bases within SAD's boundaries. For 2007 alone,

Savannah District's military construction budget doubled from $500 million to $1 billion for 18 BRAC projects. By 2010, Charleston District managed $113.8 million in BRAC work; Mobile District $769.3 million; and Savannah District $1.8 billion. Altogether, South Atlantic Division oversaw more than 94 military construction projects within its boundaries, totaling $2.657 billion.[60]

> **The BRAC Challenge**
> **General Todd Semonite**
> **SAD Commander, 2009–2012**
>
> SAD's BRAC mission was very challenging: to build a facility, to do it under a tremendous amount of time stress, under pretty demanding environmental requirements and to do it all at once. With so many projects and contractors, we had to be very careful that we didn't drive up materiel prices by default. In a way, you're almost competing against yourself.

During the past fifty years, the majority of SAD's military construction projects were consolidated at the Mobile and Savannah districts. However, with the tremendous amount of work required under BRAC, SAD transferred some military construction responsibilities to Charleston and Wilmington Districts. For example, BRAC 2005 designated Fort Jackson as the Army's only Drill Sergeant School, the Department of Defense Joint Center of Excellence for Military Chaplaincy, and as one of four headquarters for the newly designated US Army Reserve Regional Support Commands. In 2008, SAD designated Charleston as the lead district for military construction work at Fort Jackson. This has also been a part of General Todd Semonite's effort to evenly distribute the workload among the districts and to more closely align the district boundaries for both military construction and civil works. While BRAC has allowed the other districts to assume new responsibilities, SAD will face decisions similar to those faced in the later Cold War period. When the expenditures decrease after 2011, will military construction once again be navigated towards Savannah and Mobile, or will each district have to accommodate a lighter overall workload?[61]

SAD and Mobile District were responsible for the construction of three 4-Star Command Headquarters to be occupied by Fiscal Year 2011. These included new headquarters for US Central Command (CENTCOM) at MacDill Air Force Base in Tampa, Florida; the Army Materiel Command (AMC) at Redstone Arsenal in Huntsville, Alabama; and US Southern Command (SOUTHCOM) in Miami, Florida. Savannah District was charged with a fourth 4-Star Command, a joint headquarters building for US Forces Command (FORSCOM) and the US Army Reserve Command (USARC) at Fort Bragg, North Carolina. Each of these was a major undertaking.

For example, construction for the joint FORSCOM-USARC headquarters building began in December 2008 and was designed to absorb the personnel and missions from the de-commissioned Fort McPherson in Georgia. The new $290 million dollar building, which

opened during the summer of 2011, consists of 631,749 square feet and accommodates 2,500 employees. The building also has state-of-the art security and Internet Technology facilities. The two commands occupy separate wings connected by a shared lobby, with each command suite having a private terrace. The building also has several unique features, including raised floors to contain an air distribution system allowing for improved thermal control. Located next to Fort Bragg's Old Post Historic District, the new building stands in stark contrast to its predecessors. SAD is overseeing construction of a new generation of buildings.[62]

The new joint FORSCOM-USARC headquarters building at Fort Bragg, North Carolina opened for business in 2011.

Additionally, Mobile District was selected to manage the National Environmental Policy Act program for BRAC 2005 nationwide, the largest NEPA program managed by any Federal agency to date. Mobile's NEPA Support Team provided oversight and quality control for nearly 200 environmental documents considering the impacts on cultural resources, threatened and endangered species, hazardous wastes, noise, air quality, socio-economics, and environmental justice.[63]

TRAINING CENTERS

A major goal of BRAC and Army transformation was consolidation of Army and Air Force training sites to reduce duplication and benefit from economies of scale. The Army conducts much basic training at Fort Benning, near Columbus, Georgia, where a substantial amount

of undeveloped land is available for expansion and to build modern facilities for the influx of trainees from installations that are closing under BRAC. Fort Benning is currently the sixth largest military installation in the US, and will have a total of 144,000 people on post for training 51 percent of the Army's soldiers after the BRAC process is complete.

A significant addition to the post is the Maneuver Center of Excellence headquarters. With 80 percent of the Center constructed from recycled products, this headquarters will include classrooms and support offices and staff. The influx of soldiers with their families to the installation also called for the creation of three child development centers. Other additions to the enlarging Fort Benning included simulation centers, an armed forces reserve center, and road enlargements.

In addition to Fort Benning, two specialized training facilities were built at Fort Jackson in Columbia, South Carolina, one for Army Drill Instructors and one for the DoD Chaplaincy Joint Center of Expertise. The $22 million Fort Jackson Consolidated Drill Sergeant School BRAC construction contract was awarded in March 2008 with the school occupied on December 1, 2010. This two-story, 60,000 sq. ft. headquarters includes a lobby, administrative space, classrooms, conference rooms, communication room, arms room, mail room and a physical fitness center. The dining facility, a one-story 18,000 sq. ft. building, serves up to 500 soldiers per meal and is also available for group activities. A track and physical training area accommodates seven separate physical training activities.

The $10.5 million Armed Forces Chaplaincy Joint Center of Expertise construction contract was awarded in April 2009 and the completed center was accepted by Fort Jackson on January 15, 2010, with classes starting the next day. This 45,000 sq. ft. facility has two stories and includes classrooms, administrative offices and auditoriums. Unique features acknowledging the inter-service aspect of the chapel are stained glass windows that were installed from a Naval Chapel, an Air Force Chapel and an Army Chapel that closed when BRAC established Fort Jackson's Joint Center of Excellence for religious training and education.

HEALTH CARE FACILITIES

Not technically a BRAC project, SAD broke ground for Fort Benning's Martin Army Community Hospital in April 2011 and it is scheduled for completion in the fall of 2014 at a cost of $333 million. The goal in planning the Martin Army Community Hospital was to make health care less stressful for the patient and staff by providing a more comforting atmosphere for service members and their families alike. This 745,000 sq. ft. hospital will be LEED certified silver and employ up to 400 health-care providers.

Digitally designed, the construction process allows off-site prefabrication of much of the facility, which is shipped intact for installation onsite. This improves quality control of the hospital materials and systems during construction with reduced cost. The hospital complex has three sections – a hospital tower and two clinic wings with a central grand

concourse creating a natural separation and serving as a gathering place with seating areas and views to the natural woods.

The completed hospital will be nearly double the size of the original 1958 hospital and include two 1,000-car parking garages, one for patients and visitors and another for hospital staff. The state-of-the art medical facilities include 70 inpatient beds, four acuity adaptable intensive care units (ICU), four step down ICUs, 24 medical surgical beds, 14 mother-baby beds and 24 psychiatric beds. The ICU has eight beds with the capability to expand to 24 acuity adjustable beds.

AIR FORCE WORK

The South Atlantic Division completed BRAC projects at seven Air Force bases, including Moody, Robbins, and Seymour Johnson Air Force bases in Georgia, Columbus AFB in Mississippi, Shaw AFB in South Carolina, and Eglin and MacDill AF bases in Florida. Especially significant are the projects at mammoth Eglin Air Force Base near Fort Walton Beach, Florida. Work at Eglin includes utility infrastructure and cantonment upgrades, Special Operations hangars, renovated warehouses, airfield haul roads and taxi-way extensions, a fresh water rinse facility, training dining facility, dental clinic, fitness center and child development center.

In April 2011, officials broke ground for the Martin Army Community Hospital at Fort Benning. The $333 million facility replaces the installation's original 1958 hospital.

ENDNOTES

1 Mexico remained the responsibility of the Ft. Worth District.

2 Barber and Gann, 317-318.

3 Ibid., 320.

4 Ibid.

5 Ibid., 323.

6 Ibid., 325-326.

7 Ibid., 333-334.

8 Ibid., 329.

9 Ibid., 328-330.

10 Walter Ennaco interview.

11 Walter Ennaco interview.

12 William L. Furlong, "Costa Rica Caught Between Two Worlds," *Journal of Interamerican Studies and World Affairs*, Vol. 29, no. 2 (summer, 1987), 136.

13 *The Mobile*, Vol. 8 No. 4 (April 1986), 4 ; Corps of Engineers Memo dated September 6, 1985, titled, "Utilization of FY84/85 Supplemental Military Assistance Program Funds—proposed Construction for El Salvador, Honduras and Costa Rica," located in Mobile District Files Box marked "099131 3054 PM-LA" file number 415-10F MAP Projects. Guatemalan military leaders yearning to get their hands on some of the military hardware and expertise the US offered made some attempts at transitioning to civilian leadership after 1984. By that date, they were the only country still ruled by a military government. The military transition to a civilian government attracted the financial assistance desired and put civilians in the position of absorbing blame for poor economic situations. According to one historian of this period, this move was merely a not so subtle "attempt by the military to consolidate and stabilize its own power." Carothers, *Name of Democracy*, 71. After 1986, Costa Rica pulled out of the Latin American initiative anti-insurgency effort, but continued to employ district officials for non-military Support for Others projects. Walter Ennaco interview; Furlong, "Two Worlds." 140–141.

14 Corps of Engineers Memo, September 6, 1985, "Utilization of FY 84/85." Op.cit.; Winnie L. Smith, "Success Stories in Central America," *The Mobile,* Vol. 9 no. 3 (March 1987), 4; Corps of Engineers Memo marked "FY84/85 CR/ES/Hon" Mobile District file box 099131 PM-LA, file 1:515-13. The term used most often in the public documents is "self-sufficiency." That is, the Hondurans and El Salvadorans were theoretically being trained by US personnel to fight their own war. For other public debate over US anti-Sandinista involvement in Central America, see Anne-Marie O'Connor, "Honduran military split over how much nation should toe US line," *Christian Science Monitor*, February 21, 1985, 9; Joanne Omang and Edward Cody, "An Uneasy Partner: Honduras Wary of US Policy, Support for Nicaraguan Rebels, El Salvador Raises Concern," *Washington Post*, February 24, 1985; Joanne Omang, "Lengthy US stay in Honduras Indicated," *Washington Post,* July 17, 1985.

15 Smith, "Success Stories," 4; Corps Memo, "Utilization of FY 84/85."

16 Ibid.

17 "Utilization of FY 84/85" op. cit. and "Memo for Commander Mobile District Corps

of Engineers, re. Center for Superior Studies for the Salvadoran Armed Forces," Mobile District File Box 0999903 671 PM-LA D10/03, file 415-10F.

18 For Sasser quote and SAD response, see copy of comments in Mobile District File Box "PM-LA 099131," file marked "415-10F Corr." Also see Julia Preston, "US Seeking GI Barracks in Honduras; Sasser Says Presence is Now Permanent," *Washington Post*, February 18, 1987, and Joanne Omang, "Fight over Aiding Nicaraguan Rebels Resumes in House," *Washington Post*, April 9, 1986.

19 Ibid., and for other comments on the Honduran construction see, "US to Spend $50 Million to Build Honduras Facilities," *Washington Post*, February 7, 1986, and "Entrenching in Honduras," *Washington Post*, February 18, 1986, "Containment in Nicaragua," *Washington Post*, April 2, 1986.

20 Mobile District, US Army Corps of Engineers, "Programming and Planning Data for Contingency Facility (Cedardeck) FY87 JTF-Bravo, Palmerola Air Base, Honduras," Mobile District File Box 099903 671 D10/03 PM-LA, file marked 415-10F. The report carefully defines "temporary."

21 For a full discussion of the J-6 program, see Arnold Engineering Development Center and the Air Force Systems Command, *Project Book for PDC Number ANZY-870198, Large Rocket Test Facility (J-6). Vol. 1 of 2 Sections A-E.* Arnold Air Force Base, Tennessee, 1987; Lt. Col. Guy W. Demoret, Lt. Col. Peter B. Root, Michael T. Abeln, and Leonard F. Jones, Jr., "Partnering Brings Success," *The Military Engineer*, Vol. 85 no. 556 (May–June 1993), 4-7; Office of Public Affairs, Arnold Engineering Development Center, Arnold AFB, Tennessee, and Public Affairs Office, Army Corps of Engineers, Mobile District, Mobile, Alabama, *J-6 Large Rocket Test Facility*, an information pamphlet, not dated; Michael T. Abeln, "J-6: Partnering at Rocket Test Facility," *The Mobile*, Vol. 14 no. 2 (Feb. 1992), 6. For information on the management plan, see US Army Corps of Engineers, Mobile District, South Atlantic Division and Arnold Engineering Development Center, Air Force Systems Command, *Management Plan for Design, Construction & Activation [of] Large Rocket Test Facility (LRTF) [at] Arnold Engineering Development Center, Arnold AFB, Tennessee*, unpublished report, June 1986. A copy was in the personal papers of Michael Abeln marked "J-6 Procedures and Management Plan."

22 Mike Abeln interview.

23 Karen J. Weitze, *Keeping the Edge: Air Force Materiel Command Cold War Context (1945-1991) Vol. II,* (Fort Worth District: US Army Corps of Engineers, August 2003), 18.

24 Thomas A. Clinton interview and Abeln interview.

25 Ibid.

26 Abeln interview.

27 Abeln, "Partnering at Rocket Test Facility," 6; also Abeln interview.

28 Demoret et al., "Partnering Brings Success," 5. Ebasco/Newberg was a joint venture made up of the EBASCO Constructors, Inc., and Gust K. Newberg Co. both based out of Pasadena.

29 *Partnering Agreement of the J-6 Team for the Large Rocket Test Facility Arnold AFB, TN*. A copy is in the ownership of the authors.

30 *Management Plan for Design and Construction Large Rocket Test Facility (LRTF)*

Arnold Engineering Development Center, Arnold AFS, Tennessee (Mobile District and South Atlantic Division: US Army Corps of Engineers, June 1986), 29, *J-6 Large Rocket Test Facility Arnold Engineering Development Center Arnold AFB, TN*, (Mobile District, US Army Corps of Engineers, n/d), p. 4, Guy W. Demoret, Peter B. Root, Michael T. Abeln, and Leonard F. Jones, Jr. Partnering Brings Success, *The Military Engineer*, Vol. 85 no. 556 (May-June 1993), 6.

31 Abeln interview.

32 Mobile District Office files, Box 1227 PM-M J-6 415-10f Memorandum from Edward W. Crabtree, Jr. "J-6 Lesson Learned" dated 16 July 1991.

33 Michael Abeln, J-6 partnering at rocket test facility, *The Mobile*, Vol. 14 no. 2 (February 1992), 6, Michael Abeln interview, and Gretchen Greeson, District Hosts DEH/BEC Conference, *The Mobile*, Vol. 15 no. 4 (May/June 1993), 8.

34 "District Hosts DEH/BCE," *The Mobile*, 8-9. For the award fee program, see Ebasco/Newberg Joint Venture, *J-6 Large Rocket Test Facility, Award Fee Program, Contractor's Evaluation No.* 2, unpublished report prepared for the Mobile District, US Army Corps of Engineers, September 1991. A copy was in the personal papers of Mike Abeln.

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38 See Bob Woodward, *The Commanders* (New York: Simon and Schuster, 1991) for a discussion of the diplomatic maneuvers related to the First Gulf War.

39 McDonnell, 39-40.

40 McDonnell, 40.

41 "More Desert Shield," *The Bench Mark*, September 1990, 1.

42 Frank N. Schubert and Theresa L. Kraus, 51.

43 Telephone interview with Colonel William Miller, 8 December 2005.

44 McDonnell 1996, 41.

45 "More Desert Shield," *The Bench Mark*, September 1990, 1.

46 Miller interview.

47 McDonnell 1996, 42.

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Logistics and the Gulf War. (Arlington, VA: Institute of Land Warfare, October 1992); William Pagonis "Theater Logistics in the Gulf War." *Army Logistician*, July-August 1992, 2-8; William Pagonis, "Observations on Gulf War Logistics." *Army Logistician*, September-October 1992, 5-11; and William Pagonis and Harold E. Raugh, Jr. "Good Logistics is Combat Power." *Military Review*, 71 (September 1991), 28-39.

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50 "MEAPO Supports Desert Shield," *The Bench Mark*, August 1990, 2.

51 "More Desert Shield," *The Bench Mark*, September 1990, 1.

52 Interview with R. Locurcio, 14 November 2005.

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54 Locurcio interview.

55 Miller interview.

56 "EUD/MEAPO to Merge Under SAD," *The Bench Mark*, January/February 1991, 1.

57 McDonnell, 1996, 191.

58 For more information on closing out the post-Cold War Military, see David S. Sorenson, *Shutting down the Cold War: The Politics of Military Base Closure* (New York: St. Martin's Press, 1998).

59 "Corps Sets Pace in Response to Transformation, BRAC Challenges," *Spectrum*, Fall 2006, 4-5; Leadership in Energy and Environmental Design, or LEED, was a certification program developed by the US Green Building Council in 1998 to improve modern building performance for environmental sustainability, including energy savings, water efficiency, and CO2 reductions.

60 "Corps Sets Pace in Response to Transformation, BRAC Challenges," *Spectrum*, Fall 2006, 4-5; Interview with Tor Brunso, 31 May 2011.

61 "Fort Jackson Construction Well Under Way," *Spectrum*, Vol. 4 No. 2, 2009, 4-5.

62 "Savannah District Building Strong with FORSCOM and USARC Headquarters," *Spectrum*, Vol. 4, No. 2, 2009, 12-13. Also, interview with General Todd Semonite, 28 February 2011.

63 "Mobile Chosen to Execute 2005 Base Realignment and Closure NEPA Program," *Spectrum*, Fall 2006, 6.

CHAPTER 7 – HARBOR AND NAVIGATION PROJECTS IN THE POST WAR PERIOD

The post-World War II era was a time of prosperity for America. Overseas trade grew dramatically, and harbors throughout the US and in SAD expanded. Canals, locks, and harbor dredging make for faster transportation of goods and allowed local economies to grow. Cities and states soon called on the Corps of Engineers to help them build the larger facilities and deeper channels demanded by new freighters from Europe and Asia. In SAD, Jacksonville, Mobile, Charleston, Miami, Savannah, Tampa, Pascagoula, and Wilmington harbors went through expansions. Slack water facilities were also enlarged and upgraded to be more efficient. Histories of the SAD districts describe in some detail these navigation and harbor improvement projects.

Larger ships coming in to Savannah demanded harbor deepening.

In the 1950s and early 1960s, river navigation projects were important to SAD districts, and dredging, channel improvements, and lock construction undertakings were common. Beginning in the late 1960s, however, environmental activism and taxpayer concerns about cost began to make it more difficult to justify smaller navigational projects on inland rivers in the Southeast. Rail and truck transportation grew steadily, but river barge traffic remained at 1950s levels.

In the 1970s, environmental concerns began to take center stage after Congress passed the National Environmental Policy Act in 1969. Environmental activists challenged nearly every large Corps project. The Jordan Dam in North Carolina, the Richard B. Russell Dam on the Savannah River, and the Cross-Florida Barge Canal all weathered lawsuits. The Barge Canal was ultimately stopped by the President and never restarted. The most intensively fought battle, however, was the over the Tennessee-Tombigbee Waterway in Tennessee, Mississippi, and Alabama. The largest navigation project in the Division, the Tenn-Tom began in 1971. This massive 234-mile canal turned out to be one of the last major navigation projects for the South Atlantic Division. The waterway was completed, but not before two lawsuits, numerous and lengthy public hearings, massive escalating costs, political pressure, and even a personal defense of the project by the Chief of Engineers. It was an extremely busy but transitional time for SAD.

Dredging in Mobile harbor in 1995.

In the 1980s, benefit/cost issues became a concern for federal water projects in two ways. First, the sites along major rivers in the South with the best opportunity for benefit (navigation improvement, flood control, hydroelectric generation, water supply, and recreation) had already been developed by the mid-1970s. The remaining sites for dams and waterway improvements had lesser potential benefits and greater development costs in engineering, construction, and operation.

Snagboat Snell *in North Carolina Waterways.*

Second, effects on the environment resulting from the development of large water projects also began to be noted. First emerging in the late 1940s, environmental concerns surfaced on an active scale in the 1960s, and matured in the 1970s as citizens became more aware of the impacts of past projects. Environmental effects began to be seen as project costs, further tipping the benefit-cost ratios against new development. While operation of large projects continues, and is a very significant role for the Division and the districts, development of new facilities became rare after the 1970s projects were completed.

Perhaps even more significant in the long run than this critical review, the public began to demand a role in making early decisions on large, expensive civil works projects by the Corps and other federal agencies. Many citizen groups asserted the Corps' decision-making process was flawed. Careful study of alternatives, with open, public meetings and input was necessary to guide the process. The public's demand for open decision-making led to the National Environmental Policy Act of 1970 (NEPA). Through the 1970s, SAD adapted to this law and the dramatic changes it brought.[1]

While SAD continued to review design plans for district projects, work with proposed and funded budgets, and make work allocation decisions, the Division office became increasingly helpful to the districts by providing environmental guidance and coordination. SAD staff provided the districts with legal and technical assistance in developing and reviewing Environmental Impact Statements, in hiring new staff trained in environmental disciplines, and, importantly, in helping districts troubleshoot issues that arose with several projects.

In this chapter, we focus on these environmental issues and the assistance that SAD provided for the districts. We examine two navigation projects (one in Florida and one in Mississippi and Alabama) and one harbor project (in South Carolina) to illustrate the success and issues faced by SAD in the period after 1970.

THE CROSS FLORIDA BARGE CANAL

The Cross Florida Barge Canal highlights a number of issues faced by SAD in this era. First, the project was not economically strong, maintaining only a marginal benefit-cost ratio. Second, SAD and the Jacksonville District had to deal with strong political forces in Florida and in Congress that, after initial support, came to oppose the project. Third, it was very evident during the life of this project that Florida's environmental concerns were increasing. Citizens in the state formed groups of experts to challenge Corps conclusions and decisions and to lobby political groups.

In January 1971, President Richard Nixon ordered a halt to further construction of the Cross Florida Barge Canal. His primary reason was to prevent potentially serious environmental damages to the water-sensitive region of the Oklawaha River Valley. The order was without precedent, though only four days earlier a federal judge in Washington, D.C. had issued a similar temporary halt to construction due to the absence of an Environmental

Impact Statement. Ultimately, the President's order was declared illegal by a federal judge, who ruled that only Congress could determine the fate of the project. The story of the Cross Florida Barge Canal bridges the gap between the large SAD water projects that followed the end of World War II and the environmental era that emerged in the 1970s.[2]

The idea of a canal across north-central Florida was not new. President John Quincy Adams had commissioned a survey of the area in 1826 to look into the possibility of building a canal across the "waist" of the state, where the peninsula narrows and a series of lakes and rivers could be linked to provide a shortcut across the state. A century later, Jacksonville and New Orleans business leaders founded the National Gulf-Atlantic Ship Canal Association and revived the idea of a canal across Florida. During the Great Depression, the association obtained Florida legislative backing and the interest of the Roosevelt administration. In 1935, President Roosevelt authorized $5 million of WPA emergency funding for building the Gulf-Atlantic Ship Canal as a public works project. However, Roosevelt's congressional enemies challenged his method of financing the project, so the President left further funding up to Congress. Congress failed to provide money, and work stopped in June 1936.[3]

The Florida Canal faced other political problems as well. The Florida railroads, challenged by hard times in the 1930s, opposed the idea of the canal, as did several south Florida cities that did not stand to benefit from the canal. A Jacksonville District study concluded that the project was neither necessary nor economically viable. A US Geological Survey of the project warned that the canal might damage the Floridian Aquifer by allowing salt water to intrude into the subterranean limestone. Additionally, the proposed canal route would cut off the flow of water into the Oklawaha River from two natural springs that were popular tourist spots, Silver Springs and Rainbow Springs. The combination of political, economic and water source problems ended the project until World War II.[4]

An Aboveground Canal?

During the early months of World War II, German submarines operating in the Straits of Florida were responsible for sinking a number of US ships and threatening the supply of oil from the Gulf of Mexico to the East Coast. The Corps recommended a 12-foot-deep, raised-level canal be reauthorized as a defense project. The idea of raising the canal placated scientific concerns about damaging the Floridian Aquifer. The canal would allow valuable bulk materials such as oil and cement to ship to the East Coast without exposure to German U-boats. Congress reauthorized the project in 1942 but did not provide funding. As Allied fortunes began to turn in 1943, Congress recognized that the canal might be unnecessary. Additionally, the country experienced war-generated shortages in both construction materials and labor that made the project impractical. For nearly twenty years after the war, the project remained in the Corps' list of backlogged Civil Works projects, authorized but unfunded. (Barber, Savannah District, 261-268).

The Canal remained in the Corps backlog until the late 1950s. In 1958, Congressman Robert Sikes (D-Florida) successfully used his position on the House Committee of Appropriations to obtain funding for a study of the canal project. He was aided by the Florida legislature, the Jacksonville Chamber of Commerce, the Florida State Federated Labor Council, and the Northern Florida Congressional Delegation. Most of the impetus for the canal came from Florida legislators' desire to tap into the increased waterborne transportation that followed World War II. State newspapers such as the *Orlando Sentinel* that supported the canal wanted to "put the state on the main street" of the nation's waterways. The purveyors of the project hoped the canal would attract more industry to a poor and rural part of the state and aid in flood control in the wet region.[5]

President Johnson speaks at the groundbreaking ceremony of the Cross Florida Barge Canal.

Jacksonville District's report estimated a return on investment large enough to elevate the project from inactive to active status in SAD annual reports beginning in 1960.[6] Though not included in the Corps' benefit-cost calculation, the military saw advantages in the canal. The growth of the Soviet Union's submarine fleet in the 1950s raised US fears of ship attacks off the Florida coast in time of war. Cuba's inclusion into the Soviet sphere of influence in the late 1950s only heightened this concern.[7]

A completed section of the Cross Florida Barge Canal, excavated through dry land.

The route for the high-level barge canal as proposed by the Corps differed little from the 1930s Gulf-Atlantic Ship Canal. The planned waterway began at Jacksonville and proceeded up the St. Johns River to a point above Palatka. Here the canal cut through eight miles of lowland swamp to the Oklawaha River. The project channelized the river for 30 miles to a point south of Silver Springs. From Silver Springs, the canal cut through 35 miles of central Florida highlands south of Ocala to the Withlacoochee River. The route followed that river for a short distance, and then went through another shortcut of highland for eight miles to the Gulf of Mexico near Yankeetown.[8]

The canal got a national boost when presidential candidate John F. Kennedy promised to support the project if elected. Kennedy delivered on his promise and allocated funding in the 1962–63 federal budgets. Despite strong opposition, Sikes, along with representatives Carl Albert (D-Oklahoma) and Carl Vinson (D-Georgia), managed to keep funding for the canal in the public works appropriations. In February of 1964, President Lyndon B. Johnson presided over the groundbreaking for the new Cross Florida Barge Canal at Palatka, Florida.

Financing for the canal came slowly until the late 1960s. The target date to complete the project was early 1971. To achieve this goal, Jacksonville District requested $73.6 million for fiscal years 1965 through 1969. Congress responded by allocating only $46.8 million. This extended the completion date and drove up costs. Due to inadequate funding,

the District had to delay awarding major contracts for nearly three years. At the current rate, the manager of the Canal Authority told Congress in 1969, the canal could not be finished until 1976. By June 1969, with less than two years remaining until the original completion date, the work was less than one-third finished. Meanwhile, the war in Vietnam was siphoning off funds from domestic programs, and funding for the canal suffered.[9]

Early Opposition to the Cross Florida Barge Canal

In the early 1960s, a small group of Florida naturalists voiced opposition to channelizing the Oklawaha River. Led by members of the Florida Audubon Society and professors from the University of Florida, the group adopted the slogan Save the Oklawaha. This group focused their opposition not on stopping the canal but on the route chosen through the Oklawaha River Valley. Congress had only recently named the Oklawaha to the list of wild and scenic rivers in the US. The opponents also were concerned that the project had no public discussion prior to reauthorization and funding. Initially, the railroads voiced opposition due to the competition from the canal.

Opposition to the project increased inside Florida. Much of the opposition was based on the project's growing cost. District estimates increased from $157 million in 1965 to $175 million by 1969, and by 1970 had reached $181 million. Inflationary costs drove land and construction prices up. The increased costs generated political opposition in the Florida legislature. South Florida Republicans, who saw no benefit from the canal to their region, complained that the project was looking like a "boondoggle."[10]

Opponents did little to prevent continuation of work on the canal until a series of media reports in the late 1960s increased visibility and opposition to the project. The *Miami Herald*, a longtime opponent of the first Ship Canal and vocal about its opposition to the Barge Canal, ran an article in March 1967 headlined "Vast Lakes to Drown Picturesque Oklawaha." Water hyacinths, a rapid-spreading weed, covered the Rodman Pool, one of the canal's reservoirs, and environmentalists used the occasion to reaffirm their claim that the Oklawaha Valley would change from a free-flowing river to a weed-choked trap. Just as the canal was attracting national attention in the media, the Corps produced a documentary illustrating the work on the canal. In the documentary, the 306-ton Corps "Crawler-Crusher" was seen crushing and destroying trees in the Rodman Reservoir. Opponents of the canal used the pictures to sway public feeling against the project.[11]

The ecology movement, as the early environmental movement was called, began to attract national attention, and ecologists pointed to the canal as an example of a project that did irreparable harm to the environment. In 1969, the Environmental Defense Fund, a new environmental legal group that employed biologists, chemists, economists, and other university scientists, got involved in the debate over the canal. They suggested that the opponents challenge the project in court. A group called the Florida Defenders of the

Environment (FDE) was formed. The group's scientific advisory committee consisted of biologists from the University of Florida and Miami University. Through openness with the press and unrestricted access to their information, the group built a level of trust with writers and reporters. In September 1969, FDE brought suit in Washington, D.C., to stop construction due to the "total social cost and real social benefits" of the Cross Florida Barge Canal. At the same time, FDE developed an Environmental Impact Statement for the canal.

Reader's Digest: "Rape on the Oklawaha"

Further criticism of the project came in January of 1970 when *Reader's Digest* magazine published an article by James Nathan Miller entitled "Rape on the Oklawaha." The article accused the Corps of financial manipulation to justify the costs, and called the project both a "boondoggle" and a "promoter's dream." Finally, Miller accused the Corps of destroying the "magnificent primordial river" in order to serve local commercial interests. The article lacked intellectual assessment but was effective in swaying public opinion against the canal. The magazine's 18 million readers responded by sending thousands of letters to the Secretary of the Interior and other federal and state officers asking the various governments to stop the project.

Public criticism came at a time when Congress was considering the National Environmental Policy Act (NEPA), environmentalists celebrated the first Earth Day, and President Nixon established the Council of Environmental Quality (CEQ). The FDE Environmental Impact Statement was published in March 1970. It suggested not only stopping the project but also draining the Rodman Reservoir. Meanwhile in Washington, the canal came to the attention of the President's cabinet. Secretary of the Interior Walter Hickel requested of the Secretary of the Army that a moratorium be put on the canal until an Interior Department environmental study could be completed.[12]

Supporters of the canal acted quickly on these events. W. A. McCree, president of the Florida Waterways Association, wrote a detailed defense of the project, refuting a number of the claims of the FDE's Environmental Impact Statement. McCree also wrote *Reader's Digest* to clarify the supporters' position on the project.[13]

In Washington, Senator Spessard Holland (D-Florida) wrote a lengthy letter to Secretary Hickel reminding him of 74 separate studies performed on the canal since 1826, and that the Corps had spent some $45.5 million of congressionally authorized funds to complete about 31 percent of the work. He went on to say, Hickel should read McCree's refutation, and that he was "unalterably opposed to any moratorium being placed on the construction." He reiterated to Hickel that he would not, "as one member of the Senate Appropriations Committee and Subcommittee on Public Works Appropriations, look with

favor on allocating for [additional] studies any funds appropriated for construction." He concluded by reminding Hickel that the federal government would have to spend millions more shutting the project down, even if only temporarily.[14]

Temporarily, Senator Holland got his way. He was able to prevent any effort to restrict funding for construction or to allocate funds for a new Interior Department ecological study. However, the Chief of Engineers responded to Hickel's letter by authorizing SAD and Jacksonville District to look at alternative routes that would avoid changing the Oklawaha River. The District developed a plan to reroute the canal one mile northwest of the river, permitting 20 miles of the river to remain natural. The plan's estimated changes would cost $5 million and did not substantially change the benefit-cost ratio from the 1960 plan. The Jacksonville District one-mile-away concept still kept the channel for the canal in the Oklawaha Valley, and conservationists and the environmental community believed that this still posed a danger to the region.[15]

At the same time, CEQ was studying the problem. On December 1, 1970, the Council recommended that the President terminate the canal for three reasons. The Council concurred with environmental findings that the project had a detrimental effect on the Florida environment, especially on water, fish, and wildlife. It noted that the project had always been economically marginal, but, even if cancelled, could return annual benefits of some $1.2 million on the finished portion. Finally, the Council observed that the political advantages were greater than the disadvantages, noting that Republican Governor Claude Kirk had backed away from the project and that only a minority of people in Jacksonville and Tampa really supported it. The Council also noted the 20 miles of the Oklawaha River saved by Jacksonville District's idea would only be seen by environmentalists as a token action.[16]

Nixon took the Council's advice and on January 19, 1971, ordered a halt to further construction of the Cross Florida Barge Canal. His primary reason was to "prevent potentially serious environmental damages" to a "uniquely beautiful, semi-tropical stream, one of a very few of its kind in the United States." Never before had a sitting US President stopped an appropriated and funded Civil Works project. Environmentalists applauded the President's decision, but canal supporters took their case to the courts.[17]

Meanwhile in the FDE lawsuit, Judge Barrington D. Parker of the US District Court for the District of Columbia enjoined the project and ordered construction halted. His primary reason was the absence of a proper Environmental Impact Statement under NEPA provisions. The judge's ruling was overridden in the public eye by the President's action.

Canal supporters continued their case in court and sought consideration of Jacksonville District's 1970 report suggesting that an alternative route for the canal might be suitable. As a result of the President's action, a series of lawsuits threatened to confuse the issues, so Judge Parker combined five suits into one legal action. In July 1973, the suit came to court in Jacksonville.

In May 1974, Judge Harvey M. Johnsen ruled that the President had no executive power to terminate legislatively authorized public works projects. On the FDE side, he ordered Congress to prepare a new Environmental Impact Statement. On the proponents'

side, he found that the FDE had erred in claiming that the Corps of Engineers had "abused an administrative discretion" in finding that the canal would have no effect on ground water. Neither side chose to appeal.[18]

As ordered by Judge Johnsen, Congress authorized the Army to have the Corps prepare a restudy of the project. Jacksonville District prepared the report and released it in February 1977. The report gave two different approaches to the project: a best completion and a best non-completion alternative. The study concluded that there were no engineering problems that could not be solved, and that most of the serious issues centered on the contamination of the ground water and lack of sufficient water to operate in droughts. The District found that there was an impact on the environment regardless of which alternative was selected. However, the report stated, though the "selected non-completion plan would conserve the existing resources…No overriding adverse environmental impacts attendant to the selected completion plan were identified." The report concluded that the Governor of Florida and his cabinet had voted against completing the canal the previous month. At the same time, the Chief of Engineers' Office was concluding the same thing. On February 24, 1977, General Morris recommended against continuing the canal, citing both potential environmental damage and economic marginality as reasons for his decision.[19]

The vote by the governor and the cabinet, the changing environmental awareness of the citizenry, the Chief of Engineers' position, and the continuing problems with other Corps projects such as the Tennessee-Tombigbee Waterway and the Central and Southern Florida Project brought the Cross Florida Barge Canal effectively to a close. Though the work remained on the active list of Corps projects for more than 13 years, and discussion continued about the possibility of renewing interest in the 1980s, the project remained dormant.[20]

Congress de-authorized the Cross Florida Barge Canal in November 1990 and established a Cross Florida National Conservation Area out of the lands. On November 20, 1993, the State of Florida purchased the lands of the canal and title was passed by the Jacksonville District on behalf of the Secretary of the Army. Commenting at the ceremony in Ocala, Florida, District Engineer Colonel Terrence Salt noted how ideas of federal stewardship changed over the years, "from an idea and a dream of a century ago to the needs and priorities of today, which are different." As a sign of how things had changed, Congressman Charles Bennett of Jacksonville, who had been one of the main proponents of the canal, introduced the legislation to have the canal property set aside for conservation and recreational activities. The plans for the area included conversion of the property into a Cross Florida Greenway.[21]

THE TENNESSEE–TOMBIGBEE WATERWAY

The Tennessee-Tombigbee Waterway project began in 1971 and ended with the opening of the great canal in 1985. The period saw dramatic changes both in SAD and in the districts in organizational accommodation to the environmental emphasis on public water projects. Political maneuvering by both proponents and opponents of the waterway was intense throughout this period. Ultimately, the proponents won, and the massive waterway opened

Early Brochure Map of the Tenn-Tom and Other Barge Routes.

in January 1985. It ushered in a new era of environmental impact and cultural resources mitigation, illustrating what had become necessary to satisfy current laws and regulations.

Although the Tenn-Tom was completed, it became the last of the large federal water projects in SAD. After 1985, except in Puerto Rico, SAD districts never performed major navigational or dam and reservoir projects unless it was a replacement for an existing dam or lock, or had an environmental restoration aspect to it.

The Tenn-Tom produced so much attention that bibliographic entries are voluminous. Dr. Jeffrey K. Stine completed the history of the project in a Corps sponsored manuscript. Stein later published a book on the political and environmental aspects of the project: *Mixing the Waters: Environment, Politics, and the Building of the Tennessee-Tombigbee Waterway*. Although his book was critical of the project, Stein acknowledged that the engineers performed their job well.[22] To illustrate the extent to which the project was subjected to public inspection, editors of *Environmental Geology* noted that, during the litigation that followed the project from the start to finish, "virtually every document related to the Tennessee-Tombigbee Waterway obtained from every level of the Corps as well as the Secretary of the Army's office" since the 1930s was presented in court.[23]

In the beginning, the project carried wide support in Tennessee, Alabama, and Mississippi, whose legislators had been lobbying for it for decades. President Richard Nixon presided at the opening of construction on the waterway in May 1971.[24] The waterway was a joint project of the Nashville and Mobile districts. At the time, the Tennessee-Tombigbee Waterway was the largest civil works project of its kind in the US.[25] The project involved a 254-mile waterway corridor from the lower Tennessee River in Mississippi to Demopolis Lock on the Black Warrior River in Alabama. The waterway provided barge traffic on the Ohio and Tennessee rivers with an alternative route to the Gulf of Mexico. From the Black Warrior River, traffic moved into the Mobile River and to the port of Mobile. The project involved the construction of ten locks and dams, flooded 40,000 acres, moved more than 300 million cubic yards of earth, and cost $1.4 billion.[26] It opened for traffic in January 1985 ahead of schedule, despite two lengthy NEPA-related lawsuits in 1971 and 1976.[27]

President Nixon speaks at the Tenn-Tom Groundbreaking, May 1971.

Almost from the beginning, the Corps came under harsh criticism for the cost-benefit ratios they used in computing the justification of the immense expenditures. By 1976, Corps economists, originally concerned primarily with navigational benefits, had to include recreational and development potential to the benefit side of the equation in order to get a positive benefit ratio.

Environmentalist legislators such as Senator Gaylord Nelson of Michigan led the opposition to the project by

attacking Congress for rushing into a "massive project whose environmental damages might outweigh any possible benefits." He attacked the project as not only a possible environmental disaster, but also a potential "economic flop."[28] He was countered in Congress by Southern political leaders including Senator John Stennis of Mississippi and Senator Howell Heflin of Alabama, along with Congressmen Joe Evins of Tennessee, Jack Edwards and Tom Bevill of Alabama, and Jamie Whitten of Mississippi. Masters of political maneuvering, these men and their supporters rightly banked that their colleagues would not, as the *Chicago Sun-Times* observed, seriously challenge "powerful committee chairmen who control spending on pork barrel projects nationwide."[29]

Budgetary Problems for the Tennessee-Tombigbee Waterway: $231 Million to $1.4 Billion in Five Years

Fighting increasing costs gave the proponents of the project their most serious congressional problem. By 1975, SAD division engineer Brig. General Carroll N. LeTellier had the unpleasant responsibility of disclosing at the Senate and House Appropriations meetings that the estimated cost of the waterway would exceed original estimates by more than a billion dollars. LeTellier was ordered not to release the information before the Mobile district could recalculate the benefit-cost ratio so as to present both sides of the complex project. In January 1976, the Corps publicly announced that the cost of the project had gone from $815 million the previous year to an estimated $1.36 billion—an increase of $545 million in one year. This represented an increased cost of the project of more than four times the original estimate of $235 million in 1971. An Army Audit Agency found that the Corps had misled Congress by not taking all cost factors into consideration when requesting appropriations. Additionally, the benefit/cost ratio had fallen from 1.6 to 1 to a revised 1.1 to 1 (Stine 161-163).

In 1977, newly elected president Jimmy Carter put the Tenn-Tom on his water projects review list for reevaluation because of potential environmental impact. Carter quickly backed down in the face of political pressure from Congress. Despite Carter's backpedaling, critics of the waterway were growing in number. An alliance of environmental and railroad organizations, with support from critics among fiscal conservatives, had inaugurated a second lawsuit in 1976. President Carter and his advisers privately concluded that the Corps had probably used misleading or incorrect factors in assessing the benefits of the Tenn-Tom but decided to wait for the court decision and did not intervene further in the controversy.[30]

Despite the controversy surrounding the waterway's construction, the project helped the Mobile District and SAD officials work more closely as team members on projects. The cultural resources program carried out before the construction of the Tenn-Tom illustrated the early development of cross-agency and cross-disciplinary teams in an early form of what the Corps would later call "Life Cycle Project Management" or simply "Project

"Pulling the Last Plug" on the Tenn-Tom, 1984.

Management."[31] Additionally, the program served as a model for other work going on at the Russell Dam and at Jordan Dam in North Carolina as well as other work inside the Corps.

By 1977, Corps officials were able to successfully nominate the Tombigbee River Multi-Resource District to the National Register and develop a single Memorandum of Agreement for project oversight. They also worked closely with the National Park Service's Interagency Archaeological Service-Atlanta office to develop an archaeological mitigation program for the waterway. The program encompassed "the broadest possible range of resource categories to ensure that necessary mitigation treated all categories equally."[32] These categories included prehistoric archaeology, historic archaeology, underwater archaeology, oral history, general history, historic buildings, and other historic engineering and industrial sites. After the waterway was completed, the Mobile District monitored sites to track vandalism and erosion; this monitoring still continues.

Interdisciplinary Teams and Meetings are Successful in the Cultural Resources Program on the Tenn-Tom

The [Mobile District] Planning Division's Environmental Resources Section was responsible for cultural resources at the time of the construction. Owing to the intensive litigation, media criticism, and congressional controversy, the Tenn-Tom was vulnerable to work stoppage from a number of economic, environmental, and cultural perspectives. However, unlike the environmentalists, archaeologists observed that the Tenn-Tom represented an opportunity for the scholarly study and an opportunity for an alliance between the district and the archaeological community. In October 1977, Corps archaeologists held a four-day meeting with lengthy "free and candid debate of the issues on the project" was both novel and successful. Jerry Nielson, Mobile District archaeologist, noted that the meetings represented a wide range of expertise from federal archaeologists, and helped "resolve misunderstandings and reach acceptable compromises for mitigation plans."(Stine 1992, p.21).

The waterway also initiated a large mitigation program to offset the destruction of thousands of acres of bottomland hardwoods and wetlands by the construction of the waterway. Unfortunately, funding for the mitigation was held up for several years because Congress could not agree with the executive branch on an omnibus water bill. In 1986, Congress passed and President Reagan signed the first Water Resources Development Act in ten years. The bill allocated some $66.2 million for the Mobile District to mitigate impacts to bottomland hardwood and wetlands lost in the building of the Tennessee-

Barge on the Tenn-Tom.

Tombigbee Waterway. The plan entailed purchasing tracts of similar land to place under federal or state land management for environmental protection.

Beginning in 1987, the Mobile District spent $92 million over the next fifteen years purchasing some 88,000 acres of bottomland hardwood in Mississippi and Alabama. A project delivery team was created to manage the purchased acreage and add those lands to 70,000 acres then being managed by other federal agencies in the two states. The Tennessee Tombigbee Project Delivery Team became responsible for a wide range of acquisition and management activities such as hunting programs, waterfowl impoundments, bird and wildlife management, agricultural planting, wetland controls, and forestry management, as well as for parks and recreational areas that included several beaches. Additionally, in working out acceptable means of measuring environmental losses created by the waterway, the team became involved in establishing environmental educational facilities, a visitors' center, a historical museum, coordination of educational programs with local schools and universities, protection of paleontological sites, ongoing archaeological site identification and excavation, and reintroduction of endangered species.[33] By 2003, the team had purchased all but a few thousand of the target acreages established by Congress.[34]

The Tenn-Tom environmental program was developed to meet public concern as expressed in NEPA and the National Historic Preservation Act (NHPA). SAD initiated this program in the early 1970s, focusing on Tenn-Tom and other ongoing projects, especially Russell Dam and Reservoir, the Central and South Florida Project, and the Jordan Lake and Dam. NHPA and especially NEPA had two important points: (1) environmental impacts need to be identified and considered in project development, and (2) the decision to build or not build, the selection among alternatives, and evaluation of all benefit, cost, and impact issues must be made in public, with reasonable citizen and interested party input. The Corps of Engineers knew that it was one of the target agencies for NEPA, and that if it did not comply there would be public outcry and lawsuits that would delay and stop projects.
To minimize this the Chief of Engineers, Lt. General Frederick J. Clark, announced in June 1970 that the Corps would work strongly to encourage public participation in identification of project needs, definition of environmental issues, and selection among alternatives. Clark then appointed advisory committees, moved quickly to define guidelines and objectives, and consulted directly with division and district commanders.[35]

SAD also moved quickly to establish environmental units both at the division headquarters and in the districts. For example, John Rushing, engineer and senior planner in the Mobile District, was brought to division headquarters to organize a new environmental branch, and to institute standards for performing environmental research, assessments, and report writing. Rushing established working groups at each of the districts and together the teams developed protocols for producing Environmental Impact Statements, consulting with other federal agencies and with state government departments. SAD assisted the

districts in organizing public meetings, negotiating with environmental organizations and other public interest groups, and aiding in resolving legal issues. SAD also hired new staff in environmental research disciplines at the division office and encouraged each district to do the same. There was an early focus on biological and water study fields, but archaeologists appeared at SAD and in the districts by the mid-1970s. Rushing's goal was to coordinate the district environmental units to maximize their effectiveness throughout SAD.[36]

THE COOPER RIVER REDIVERSION CANAL

One large South Carolina project that did not result in the same level of environmental concern was completed during this period. The Cooper River Rediversion Canal was a Corps-designed answer to a severe shoaling problem in the Charleston Harbor.

The problem began with the Santee-Cooper Lakes system. This multi-purpose system of lakes, dams, and powerhouses along the Santee and Cooper rivers in eastern South Carolina was completed under New Deal funding in 1942. The project is managed by the Santee Cooper Authority; the Corps served only as the permitting agency. However, the Santee Cooper system's diversion of much of the Santee River into the Cooper River allowed tons of silt to be carried and deposited into Charleston Harbor. The very valuable harbor was becoming filled with silt and would eventually be a shallow mud flat. The Charleston District confronted two difficulties. Ship channels had to be dredged to remain open, and the V-shaped channels were becoming geometrically more expensive year by year.

The second problem was finding locations for disposal of dredged material. Such sites had become rare and expensive, and it had been recognized that placing dredged material was a growing environmental impact issue. Historian Jamie Moore explained the origin of the dredging problem:

> This drastic change [building the Santee Cooper Lakes system] brought freshwater that flowed on top of saltwater carrying tons of fine, inorganic silt into the tidal estuary. The Cooper River estuary changed from a vertically mixed river to a salt-wedge stratified type, creating an ideal environment for the deposition and entrapment of sediments in the harbor.[37]

After several years of discussion, in 1968 the District suggested an answer. Models and studies carried out by the Corps Waterways Experimental Station (WES) concluded that the answer lay in slowing the flow rate of the Cooper River. District officials proposed to redivert 80 percent of the fresh water from the Cooper River back into the Santee River. This would reduce the fresh water inflow into the Cooper and thus into the harbor.[38] The Santee-Cooper system had increased the flow rate of fresh water from the Cooper River to the Charleston Harbor from 72 cubic feet per second to 15,600 feet per second. They proposed to reduce that back to 3000 feet per second. Thus, the two rivers would more closely approximate their historic flows.

The plan was approved by the State Ports Authority and the South Carolina Public Service Authority and involved digging a rediversion canal to remove a large portion of

the water that emptied into Lake Moultrie and ultimately the Cooper River, and return it to the Santee River. This dramatically reduced the silting of Charleston Harbor, allowed the building of a new hydroelectric plant, and returned the lower section of the Santee River to much of its original flow rate.[39] Since the project was an extension of the Charleston Harbor, the Charleston District was authorized by the SAD to construct the massive project. SAD's Division Engineer authorized Savannah District to support Charleston, and both districts were to draw upon the expertise of the Philadelphia District.[40]

Waterways Experiment Station model of Charleston Harbor.

The project was authorized by Congress in the Rivers and Harbors Act of 1968. However, initial land acquisition funding was not available until 1975, and formal approval for construction was not received from the Chief of Engineers office until January 1977.[41] The project involved erecting a twelve-mile canal between Lake Moultrie and the Santee River divided by a dam and a three-generator power plant at St. Stephens. The power plant would produce 84,000 kilowatts of electricity. The estimated cost in 1977 was $96.1 million.[42]

The Charleston District needed to address a number of environmental and industrial issues. The Santee-Cooper Lakes project had created a number of small islands in the Santee River that had become wildlife refuges and might become inundated with the increased river flow. US Fish and Wildlife Service and US Forest Service estimated that some 9,000 acres of swamp and bottomland would be seasonally flooded by the increased flow along the Santee. Additionally, the South Carolina Wildlife and Marine Resources observed that some oyster and clam beds along the Wando and Cooper rivers would be negatively impacted. Industries built along the Cooper River might begin experiencing salt water incursion once the flow of the Cooper was reduced. There was also the concern over the impact of 2,300 acres that had to be acquired and altered for the canal and dredge spoil disposal. Most of it ran through farms and lowland swamps.

The St. Stephen powerhouse in the Cooper River Rediversion Canal.

The Environmental Impact Statement noted that whereas current oyster and clam beds on the Wando and Cooper rivers would be destroyed, historic beds in the Santee River would be restored. The Corps acknowledged that the bottomland swamp would be seasonally flooded by the rediverted water in the Santee River, but asserted that this flooding would contribute to improved fishing and fish nursery grounds. Finally, the Corps found that the increased water flow would more fully impound old rice fields in the Santee River close to its coastal outlet, contributing to increased use by waterfowl. To help offset any negative impact on fishing, the Corps proposed building a fish hatchery at the tail race of the new canal and a fish lift at the power plant. Tests run at WES indicated that salt water would not reach the industries along the upper Cooper River if the planned altered flow of 3,000 cfs was maintained. Finally, the spoil areas created by construction would

be graded and revegetated. These 900 acres represented only a small portion of the land that would be required for continued spoil disposal in dredging Charleston Harbor in its current state.[43]

Though local environmentalists challenged many of the Corps's positions and figures, questions and comments were addressed, and no lawsuit followed. Most of the environmental criticism in the papers was leveled at the Corps' economic conclusions. A University of South Carolina oceanographer suggested that releasing water at Lake Marion's Wilson Dam farther upstream from the projected canal would be a less expensive method of solving the shoaling issue. TThe Corps concluded that, with a new canal and new powerhouse, the cost of reimbursing the South Carolina Public Service Authority for lost generating capacity at the Pinopolis Dam (at the Cooper River headwaters below Lake Moultrie) made this option too expensive. Local citizens voiced other environmental concerns about the loss of fishing and shellfish industries in the Charleston area. Most of these were answered by the positive enhancements that the increased water flow would have on restoring the Santee River.[44]

The Cooper River Rediversion Canal officially opened in November 1985 at a cost of $191.5 million, more than double the projected cost in 1977.[45] The district defended the cost increases, citing design changes and inflationary pressures. The project went through without lawsuit or serious environmental objections. The Corps was learning to anticipate and plan for objections, and the overall restorative nature of the project tended to absorb much of the environmental criticism. Financially, the City of Charleston, the South Carolina Ports Authority, and Corps officials convinced the local citizenry that the Corps had done an acceptable job of selecting the least detrimental solution to the very significant harbor shoaling problem.

UNDOING WHAT IT ONCE DID?

The Cooper River Rediversion project introduces another aspect of SAD work in the late twentieth century. The argument can be made that SAD will spend the next century undoing what it did in the last century. Dr. Martin Reuss, senior Corps historian, noted recently, "future projects will be more closely tied to watershed management and ecosystem restoration. Billions of dollars may be spent to undo what federal water agencies, pursuant to congressional direction, did earlier."[46] The billions of dollars Congress has authorized to restore the Everglades in southern Florida illustrate this. Perhaps the Corps should view the Cooper River Rediversion project as one of its first environmental restoration undertakings, and recognize this as a major new mission for its engineering and management capabilities.

PUTTING AMERICA TO WORK: SAD PROJECTS BENEFIT FROM THE AMERICAN RECOVERY AND REINVESTMENT ACT

As this history goes to print, SAD is putting the finishing touches on a billion dollar undertaking – putting people back to work. As a result of a severe economic recession, newly elected President Barack Obama signed the American Recovery and Reinvestment Act (ARRA) in February 2009. The intent of this highly controversial legislation was to stimulate the economy and create jobs for the increasing ranks of unemployed Americans. In all, the Corps received $4.6 billion for civil works projects and $2 billion for military programs. Early goals for recovery included 8,000 jobs for every $1 billion, so for the Corps, this meant a goal of 48,000 jobs. SAD received $1 billion in ARRA funds, including $700 million for civil works, and $300 for its military program.

When the President put out the call for "shovel-ready" projects, the greatest challenge faced by the Corps and all Federal agencies was to meet the accelerated timelines for letting contracts. SAD conducted a review of its "wish list" and submitted a list of projects to the Office of Management and Budget for approval. According to ARRA, all funds had to be obligated by September 10, 2009; SAD met this goal and actively participated in carrying out the President's economic mission. Projects on the agency's list included a cornucopia of opportunities, from small $10,000 recreation projects to multi-million dollar contributions to the first Everglades Restoration project. While SAD's military construction program

Even the smallest ARRA project made a difference. This restroom at Lake Walter F. George is now ADA compliant.

received a number of projects, by far the biggest benefactor was the Civil Works operations and maintenance program.[47]

Many projects were long overdue, and SAD took the opportunity with ARRA to fund some of its obligations for navigational improvements. For example, in Jacksonville District, ARRA helped to fund the $34 million third phase of the Jacksonville Harbor deepening project, authorized in 1999. The project included deepening a 5.3-mile reach of the port's main shipping channel from 38 feet to 40 feet, and included the removal of 2.1 million cubic yards of disposed material. Importantly, the project is part of a broader goal for the nation's ports to accommodate the water depths required for fully loaded modern vessels.

Jacksonville District completed two other important navigational projects with ARRA funds. These included a $1.9 million dredging effort at Ponce de Leon inlet near Daytona. Shoaling, or underwater buildup of sand and sediment, in the inlet has caused nearly 500 groundings and close to 150 vessels have capsized since the early 1980s, and Coast Guard rescue operations have been impacted. The project removed almost 150,000 cubic yards of material. The second project was an ongoing effort at Fernandina Harbor in northeast Florida and benefitted from the infusion of $1.6 million. The project consisted of the construction of two stone jetties at the harbor's entrance: the north jetty is 19,150 feet long and the south jetty is 11,200 feet long. In addition to the jetties, the project also included a 32-foot deep channel from the Atlantic Ocean to Lanceford Creek and the Amelia River. Much of the dredged non-beach quality material was placed along the south jetty to replace materials lost through erosion and high tides. Importantly, the project helped to protect Fort Clinch, constructed in 1847, located on the northern tip of Amelia Island.

In Wilmington District, the Corps completed repairs to rock rubble breakwater structures at Ocracoke Island and Smith's Creek near Oriental, North Carolina. The breakwaters were constructed and are maintained by the Corps to provide "harbors of refuge," areas where smaller vessels can harbor in severe weather. Funded by ARRA, the repairs required the transportation of new rock, which resulted in employment for construction workers and truck drivers. During its support of ARRA, SAD completed a number of similar smaller, less visible projects that will make major impacts to many people.[48]

In Mobile District, ARRA funded the completion of a $30 million project to improve maneuverability at the Choctaw Point Container Facility and the McDuffie Coal Terminal in Mobile harbor. The Mobile Turning Basin project was originally authorized in 1985, and these two components were considered "shovel-ready" for the purposes of ARRA. The first ARRA funded contract was let in July 2009 and the project was completed in August 2010. The project resulted in the removal of 2.7 million cubic yards of dredge materials, with most of that material recycled for other uses. Ultimately, the project improved the Alabama State Port Authority's competitiveness because ships are now able to turn more quickly and have the added benefit of an additional shipping lane.

In the end, SAD's programs benefitted from ARRA while also providing jobs in the southeast, primarily through its contractors. Many of the projects had been on the agency's "to-do" list for a number of years, but simply lacked Congressional funding. As ARRA projects are completed, however, SAD's funding, particularly for civil works, will return to

previous levels. With the recession ongoing and calls for limits on Federal spending growing more prominent, the agency will be challenged in its prioritization of projects.

The Race for Post-Panamax Shipping

The term Panamax refers to the formal current size requirements of vessels that can be accommodated by the Panama Canal, completed in 1914. However, when new locks are operational in 2014, modern and much larger vessels will be able to traverse the canal. Thus, many American seaports are working with the Corps to deepen their harbors for "Post-Panamax" shipping. Savannah District is one of the nation's fastest growing ports, and while its channel was deepened from 38 feet to 42 feet in 1994, it remains comparatively shallow in relation to other ports, which feature depths of up to 50 feet. The Port Authority of Georgia estimates that deepening the harbor to 48 feet could result in more than $115 million in economic return. The Corps has undertaken more than 40 studies for the controversial project, which was sent for public comment in 2010. Concurrently, Charleston District is working with its local partners to study increased harbor depths, putting the two cities in competition with one another for a new maritime economy. It is anticipated the race for Post-Panamax Shipping will continue to require the engineering expertise of SAD and its districts in the coming years.[49]

ENDNOTES

1 Daniel A. Mazmanian and Jeanne Nienaber, *Can Organizations Change?,* ()The Brookings Institution, 1979. Mazmanian and Nienaber provide a detailed description of the Corps' response to NEPA and the rise of environmental concerns, especially in regard to the move toward open planning.

2 *Florida Experience*, 284-289, Office of the White House Press Secretary, Statement by the President [on the Florida Barge Canal], January 19, 1971 (copy is in the archives of the US Army Corps of Engineers, Office of History archives, "Presidential Statements," II-20-2).

3 In order to move fast to put people to work, Roosevelt authorized work to begin on several projects before Congress had an opportunity to technically pass the funding. Roosevelt was attempting to alleviate suffering by using the Emergency Relief Act and Works Progress Administration money to fund the first year's work. But to his enemies, the president appeared to using high-handed methods of sidestepping the checks and balances set up by the Constitution. Congress reacted by refusing to allocate more funds and thus brought work to a standstill in June 1936. Henry Eugene Barber, "The History of the Florida Cross-State Canal," a PhD dissertation (University of Georgia, Athens, 1969), 165-179.

4 Carter, 271-72.

5 Barber, 261-268.

6 Barber, 264. The Speaker of the House, Clarence Cannon (D-Mo.) unalterably opposed the project. He is reported to have commented when the Sikes bill passed, "No bigger bunch of pirates ever sailed the Spanish Main. All the money that Captain Kidd and Long John Silver stole is infinitesimal compared to this raid on the federal treasury." Carter, 278.

7 Barber 268, 272.

8 Barber, 265.

9 Carter, 284 and Barber, 281-82, and Spessard L. Holland (D-Fla.), "Letter to the Honorable Walter J. Hickel, June 15, 1970," (a copy is in the file of the USACE OH archives under "Correspondence between Executive Departments, 1970," File II-20-3.

10 Barber, 283, Holland to Hickle, June 15, 1970.

11 Carter, 292.

12 Carter, 292.

13 W. A. McCree, "Environmental Impact of the Cross Florida Barge Canal with Special Emphasis on the Oklawaha Regional Ecosystem by Florida Defenders of the Environment and Refutation by W. A. McCree., President, Florida Waterways Association, Summary of Findings," not dated, W. A. McCree, "Letter to Hobart Lewis, *Reader's Digest*, January 9, 1970," (a copy is in the USACE OH archives in "Correspondence between Executive Departments, 1970," file II-20-3).

14 *Ibid*. John W. Morris, *Engineer Memoirs Lieutenant General John W. Morris, USA Retired*, US Army Corps of Engineers, Office of History, Alexandria, Virginia, 2000, 105.

15 Carter, 292-93.

16 Carter, 292.

17 Carter, 304.

18 Otis Perkins, Judge Orders Federal Deposit to Cover Canal Land Cost, [Jacksonville] *Florida Times-Union*, Friday March 21, 1973, Carter, 306, "Cross Florida Barge Canal Chronology" a summation of the events to 1977, not dated. A copy is found in the USACE OH archives under "Cross Florida Barge Canal," File II-19-1.

19 US Army Corps of Engineers, Jacksonville District, *Cross Florida Barge Canal Restudy Report*, (February 1977), 1-2, Dick Hogan, "Resources Unit: Drop Support for the Canal," *Jacksonville Journal*, Thursday, December 16, 1976, *Atlanta Journal-Constitution*, "Canal's Future Bleak," Friday, December 17, 1976, Department of the Army, Office of the Chief of Engineers, News Release, "Chief of Army Engineers recommends Cross-Florida Barge Canal Project Be Terminated," 24 February 1977. Interesting, years later in an interview, Morris admitted it was his personal opinion that the project should have been built, that the environmental issues were real but not unmanageable, *Morris Memoirs*, 105.

20 US Army Corps of Engineers, South Atlantic Division, "More Barge Canal Hearings Conducted," *Information Bulletin*, (June 1985), 3, Annual Report, 1990, 9-5.

21 Annual Report, 1990, 9-4, See also the Jacksonville District web page under Project Portfolio. http://www.saj.usace.army.mil/digitalproject/dpn (accessed 17 February 2006), Preston Lockridge, "Cross Florida Barge Canal," *Reflections* (January-February 1994), 5.

22 Jeff K. Stine, *Mixing the Waters: Environment, Politics, and the Building of the Tennessee-Tombigbee Waterway* (Akron, Ohio: University of Akron Press, 1993), 255.

23 Auerback, S. I., P. E. LaMoreaux, and G. J. McLindon, "Editorial," *Environmental Geology and Water Sciences*, Vol. 7 no. 1/ 2 (1985), 4. Ironically, the authors note that the collection of so much data on a single project in a single place has been one of the project's greatest contributions. The material has provided the grist for master's and doctoral thesis work for years.

24 Nixon gave the keynote address. Environmentalists are often quick to note that Nixon had only a few months before, by executive order, terminated the Cross Florida Barge Canal, another SAD project that had attracted intensive environmental opposition.

25 Since completed, it has remained the largest, however, the Everglades restoration may surpass the Tennessee-Tombigbee Waterway in both size and cost before it is completed. The authors will examine this project in chapter 6.

26 Students of the waterway boast that the earth moved superseded the tonnage moved in building the Panama Canal. Stein, "Cultural Resources," 8.

27 Jeane, *Mobile District*, 179-80.

28 Stine, *Mixing the Waters*, 150

29 Ibid. 154.

30 Ibid. 175.

31 Today known as Project Management Business Plan (PMBP).

32 Jeane, *Mobile District*, 182.

33 Ibid., 67-69.

34 For more on the Tennessee-Tombigbee mitigation see Bailey and Philips, 66-72.

35 Mazmanian and Neinaber, *Can Organizations Change?* (Washington, DC: The Brookings Institute, 1979), 25-36.

36 Interview with John Rushing, April 2007.

37 Moore, *Lowcountry Engineers*, 89.

38 SAD, "Water Resources in South Carolina," 30-31; Moore, *Charleston District*, 89-93.

39 Ibid., 93; Charleston District, US Army Corps of Engineers, *Final Environmental Statement, Cooper River Rediversion Project, Charleston Harbor, South Carolina*, (Charleston, SC: US Army Corps of Engineers, 1975), 41.

40 Julia Coaxum, "Cooper River Rediversion project is completed," *District Dispatch*, Vol. 1 no. 29 Fall 1985, 1

41 *Annual Report Fiscal Year 1984 of the Secretary of the Army on Civil Works Activities (1October 1983- 30 September 1985)*, (Washington, D.C.: US Government Printing Office, 1986), 7-4; Julia Coaxum, "Cooper River Rediversion Gets Go Ahead from OCE," *What's My Name* (*Charleston District Newsletter*), Vol. 1 no. 1 (28 January 1977), 1.

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43 Charleston District, *Rediversion Project*, 48-55; David Hubbard interview; Charleston District, US Army Corps of Engineers Public Information Office, *Cooper River Rediversion Project*, (Charleston, SC: Charleston District, US Army Corps of Engineers, n/d). Ultimately, the cfs was altered to 4,500.

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46 Martin Reuss, "The Development of American Water Resources: Planners, Politicians, and Constitutional Interpretation," in *Managing Water Resources Past and Present, The Linacre Lectures 2002*, edited by Julie Trottier and Paul Slack, (New York: Oxford University Press, 2004), 67.

47 "In South Atlantic Division: Major Impact with Minor Construction," *Public Works Digest* (July/August 2010), 33

48 "ARRA: Putting America to Work, *Spectrum*, Vol. 5, No. 2 (2010).

49 "South Atlantic Division Harbors: Gateways to the World," *Spectrum*, Vol. 5, No. 4 (2010).

CHAPTER 8 – THE BIG DAM ERA

South Atlantic Division reservoirs provide flood control and protection of the farmlands and cities of the South. Hydroelectric facilities at the dam sites supply electricity to make rural life easier and to power industrial growth. The citizens enjoy significant boating, fishing, and other recreational activities. The water supplies provided by SAD reservoirs allowed the industrial, commercial, and urban development of the South since World War II and have increasing importance today.

Carters Lake in the mountains of north Georgia.

Civil Works water projects grew steadily in SAD during the five years after World War II. This growth accelerated during the 1950s and the 1960s. Large projects such as the Savannah River reservoirs at Clarks Hill and Lake Hartwell, the Apalachicola-Chattahoochee dams at Lake Seminole, Carter's Lake, Walter F. George Lake, and the South Florida Project were some of the projects that kept SAD busy coordinating and managing the Division's resources.

THE SAVANNAH RIVER DEVELOPMENT

Like all of SAD, Savannah District was poised to take advantage of the postwar trends in water resources development in the US. The important harbor at Savannah and the excellent potential of the Savannah River for multiple-purpose development assured a substantial workload for the District. The increasing size of boats and barges, however, rendered Georgia's shallow and less navigable streams and shallower harbors less valuable for traditional navigation. Clearly, the Savannah District's future in developing structural solutions to water resource problems would lie more in the work that federal and state agencies could perform with new comprehensive, multi-purpose projects.[1]

Expensive multi-purpose dams represented the most dramatic change in the nature of the civil works mission for Savannah District after World War II. Based on a 308 Report for the Savannah River basin in 1933, and a subsequent survey in 1939, the 1944 Flood Control Act approved a plan for eleven Savannah River basin reservoirs for flood control, hydropower, and other purposes. Priority was given to two dam sites, Clarks Hill (renamed J. Strom Thurmond) and Hartwell. Later, a third location, Trotters Shoals (renamed Richard B. Russell Dam), was selected and built.[2]

Like all other federal work in the immediate post war period, the large dams and reservoirs were designed and built using traditional Corps stove pipe management. The District's planning division researched the project and presented to the District Engineer its plan for the watershed. Most of the basin data was gathered in the 1933 and 1939 surveys

Clarks Hill Lock and Dam (now Thurmond Lake), Savannah River, South Carolina and Georgia.

of the river. After SAD and Headquarters review and approval, the plans were presented to Congress. Congressional funding was appropriated, and the District's engineering division took the project as hypothetically planned and put pencil to paper to design the works. Then, construction division took the project as engineered, and along with the District Engineer, who served as primary contracting officer, bid the work out to various contractors for completion. The entire project was managed from inside the engineering division using various engineering members as part of the management team as their disciplines were needed. After completion and dedication, operations division took over managing the day-to-day operations in conjunction with state and federal regulators.

Traditional stove pipe management emphasized safe and useful projects in a timely manner within the budgetary constraints set by Congress. No attention was paid to adverse effects to the land or fish and wildlife except as it involved a federally protected preserve. The objectives of the work were essentially regional development and flood control. If archaeologists were needed to re-locate a cemetery, as was necessary at Lake Hartwell, they were hired usually through the affected states to perform the work. If a forestry evaluation was necessary due to proximity of a state or national park, the individual agency was contacted, such as South Carolina Department of Natural Resources at Russell Lake. The Corps saw little in-house need for such disciplines as biology, archaeology, or forestry.

SAD dams and lakes.

Project	River Basin	Purpose	Completed
Millers Ferry	Alabama	N-P	1970
R.F. Henry	Alabama	N-P	1975
Carters	Coosawattee	FC-P	1975
Allatoona	Etowah	FC-P *	1950
W.F. George	Chattahoochee	N-P	1963
George W. Andrews	Chattahoochee	N-FC	1963
West Point	Chattahoochee	FC-FW-N-P-R	1975
Buford	Chattahoochee	FC-N-P **	1957
J.S. Thurmond	Savannah	FC-N-R-P	1953
R.B. Russell	Savannah	FC-P-R-FW-ARA	1985
Hartwell	Savannah	FC-N-P	1962
John H. Kerr	Roanoke	FC-P-R-WS-FW	1952
Philpott	Roanoke	FC-P	1953
Jim Woodruff	Apalachicola	N-P	1957
Falls	Neuse	FC-FW-WS-WQ-R	1981
B. Everett Jordan	Cape Fear	R-WS-FC-FW-WQ	1974
W. Kerr Scott	Yadkin	R-WS-FC-FW	1962

Legend:	
FC	Flood Control
P	Power
N	Navigation
FW	Fish and Wildlife
R	Recreation
ARA	Area Redevelopment
WS	Water Supply
WQ	Water Quality

* As of 2011, Allatoona is in litigation over water supply operations.

** According to a 2011 ruling by the 11th Circuit Court of Appeals, Buford is also authorized for water supply.

CLARKS HILL (J. STROM THURMOND) DAM AND LAKE

The decision to construct a dam at Clarks Hill illustrates the process by which multi-purpose projects were developed, authorized, funded, and constructed in the postwar years. Armed with the findings of the 308 Report, community leaders in Augusta were invited in May 1935 by Savannah District Engineer Colonel Creswell Garlington to discuss the river's development. Garlington suggested these community leaders promote their cause by tying navigation, flood control, and hydropower into a comprehensive development package best achieved at the Clarks Hill location. "Impressed" with the engineer's ideas, the group then went to Norfolk (then SAD's office location) to "enlist the aid"[3] of SAD Division Engineer Earl I. Brown, who sent them, along with his endorsement and guidance to Washington to visit the Chief of Engineers, General Edwin M. Markham.

After gaining the support of Georgia Senators Walter F. George and Richard Russell and the help of their local congressman, Paul Brown, the men were able to convince Franklin Roosevelt to appoint a special board to investigate possible projects at Clarks Hill and other sites north of Augusta. Public hearings, additional documentation, and political support eventually convinced the Senate to pass a resolution in 1938 calling upon the Board of Engineers for Rivers and Harbors to review the 308 Report. Although the review was completed by the Savannah District Engineer in 1939, World War II delayed consideration until 1943, when a report called for the development of the eleven multi-purpose projects

Clarks Hill (Thurmond) Powerhouse Control Room, 1955 (USACE photo).

on the Savannah River, beginning with Clarks Hill and followed by the Hartwell site.[4]

Located 22 miles upstream from Augusta, Clarks Hill Dam and Lake was one of the first multi-purpose projects constructed in the SAD. The project was built between 1946 and 1954 at a cost of $79.2 million, and included an earthen embanked dam 200 feet high and 5,680 feet wide across. The spillway was over 1,000 feet long and has 23 tainter gates, each 40 feet wide by 35 feet high. The reservoir covered 70,000 acres and had 1,200 miles of shoreline, making Clarks Hill one of the largest inland bodies of water in the South.

As it was being developed, the project became embroiled in a public debate over federal or private ownership. Even during Roosevelt's long administration, there were strong forces in both political parties that opposed much of his effort to federalize some services. After World War II was over, this debate continued, and the Clarks Hill project became a focal point for both sides. The controversy began in 1946 when Georgia Power Company attempted to renew a 1928 license that its subsidiary, the Savannah River Electric Company, had received to build and operate a hydroelectric plant at Clarks Hill. Georgia Power had surrendered its license in 1932, assuring local boosters of the project in 1935 that it was no longer interested, except as a potential purchaser of power from the completed dam.

Shortly after the project began in 1946, however, President Truman halted work because of depressed economic conditions, and during the freeze, Georgia Power launched a protest of the project. Following public hearings and heated newspaper discussions, Georgia Power appealed a local district judge's order to the Federal Power Commission in late 1946. When Truman lifted the freeze at the end of 1946, the district continued work on the project. In January 1947, the Federal Power Commission rejected Georgia Power's appeal, though the company did not give up and continued its efforts until 1949. Georgia Power appealed to Representative George A. Dondero of Michigan, Chairman of the House Committee on Public Works. He introduced a bill requiring the Federal Power Commission to grant a license to Georgia Power to enter into partnership with the Corps to build the powerhouse component of the project. The bill was defeated in Congress. Georgia Power and its sister company Savannah River Electric Company refused to sell lands needed for the project, and appealed condemnation in federal court[5]

Power for the People

The hydropower produced at Corps dams is a valuable commodity. Not only is it considered "clean energy" with no carbon emissions, but it can be turned on and off quickly and is therefore an important source of peaking power for times of high-energy demand.

So, who gets that clean and reliable Federal power in the southeast? According to the 1944 Flood Control Act, power in excess of that required for flood control and navigation is to be sold to public bodies and cooperatives or "preference customers" at the lowest practicable rates. The power is marketed to the preference customers by the Department of Energy's Southeastern Power Administration (SEPA) headquartered in Elberton, Georgia. The money generated from power sales is deposited into the US Treasury to help defray costs of the authorized projects. SEPA does not own transmission lines and must contract with private utilities to get power to its customers.[6]

The Clarks Hill site was developed as a flood control and hydroelectric power project, but it also had a valuable recreational component. A controversy erupted over the topping of trees in the reservoir. When the Corps modified their construction plan to minimize expenses and only top trees in some recreational areas, local residents complained. The residents were concerned about safety issues to boaters and potential for malarial issues from stagnant water forming around dead trees during low periods. The district agreed to clear all vegetation in recreational areas to prevent these problems.[7] This is an early example of public input having substantial effects on civil works projects.

Clarks Hill Lake was the first SAD experiment with recreational benefits. Savannah District held public meetings in both Georgia and South Carolina to obtain local involvement for the lake's recreational plan. The District opened a number of recreational areas to the public, as well as offered lots of land along the waterfront for residences.[8] In 1987, Clarks

Hill was renamed Strom Thurmond Dam and Lake for the long-serving South Carolina senator.

The Savannah District and SAD efforts to control costs did not prevent the project from being substantially over budget. By the time the project was completed in 1954, costs had more than doubled from the 1944 estimate of $35.3 million.[9]

HARTWELL DAM AND LAKE

The second major multi-purpose dam on the Savannah River was Hartwell Dam and Lake. This $89.2 million project was built between 1955 and 1962 on the upper Savannah River. Located 89 miles above Augusta, Hartwell was one of the eleven reservoirs approved in the 1944 Flood Control Act, but no appropriations were authorized until 1950.[10]

Hartwell is a large 17,800-foot earthen-banked dam that created a reservoir of 55,950 acres. The reservoir extends 7.1 miles up the Savannah River to the confluence of the Tugaloo and Seneca rivers, and then 41 miles up the Tugaloo, and 27 miles up the Seneca. These rivers, and their many tributaries flowing through Piedmont valleys, created a complex shoreline 982 miles long. Building Hartwell required relocating railroads and power lines, raising and constructing several bridges, and building several new roads. One of the unique features of the project was the outdoor power plant on the South Carolina side of the river, the only one to be designed and constructed by the Corps of Engineers. Like Clarks Hill, costs escalated. The project was estimated to cost $68.4 million in 1950 but ultimately cost almost $90 million[11]

Hartwell Dam under construction, 1958.

A serious controversy involving the Chief of Engineers arose when Clemson College objected to potential flooding of a tract of land used for agricultural research. Savannah District and SAD officials began discussions as early as 1949 but could not resolve Clemson's issues. A US Department of Agriculture study confirmed Clemson's academic findings that the land was irreplaceable if destroyed. Despite Savannah District and SAD efforts, an impasse was reached, and a work stoppage occurred in 1956. The Chief of Engineers came to the project and negotiated directly with the Clemson President to resolve the problem.[12]

The two parties agreed that Savannah District would build dikes to prevent flooding the Clemson property. The dikes, completed in 1961, diverted the Seneca River around the Clemson land to prevent inundation. [13]

This challenge to the Hartwell project may be construed as an early effort to alter a Corps project for environmental purposes. Clemson's biologists, geologists, and hydrologists' research successfully challenged Corps opinions and findings. The challenge and resulting impasse were serious enough that the Chief of Engineers became involved to negotiate a settlement. However, the challenge was in no way critical of the Hartwell project; the project enjoyed wide public approval. The effort was intended only to preserve lands scheduled for flooding that school officials saw as irreplaceable. Like attitudes throughout the region and the nation in mid-century, large dam and reservoir projects were perceived as the obvious and cheapest answer to the severe flooding that plagued the region.

A More Humorous Controversy

A more humorous controversy erupted in 1956 during the construction of Hartwell Dam. During the clearing process seventy-eight-year-old Mrs. Eliza Brock and her daughter confronted contractors with a rifle, refusing to allow them to begin clearing her 103 acres of land. It seems that Savannah District Real Estate Division had purchased her deceased husband's share of the land, but had only presented her a formal "declaration of taking" from the Corps, to which she had not agreed. Therefore, she still possessed a one-half interest in the 103 acres. After a short negotiation, however, she settled out of court for $6,850. Maynard notes that she may have been the only person in Corps history who jointly owned land with the federal government.

TROTTERS SHOALS (RICHARD B. RUSSELL DAM AND RESERVOIR)

The Trotters Shoals Project, later named the Richard B. Russell Project, was the third multi-purpose project authorized by Congress for the Savannah River. Congress appropriated funding for the large dam project in the Flood Control Act of 1966. The project is located 16 miles southeast of Elberton, Georgia, or about 63 miles above Augusta. The project won an Honorable Mention in the 1986 Corps-wide Chief of Engineers Design and Environmental Program. Like many other large water projects of the 1970s, the Russell Dam and Reservoir became awash in controversy and was only finally completed with substantial environmental accommodations. The project also coincided with SAD headquarters efforts to add disciplines to the planning branch in order to accommodate the environmental aspect of the Corps mission.

Construction on the project, though approved in 1966, did not begin until 1974. The 1,885-foot-long concrete gravity dam was 195 feet high and contained four generating units producing a maximum power of 600 megawatts. The reservoir power pool stood 475 feet above sea level and covered 26,650 acres. The Russell project, when combined with

Completed Richard B. Russell powerhouse.

Lakes Hartwell and Clarks Hill, formed a 120-mile chain of lakes on the South Carolina-Georgia border.

Russell is the Third Choice for the Dam

Though Russell Dam became a focal point for environmental debate over the dam, the dam was actually the third choice for a Corps project. The previous two choices were strenuously opposed in the early 1960s by then South Carolina governor, Ernest "Fritz" Hollings. His concern at the time had nothing to do with environmental damage, but centered on the South Carolina land that the two early options would remove from private ownership; land that had been slated for industrial development. The Russell site was selected as the third and least invasive project on South Carolina's plans.

"

A Division Engineer explains the environmental problems that Corps officials face

In an interview in 1984, Division Engineer Brig. General Kenneth E. McIntyre spoke out about the Richard Russell Dam and its environmental problems. He explained the small, difficult issues that often plague SAD leadership in the Civil Works arena.

[At Richard B. Russell in 1979] "one of the main concerns that environmentalists, both in South Carolina and Georgia, faced was that they were concerned that this new dam would cause the oxygen content to go down to unacceptably low levels during the summer months. Here we are talking about judgment costing lots of money. The states want five parts per million, and probably if you left everything to its own course, it would only be four. Nobody could prove really whether that was detrimental to the fish or not. But it didn't meet state water quality requirements, and it could have been interpreted not to meet EPA requirements." (McIntyre Interview, p. 360-361).

With its start in the 1970s, Russell Dam came under close environmental scrutiny. After numerous groups in both Georgia and South Carolina opposed the project, Governor James Edwards addressed a letter in 1975 to the Savannah District Engineer expressing his refusal to support the project as it had been designed. In 1976, the South Carolina Wildlife Federation, on behalf of several environmental groups, filed a lawsuit to halt the project on the grounds that the Corps violated federal laws regarding water quality, fish and wildlife habitats, and other environmental features.[14] Though the court ruled in the Corps' favor, the Savannah District proceeded more slowly and thoroughly on the Russell project than it had in previous projects. Additionally, the dam project was on President Carter's hit list of questionable water projects that he tried to halt funding in order to decommission the project.

Intensive Environmental Opposition to the Project

Environmental opposition came from many Georgia and South Carolina agencies and organizations. The South Carolina Department of Natural Resources, in their July-August 1975 magazine, *South Carolina Wildlife*, published an article damning the project called, "Trotters Shoals: The Big Boondoggle." The emotionally charged article pointed out a number of issues wrong with the project, most specifically cost escalation: the projected cost grew from $79 million in 1966 to $231 million nine years later. The author made a strong case against the project by interviewing a number of long time residents of the area who were adamantly opposed to the project. The author went on to say that the Corps was planning to destroy 200 million years of geologic history, and was "insensitive" to human and environmental needs by acknowledging that the 26,650 acres of land to be flooded would no longer produce wildlife, timber or crops and yet the "adverse impact" was "inconsequential." The article concluded that the Corps' plans to destroy the last remaining 30 miles of an "environmental treasure" should be of much concern, and the entire effort was rooted in "political expediency" at the expense of "human and environmental needs." (Borg, pp. 18-41).

Responding to the Chief of Engineers Lt. General Frederick Clarke's call in the early 1970s to "examine existing and proposed policies, programs, and activities from an environmental point of view," SAD General Walker and subsequent Division Engineers developed a new Planning Division within the SAD office.[15] By the late 1970s, the most unique aspect of the new planning group was the Environmental Resources Branch that included, along with a supervising Civil Engineer, an archaeologist, an environmental resources planner, a biologist, a landscape architect, a fisheries biologist, and a sanitary engineer. Additionally, the districts began to follow suit and create their own Environmental Resources Branches that also included biologists, archaeologists, geologists, and foresters.[16]

The Savannah District performed numerous studies that researched wildlife, cultural resources, water quality, geologic, seismic, and general environmental impact, as well as natural resource management. The seismic studies determined the maximum earthquake

force that the dam could withstand. As a result, the dam design was subjected to dynamic analyses to determine its adequacy to withstand seismic activity. An environmental management and recreational development master plan provided guidance and design for recreational facilities on the lake.[17]

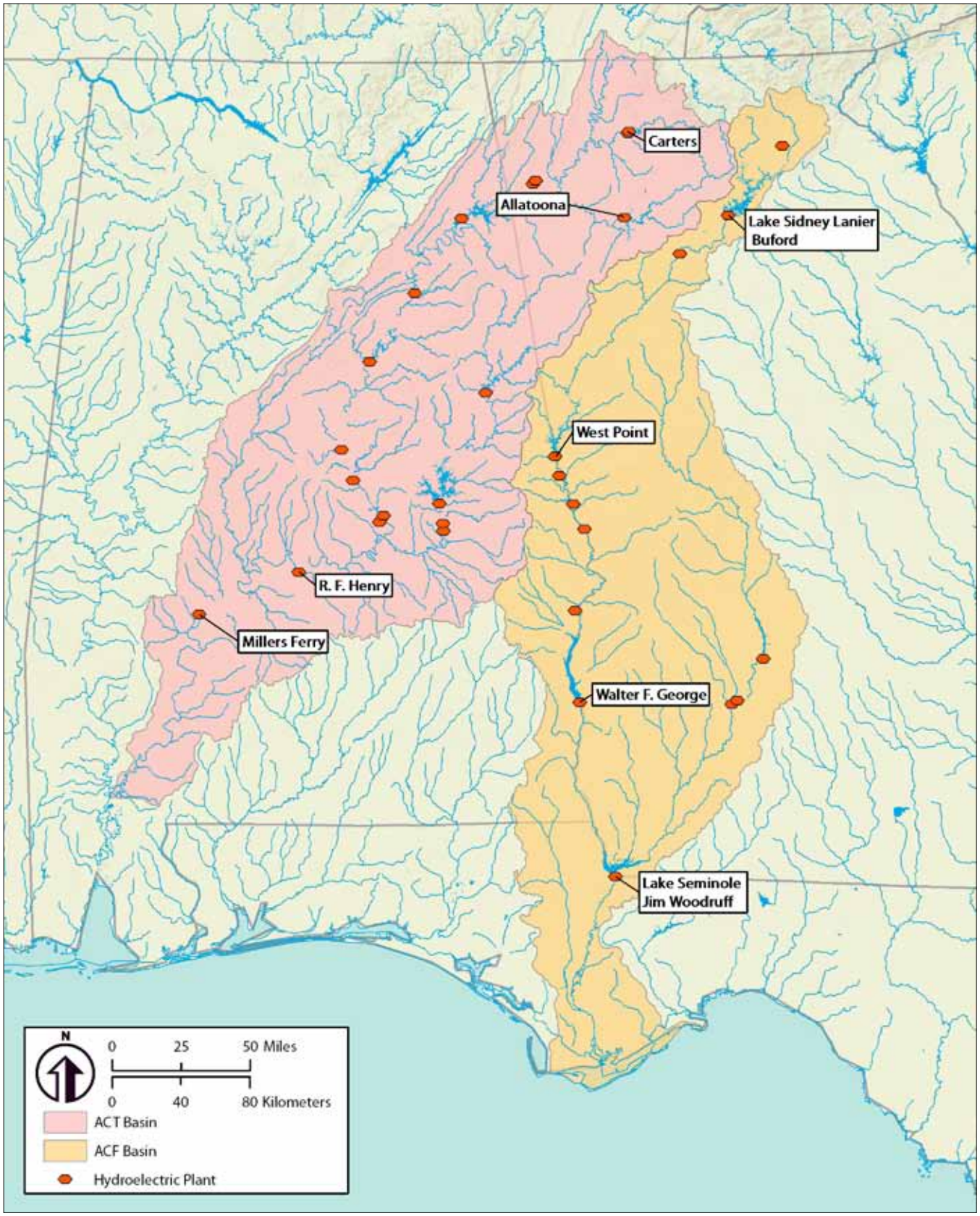
A back pumping process to increase the kilowatt-hours of the hydroelectric plant was challenged by representatives from both states' fish and wildlife departments in 1986.[18] Though an injunction held up construction, the back pumping operation was ultimately added to the dam when the SAD and Savannah District convinced a federal district judge that it could install adequate methods of protecting the fish. However, the judge's ruling only allowed the District to install the pumps, but not to place them into service, primarily because the South Carolina Department of Natural Resources was not yet convinced that the fish kill by the use of the turbines was as insignificant as the SAD and Savannah District study showed. By October 2000, the pumps were still not operational and Savannah District asked the district court judge to lift the ban on their usage.[19] The court ruled in the Corps' favor in May of 2002, and the units were placed in commercial operation in September.[20]

During planning and construction, Savannah District (James Cobb) and SAD (Marc Rucker) archaeologists, working with the National Park Service, the University of South Carolina, and a number of contracted research firms identified and documented more than 600 pre-Contact Indian and later historic sites inside the affected area. Many sites were studied in detail as mitigation of impact to the cultural resources. These studies made a significant contribution to understanding how different peoples have lived in this region of the South Carolina-Georgia Piedmont. The Savannah District, working with SAD Environmental Resources Branch officials, made the project a model cultural resources program.[21]

WATER WOES AND WATER WARS

The completion of these flood control projects are only the beginning of SAD's role in water resource management. As evidenced by the last two decades, flood control projects may also be titled "drought control projects." As it enters the twenty-first century, SAD has been challenged by increasing pressure on its water resources. The so-called "Water Wars" have involved three states, dozens of state and federal agencies, in addition to hundreds of local stakeholders.[22]

The Apalachicola, Chattahoochee, and Flint rivers form what is called the ACF basin. Each river has a very distinct watershed, and each is represented by different urban, agricultural, and ecological constituents. The Chattahoochee River traverses metropolitan Atlanta, home to nearly five million residents, and serves as the geographical boundary between Georgia and Alabama. The majority of the river is impounded, with thirteen reservoirs in all, three of which (Buford, West Point, and Walter F. George) are managed by SAD. The Flint River originates south of Atlanta, and flows through and supports the prime agricultural land in southwest Georgia. It is fed by two creeks, Kinchafoonee and Ichawaynochaway, as well as a system of underground aquifers. Unlike the Chattahoochee, the Flint runs largely unimpeded, with only Lake Blackshear between the headwaters and its terminus at Lake Seminole.



Corps dams in the ACT/ACF river basins.

Formed by the Flint and Chattahoochee rivers at Lake Seminole, the Apalachicola River and its estuary are home to one of the most delicate and biologically diverse ecosystems in the United States. Although altered by Corps dredging to retain navigational channels, the Apalachicola River is largely protected by both conservation and low population density. More than ten percent of the nation's oysters originate in Apalachicola Bay, and it serves as the habitat for numerous endangered species. This habitat requires a delicate balance between the river's freshwater origins and the saltwater of the Gulf of Mexico. At the lower end of Lake Seminole, the Corps manages water flowing out of Jim Woodruff Dam.[23]

The second river system at the heart of the water wars is the Alabama-Coosa-Tallapoosa (ACT) basin. The ACT basin drains approximately 22,820 square miles in portions of Tennessee, northwest Georgia, and Alabama. The Coosa and Tallapoosa rivers form in northwest Georgia and include two major tributaries, the Coosawattee River and the Etowah River. The Coosa and Tallapoosa merge near Montgomery, Alabama to form the Alabama River, which deposits into the Gulf of Mexico near Mobile. There are 18 dams in the basin, 6 Federal and 12 non-Federal. The reservoirs impounded by those dams serve a variety of purposes, including navigation, hydropower, flood control, water supply, and recreation. Like the ACF basin, the headwaters of the ACT, including Carters Lake and Lake Allatoona, provides part of the water supply for the metropolitan areas northwest of Atlanta. Downstream, the Alabama River supports a substantial agricultural economy, navigation, industry, and a delicate ecosystem.[24]

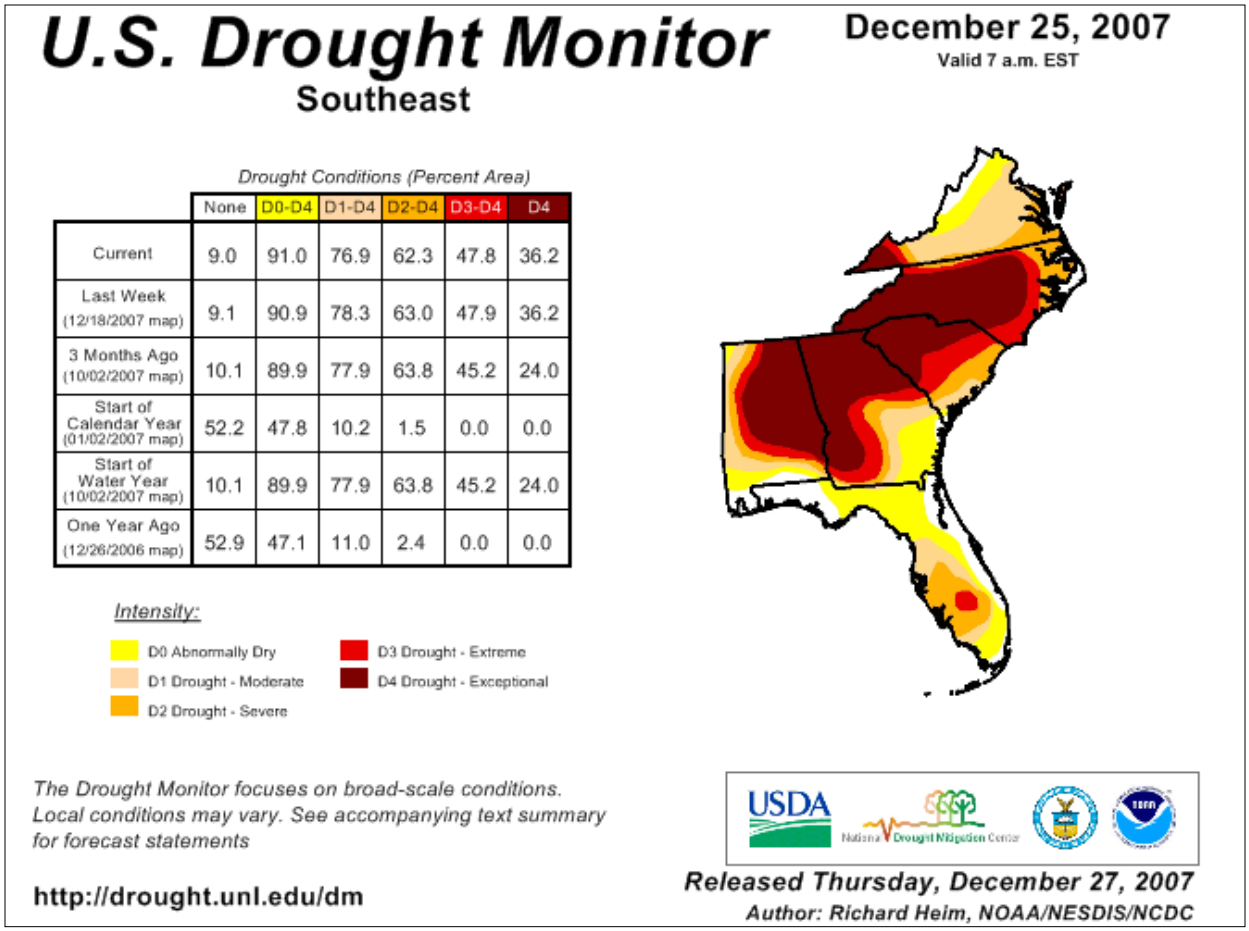
In the decades following the completion of Buford Dam in 1956, the City of Atlanta grew to become a major economic hub in the southeastern United States. The population growth strained the city's water resources and, over time, it made agreements with SAD to withdraw water from Lake Lanier. Dry periods of the 1980s highlighted an issue that emerged from 1990-2010 in subsequent and more devastating droughts. SAD dams in the southeast have a multitude of authorized purposes, including hydropower, water supply, flood control, and navigation. In addition, the lakes have become popular destinations for recreational activities, such as boating, fishing, hiking, swimming, secondary homes and resorts. These "competing uses" of a single natural resource are a challenge for SAD's water resource management.

Beginning in 1990, the controversy over water management in the two basins led to a multitude of lawsuits and an interstate political battle among Alabama, Georgia, and Florida. During the 1990s, the three states tried to negotiate their differences outside of the courtroom. Working with federal and private stakeholders, the negotiations were designed to develop agreements or compacts for water allocation in the two river systems. During this time, SAD worked closely with other state, federal, and local stakeholders to address concerns over its water management and began drafting Environmental Impact Statements for new formulas under consideration by the three states.

The compact negotiations were slow and became tense as an additional drought hit the southeastern US in 1998-2002. In 2003, the negotiations broke down completely and the parties returned to active litigation for the final decision. As the states took the litigation to court, the southeast experienced another prolonged period of unprecedented dry conditions from 2006-2008. According to the US Department of Agriculture (USDA),

over fifty percent of the southeast was in "exceptional drought" conditions. Lake levels fell dangerously low for both power generation and water-supply withdrawals. For example, the two main generating units at Buford Dam can operate with a pool level minimum of 1035 feet, and in November 2007, the water pool level at Lake Lanier dropped to 1055 feet. As the lake pool levels in the ACT/ACF basin dropped in 2007 and 2008, water releases at Corps dams, even if required for downstream ecological support, were sensationalized as "man versus mussels" in the press. Because SAD operates numerous dams in the ACT/ACF basin, the "temptation to blame [the agency] is strong."[25] The battles, however, were political and the agency was left in the uncomfortable position of balancing all of the competing uses as well as managing its water resources according to Congressional authorization.

In 2009, the Middle District Court of Florida criticized the Corps for failing to update its water control manual within the past 50 years, and ruled that water supply was not an authorized purpose of Lake Lanier, which had become the primary water source for the greater Atlanta area. The decision left Georgia and the City of Atlanta with the challenge of developing a solution to its water quantity problems. Judge Paul Magnuson established a



USDA Drought Monitor, December 2007.

Receding shoreline of Lake Lanier, 2008 (USACE photo).

three-year time limit for the Corps to return its operation of Buford Dam to the "baseline operation" of the mid-1970s. SAD and Mobile District worked to update the Corps' water control manuals for both the ACT and ACF basins, and provided technical assistance to other stakeholders as the lawsuits were appealed in Federal court.

In June 2011, the 11th Circuit Court of Appeals reversed the Magnuson ruling, declaring that the use of Lake Lanier for water supply is clearly authorized by the original authorizing legislation as well as subsequent laws. The court vacated the three-year deadline, and remanded the case back to the district court, with instructions to the Corps to define the limits of its legal authority to provide water supply from Lake Lanier. Specifically, was the Corps within its authority "to accommodate net withdrawals of 190 million gallons per day (mgd) annually from Lake Lanier, and to ensure flows of at least 1381 cubic feet per second (cfs) downstream at Atlanta, by the year 2030 as requested."[26]

In late June 2012, after many discussions and technical and legal analyses, the Corps' Chief Counsel, Earl Stockdale, filed a legal opinion with the court, which stated "[the Corps] has the legal authority under the 1946 [Rivers and Harbors Act] to release water from Buford Dam sufficient to accommodate Georgia's requested downstream withdrawals of 408 mgd; that withdrawals of 20 mgd from Lake Lanier are authorized under relocation

agreements and the 1956 Act; and that the Corps has discretion under the Water Supply Act to accommodate additional, net withdrawals of 170 mgd from Lake Lanier (including withdrawals of 277 mgd and returns of 107 mgd to the reservoir), because accommodating those withdrawals and returns would not fundamentally depart from Congressional intent for the Buford Project and the ACF system."[27]

The determination of legal authority did not imply that the Corps would automatically grant this or any other request for water from the lake without a careful review and environmental analysis. "It's important to note that this legal opinion only addresses whether the Corps has the legal authority to operate the project to accommodate Georgia's request," the Corps said in a news release accompanying the legal opinion. "It does not in any manner indicate the Corps must, should, or will exercise its discretion to operate the project to meet the request."[28]

The states of Alabama and Florida had previously sought review of the 11th Circuit decision by the United States Supreme Court, but on June 25, the court declined to hear the case, thus upholding the 11th Circuit decision. The Corps' legal opinion was filed the next day on June 26, 2012.

Having cleared these legal hurdles, the Corps could now proceed with completing an update of the water control manual for the ACF system, including water supply as an authorized purpose of the system to be considered among other purposes.

The droughts and litigation permanently altered the way in which the Corps and the public regard water resource management, and in the future, SAD will be constantly challenged with these issues. As Judge Magnuson wrote, "The problems faced in the ACF basin will continue to be repeated throughout this country, as the population grows more and undeveloped land is developed. Only by cooperating, planning and conserving can we avoid the situations that gave rise to this litigation."[29]

THE CENTRAL AND SOUTHERN FLORIDA PROJECT

Congress authorized the Corps to begin the Central and Southern Florida Project in response to continued flooding problems in central and south Florida in the late 1940s. In essence, the project was a giant plumbing work of canals, pumps, and levees designed to prevent flooding in the fast-growing urban areas. The plan also created additional land for agriculture, offered greater access to recreational opportunities, and provided better navigational access across south Florida. In addition, it was supposed to ensure sufficient fresh water to maintain the environments of Everglades National Park and Florida Bay.

Ideas about draining the vast nine million acres of the Everglades in southern Florida had been discussed on a state and national level since the region was first mapped by the United States in the 1830s, but no systematic attempts were made until the 1880s. An early effort backed by a wealthy industrialist failed in the 1890s, but in the first decade of the twentieth century, the State of Florida created the Everglades Drainage District and began building several large canals from Miami, Ft. Lauderdale, West Palm Beach, and Fort Pierce to Lake Okeechobee. Additionally, the state built a levee around the southern end of the lake to prevent the overflow of floodwaters. These efforts allowed small towns and farms to develop around the southern rim of the lake. Most of the state work was completed by 1917.[30]

The 1928 Hurricane

In September of 1928, a hurricane came ashore at West Palm Beach and moved inland toward Lake Okeechobee. The storm knocked out power and wrecked havoc in West Palm Beach, but did far worse damage in the glades.

The levee around the southern edge of Lake Okeechobee failed around midnight and sent a wall of water driven by powerful winds into the towns and farms below the lake. Towns such as Canal Point, Pahokee, and Belle Glade were swamped and residents clung to their houses and anything that would float, some riding the storm several miles all in the dark. More than 2,500 people drowned, mostly poor white and African-American farmers and their families, in the second worst US natural disaster of the century.

Newly elected President Herbert Hoover toured the devastated region in November, and pledged support to rebuild the dikes. The normally reticent Republican gave full support for federal funding to rebuild a larger dike around the lake. When the dike was finished using New Deal funds, it was named the Hoover Dike for the former President.

Southern Florida saw extensive development in the early 1920s. Land speculators and new residents intrigued with the state's mild winters drove land prices up. Cities such as Miami, Tampa, and West Palm Beach expanded quickly. The population of Dade, Broward, and Palm Beach counties increased from 66,500 in 1920 to 214,800 by 1930, a growth rate of more than 300 percent. However, hurricanes in 1926 and 1928 broke the levee around Lake Okeechobee and caused the deaths of more than 2,500 people. The federal government responded by building a larger, safer levee system for the lake in the 1930s. The new system of dikes was severely tested in 1947 when, after a particularly wet spring, two hurricanes swept over Lake Okeechobee that summer and fall. The dikes held and Jacksonville District engineers kept flooding to a minimum in the southern part of the state. However, in central Florida floodwater overflowed the banks of the Kissimmee River, inundating towns and farms.[31]

Congress supplied funding for the Corps to study the central and south Florida region for flood control and other purposes, and in November 1947, Jacksonville District began a comprehensive review of all the rivers, lakes, and canals of central and southern Florida. The review covered 18 Florida counties and more than 15,700 square miles from Orlando to the Florida Keys. The study assessed the river basins that drained into or out of Lake Okeechobee, including the Kissimmee and Caloosahatchee rivers, the Everglades, and the St. Lucie, Palm Beach, New River, and Miami canals. The District report suggested a comprehensive, interrelated program for minimizing flood damage, preventing soil erosion from the agricultural areas, improving navigation, improving ground water levels, and protecting wildlife.[32]

The District also addressed the subject of salt water incursion on the southeast coast of the state. Salt water, seeping into the underground aquifer that served southeastern Florida, was ruining wells and driving up the expense of potable water to both the cities and rural areas.[33]

The plan was extensive, and doubtless was one of the largest and most complex water management projects built by the Corps. It included protection of 1,000 square miles of muck soils south of Lake Okeechobee for agricultural use, and created three primary water storage areas covering 850,000 acres south and southeast of the agricultural area. The plan also included a 60-mile long north-south earthen levee to protect the southeastern urban area from floodwaters. In addition to the primary levee, the plan included smaller levees to surround and protect the agricultural and water conservation areas. Lake Okeechobee was converted into a large reservoir surrounded by levees and canals. Four pumping stations sped release of the lake water into the canals to the conservation areas.

The District planned numerous joining canals and smaller pumping areas to manage the huge area. Lakes in Central Florida needed to be converted to reservoirs to hold floodwaters so the Kissimmee River would not overflow. Additionally, earthworks would be constructed northwest of Lake Okeechobee along the Caloosahatchee River and northeast along the St. Lucie Canal to improve removal of water on the northern side of the lake. Larger watercraft could use the deeper draft canal and river to cross the state. Finally, the meandering 105-mile-long Kissimmee River would be shortened into a 52-mile channel. The channel would drain surrounding swamplands that could be converted into cattle and agricultural lands and speed removal of floodwaters from central Florida. The northern and eastern boundary of the Everglades Park would be set by the surrounding levees. This controlled floodwaters that threatened the lower east coast of Florida and ensured a safe supply of fresh water to the 1.6-million-acre Everglades National Park.[34]

Congress passed legislation based on the Jacksonville District's plan and authorized the first phase in its Flood Control Act of June 30, 1948. In 1949, the State of Florida created a five-man governing board, the Lake Okeechobee Flood Control District, to oversee the acquisition of lands, rights of way, and planned rerouting of roads, bridges, and public utilities. Construction began in 1950 on what was anticipated to be a $230 million project. Over the next 18 years, Congress added additional contiguous areas under what became the Central and Southern Florida Flood Control District (CSFFCD). As part of the agreement established between the State of Florida and the Corps, CSFFCD managed the program, but Jacksonville District maintained control over all the levees, channels, locks, and other control works for the regulation of Lake Okeechobee and the conservation areas.[35]

The Corps began work on the project in 1950 and had completed 30 percent when the project was tested by heavy rains. Between March and September of 1960, central and south Florida was hit with extensive spring rains, three tropical systems, and two hurricanes. Rainfall in August and September 1960 was more than four times the normal amount for wet months. Though unfinished, the dikes and canals did their jobs, and flooding was limited to sparsely inhabited areas around the northern shore of Lake Okeechobee.

By the end of the 1960s the project was halfway complete. The system consisted of 917 miles of levees, 950 miles of canals, 30 pumping stations, 192 floodway control and diversion structures, 57 railroad bridge relocations, and two highway bridge relocations.[36] In 1975, a typical year, a spring drought brought the elevation of the 730-square-mile Lake Okeechobee down to 11.1 feet. Heavy rainfall in summer brought the level up to nearly 15.5 feet by August. The rains continued to keep the lake at that height until November, despite regulatory discharges to the Caloosahatchee River and the St. Lucie Canal. Few

argued against the fact that, as a flood control measure, the Central and Southern Florida Project was successful.[37]

The project as a whole was inadequate from the start; in particular, two unforeseen problems emerged. First, Jacksonville District planners projected growth in central and south Florida to be two million residents by 2000, and the system was designed accordingly. However, by the early 1970s, nearly twice that number called the region home. Local resources were strained as a result.

Second, National Park Service managers argued that CSFFCD was not allocating enough water to the Everglades National Park and Florida Bay. CSFFCD management answered to the Governor of Florida. Since the Jacksonville District took instructions for water releases from the reservoirs from the CSFFCD, there was little they could do for the national park. If the park called for water, the Corps could not respond unless approved by the CSFFCD; however, CSFFCD management was more concerned with the needs of a burgeoning population. This problem festered through the 1960s and then exploded in the early 1970s.

Problems with the Central and Southern Florida Project and the Everglades began surfacing during a drought that plagued south Florida in the early 1960s. In 1962, a four-year drought began. By the time of the drought, the Corps had not completed the two largest water conservation areas. Without the water conservation areas, fresh water could not be stored for the Everglades National Park's use. Instead, the water was released to the ocean.

Early Environmental Efforts in Florida

During the drought years, environmental groups such as the National Audubon Society charged that CSFFCD management cut water supplies to the park. National Park Service naturalists noted that sloughs normally full by late fall were barely at a trickle, and claimed that flood control managers made sure that "powerful farming interests and real estate developers" got water at the expense of the national park. A Park Service memorandum dated January 3, 1963, claimed that CSFFCD management made no commitments on the amount of water the park could expect, and furthermore maintained, "the Park has no water rights." *National Parks* magazine claimed that Everglades National Park became an afterthought of flood control managers. Sources: Verne O. Williams, "Man-Made Drought Threatens Everglades National Park," *Audubon*, (September-October 1963), 293, Paul M. Tilden, "The Water Problem in Everglades National Park," *National Parks*, (March 1964), p. 10.

In the winter of 1965, though some 400,000 acres of agricultural area obtained water, little went to the Everglades National Park. Animals disappeared from the park, birds failed to show for nesting seasons, alligator holes dried up, and fish disappeared. Environmental organizations decried the flood control district managers' "unbelievable bungling" as they dumped "more [fresh] water into the sea in one season than the park could use in years." Rumors of deer and other animals' starvation proved to be false; nonetheless, the

From Famine to Feast: Saving the Everglades Deer Herd

The return of rains in 1965–66 abated some of the concerns over persistent droughts, but then just the opposite situation occurred. An extremely wet summer in 1966 inundated the Everglades. Wildlife in the park, especially deer, became surrounded in a watery sea with no escape. The situation was relieved only when CSFFCD officials ordered the District to pump excess water east and north out of Lake Okeechobee. Until the waters abated, the District stopped all traffic on the levees so the animals could find higher ground. The Everglades deer population was preserved (Jacksonville History, pp. 108-109).

concerns of the Department of the Interior on the original report proved prophetic. In 1948, Assistant Interior Secretary William Warne commented on the Corps' plan, saying that for the National Park Service the question was not that there is "too much water, but a guaranty that there shall not be too little."[38]

The rains in 1965–66 only aggravated complaints about the quality and consistency of the water coming to the park. To counter the growing complaints, Congress authorized the Corps to study the situation. In 1967, Jacksonville District began a study to ensure that the needs of the Everglades National Park were met. Yet as late as 1969, Nathaniel P. Reed, a special assistant to the Florida governor for natural resources, continued to emphasize, "man is priority number one and his activities such as farming and ranching are number two, and somewhere along the line sufficient water will be made available for the Everglades Park."[39]

The problem caught the public's attention in the spring of 1971 when a series of fires swept the Everglades. The fires destroyed nearly one-half million acres and eventually triggered a massive environmental restoration plan for SAD, discussed in greater detail in Chapter 10.

The South Florida Project began as a multipurpose reservoir and drainage system. However, as the 1960s progressed, the project came under criticism from environmental groups for the deterioration of the Kissimmee River, Lake Okeechobee, and Everglades National Park. The cry for a change in policy and a new look at the project reached national proportions in the early 1970s. Yet by the late 1980s, though the Corps was looking closely at the possibility of a large restoration project that might encompass the entire South Florida Project, they had no mandate from Congress for such a project. A comprehensive restoration plan was finally authorized in 1990, and has taken more than twenty years to implement. Environmental restoration efforts in South Florida are detailed in Chapter 11.

RIVER SYSTEMS IN NORTH CAROLINA

Two projects in North Carolina that became embroiled in environmental issues also served to illustrate the tremendous increase in costs that Corps projects experienced, and the criticism that by the 1980s was changing the Corps from the inside. A devastating flood struck Fayetteville, North Carolina, in September 1945 and inundated 25 percent of the

The Jordan Dam on the New Hope River, North Carolina.

town. Congress responded by ordering the Corps to review and update the 308 Report prepared a decade earlier for the Cape Fear River Basin.

Lack of congressional funding held up completion of the survey until 1963. The original 308 study for the basin had included a recommendation for three large dams and reservoirs along the river. However, the Wilmington district plan suggested only a single reservoir at confluence of the Haw and the New Hope rivers. The presentation of the plan caused a bitter debate among the North Carolina congressional delegation, the citizens of the New Hope Valley, and the Soil Conservation Service. Ultimately, a compromise was reached among the parties, and Congress authorized one large dam and two smaller ones in December 1963. The New Hope site was selected for the large Jordan Dam project, with a projected cost of $25.5 million and a benefit-cost ratio of 2.5 to 1.[40]

Controversy plagued the project. Due to Wilmington District's relegation to a support district, the Savannah District provided the design and real estate acquisition while Wilmington District provided the construction management. This put the Wilmington District in the awkward position of implementing plans into which they had had little input. Meanwhile, Congress refused to provide full funding, having allocated only $7.2 million for the project by 1968. Due to prolonged delays, estimates of the final cost skyrocketed to more than $120 million, while the benefit-cost ratio fell to 1.5 to 1 by 1974.

The Jordan Dam project had to survive court orders and lawsuits, one of which forced the district to complete an 800-page Environmental Impact Statement (EIS).[41] The first contracts were awarded in 1967 and work went forward for four years. In 1971, with the dam half complete, environmental groups sued to halt construction because of an inadequate Environmental Impact Statement. The problem faced by many Corps projects in the early 1970s was transitioning into a more environmentally sensitive agency. Corps directives from Washington merely stated that for projects that predated NEPA, the public "should be considered" when conditions warranted a substantial change to the project.[42] Most districts and their division leaders saw no need for expensive work stoppages to accommodate previously approved and financed projects. On the other hand, environmental groups attempted, successfully in many cases, to apply the law retroactively to all ongoing federal water projects.

When the Conservation Council of North Carolina sued in court for inadequate compliance with NEPA regulations, a federal judge agreed and ordered Jordan Dam work stopped in 1971 until a revised EIS could be completed. The president of the Conservation Council of North Carolina accused the district of "withholding information, deliberately misrepresenting the facts, and failing to examine alternatives to the project." Additionally, he derided the district for ignoring a "compendium of derogatory correspondence and comments" about the project.[43] There were two and a half years of litigation and negotiation before all sides came to an agreement in February 1974.

Environmentalists Fail to Prevent Jordan but Succeed at Others

Though the environmental groups were not able to cause Jordan to be scrapped as a project, they were effective in halting two other planned projects for the river system. Randleman Dam and Lake and Howard's Mill Dam were scheduled to be completed after Jordan, according to the original agreement from 1963. Howard's Mill was classified as deferred due to economic considerations in 1980, and after further study, Randleman was classified as deferred in 1992.

Source: *Annual Report Fiscal Year 1994 of the Secretary of the Army on Civil Works Activities (1 October 1993-30 September 1994) Vol. II*, (Washington, D.C.: US Government Printing Office, 1995), p. 6-11; However, the Randleman Lake and Dam is being pursued by the Piedmont Triad Regional Water Authority independent of the Corps of Engineers. As of 2004, they had obtained permits, and were in the process of acquiring the land for the project. http://www.nr.infi.net/~ptrwa/History.htm (accessed June 27, 2005).

During this two and a half year period, the uncompleted dam stood at the vulnerable height of 48 feet above the streambed. This height would have left the structure susceptible to overtopping in high water. Fortunately, the river did not threaten the construction in those intervening years.[44]

After the authorization to continue construction was issued by the courts, the dam was completed in 1976 at a cost of $129 million. Meanwhile, the district completed an addendum to the EIS that satisfied the court and in July 1977, impounding of the reservoir was allowed to proceed. However, the Conservation Council was not easy to please. As late as October 1977, the council, not satisfied with this EIS addendum, sought an appeal to deny impounding of the reservoir. The appeal was denied and final construction of two roads and impoundment of the water was completed.[45]

In 1964, the Wilmington District completed a six-year survey of the Neuse River basin. The main recommendation was the erection of an $18.6 million dam at Falls Village. Here the Neuse River changes course and rock forms a natural wall for the reservoir. Though the dam was designed for flood control and recreation, its most important feature was to serve as a source of water for the fast-growing Raleigh area.

Congress authorized the project in 1966, but funding was slow, the project fell behind schedule, and land costs in the area escalated as speculators began buying up potential lakefront property.[46] By 1969, only $500,000 had been set aside for land acquisition and $675,000 for construction. Like the Jordan project, the Falls project became entangled in legal issues as three environmental groups sued the Wilmington District to reduce its scope. The district withstood the suit and construction was not halted, though it was slowed by the preparation of a revised 2000-page EIS.

Varied Opposition to the Falls Project

A wide range of groups opposed the Falls of the Nuese project or wanted to scale it down. In June 1972, Research Triangle Sierra Club, ECOS, and Wake Environment asked the courts to reduce the project for environmental reasons. Though the motion was denied, in March of 1973, area landowners represented by the Neuse Valley Association brought suit against the Wilmington District for failing to prepare an adequate Environmental Impact Statement. Meanwhile the North Carolina Senate delegation also feuded over the project with Senator Sam Ervin (D-N.C.) fighting for the project, and Senator Jesse Helms (R-N.C.), siding with landowners against it (Hartzer, pp. 127-128).

Meanwhile, the city of Raleigh had relied on the completion of the project by 1971 to meet its water needs. When construction had not begun by 1967, the city was forced to build a $7.6 million reservoir to meet its water requirements. Construction began on the dam and roads in 1978. In 1981, a drought left the city again in a crisis. The city applied to the Wilmington District to begin withdrawing water from the still uncompleted reservoir. The Corps responded to Raleigh's request for water and partially filled the uncompleted reservoir, allowing the city to withdraw thirty million gallons a day.[47] The dam was completed and the reservoir filled in 1983.

A Division Engineer Discusses Managing Costs

Maj. Gen. Carroll Le Tellier, SAD Division Engineer from 1973-1976 explains some of the issues he faced.

You make the best [budget] estimate you can. The Division Engineer goes to Washington with a briefcase full of reports and attends Congressional hearings. My staff and I went down to the districts and asked them the hard questions. They need a certain amount of money to keep a project on track and on budget. But you get problems like this. The contractor goes so fast that you run out of money to pay him. You do not want to slow him down just because he just sent you an 'exhaustion of funds' letter, and in the letter he explains that his costs will go up if he has to stop. Well, the Division Engineer looks to see if there are other funds inside the Division that could be diverted. The Corps rules will not let you go back to Congress until next year, so you try to see if the Corps nationwide has any money that could be diverted. Then the Division Engineer must decide whether to stop another project in order to keep an important one going. He may even have to go to a Congressional Committee to get additional funding to keep his key project going. Meanwhile the contractor is complaining because he cannot finish early. Money matters must be handled delicately since it is a felony to spend more than you are budgeted, yet you are judged on how close to the spending limit you can come without going over." (Le Tellier Interview).

Environmentalists had been unable to stop the two large projects in SAD. However, they forced lengthy delays and reevaluation of the original environmental assessments. Courts also clarified the issue of grandfathering ongoing construction projects. They demanded that the SAD districts make a complete and thorough environmental assessment of all current projects regardless of whether authorization occurred before 1970. Finally, the fights over the North Carolina projects clarified to all federal agencies how strong the grass roots environmental movement had become in the South. Environmentalists garnered support from farmers, small landowners, city and town politicians, conservation groups, and the general public to question the "build, build, build" mentality that had characterized the work of development agencies in the past.

To carry out this further project review, the American taxpayers bore the brunt of the expensive litigation, the delays, and the preparation of reports. The delays provided time for inflationary factors to add immensely to the cost of the projects. Originally estimated in the early 1960s at a cost of $44.1 million, the two projects cost more than a quarter of a billion dollars.[48] The skyrocketing costs of large water projects made it more difficult to arrive at a positive benefit-cost ratio, and eventually SAD water management projects were no longer proposed.

THE LAST DAM PROJECT: PORTUGUES DAM, PUERTO RICO

With the final pumpback units coming online at R. B. Russell in 2002, the last remaining major flood control project for SAD is the completion of the Portugues Dam in Puerto Rico. Located three miles northwest of Ponce, Puerto Rico, the dam is part of a larger flood protection project in the region that was initiated in the 1970s. According to estimates, without the dam, 25-year floods can overtop existing channels and levees, 40,000 people are susceptible to 1.5-meter high flooding, and 1,833 acres of urban areas can be impacted. To accomplish its goals, the Corps had to address the topographical and geographical challenges of working in the region. Experts agreed that conditions called for the creation of the Corps' first three-centered double curvature thin arch dam.

Early construction cost proposals came in well above the government's estimates. To reduce costs, SAD initiated an additional five-year study to investigate alternate designs, on-site field investigations and test programs. The Jacksonville District enlisted experts from Portland District, the Corps' Engineering Research Center in Vicksburg, along with several private engineering firms to develop new dam software and design criteria. Finally, SAD changed the design from a double-curvature thin arch dam to a single-center Roller Compacted Concrete (RCC) dam, the first in Corps history. RCC construction is similar to paving, in that the material is incorporated by bulldozers and then compacted by vibrating rollers. The material content is much drier than traditional concrete and cures with lower heat content.

In March 2008, Jacksonville District awarded the first construction contract for the project. When completed, the structure will measure 220-feet high, 1,230 in length and will include 367,000 cubic feet of RCC. From early planning through completion, the total project costs are estimated to reach $715 million, with 75% federal funding and 25% funded

Artist's rendering of the Portugues Dam.

by the Puerto Rico Department of Natural and Environmental Resources. Since the dam represents a large Federal expenditure, SAD has taken care to make project information public by using the internet. Jacksonville District maintains an interactive website with project information in both Spanish and English, along with monthly project photos and a "Web Cam." Upon completion of the Portugues project in 2012, SAD's Big Dam Era will come to an end.[49]

ENDNOTES

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CHAPTER 9 – INTERAGENCY AND INTERNATIONAL SERVICES

Since the late 1970s, SAD coordinated district work on numerous projects in Latin America and the Caribbean in conjunction with US State Department directives and funding. Nearly every district worked on various mitigation projects to offset damages to the environment by harbor deepening and reservoir building. District officials have created islands from spoil areas, restored natural areas, purchased thousands of acres of wetlands to protect them from development, repaired and stabilized historic sites, and helped excavate archaeological sites. Reefs have been restored for National Oceanic and Atmospheric Administration, hospitals built for United States Agency for International Development, and construction support provided for the Nuclear Regulatory Agency, the Federal Bureau of Investigation, and the United States Post Office. Many in the Corps feel that the future of civil works, along with managing the existing reservoirs and lands under Corps control, will be found in the Corps ability to offer their engineering, planning, and contracting expertise to other US agencies and foreign governments. To reflect this change, the Corps renamed their Support For Others program in 2003 to the Interagency and International Support (IIS) program. Importantly, IIS work is all reimbursable and allows the division to be entrepreneurial, obtain projects, and receive direct payment for the work.

Officials from Mobile District oversee building of a mango processing plant in Honduras as a USAID project.

Republican Party candidate Ronald Reagan was elected President in 1980 and brought with him a program for reducing government involvement. Reagan had difficulties with the Democratic Party-led Congress with parts of his program; one of these difficulties was over changing the cost-sharing requirements on federal water projects to make local governments pay a higher percentage of the costs. Until there was agreement on this issue with a newly elected Congress in 1986, no new omnibus water resource bill was passed. During this period, local entities were calling for help with expensive harbor improvements.[1]

The Water Resource Development Act (WRDA) of 1986 altered how federal water projects would be financed well into the future. The act financed numerous new projects for the Corps but at the same time made changes to the cost sharing of future work. Until then, pursuant to the 1936 Flood Control Act, local governing agencies provided the land

and rights of way when the Corps built water-related projects. They also agreed to hold the US government free from liability during construction and operated the project upon completion. The new law increased the local share of the costs for harbor improvements, flood control projects, and feasibility, planning, or engineering studies done by the Corps of Engineers. Additionally, pursuant to requirements in the 1986 WRDA, the Acting Assistant Secretary of the Army for Civil Works ordered the Chief of Engineers to establish an Office of Environmental Policy inside the Civil Works Directorate of the Corps. This office was to help the Corps continue to adapt to a more environmentally attuned electorate.[2]

The shift to a significantly greater cost for local sponsors was a major final factor in ending the Big Dam Era. The combination of environmental issues, cost concerns, and the fact that agencies had erected most of the multipurpose water projects called for by the Corps' 308 studies made it very difficult to get Congressional sponsorship and approval for new projects. Mobile District Engineer Colonel C. Hilton "Stretch" Dunn observed in 1985 that the Corps of Engineers was facing the need to "undergo a change more dramatic than the environmental era accommodation of the 1960s/70s if it is to progress, much less prosper."[3] Dunn went on to explain that the Corps, like the country, was "running a poor second (or worse) in productivity and cost consciousness." He noted that federal agencies would play a steadily decreasing role while privatization increased. He observed that the Corps' "customers" would have alternatives to using the Corps, and that national problems with "energy, waste, groundwater, and like [would] demand a different type of Corps."

Dunn was not alone in this perspective. A quick review of the Assistant Secretary of the Army's annual reports in the last half of the 1980s shows a marked decline in dollars spent on new work. For example, between 1982 and 1986, the amount spent by the project-rich Jacksonville District fell from $78.9 million to $48.3 million—a drop of nearly 40 percent. The Mobile District's work fell from $134 million to less than $34 million in a drop of more than 75 percent, while the Savannah District's work fell 64 percent from $87.6 million to less than $32 million.[4]

By 1988, Senator Daniel Patrick Moynihan observed, "This extraordinary organization [the Corps] has no civil mission any more. The dams are built. The snags are out of the Mississippi, the levees are up." The Corps was running out of work. In 1989, the Savannah District had a reduction in force due to shrinking military and civil construction needs. District Engineer Colonel Ralph Locurcio told his demoralized Savannah District employees, "I license everybody to go out and find a new customer." Dunn warned his Mobile District employees, "If we do not change, we will wither or become marginally effective."[5] Division Engineer John Sobke observed that the Corps needed a better, more business-like approach to work. Project development needed to become smoother instead, "of the herky-jerky way it tended to be with the stove pipes."[6]

The Corps attempted to adapt to these mounting pressures. Reagan's efforts to privatize government functions forced the districts to pursue more active use of contractors. Additionally, the Secretary of the Army for Civil Works, Robert Page, tested and then quickly implemented Life Cycle/Project Management in all the divisions in 1989. The Corps began to participate actively in "partnering" with both contractors and clients, now called "customers." Meanwhile, Corps districts sought out other venues for work through their IIS program.

The end of the Cold War in 1989–90 had a noticeable impact on the SAD. Although Congress supplied no leap in civil works funding as it had during World War II and the Korean War, the BRAC of 1988 provided a new opportunity for both civil and environmental work inside the planning divisions of several SAD districts. Additionally, the Formerly Used Defense Sites program (FUDS) authorized the Corps to manage cleanup at sites formerly owned and used by the military.

There was a slowly occurring change in the relative importance within districts of the different divisions. For many years, the districts' construction divisions were busiest and had the most employees and tasks to perform. As new construction declined after the mid-1980s, planning and operations divisions within the districts took on increased importance.[7]

SUPPORT FOR OTHERS GROWS

The Corps of Engineers has historically helped other federal and non-federal agencies. In SAD, some of this work occurs during emergencies, when the Corps supports FEMA activities. The Corps also supports numerous other agencies in the US, Latin America, the Caribbean, and worldwide. All five districts in the Division have IIS projects, but two districts carry the bulk of the work: Mobile and Jacksonville. Much of the Mobile District IIS work is in Latin America, while the Jacksonville District handles most of the work in the US territories in the Caribbean. As of 2003, both of these districts were carrying out projects totaling more than $50 million a year each in reimbursable work.

The SFO/IIS effort has become a vital aspect of the SAD since the end of the Cold War. These projects are fully reimbursable; that is, funding does not come directly from the Corps' civil or military budgets. When districts look for IIS projects, they must compete for the projects, sometimes even against other Corps districts. Corps officials defend this aggressive pursuit of other work by noting that due to the end of large civil works projects and the downsizing of the military in the 1990s, if they did not find work, personnel cutbacks were inevitable. Additionally, they add that the program keeps Corps districts more competitive since cost and time restrictions require the districts to stay innovative and time sensitive. IIS projects are usually between $100,000 and $5 million whereas Corps' civil works project usually ranged from $5 million to $500 million.[8]

Congress first authorized the Corps' to support other federal and non-federal agencies with the Intergovernmental and Cooperation Act of 1968. Since then, the Act was amended several times to clarify and enlarge the work scope. These acts, however, did not cover work for foreign governments. Though considered IIS work, the Corps' work for foreign entities is handled through agencies of the State Department. In June 1992, Corps headquarters issued regulation 1140-I-211, which summarized the Corps' congressional authorization for performing reimbursable work for non–Department of Defense federal agencies. The regulation laid out guidelines, such as memorandums of agreement, for the commands to use in negotiating terms and conditions for work[9]

A look at several examples of this work illustrates how SAD has moved further away from traditional management style to work more effectively in this program. SAD and

the districts have made adjustments in their internal organizations, as well as increased flexibility and openness with their external customers. The balance of this chapter examines work in historic site protection, and projects involving hazardous waste cleanup at current and formerly used defense sites. We also describe the work in the 1990s by the Mobile District in the Panama Canal Zone and Latin America, and the development of a division approach to Emergency Management.

HISTORIC PROPERTIES PROTECTION

SAD districts did a substantial amount of work in the 1980s and 1990s for the National Park Service, as well as for individual state parks, in helping to protect and preserve historic structures. Many federal and state historic sites are forts or buildings located near waterways, and much of SAD work consisted of bank stabilization and preservation to prevent these structures from deterioration.

For example, in the mid-1980s at Fort Frederica National Park on the coast of Georgia, an eighteenth-century colonial tabby powder magazine building was threatened by a badly eroding riverbank. In 1986, the Savannah District, working under the direction of the National Park Service, used crushed rock riprap to secure the bank and then planted a matting of marsh grass secured with a steel mesh foundation.[10]

In the mid-1990s, the Wilmington District helped to preserve Fort Fisher near Wilmington. This 1800s fort is owned by the North Carolina Department of Cultural Resources and was the site of a major Civil War battle in 1865.

Over the decades, parts of the eastern walls were battered away by storms, and the state wanted to protect the remaining earthworks. An earlier attempt by the state in 1970 had failed. The Savannah District suggested a stone revetment on the ocean side of the fort to prevent erosion. The $4.6 million project involved a 3,000-foot long stone buffer to protect both the remains of the fort and North Carolina Highway 421, which passed through the fortifications. The state agreed and a project delivery team completed the work in May 1996—in time to be tested by Hurricane Fran that September. The project stood up and protected both the fort and the highway from any serious damage.[11]

The Jacksonville District completed a large, 18-year, preservation project at the San Juan National Historic Site in San Juan, Puerto Rico in 1996. The $40 million improvement at the site owned by the National Park Service included strengthening the 400-year-old harbor fortifications, batteries, houses, and other defensive works erected by Colonial Spain to protect the port of San Juan. The most notable of the structures is El Morro Castle, which sits at the entrance to the harbor. The entire site is listed as a World Heritage Monument by the United Nations.

During the process, the District performed repairs and rehabilitation, built revetments and trails, removed unneeded modern gun emplacements, and constructed drainage chutes to protect the massive fortifications. District construction was geared toward protecting the monument from wave erosion, giving visitors easier walking access to views of the harbor and ocean, and returning the colonial look of the old fortifications. District archaeology

The CSS Georgia Discovered and Delineated

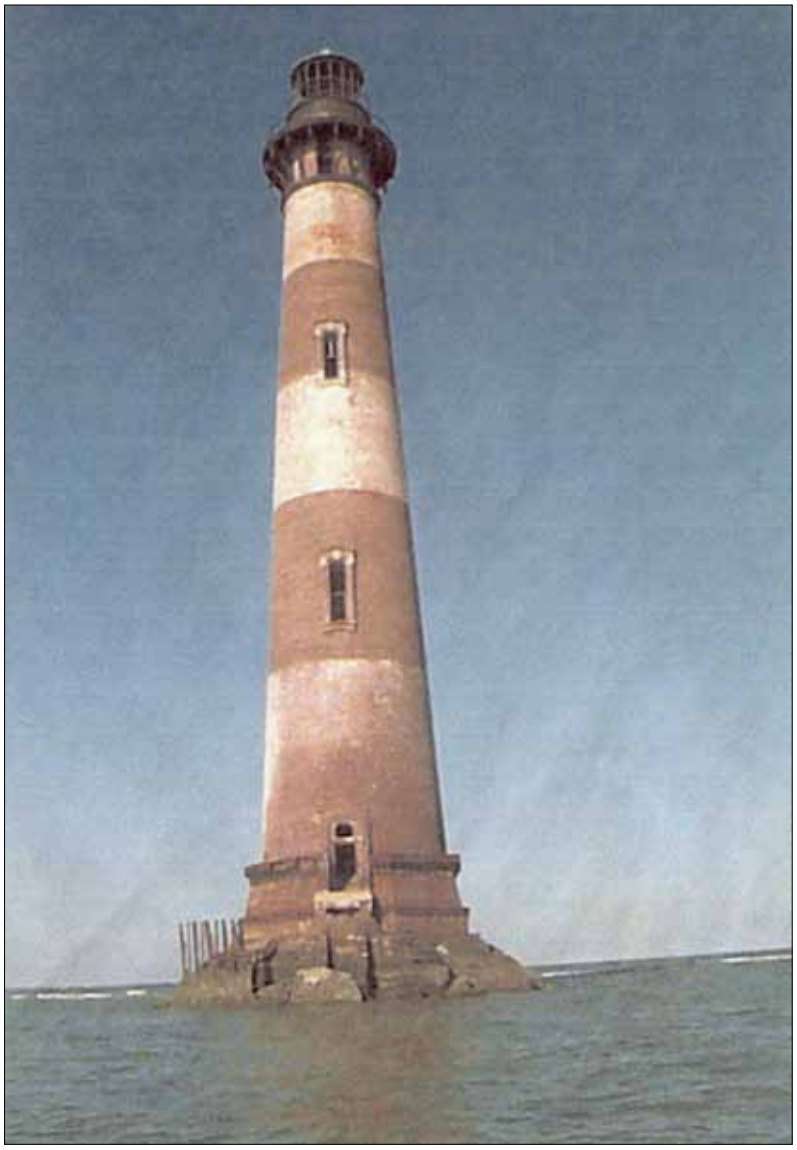
The Savannah District was also involved with identifying, marking, and removing artifacts from the CSS *Georgia*, a Confederate ironclad gunboat that guarded the river approach to Savannah during the Civil War. The remains of the gunboat were discovered in 1968 during a routine dredging operation. Although divers identified the ship, no preservation or site delineation efforts occurred until the Savannah harbor-widening project in the mid-1980s included funding for it. Ultimately, the ship site was archaeologically delineated and found to rest in the mud on the harbor's edge off Fort Jackson. District officials worked closely with the Georgia State Parks, Historic Fort Jackson, and the Coastal Heritage Society in retrieving artifacts and obtained inclusion of the sunken ship in the National Register of Historic Places in 1987 (Judy L. Wood, "Confederate ship given 'historic' status, finally," *The Castle*, Vol. 13 no. 5 (June 1987), p. 3

contractors discovered original gun batteries, living areas, and refuse piles during the work there.

While dredging San Juan Harbor in front of the fortifications in 2001, District contractors discovered two historic sunken ships. The ships had been sunk by the Spanish navy to prevent the US Navy from entering the harbor during the Spanish-American War of 1898. The Corps was able to retrieve, excavate, and remove the old hulks prior to dredging.[12] The Charleston District was involved in work with the South Carolina Department of Natural Resources and Save the Light, a nonprofit organization, to save the Morris Island Lighthouse, a national historic landmark in Charleston harbor. The state of South Carolina funded most of the cost of stabilizing the 125-year-old lighthouse. By the end of 2004, Charleston District plans were proceeding for work to begin in 2005 on stabilizing the footers and foundation of the lighthouse. The project is complicated because the abandoned light is located on land that was once part of the island but is now completely covered by water. Additionally, Charleston District performed other riverbank stabilization projects in the 1990s at Drayton Hall, a National Trust for Historic Preservation property on the Ashley River; Battery Pringle, a Civil War earthwork; and at the Dill Wildlife Sanctuary on James Island.[13]

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE REMOVAL WORK

The Savannah, Jacksonville, and Mobile Districts became involved in hazardous and toxic waste cleanup as part of their IIS activities in the 1990s. In the early 1980s, Corps headquarters designated the Omaha and Kansas City districts as Hazardous, Toxic, and Radioactive Waste (HTRW) Districts in support of the Environmental Protection Agency and its "Super Fund" cleanup. The Department of Defense Environmental Restoration Program (DERP) was used to address cleanup activities at active sites. Active sites were categorized as the Installation Restoration Program (IRP) and abandoned sites were categorized as FUDS. The



Morris Island Lighthouse in Charleston Harbor stabilized by Charleston District.

laws and Corps directives authorized the two Districts to address cleanup of contaminated groundwater, soils, underground storage facilities, PCB-containing transformers, abandoned drums, and other forms of contamination. Additionally, they were specifically ordered to clean up lost, abandoned, discarded, buried, or fired explosives such as ammunition, chemical warfare materials, ammunition components, and explosives that were no longer under "accountable record control" of Defense Department activity. The authorization covered mixtures of explosives, explosive soil, and even building debris and hazardous structures at more than 9,000 sites nationwide.

By 1988, to better organize the effort, Corps headquarters decided to create a lead design District in each Division. Headquarters selected the Savannah District for SAD, and the Mobile and Jacksonville Districts were added in 1991. SAD has more than 1,400 known FUDS in the region. Though DERP/FUDS work is located on military bases or former bases, the work is considered part of Support for Others inside the districts because it is reimbursed rather than budgeted through SAD. The three districts continued to draw upon the Omaha and Kansas City districts for help for large or very special projects.[14]

Most of the initial work was carried out by the Savannah District, which began removing asbestos in 1984 for the EPA. After being authorized as the Division's lead HTRW district in 1988, work increased. The District performed testing at Hunter Army Airfield and Fort Stewart in Georgia from 1989 to 1990. At Fort Stewart, Corps contractors tested and then removed asbestos from 25 buildings slated for destruction.[15]

One early unique task began from a local rumor that the Army Air Force had buried the remains of old B-25 bombers under a proposed parking lot expansion at the Columbia, South Carolina, airport. District geologists did not find remains of the planes but through borehole testing, determined that aviation fuel and gasoline dumped in the area had severely contaminated the soil. At the same time, officials determined that pesticides dumped in the same area had partially contaminated the groundwater. The Savannah District oversaw removal and disposal of the material from the construction site.

In the mid-1990s, Savannah District workers removed 167 in-ground fuel tanks at the defunct Donaldson Air Force Base near Greenville, South Carolina; cleared public recreation fields in Fernandina Beach, Florida (formerly a Navy gunnery range); and a variety of services at the former Glynco Naval Center in Brunswick, Georgia. At the same time, the Mobile and Jacksonville districts developed their own HTRW programs for FUDS work in their districts. Their work became nationwide, and later international, in scope.

Jacksonville District accomplished notable projects at Culebra Island, Puerto Rico, and at Hutchinson Island and Brooksville in Florida. Culebra Island, a former World War II bombing and gunnery range, had been converted into a national wildlife refuge. The removal work included live and dummy ordnance from the island and from underwater areas surrounding the island and nearby small cays. At the Fort Pierce Amphibious Training Base, a World War II amphibious training base on Hutchinson Island in St. Lucie County, Florida, the District removed submerged "horned scullies" from the surf, ordnance shells and land mines from the beaches, and red phosphorous from nearby former Avon Park Air Field. At Brooksville Turret Gunnery Range, the 10,000-acre former training site in western Florida, Jacksonville District personnel had to clear artillery and tank shells and small arms such as rifle grenades and mortar shells. Also at Brooksville, the Jacksonville District coordinated a team that included several federal and state agencies, along with contractors, to eliminate a suspected chemical warfare site on the former Army Air Force base.

None of these sites was still owned by the military, but they were considered too hazardous for other development until cleared by the FUDS program. Many of these properties—400 in state of Florida alone—had sat abandoned for years, and might have remained so if development pressures in the Southeast had not created a need for the cleanup.[16] By fiscal year 2003, the Jacksonville District was managing nearly $50 million in HTRW work alone.

MOBILE DISTRICT HANDLES THE PANAMA CANAL TREATY IMPLEMENTATION.

As part of both Military Construction and IIS, the Mobile District played an important role in the implementation of the Panama Canal Treaty. The treaty, negotiated between Panamanian leader General Omar Torrijos and US president Jimmy Carter in 1978, had a stormy history. The treaty debate was impassioned, as many Americans and some Panamanians felt that the US should not leave the Canal Zone. The US and Panama ratified the treaty in 1979. After some of the surrounding land was given to Panama in 1979, the US made little progress on turning over the Canal and related military bases. The fighting in Central America in the 1980s provoked renewed public debate over the safety of the Canal under future Panamanian control.

A freighter passes through the Panama Canal. SAD oversaw the turnover of the historic canal to the Republic of Panama in the 1990s.

Despite the public furor, in 1985 the Secretary of State ordered the US Army Corps Headquarters to prepare a master plan for turning over the canal. Headquarters assigned the work to the South Atlantic Division. The Division designated the Mobile District as leader of all preparation for the turnover. It took until 1988 before a memorandum of understanding between the Army command and Corps Headquarters established the "relationships and procedures through which the US Army Corps of Engineers, Mobile District, (CESAM) provides day-to-day technical support for execution of the Panama Canal Treaty Implementation Agency Master Plan."[17] SAD and Corps Headquarters authorized the Mobile District to use the Treaty Implementation Framework Plan developed by Corps Headquarters in 1988.[18]

A Treaty Implementation Plan Management Office (TIPMO) was established in Mobile.[19] TIPMO was tasked with the movement of the US Army South and US Operations Command South to Ft. Buchanan in Puerto Rico, and US Southern Command to Florida.

The plans called for redeployment of 12,000 Navy, Air Force, Marine, and Army troops and their dependents from several US bases in the Canal Zone to their new locations.[20] Along with handling the planning and studies for the redeployment, the TIPMO team was tasked with performing environmental impact statements for the destinations of the troops to be redeployed. Finally, the TIPMO team would build an entire new facility for US Southern Command somewhere in the southern US.

The TIPMO team had to continue to maintain the locks, schools, hospitals, and other government facilities on the various bases until closing. The US government was particularly concerned with the elimination of hazardous chemicals at old storage sites inside the remaining bases. All government facilities had to have cultural resources studies prepared for them. Finally, all information was to be shared with the Republic of Panama, which immediately began to press officials for help in developing Howard Air Force Base on the Pacific coast. [21]

US Army South Headquarters in the Canal Zone. Turnover of the Canal involved movement of this command to Puerto Rico.

Maintenance and Operations faced a difficult problem due to the rapid deterioration of buildings and machinery in the tropical climate. One observer noted, "It did not take long, if buildings were not maintained and repaired, to have plants growing out of the walls."[22] Hundreds of buildings were inspected, upgraded, and modernized. Asbestos was removed from dozens of buildings. Hazardous chemicals were removed from storage areas and destroyed. Hospitals had to be maintained until the very end of the US ownership. Major US bases at Fort Clayton, Howard Air Force Base, and Fort Armadour were gradually phased out and turned over to Panama.[23]

United States Army South (USARSO) and Special Operations Command South (SOCSOUTH) were scheduled to move to Puerto Rico. Political wrangling held up the move until August 1998; that gave the Mobile District only one year to move both commands. Mobile District called upon various other districts for their expertise and aid. Huntsville District in Alabama supplied expertise in indefinite delivery/indefinite quantity construction contracts. The Jacksonville District supplied contract administration, real estate, and construction expertise, and the Omaha District provided support for specialty engineering and hazardous waste cleanup.[24]

Corps employees remove asbestos at Canal Zone structures.

The Mobile District met the time schedule by renovating more than 40 buildings at Fort Buchanan in Puerto Rico in one year. Additionally, power sources were upgraded, local area networks for computerization were installed, fuel tanks were procured and installed, and $3 million worth of furniture was requisitioned and delivered. The District also crossed military agencies. In support of the Navy's removal from the Canal Zone, the District managed funding for naval preparatory work in Puerto Rico.[25]

Perhaps the most demanding project was the move of SOUTHCOM from Quarry Heights in the Canal Zone to Miami. SOUTHCOM is a joint-service headquarters consisting of more than 700 Department of Defense civilians and military personnel, as well as representatives from the State Department, the DEA, and the US Coast Guard. Its primary purpose was defense of the Panama Canal and oversight of joint US-foreign military operations in the region. In addition, SOUTHCOM supported US drug control strategy for Latin America. In March 1995, the Secretary of Defense announced that Miami was chosen as the home for the new 155,000-square-foot site.[26]

The project management team for the SOUTHCOM move consisted of numerous military, federal, and local agencies. Included in these were representatives of SOUTHCOM, USARSO, and the General Services Administration, as well as the local support team from the City of Miami. Though the Mobile District had primary responsibility for the move, representatives from the Jacksonville District were also very involved.[27]

The planned move to Miami was complicated by a limited budget. Despite a hailstorm of negative press that challenged the Army's limited funding for rental payments, the location site selected (near Miami's airport), and the list of requirements the Army had for security and technology, a request for proposals was issued in November 1995. The City of Miami cooperated fully with the Mobile TIPMO, bids were awarded, and construction began on the building in July 1996.[28]

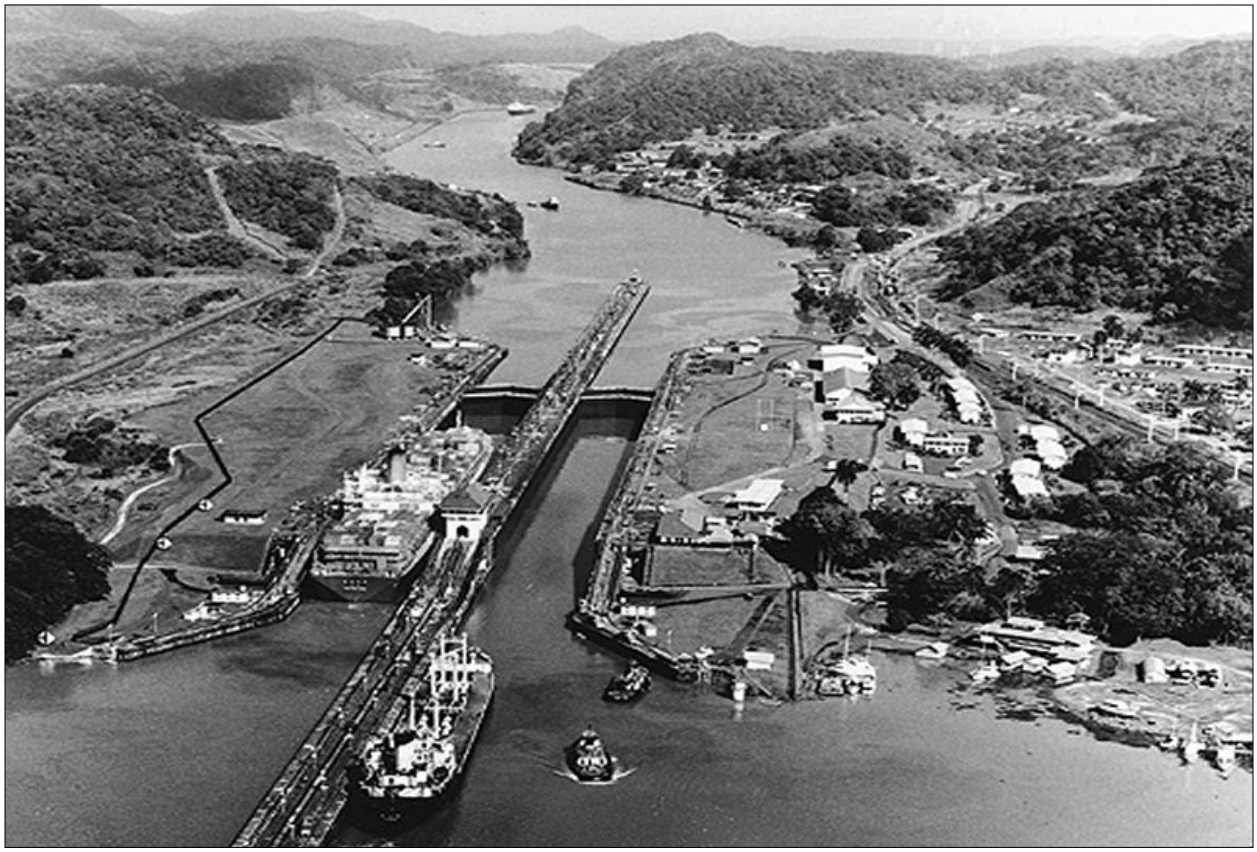
In November 1996, the Mobile District had to adjust to last-minute security issues. Headquarters determined that the building was "too vulnerable to violent regional drug trafficking organizations [which had] shown a willingness to conduct violent acts."[29] The Mobile District added a 19-acre security buffer zone to the site, pop-up barricades, blast-resistant windows, controlled entry, and additional guards. The entire project cost $70

million, including employee and dependent relocation. The annual lease was estimated at $1.73 million, plus utilities and additional leases on the buffer zone.[30]

SAD oversaw construction of the new SOUTHCOM Headquarters Building in Miami, 1997.

Mobile District officials noted that three things contributed to the efficiencies of the treaty implementation operations. One was the close work and cooperation the District had with all three military services. The second was the use of technology to communicate, including e-mail and video conferencing. These technologies permitted faster responses to the needs of the military in successfully achieving the drawdown. The third factor for success was strong support from SAD.[31] SOUTHCOM's move was the last major SAD activity in TIP, though officials continued to work on other activities until the Canal was turned over. As part of the ongoing effort for support in Latin America, SAD was approached in the late 1990s to lead the US bid for replacing the Gantuan Locks in the canal.

In 1996, the Mobile TIPMO was closed and moved to Washington for the final troop withdrawal. By then, some 420 buildings and nearly 16,000 acres of land had been transferred to the government of Panama. In addition, approximately half of the remaining 10,000 US troops stationed at the canal had been drawn down. The work by TIPMO in Mobile and later in Washington helped to produce the smooth transition of control to the Panamanian government. While most of the world's attention at the time was focused on celebrating the end of the millennium and concerns about Year 2000 computer issues (Y2K), flags over the canal were quietly transferred at noon on December 31, 1999.[32]



SAD is playing a lead role in a proposal to replace the Miraflora Locks in the Panama Canal in the future.

Through eight years of involvement with the Panama Canal implementation team, the Division furthered its partnering role with contractors and military customers. It made use of the design-build concept on several multi-million dollar projects and developed a reputation for adaptability and quality customer service. It successfully planned the US draw down from the Panama Canal, the largest turnover of US facilities since the end of the Vietnam War. Finally, it adapted new congressional financing authorities to overcome obstacles for relocating families.

THE WAR ON DRUGS

Throughout the 1980s, the Corps of Engineers, especially the Mobile District, provided support for the Reagan administration's effort to restrain communist insurgency in Latin America. The fall of the Soviet Union and the Communist bloc nations in Eastern Europe in 1989–91 ended much of their funding for the leftist guerrilla warfare in Latin America.[33] The US focus moved away from anti-Communist insurgencies to countering illicit drug smuggling.[34] Presidents George H. W. Bush and Bill Clinton put more funding and effort into attempting to restrict drug trafficking from South America. One noted event of this new war was "Operation Just Cause," which ousted Panamanian dictator Manuel Noriega in 1989. Noriega was under indictment in Florida for illegal drug trafficking activities.[35]

After Operation Just Cause, the Mobile District IIS program changed geographical

It's Yours! Former President Jimmy Carter presents the Panama Canal to the President of Panama, December 31, 1999.

focus to South America away from Central America. The District served as an extension of the US State Department through the Drug Enforcement Administration (DEA). Although Corps activity continued in Central America, the district became deeply involved in South America in the 1990s.

US government programs to encourage economic development in the region expanded. Mobile's Support for Others program built such diverse projects as bridges, roads, medical facilities, farming co-op plants, and schools. The work was particularly dangerous in Honduras and El Salvador in the 1980s and in Colombia and Bolivia in the 1990s. Here, SAD provided support for US State Department agencies such as USAID, the Department of Agriculture (USDA), and the DEA, as well as working on behalf of nearly every government in the region.

WORK FOR THE DEPARTMENT OF ENERGY

In April 2007, the Department of Energy (DOE) requested the participation of the Corps to assist with the construction and engineering of a first of its kind, Pit Disassembly and Conversion Facility (PDCF) at the Savannah River Nuclear Plant in South Carolina. The purpose of the PDCF was to disassemble nuclear weapons pits and convert the plutonium metal to an oxide that could be properly stored or disposed according to a US-Russian agreement signed in September 2000. SAD was asked to provide construction management services for the project and lead the Corps team of experts, which also included the US Army Engineering and Support Center, Huntsville. Not only was this a first-of-its-kind facility, but it was the first nuclear construction project for SAD. The seven building facility would be constructed underground, and be fully automated, with nine miles of piping, 200 miles of cables, 171 rooms, and over 120,000 cubic yards of concrete. Because the conversion process was entirely new, it was under constant evaluation, and ultimately it was decided to house the project in an existing facility. With no new greenfield construction required, SAD's role changed to staff support, and eventually that support was transferred to the Charleston District. Although the project's evolution eliminated SAD's participation in the PDCF completion, it was a testament to their reputation as construction and contract managers that DOE sought outside agency support.[36]

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growing narcotics trade, especially in cocaine. Many social liberals in Congress bemoaned the flow of funds to fight Nicaraguan-sponsored rebels that could have been fighting the drug war. Despite the rhetoric from the administration, the guerrilla war in Latin America consumed much of the administration's attention. By the time the Bush administration began to address the subject, the cocaine producers had created sophisticated and well-established marketing systems for their illicit products.

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CHAPTER 10 – READINESS AND OVERSEAS CONTINGENCY DIVISION: A NEW APPROACH

The Corps of Engineers serves the Southeast in planning, protection, and recovery from natural and man-made disasters. The Corps' involvement in disaster relief began in the nineteenth century and has evolved over time. By the 1950s, SAD district personnel identified fallout shelters in case of nuclear attack in addition to helping areas recover from natural disasters. In the 1970s, the Corps established an Emergency Management Office in each district. These offices grew with time, and by the late 1980s, the Emergency Management Offices were working as a supporting agency to the Federal Emergency Management Agency under Congressional authorization.[1]

With Southern growth in population and industry came increased impact from natural events. The districts' Emergency Management Offices expanded their coordination with each other, and a SAD-wide approach to natural disasters emerged in the mid-1990s. As the century came to a close, the Corps implemented Readiness 2000 to provide safe, flexible, and effective response to local and national disasters. SAD became home to the national-level Tactical Support Center for the Corps' Emergency Management Program.

In September 2001, when terrorists attacked the New York World Trade Center and the Pentagon, SAD units and personnel aided the recovery. In 2004, the Southeast was struck by five hurricanes in one year, resulting in $42 billion in damages. Emergency teams came from every SAD District to provide a coordinated response to hundreds of thousands of damaged homes, businesses, and governmental buildings. In recent years, the Emergency Management Program was re-named the "Readiness and Overseas Contingency Program" and was re-organized to report directly to the SAD Executive Office. The Corps emergency management services began as simple response to help areas hit by floods and hurricanes, and it developed over time into a planned, technologically advanced, substantial component of the federal effort to aid the disaster-prone region.[2]

EARLY ATTEMPTS TO PROVIDE DISASTER RELIEF

In the late 1940s, primarily as the result of their efforts at several major disasters, the Corps of Engineers became a lead federal agency during emergencies. Due to its decentralized and geographically distributed organization, and its access to military equipment and expertise, the Corps was considered best suited for a wide variety of disaster relief missions.[3] Army commanders were reluctant to stretch their engineering capacity much beyond their military obligations, but Congress gave the Corps of Engineers a lead role in aiding citizens in flood disasters through the Disaster Relief Act of 1950.[4] Using the 1950 law, President Kennedy directed the Secretary to draw upon military resources, especially the Corps of Engineers, to locate and improve the fallout shelter program for the public.[5]

The Chief of Engineers established a Civil Defense Support Group at Corps Headquarters and mobilized the divisions.[6] SAD districts were ordered to provide planning for their respective states. The districts hired architects and engineers to help identify the

structures, and plan for evacuation of affected areas. They also stocked shelters with food for prolonged stays.[7]

For example, the Savannah District located spaces for 815,000 persons by October 1962, and over the next six years, the districts located, marked, and stocked facilities to hold nearly all of Georgia's four million residents.[8] The Charleston District engineers and their contractors identified 142 area buildings that could serve as shelters for 83,000 citizens in the Charleston metropolitan area. However, this was only enough for one quarter of the population. Fortunately, the USSR and the US worked to reduce tensions after 1962, and the Civil Defense officials considered other uses for the shelters.[9]

HURRICANES

As a result of the Disaster Relief Act, President Kennedy established the Office of Emergency Planning (OEP) as an Executive Agency in 1961. When disaster struck, the state's governor contacted the President, who declared a natural disaster area. This declaration authorized OEP to begin rendering assistance. The OEP recognized that the Corps' access to military manpower, supplies, and equipment gave it fast and effective means to help. Thus, the Army Corps of Engineers became a primary contractor to OEP.[10]

Though the Southeast was struck with several smaller hurricanes in the 1960s, Hurricane Camille was particularly devastating, and illustrated emergency management strategy developed by that time. Camille was not a large storm in size, but she carried winds of 200 miles per hour and a 21-foot tidal surge. The storm slammed into the Mississippi Coast near Bay St. Louis on the night of August 17-18, 1969, and destroyed coastal towns from Ocean Springs, Mississippi west to Clermont Harbour, Louisiana. Camille left 144 people dead and $950 million (1969 dollars) in damages.[11]

Since Camille struck in the Mobile District's area of responsibility, that district took the lead in the cleanup effort. The storm created a disaster area out of 38 counties and parishes from Alabama to Louisiana.[12] The relief operation was the largest Mobile District had ever overseen. It involved 3,800 individuals, 2,100 pieces of equipment, 800 dump trucks, 70 cranes and hundreds of other vehicles. The district oversaw clearing 2,400 miles of road and more than 300,000 tons of debris. Emergency personnel encountered numerous difficulties such as communications breakdown, safety hazards, standing water breeding mosquitoes, lack of power, and thousands of displaced persons. Along with some 47,000 homes and businesses that needed repair, SAD clean up teams also grappled with improperly marked property lines, unclear OEP guidelines, inadequately trained personnel, and delays and inconsistencies with applications for aid. In the future, officials realized the Corps needed to clarify procedures and improve their policies to better manage large-scale disasters.[13]

With a few notable exceptions, hurricane activity steadily declined in the Southeast for forty years beginning in the late 1940s, and then suddenly reversed itself in the late 1980s. Beginning with Hurricane Hugo in 1989, the Southeast experienced numerous storms with increasing intensity. In 2004, a record five major hurricanes hit the region. In response, Emergency Operations Branches in the districts grew and developed. Additionally, SAD formulated a divisional approach to Emergency Management to handle regional needs,

Corps contractors take down a destroyed house after Hurricane Camille.

and when called on, to support districts outside SAD. By the end of the century, SAD had become a Corps-wide leader in Emergency Management preparations and response.[14]

When Hurricane Hugo hit South Carolina in 1989, the Charleston District activated their Emergency Management Division for the storm according to the prearranged plans. Officials quickly called on Savannah and Wilmington for help. Savannah District had a team in Charleston by 9:00 a.m. the day after the storm. Charleston remained in overall control of the Corps support for FEMA, but for a three-month period, some 532 employees from 30 districts and every division office aided in the recovery effort. The Corps became responsible for a number of activities in the weeks after the storm: bridge inspection and repair, damage survey reports, debris removal, repairing dike breaches, a log jam in nearby Lake Marion, emergency beach protection, and habitability inspections.[15]

The most exhaustive work was the debris removal from the streets and roads of the affected counties. Mobile and Savannah District supplied personnel, as did the 24th Infantry Division from Fort Stewart, Georgia. The process took more than six months. By March 1990, the districts removed more than 4.6 million cubic yards of debris and spent some $37.1 million on cleanup work.[16] Every river system in the affected areas became clogged with debris and fallen trees, as Hugo destroyed 36 percent of South Carolina's timberlands.

Damage on Dauphin Island from Hurricane Frederick 1979.

Damage in Homestead from Hurricane Andrew. Photo taken several days after the storm.

Trucks dumping debris at one of the landfills near Miami.

Charleston District created temporary dune protection for the beaches, and removed downed trees in creeks, drains, rivers, and in the forests.[17]

In their after action report, the Charleston District observed a number of activities that needed review and improvement. The largest, by far, was the post-storm mission of the District. The District report observed that there was a need for better guidance during the recovery effort, staffing of the EOC during and after the storm, and contingency plans for assistance from surrounding districts. Additionally, the report noted that future plans needed to more adequately address issues such as re-assembling of the work force, funding procedures, contract awarding, damage assessment reports, and employee aid. Quick response, the report added, was hindered by the magnitude of personal losses experienced by employees required to work. It observed that along with a plan for adjacent district support, SAD districts should develop memoranda of understanding among themselves to expedite better planning in the future.[18]

One author noted that the complexity of the intergovernmental system and relatively weak position held by the primary federal management agency, FEMA, produced poor interagency cooperation. This compounded with the size and difficulty in communicating in a natural disaster like a hurricane, especially one the size of Hugo, produced a legitimate frustration and a scenario that seem almost surreal to the victims.

SAD Learns Lessons from Andrew

Corps personnel, especially those from SAD worked many long hours under chaotic environments to help south Floridians recover from Hurricane Andrew in August 1992. Kate Hale, the Dade County Emergency Operations Manager who asked where the cavalry was early on commended the Corps for its responsiveness and observed that members did a magnificent job in aiding her community. Officials from the General Accounting Office, FEMA, Army Audit Agency, and the Hurricane Andrew Presidential Task Force also praised the engineers.

However, the storm provoked cries for change inside the federal government's efforts for large-scale catastrophes. After action reports noted that FEMA tended to piecemeal Corps activities instead of issuing them in bundles. Corps officials had difficulty knowing when their response level mission turned into a recovery mission. The Federal Coordinating Officer noted that his general opinion was that the military should have played a larger role in the initial response to major disasters because they had the capability to respond fast. The Corps report noted that improvements needed to be made in such areas as workspace, contracting, auditing, and use of small and disadvantaged businesses. Finally, the biggest complaint was the sluggishness of the federal response in the face of a catastrophic disaster. Along with miscommunications and misunderstandings between state officials and the President's office, Jacksonville District engineers did not respond to local officials primarily because they were not called upon.

Inside the districts, the Emergency Management Operations Center handled the natural disaster plans and measures. These offices incorporated various disciplines to form district teams to respond to emergencies. For example, there was a debris removal team, communications team, water and ice team etc. The centers arranged for training for logistics support personnel to aid them in moving people and machinery to disaster areas. Each district had a plan for its own district in case of emergency, and included a planned response to help other SAD districts. By the mid-1990s, the centers were equipped with satellite imagery on weather systems, personal computers, and cell, radio, and satellite phones. Additionally, each district had to keep personnel trained, equipment tested, procedures reviewed and changed, and practice exercises to simulate real world emergencies. Mobile, Savannah, and Jacksonville developed a portable trailer system that could be towed to disasters with self-generating power, phones, computers, and most of all space for negotiating and issuing contracts.[19]

Jacksonville District Command and Control Vehicle.

SAD Develops a Division Approach to Emergency Management

SAD was learning to respond on a regional level as hurricanes continued to plague the Southeast. In 1995, General Roger Yankoupe established a division-wide Logistics Emergency Response Team (LERT) first used during Hurricane Opal. This team, based in Mobile, coordinated SAD support for FEMA in disasters. Relying on weather forecasting predictions, LERT preplanned and pre-positioned the trailer units and personnel to respond once a storm passed. Prior to Hurricane Fran's landfall, LERT brought three emergency command and control trailers to Fort Bragg, North Carolina. They also notified Logistics and Information Management Specialists to move to Fort Bragg and prepare funding requests to give FEMA as soon as the Corps was authorized to act. Meanwhile Savannah and Charleston districts had personnel in Wilmington the day after the storm.

Once tasked by FEMA, SAD's Logistics Emergency Response Team (LERT) aided in delivering water, ice, and power generators as the most immediate needs for the communities. Ice takes special handling and facilities, and contractors soon scoured four states to purchase truckloads: private companies were competing for ice to restock their stores. The pre-positioning of generators at Fort Bragg enabled SAD officers to install 64 20-455 kilowatt generating units within three days. However, officials had to keep diesel fuel coming into the debris-clogged area to power the units. To complicate matters, Corps personnel had just begun clean up from Fran when Hurricane Hortense hit Puerto Rico. Hortense required Jacksonville District to withdraw support from Wilmington and begin coordinating help with Hortense recovery. Four years after Andrew, SAD had become more effective and organized.[20]

By the late 1990s, the Corps was beginning to understand that a district, or even a division, couldn't plan for and respond to all of the missions a large disaster could bring to their geographical area. Additionally, technological advances were allowing opportunities for better planning and monitoring of disasters. Networks of personal computers and printers, digital cameras, cell, radio, and satellite phones, up to the minute reports from satellites monitoring weather conditions, better understanding of flood areas, and flexible contracting methods were contributing toward a more effective ability to respond. The frequency of hurricanes in the Southeast allowed SAD activities to be trials to improve the Corps-wide response.

As SAD coordinated LERT and the innovations developed at the district level, Corps officials took notice. In Washington, they observed how SAD preplanning for Hurricane Fran decreased the response time and minimized confusion. In 1998, Corps Headquarters announced Readiness 2000, a plan for division and Corps-wide response to disasters. Much of the program was modeled after activities observed in SAD.[21]

Within each division, a district would be responsible for one or two Corps missions for the whole division. In SAD, Charleston was responsible for ice, Wilmington for potable water, Mobile for debris removal, Savannah for temporary housing, and Jacksonville for power generation and temporary roofing. Planning and Response Teams (PRTs) became the backbone of the program. These teams were made of up of Corps specialists in necessary disciplines tasked to obtain materials, labor, and services to fulfill their team missions. For example, a debris removal PRT would include team members from contracting, logistics, operations, engineering, and the legal disciplines within a district. A master list of PRTs in the Corps would be available for major emergency missions. Thus, if Charleston were hit with a hurricane and unable to coordinate a response for ice, or if the disaster was too large for one district, then another district such as Norfolk or Seattle would send a PRT ice team.[22]

SAD fulfilled four major roles in the Corps' planning for a national approach to Emergency Management. First, SAD supported the Army's 249th Engineer Battalion, called Prime Power, which was responsible for pre-positioning and operating generators for power restoration in all Corps emergencies. This battalion operated out of Fort Gillem, Georgia. Second, the Corps organized a nationwide Corps Logistics Emergency Response Team (LERT) modeled after the Mobile and SAD LERT program. Third, FEMA and the Corps

pre-scripted mission assignments so Corps districts knew ahead of time what teams would be available when a disaster situation developed. In coordination with this, contracting officers developed Indefinite Delivery/Indefinite Quantity contracts to have contractors pre-position items such as equipment, ice, water, and generators to respond quickly.[23]

Finally, Corps Headquarters drew upon the Forward Area Emergency Support Trailers (FAEST) and the trailer systems that SAD developed. Led by the Corps Deputy Commander, Major General Russell L. Fuhrman, Headquarters developed the Deployable Tactical Operations System (DTOS) with the Tactical Support Center located in the Mobile District. Essentially, DTOS was a national-level response program that included both regional and national capabilities.

DTOS unit in practice.

At the national level, Headquarters selected Mobile and Sacramento Districts to house the national level DTOS. Each system consisted of two Emergency Tactical Operations Center (ETOC) units that are self-contained trailers (eight feet by 37 feet); towed by a tractor rig, the ETOCs were modeled on the Mobile and Savannah FAEST trailers. The trailers contained state of the art computers, printers, fax machines, GPS equipment, radiophones, a satellite phone, and office space for meetings. Additionally, an Emergency Command and Control Vehicle (ECCV), modeled on the Jacksonville vehicle, supported each ETOC. This travel trailer vehicle served as a smaller communications center and additional office space.

A technician works on one of the computers inside the ECCV in Mobile.

Finally, a single Emergency Support and Sustainment Vehicle (ESSV) supported the ETOC and the ECCV. This truck carried supplies and spare parts for the other units and tows a satellite antenna hook up. As the Tactical Support Center national headquarters, Mobile District had two full DTOS systems with Sacramento housing the remaining unit.

In the remaining Corps divisions, Headquarters selected a district to obtain a Regional Rapid Response Vehicles (RRRVs). These travel trailer units were similar to the ECCV and served for regional disaster response. For example, Baltimore and Nashville districts each got a RRRV for the North Atlantic and Ohio Valley divisions.

All districts had immediate access to "flyaway" kits. These briefcase-sized kits contained a laptop computer, digital camera, satellite phone, GPS equipment, and a set of radiophones. District officials used the flyaway kits for windshield surveys or carried then into any location for quick assessment of damage and local needs.

At the Mobile District were two Containerized Tactical Operations Centers, ETOCs without wheels that could be airlifted to the Caribbean, Hawaii, or anywhere in the world. The entire system allowed the Corps to have a Command and Control Center operational within 18 hours in any location in the US.[24]

Thus, Mobile District Emergency Operations Center became a national level operation with updated computers, phones, satellite link ups, and a staging area near Irvington, Alabama, about 30 miles outside of Mobile. The system was inaugurated in June of 2000 by General Fuhrman, who complimented SAD districts on both their experience with disasters in the Atlantic and Gulf of Mexico and the role they played in developing ideas and designing equipment for DTOS.

DTOS in operation at Lakeland, Florida during cleanup of Hurricane Charley in 2004.

DTOS RESPONDS TO 9/11

On the morning of September 11, 2001, nineteen al Qaeda terrorists boarded four planes in Boston, Newark, and Washington, D.C. The terrorists hijacked the planes after murdering the pilots and crew, and proceeded to fly two of the planes into the World Trade Center buildings in downtown New York City. They also flew one plane into the Pentagon in northern Virginia. Passengers on the fourth plane attempted to retake control, but the hijackers crashed the plane into a field in Pennsylvania, killing all on board. The two World Trade Center towers collapsed, killing and injuring thousands and severely damaging surrounding structures. Among the nearly three thousand killed were several hundred New York firemen and police officers. Meanwhile, the country was in shock as the Trade Center events unfolded on live television.

Immediately, Corps Headquarters determined that New York would need a communications center and notified the DTOS Tactical Support Center in Mobile to deploy a unit there. By mid-afternoon September 11, one DTOS unit left Mobile, and on September 13 the second followed. Over the next three and a half weeks, the units participated in the search and rescue, and recovery efforts of the disaster.[25]

Corps Headquarters established local command for the New York rescue at Fort Hamilton, New York and ordered the DTOS units to aid the Fire Department of New York. The four ETOCs took position at the four corners of the site. Nashville and Baltimore Rapid Response Vehicles also arrived at the scene. Headquarters sent the Nashville unit to Pier 90 at the New York City docks, and brought the Baltimore vehicle to Fort Hamilton, New York to serve as the overall communications center. The Emergency Management team at Ground Zero found the firemen desperately searching the smoking ruins using only hand signals and a two-way radiophone. DTOS units set up their radiophones for communication inside the rubble, computer systems for monitoring search and rescue activities at the site, and satellite linkups for the satellite phones. The DTOS units became the communications and command centers for the rescue stage of 9/11.[26]

DTOS unit supports search and rescue at Vesey Street, Ground Zero.

After several days, when New York City Police Department determined there was no chance of anyone being found alive in the rubble, the New York Public Works Department assumed the cleanup stage of the operation. The DTOS mission changed to debris removal. The Federal Bureau of Investigation (FBI) and the New York City Police selected Fresh Kills Landfill on Staten Island to receive the debris, and the Nashville unit at Pier 90 filled in as a communications hub between Ground Zero and Fresh Kills.[27]

During the mission, the firemen used the DTOS computers for recording areas they searched. One of the fire department's more gruesome tasks was to record in the computers every personal belonging and body part recovered from the wreckage. The World Trade Center was not just a disaster, but a crime scene. Family members had to identify personal items such as purses, wallets, and pictures collected and sorted by the FBI. The overall scene was so disturbing, managers regularly rotated out their personnel.

Most of the Emergency Management officials were volunteers and came from a number of districts nationwide, including all SAD districts. Schoolchildren from the surrounding areas sent cards to the workers, and decorated signs that were hung on the ETOC units that deeply touched the workers. After several days, police allowed family members to visit the ruins, and converted one of the ETOC meeting rooms into a cry room. Through use of the satellite link up, the units were able to keep in touch with the Tactical Support Center in Mobile and send back regular reports. The team worked 24 hours a day for 22 days and did not experience a single communications break down. When State of New York officials

DTOS vehicles at Liberty Street, New York City on September 18.

Doug Nestor at the World Trade Center

A member of the DTOS team that was dispatched to New York from the Mobile District, Nestor gave this vivid description of the carnage at Ground Zero.

The scene was ghastly. Here was a hot 100-foot-high pile of twisted steel, concrete, glass, dust, smoke, and burning flesh, and the pallor of death hung over it all. The firemen had cranes with hoses poised over sections of the ruin, pouring water on it, while desolated and damaged buildings ringed the entire site. Smoke was pouring out of dozens of places from inside the ruin and it was a smell you will never forget.

arrived with their own trailers and computers, the DTOS units were released to return home. The two DTOS units returned to the Mobile staging center at Irvington, Alabama on October 8, 2001.[28]

KICK ME! THE HURRICANES OF 2004 AND 2005

With the new century came increased hurricane landfalls in SAD. In 2004, five hurricanes struck the division, making it the biggest hurricane year since 1950 on the US mainland. Hurricane Alex began the season brushing the North Carolina coast on August 3. Then a succession of violent storms hit Florida. Hurricane Charley struck southwest Florida at Punta Gorda on August 13, intensifying into a 145 mile an hour wind, Category 4 storm just hours before landfall. Less than three weeks later, Hurricane Frances hit Sewall's Point, north of West Palm Beach, with 105 mile an hour winds. On September 16, Hurricane Ivan, a particularly vicious storm that at one time contained sustained 165 miles per hour winds, struck the panhandle of Florida and Mobile, Alabama. Then on September 25, Hurricane Jeane, after killing hundreds in the Caribbean, struck south Florida near West Palm Beach with 115 miles per hour winds. The storm crawled up the east coast dumping up to 10 inches of rain on the saturated state. Max Mayfield, Director of the National Hurricane Center in Miami quipped in a broadcast, "it almost seems like we have a 'Kick Me' sign on the state." Not since Texas in 1886 had four major hurricanes hit one state in a single year.[29]

Corps ice being distributed at Gulf Breeze, Florida after Hurricane Ivan (Savannah District).

Millions evacuated coastal areas; many, more than once. SAD Emergency Management officials distributed nearly 14 million ready-to-eat meals, and placed 550,000 blue roof tarps on damaged homes. Even with the availability of national supplies, Corps officials ran out of spare tarps, and Ivan survivors had to wait several days until new ones could be manufactured. Wilmington and Charleston District PRTs distributed 15 million pounds of ice and 1.7 million gallons of water to Florida and Alabama. Prime Power supplied 64 generators for Ivan, then quickly serviced them and moved them to east Florida for work after Hurricane Frances. At Hurricane Charley, officials from every division in the Corps

placed 25,000 blue roofs on damaged homes in the Naples area only days after the storm. More than 1,300 Corps personnel from every district and division supported recovery efforts.[30]

After Hurricane Ivan, Corps contractors removed nearly one million cubic yards of debris in three Alabama counties while Mobile and Jacksonville District personnel experimented with a new type of temporary housing. The Expedient Housing plan allowed Corps officials to place utilities aboveground and not underground, thus speeding up installation time. [31]

While 2004 may have been the busiest hurricane season in SAD Emergency Management history, the following year proved to be the year with the longest reaching impacts. On August 30, 2005, Category 3 Hurricane Katrina landed at Buras-Triumph, Louisiana just below New Orleans. Because the City of New Orleans sits below sea level, it is protected by a complex system of levees and canal walls. Ultimately, the levee system surrounding the city failed and thousands of residents were stranded in the floodwaters. To the east of New Orleans, the Mississippi Coast was devastated by the powerful right-quadrant winds and a 27-foot storm surge that penetrated six miles inland. In all, Katrina cost more than $80 billion in damage, and initiated a strong response from the Federal government to study the integrity of Corps structures.

As a result of Hurricane Katrina, the Corps could no longer claim it had never had a structural failure. This initiated a two-phase solution to hurricane protection within SAD boundaries. First, this response included investigations and studies of Corps dams, levees, and dikes to evaluate the potential for failures at some of its aging structures and to identify remediation measures. The second element included programs designed to limit the impact to human lives in hurricane prone areas.

Following a study of Corps structures, the Hoover Dike surrounding Lake Okeechobee in Florida was identified as at-risk for failure. Constructed in the 1930s, Hoover Dike represents just one element of SAD's aging infrastructure. Although some work had been underway as early as 2000, the major rehabilitation efforts were prioritized following Hurricane Katrina. Stretching 143 miles in length, the dike is divided into eight sections or "reaches." Repairs include filling the existing toe ditch, testing landslide seepage management features, and installing a cutoff wall. Construction for the cutoff wall that began in Reach 1 (Port Mayaca to Belle Glade) near Pahokee in 2010 will help prevent underground erosion below layers of limestone, crushed shell, and sand, all of which are susceptible to seepage. If left alone, over time the seepage can cause catastrophic system failure. SAD is also replacing or removing 32 of the old culverts constructed during the 1930s.[32]

In addition to structural solutions, SAD is addressing the needed repairs in a system-wide approach. Other means to prevent failure include consulting with the South Florida Water Management District to lower the water levels during the summer months to prevent larger water releases that may result from tropical storms and hurricanes. Sudden large releases of water can not only put pressure against the aging structure but also can devastate regional ecosystems. Between 2007 and 2010, over $300 million was appropriated for the Hoover Dike rehabilitation project, representing nearly one-quarter of dam safety funding in the United States.

The Herbert Hoover Dike surrounding Lake Okeechobee in Florida was identified as high risk for structural failure in a study following the Hurricane Katrina disaster.

Another program resulting from the devastating effects of Hurricane Katrina was the Mississippi Coastal Improvements Program (MsCIP). Managed by SAD and the Mobile District, MsCIP was designed as a comprehensive regional approach to modify, improve, or create various environmental or ecological conditions to reduce hurricane impacts. These included considerations for storm damage reduction, prevention of saltwater intrusion, preservation of fish and wildlife, and prevention of erosion. For instance, one element of the plan included purchasing low-lying and flood-prone inland areas in the Franklin Creek area of Jackson County, Mississippi. The purchase of these areas was followed by an ecosystem restoration to allow a more natural absorption of storm surge with minimal impacts to human life. Other individual projects included beach and dune restoration. MsCIP included structural solutions as well, including raising the height of Forrest Heights Levee. In all, the program selected 12 individual elements estimated to cost more than $107 million, with an approximate 60% share funded by the Federal Government, and the remainder sponsored at the state and local levels.[33]

Deepwater Horizon Oil Spill, 2010

On April 20, 2010, an explosion occurred on the Deepwater Horizon oil platform below the Mississippi Delta in the Gulf of Mexico. Operated by British Petroleum, the well began gushing thousands of barrels of crude oil into the Gulf, devastating the marine and wildlife along the coastlines of Louisiana, Mississippi, Alabama, and Florida. SAD's regulatory programs in Mobile and Jacksonville districts were called into action to objectively evaluate and expedite hundreds of requests from local, state, and federal agencies in an attempt to minimize the environmental effects. One of the biggest policy issues included the application of general permits to the Gulf-wide spill. SAD consulted with Corps headquarters and determined that Emergency Permitting Processes best addressed the oil spill, which is an abbreviated and programmatic approach approved by Division Commander for activities associated with the oil spill. On average, most permits were processed in three to five days, and constant communication helped ensure paperwork and evaluation consistency between the districts. Because of this experience, SAD developed new and refined templates for its emergency procedures should another Gulf-wide disaster occur.[34]

CONCLUSION

SAD contributed to the effectiveness of the Corps' emergency management and readiness program throughout the twentieth century. The Southeast, with its vulnerable coastline and extensive river system, grappled with recurring floods, droughts, and hurricanes as well as other natural disasters. Federal investment in emergency services increased after World War II. SAD districts located and approved Civil Defense shelters and established emergency evacuation plans for coastal communities in the 1950s and 1960s. They prepared floodplain and water resource studies, and dam inspections in the 1970s. They wrestled with a persistent drought in the 1980s. They continued to improve their response in the face of a string of natural disasters in the 1990s and early 2000s. By the end of the century, an SAD district housed the national Tactical Operations Center for Corps-wide disaster response.

Over time, SAD districts have developed a coordinated, preplanned, regional response for FEMA, bringing ice, water, power, shelter, and other supplies effectively to damaged areas. Once immediate needs are met, district officials and contractors continue to provide an array of engineering and support, from debris removal to bridge inspections. SAD's expertise has been studied and extended by Corps officials nationwide, and SAD's experience and capability were certainly one reason for its selection as the national emergency services center.

ENDNOTES

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CHAPTER II – A NEW ERA: ENVIRONMENTAL PROTECTION AND RESTORATION

The projects discussed in Chapters 9 and 10 illustrate the new missions that the Corps and SAD have developed since 1970. In the 25 years since NEPA studies became required, SAD developed ecological and cultural expertise, and learned to work carefully in an open planning process with citizen and local groups. These changes have allowed the Corps to be ready to support the needs of the nation in new environment-focused missions.

The public recognized the importance of the environment in the 1960s and 1970s, and Congress responded with laws to protect historic properties, to consider carefully all environmental impacts caused by federal actions, and especially to protect and enhance the nation's water and air. Many environmental groups had long seen the Corps of Engineers as a major development agency, focused on designing and building infrastructure without sufficient concern for the environment. The Corps nationally came to be criticized more and more for its championing of projects seen as adversely affecting the environment. Citizens and activist groups also found it hard to work effectively against Corps projects in large part because of the way they developed; working primarily without public awareness, local officials and Corps officers and technical experts studied, designed, and then announced projects, large and small, as already decided.

The National Environmental Policy Act of 1969 (NEPA) went into effect with President Nixon's signature in 1970. NEPA required consideration of environmental impacts during the planning stage of a project. The act did not require that projects be halted if there were found to be potential impacts; NEPA is a "stop, look, and listen" act requiring only that a process of study and consideration be undertaken. It was not immediately clear to agencies, however, exactly what the required process should consist of, [2] but they began anyway to develop "Environmental Impact Statements."

Nathan D. "Skeeter" McClure, Mobile District Chief of Planning and Environmental Division, 1988–1997

A group of us in Planning wrote the first Mobile District and SAD Environmental Impact Statement in 1971. This was for the Tennessee-Tombigbee Waterway. The group included engineers and one biologist: Bill Ruland, Emanuel (Manny) Drago, Hugh McClellan, John Rushing, Lloyd Saunders, Jack Mallory, and Don Conlon.

The project had been authorized before NEPA was enacted, but it was still very controversial. We had developed a Technical Studies Work Plan for the EIS, which was reviewed by SAD and by HQ. We sent a draft of the EIS up to South Atlantic Division for review. They said it was too long. We didn't know what to cut, so we reformatted it to one-and-a-half spacing instead of double spacing. That did the job, and it was approved by SAD and HQ for sending out for comment by other agencies. The Final EIS was 32 pages text, two figures, 57 pages of letters, and 19 pages of responses to agency comments.

As important as Environmental Impact Statements were in documenting and publishing information about impacts of projects and project alternatives, just as important was the effect NEPA had on the project planning and decision-making process.[3] Over the decade following the introduction of NEPA, the Corps, along with other federal agencies, began to open their project decision making processes to public scrutiny first, and then to public input, and finally to public involvement and partnership. Mazmanian and Nienaber studied in detail the Corps' adjustment to NEPA; they concluded that Corps leadership at the highest levels decided to embrace the planning and decision making changes required by NEPA, and that because of this leadership, the Corps has made a successful transition to being an environmental proponent.[4]

To carry out effective Environmental Impact studies, the Corps had to develop its own environmental expertise; specialists in biology, water evaluation, air studies, history, and archaeology were hired and developed as Corps employees, working side by side with engineers and other Corps officials. As these technical specialists became established in Environmental and Planning groups, they built Corps capability and knowledge, not only in how to prepare complete EIS documents, but also in how to manage environmental issues, including restoration.

Several of the largest Corps engineering and construction undertakings started in the last 20 years have been designed to repair and restore unintended environmental damages related to past projects of the Corps, state authorities, and other organizations. The Cooper River Rediversion in South Carolina, discussed in Chapter 7 above, was designed as a navigation improvement project to reduce silting in Charleston Harbor. In preparing the EIS in the 1970s, the Charleston District and SAD, working with state resource agencies and with interested parties, were able to document the significant environmental restoration effects of rediverting water into the Santee River drainage and enhancing wetland and fisheries ecology that had been damaged in the 1930s construction of lakes by the Santee-Cooper Authority. SAD gained expertise and interest in environmental restoration from this project.

BEACH PROTECTION AND RESTORATION

This mission found early expression in the Corps' beach renourishment program. SAD districts have played a key role in keeping South Atlantic beaches from disappearing. Although beaches are popular for recreation and tourism, their main purpose is to protect the mainland from storms and hurricanes. Like so many other areas of the Corps Civil Work, this has not been without criticism, especially from some environmental groups who prefer other less intrusive options.

Projects to stabilize beach erosion date back to the 1930s in SAD. Most beach erosion was natural, and eroding beaches were replaced elsewhere by aggrading beaches. Property ownership and recreational uses of the existing beaches were well established, and the property was very valuable. Citizens and local governments called on the Corps to build seawalls, place riprap, and construct jetties and groins to minimize continuing erosion. These actions were considered by many to be protecting the environment. "Restoration" of the beaches

Beach renourishment in the Biloxi, Mississippi area.

by placing new sand on eroded areas (renourishment) grew as a practice after World War II, especially in North Carolina and in Florida, where long coastlines proved formidable to maintain. Except for the quickly developing areas of Tampa Bay, Sarasota, and Ft. Myers, beach erosion work was focused along the Atlantic seaboard. Nearly 40 percent of the shoreline miles in the lower 48 states are located inside the SAD (14,620 miles of the 36,940). The Jacksonville District alone completed 107 Corps shoreline protection projects by fiscal year 1993 that represented 47.4 percent of the Corps's total national projects. The Jacksonville District also maintains two-thirds of the SAD beach erosion projects.

The Corps has derived its modern authority for erosion control over time, beginning with the Rivers and Harbors Act of 1930, which created a Beach Erosion Board inside the Corps. Prior work on erosion had been limited to jetties built for military and navigational purposes. In 1936, Congress passed the Act for Improvement and Protection of Beaches along the shores of the United States, which attempted to define the federal role in beach erosion. During the depression, New Deal legislation sponsored a massive beach dune construction project on the North Carolina Outer Banks that constructed 115 miles of high dunes. Though the Beach Erosion Board encouraged greater Corps involvement in the issue after World War II, their solutions were predominately nonstructural ones. The first restoration projects occurred in the northeast after a number of severe storms in the mid-1950s. In 1962, the Ash Wednesday storm precipitated a widespread beach renourishment program in the US. The next year, the Beach Erosion Board was replaced by the Coastal Engineering Research Center (CERC) at Corps headquarters at Fort Belvoir, Virginia. In 1983, the CERC was moved to the Corps' Waterways Experimental Station in Vicksburg, Mississippi.[5]

Additional congressional enactments expanded the Corps' involvement in shoreline protection. The 1972 Clean Water Act authorized the Corps to issue all permits for dredging. The WRDA of 1974 authorized the Corps to do coastal zone planning. Two years later, the WRDA of 1976 gave the Corps the authorization to place beach-quality sand from its dredging projects on nearby beaches, making better use of dredged material. The WRDA of 1986 changed the local sponsors' portion to 50 percent of the costs of placing the sand.[6]

Critics and some proponents of the Corps' beach erosion control efforts would not place the program into a restoration category. Yet, most of the criticism has to do with the cost and practicality of restoring shorelines from natural erosion, not with the fact that the Corps has attempted to replenish what nature removes largely due to man's action. The cost of this expensive work has provoked critics like Senator William Proxmire (D-Wisconsin), who in 1985 awarded the Jacksonville District his Golden Fleece award—for wasting taxpayer money on a $31 million Miami Beach renourishment project.[7]

The erosion issue has also placed the Corps in a position to receive criticism from businesses, homeowners, and beach goers. These groups accuse the Corps of not doing enough to protect the eroding beaches. Others criticize its renourishment efforts as attempts

to placate political leaders while making work for its districts. Many in the environmental community not only reject the Corps' logic for their program, but also question the Corps' involvement in the issue at all. Yet Congress and public sentiment generally, has been in favor of beach renourishment in lieu of structural retreat, which seems to be the only alternative.[8]

The Holiday Inn at Folly Beach Illustrates the Problem with Beach Renourishment

By the 1970s, Folly Beach, South Carolina was the most armored beach in the southeastern United States, and in the opinion of some, rivaled only in ugliness by some portions of the New Jersey shoreline. In the 1980s, the Holiday Inn Company built an imposing nine-story edifice at water's edge in downtown Folly. However, almost from the beginning the hotel had financial troubles largely because there was no beach on its ocean side. Efforts by the city and the Charleston District resulted in construction of eight groins and beach renourishment in 1993. However, the renourishment did not work. In 1994, tides washed 125 of the 200 feet of dry sand placed behind the inn out into the ocean. By 1995, no high tide beach existed. Though the Corps insisted that the sand was still present, but in the surf, physical investigation by a local geologist indicated that instead, not only was there no beach but the wall built to protect the Holiday Inn had actually increased erosion to the south. The project, which included a portion of the beach, cost the town of Folly Beach $ 2.3 million. The Corps completed additional renourishment in 1998, 2001, and again in 2005 (Pilkey and Dixon, pp. 113-125 and Folly Beach Surfcam.com).[9]

BEACH RENOURISHMENT IN THE DISTRICTS

Charleston District work included completion of Folly and Myrtle Beach restoration in the mid-1990s. The Folly Beach renourishment work was completed in 1993 and cost $11.6 million. The project unloaded some 2.7 million cubic yards of sand over a 4.8-mile stretch of the beach. In addition, contractors rebuilt or stabilized nine groins.

Also during the 1990s, a large project was carried out at Myrtle Beach, South Carolina. Here storms in recent years had washed away much of a wide and beautiful natural beach, affecting beach users and beachfront business. The $49.1 million project laid 6.3 million cubic yards of sand on 25.4 miles of beach at Myrtle Beach, North Myrtle Beach, and Garden City Beach. Authorized by Public Law 101-640, passed in November 1990, construction was completed at the three beaches by the end of 1998. Congress, recognizing that continued work would be necessary, authorized, but did not appropriate funds for, an ongoing schedule of work fifty years into the future.[10]

Wilmington District worked at Fort Fisher and at a number of public beaches along the southeastern shoreline of the state. These projects have been extended, in part to match the Wilmington Harbor dredging and the supply of sand. Only one of these projects, the renourishment of Ocean Isle Beach, was complete by 2004. The extension of this project

illustrates how difficult beach work can be at both a local and national level. Despite receiving approval in the 1966 Flood Control Act, Congress did not appropriate funding until 1985. Meanwhile, the local partner was unable to allocate the 50 percent cost sharing for another 16 years. Finally in 2001, the Corps began work on the $8.8 million project, building a vegetated dune some 25 to 50 feet in width on 3.25 miles of beachfront. Three other beaches, Oak Island Beach, Caswell Beach, and Holden Beach, were still under evaluation as of 2004.

An interesting environmental concern for the Wilmington District beach projects has been the threat of harm to sea turtle nests. The local Nature Conservancy chapter was contracted and worked as a partner with the district to monitor the dredging and to remove several discovered nests to a safe area.[11]

In Georgia, which has the smallest and least developed coastline in the SAD, only Tybee Island near Savannah received any beach renourishment work. The Savannah District replenished the beach and strengthened a northern and southern groin in 1988. The project cost $2 million and was split 51/49 percent; Georgia state funding provided the larger percentage. A 1994 beach evaluation study convinced Congress to allocate an additional $5.7 million in fiscal years 1997 to 1999 that was matched by $3.8 million from the city of Tybee Beach for continued renourishment of the beachfront. This work was completed in fiscal year 2000.[12]

The Mobile District had no important beach renourishment projects after 1985. Although tropical storms batter both Atlantic and Gulf Coast beaches, beaches along the Gulf of Mexico suffer substantially less impact from beach erosion than do their counterparts on the Atlantic coast. Thus, most of the SAD work on the Gulf Coast occurred in the rapidly developing areas of southern Florida.

The bulk of the beach renourishment funding in the SAD was spent in Florida, as that state has a 1,400-mile coastline. In 1994, the Jacksonville District performed nearly one-third of all the national Corps beach erosion projects. Between 1985 and 2003, the Corps spent $184.3 million in federal tax dollars and $89.5 million in local revenues on rebuilding 15 beaches in Florida. The threat of erosion is particularly high along large portions of the highly developed eastern and southern coasts. Only in Dade County, where the Miami Beach project appeared to be moderately successful, was the District not working on erosion projects. Several of the larger projects included $31.3 million on Duval County beaches, $39.1 million on Brevard County, $18 million on Palm Beach County, and $82.3 million on Pinellas County.[13]

Beach protection and restoration programs have a long history in the SAD districts. These projects are generally very well appreciated by the public and by state and local governments. The program efforts are easy to see and appreciate, for users of the beach and for businesses and property owners relying on stabilization of the beach as an economic resource. SAD historically has provided assistance to the districts as requested for this, but there are few controversies that require special management or review assistance.

OTHER ENVIRONMENTAL RESTORATION WORK

Nearly all the harbor improvements initiated after 1985 included some form of environmental preservation effort. The Savannah harbor project was held up for years because the Corps, the National Park Service, the Fish and Wildlife Service, and the Environmental Protection Agency could not agree on evaluations of impacts on and mitigation proposals for the adjacent Savannah National Wildlife Refuge. The refuge consists of thousands of acres of former saltwater marshlands that were converted into rice impoundment fields in the nineteenth century. After the end of rice cultivation in the late 1800s, rice field dikes eroded and saltwater became reestablished. In the early 1970s, much of the marshland had become freshwater fields again due to the erection of a tidal gate during Corps work on the Savannah Harbor. The new project planned to restore some of the freshwater marshes to saltwater marshes. Despite the fact federal law gave priority to restoration of marshlands to their natural state, the environmental impact of the project was negatively perceived by the public. After thorough public discussion, the Savannah District removed the controversial tide gate in 1991 and large portions of the wetlands returned to saltwater marshes.

The Wilmington District created a nursery ground for fish to mitigate for loss of a spawning area in the Cape Fear River caused by the expansion of the Wilmington harbor. The district created a 500-acre primary nursery ground for fish spawning at the point where the Brunswick River empties into the Cape Fear River. The project called for the creation of a 32-acre marsh island and estuary.

A Unique Use of a Spoil Area in the Savannah River

During the late 1980s, the Savannah District discovered that the spoil disposal areas in the Savannah River were becoming wildlife paradises. As District officials already knew, the areas were mosquito breeding grounds. But the mosquitoes attracted pond birds who fed on them, and the sand piles provided nesting grounds for terns. Interestingly, the birds were so seldom disturbed that they lost their fear of humans and allowed District officials to guide study groups among them while they nested.

Finally, as an additional part of the mitigation effort, Corps contractors installed thirteen primary monitoring stations in the river to measure salinity, soil chemistry, and changes in vegetation and tidal amplitude caused by the changes to the river.[14]

In 1996, the Wilmington District installed a fish lift at Lock and Dam No.1 on the Cape Fear River in the Wilmington District. It allowed shad to proceed upriver to spawn.[15] At the same time, the Charleston District used the same idea with their Cooper River Rediversion Canal at the Santee-Cooper Lakes in South Carolina.

Several districts have used other agency funding to help coordinate restoration of bird nesting islands. The Mobile District created a "home for the birds" out of an old dredging spoil island in Mobile Bay in the early 1980s. Here the District planted marsh grasses and other seaside vegetation to attract nesting sea birds. By 1985, endangered brown pelicans were nesting on the island along with some 4,000 gulls, skimmers, and terns. In 1988, nearly

600 pelicans had made the island home and nearly 1,400 nestlings were mature enough that year to fly away. The project was coordinated in conjunction with the Alabama Department of Conservation and Natural Resources and the US Department of Fish and Wildlife, with the Corps supplying the island. The district did similar work at Deer Island, Mississippi, and Dauphin Island, Alabama.[16]

In 1999, the Wilmington District oversaw the restoration of Battery Island in the mouth of the Cape Fear River. The district had enlarged bird-nesting areas on two smaller nearby islands in 1992. Battery Island, nesting home to more than 10,000 pairs of ibises, herons, and egrets, was North Carolina's largest nesting island for these birds. The state of North Carolina owned the island and served as the sponsor for the restoration work, though the Audubon Society managed the protection efforts. A 1999 study showed that shoreline for the island was being lost at the rate of twelve feet per year. The district coordinated efforts that culminated in contractors placing 35,000 cubic yards of sand from the shipping channel on the beach.[17]

The Jacksonville District successfully restored ten acres of the forty-five-acre Munyon Island as a nesting area for water birds in 1996. Historic Munyon Island was a 15-acre island located in the Lake Worth lagoon inside the Intracoastal Waterway in Palm Beach County, Florida. The island had been the site of the Munyon Hotel in the early twentieth century, but had been abandoned when the hotel burned in 1917. During the building of the Intracoastal Waterway in the 1930s, the island served primarily as a spoil area and thus grew to three times its original size. The project was sponsored by the Palm Beach County Department of Environmental Resources Management. It involved not only the planting of native shrubs, but also the placing of protective limestone armoring and the creation of canals and channels to reinstate a tidal flush action critical to attracting fish, birds, and invertebrates. Additionally, all exotic plants that had taken over the island were removed. The project was the first of its kind for the Jacksonville District under Section 1135 of the WRDA of 1986.[18]

Jacksonville Work for NOAA to Restore a Reef Near Miami

In October 1989, the *Alec Owen Maitland*, an oilfield supply ship, ran aground on a reef in the Key Largo National Marine Sanctuary—destroying some 70 percent of the coral reef at that site. In 1995 and 1996, the Jacksonville District, working for the National Oceanic and Atmospheric Administration, began a restoration effort at the reef. The District oversaw the installation of a series of nine-ton concrete armor units to both stabilize the reef and recreate the damaged habitat. A second phase of the project involved placing organisms similar to those originally inhabiting the reef back into the environment to enhance restoration. Additionally, Jacksonville District officials served on the US Coral Reef Task Force, created in 1998 by executive order of the president, to reduce and mitigate coral reef loss in American waters (Fuderer, *The Drawbridge*, "Coral Reef Restoration," (February 1996), p. 10-11, and Colon, *Reflections,* "Reef Preserves," pp. 16-17).

The Jacksonville District also used mitigation funds during a deepening of the Fort Pierce Harbor in 1996 to do work for St. Lucie County. Here it removed exotics from Coon Island in the harbor and replanted the island with natural vegetation. At the same time, the District constructed an 11-acre shallow water lagoon and a 16-acre shallow water habitat for pond birds, built a four-acre artificial reef, and renourished a local beach with the dredged sand.[19]

Two wildlife mitigation projects in the SAD were financed by the WRDA of 1986 involving purchases of large amount of real estate to offset habitat destroyed. The Mobile District wildlife mitigation represented lands lost in the building of the Tennessee-Tombigbee Waterway. In Georgia, the Savannah District acquired a smaller but substantial amount of land as mitigation for habitat loss in building the Richard B. Russell Dam.

Beginning in 1987, the Mobile District spent $92 million over the next 15 years purchasing 80,000 acres of bottomland hardwood in Mississippi and Alabama. A project delivery team was created to manage the purchased acreage and add those lands to 70,000 acres then being managed by other federal agencies in the two states. The team became responsible for a wide range of acquisition and management activities such as hunting programs, waterfowl impoundments, bird and wildlife management, agricultural planting, wetland controls, and other aspects of forestry management such as parks and recreational areas that included several beaches. Additionally, in working out acceptable means of measuring environmental losses created by the waterway, the team became involved in establishing environmental educational facilities, a visitors' center, a historical museum, coordination of educational programs with local schools and universities, protection of paleontological sites, ongoing archaeological site identification and excavation, and reintroduction of endangered species.[20]

The Savannah District project was not quite as complex. The district acquired 10,165 acres in South Carolina and 11,775 acres in Georgia. The memorandums of agreement that set the acquisition of the tracts in motion specified that the land, once obtained, would be handed over to the two states to be managed, at federal expense, for fish and wildlife purposes. By 1994, Savannah District real estate officers had bought the land from seven landowners for $20.2 million.[21]

SOUTH FLORIDA RESTORATION PROJECTS

The Jacksonville District has always had a large Civil Works mission, but the assignment of the Everglades Restoration Project gave it the largest single Civil Works project in the Corps.[22]

The state of Florida is a unique appendage to the Southeast. It averages 54 inches of rainfall per year and has more natural lakes than any other state except Minnesota. It is the most tropical state in the lower 48 states and regularly faces severe changes in environment, experiencing both drought and flood conditions in a typical year. Most of the rain in the state falls between June and October, and the southern half of the state has only two seasons, wet and dry. The state is particularly susceptible to hurricanes and in 2004 was hit by a record-setting five storms. Lake Okeechobee forms the center of the southern third of the

state. Prior to the 1960s, water from a series of 18 lakes south of the city of Orlando flowed into Lake Okeechobee from the north via the Kissimmee River. Whereas parts of Central and Northern Florida have rolling hills, the southern third of the state is extremely flat with little topographical change, save the coastal ridges on the Atlantic and Gulf of Mexico.[23]

The state has experienced exceptional growth and is the leading Southeastern state in population, 18.8 million as of 2010. The southeastern corner of the state is the most populous, containing more than 6.5 million residents. Most Floridians live in one of six metropolitan areas, all of which contain more than one million residents: Jacksonville, Orlando, Tampa-St. Petersburg, West Palm Beach, Ft. Lauderdale, and Miami. Except for Jacksonville, all of these areas are in Central or Southern Florida. The state is one of the leading destinations for Americans moving from the Northeast and Midwest to the Sunbelt. Despite the strong tourist and retirement industry, the state also has a large agriculture and ranching industry. Most of the agriculture is citrus fruits, sugar cane, and winter vegetables grown in the southern half of the state.[24]

Congress authorized the Corps to begin the Central and Southern Florida Project in response to continued flooding problems in Central and South Florida in the late 1940s.

The Tamiami Trail, officially designated US 41, stretches 264 miles across south Florida between Tampa and Miami. While offering beautiful vistas of the Everglades, the raised roadway disrupts the natural water sheet flow feeding delicate natural habitats.

The project encompassed canals, pumps and levees designed to prevent flooding in the fast growing urban areas. The plan also created additional agricultural lands, offered greater access to recreational opportunities, provided better navigational access across South Florida, and was designed to insure sufficient fresh water for Everglades National Park and Florida Bay.

When Jacksonville District began building the Central and Southern Florida Project in the 1940s (see Chapter 8), engineers, and the nation in general, had different views about the environmental impact. The dominant view at the time was that the Central and South Florida Project would enhance the Everglades environment by making it inhabitable and economically productive. By the time the century ended, Jacksonville District had embarked on a project that included environmental restoration as a primary aspect of the work.[25]

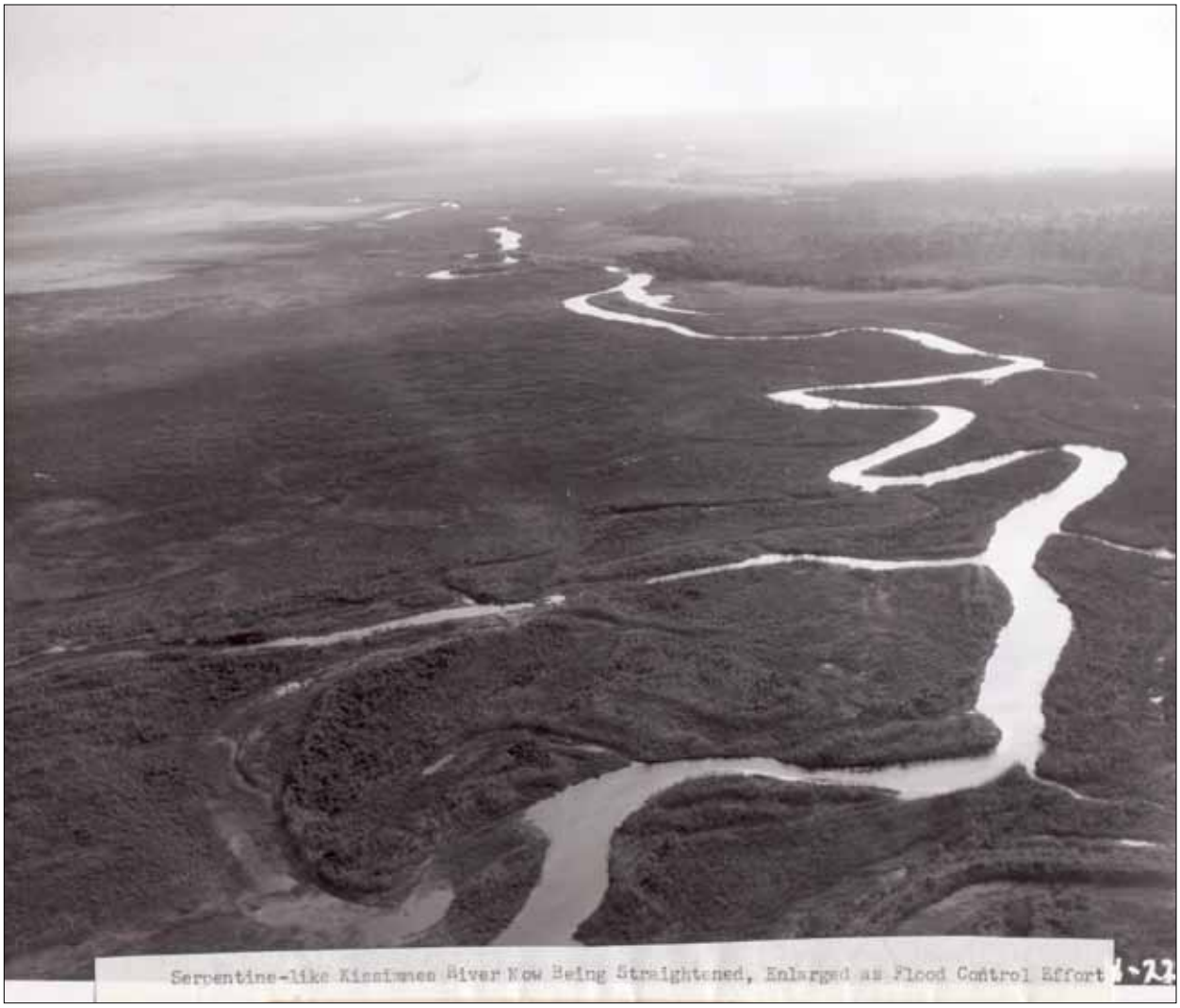
Problems with South Florida's water supply caught the public's attention in the spring of 1971 when a series of fires swept the Everglades. The fires burned for weeks, destroyed 400,000 acres of dry peat muck, and caused dangerous driving conditions in the populated areas. The National Park Service and environmental groups had been warning for years that the Everglades were dying for lack of water, and the fires of spring 1971 seemed to confirm their claim.[26]

KISSIMMEE RIVER

As a direct result of the fires in the Everglades, Florida Governor Rubin Askew called a conference in Tallahassee during the fall of 1971 to discuss South Florida's water problems. Attendees at the conference included conservationists, naturalists, scientists, and others concerned about the environmental future of the state. One of primary topics of discussion at the conference was the condition of Lake Okeechobee. Attendees called for a reevaluation of the Kissimmee River portion of the Central and Southern Florida Project as biologists were seeing signs that Lake Okeechobee was suffering from a high levels of phosphorus. According to environmentalists, the phosphorus was coming down Canal C-38 (the old southern section of the Kissimmee River) 11 times faster than before channelization. This did not allow time for the hazardous chemical to settle out of the water. The participants noted the absence along the canal of ibises, eagles, and several species of fish and freshwater shrimp. The conference called for restoration of the river to its natural state to prevent further deterioration of Lake Okeechobee.[27]

In 1976, the Florida Legislature enacted the Kissimmee River Restoration Act, which recommended the partial backfilling of the river. Two years later Congress supplied funding for a Corps feasibility study to modify the original Central and Southern Florida Project, which at that time was only half complete (work on the original plan had been halted in 1971). The study took seven years, and Jacksonville District released it in 1985. The study agreed with the Kissimmee River Coordinating Council that restoring the river would supply environmental benefits. However, it noted clearly that flood control and navigation were missions of the Central and Southern Florida Project, not environmental restoration. Additionally, the restoration benefit cost ratio did not justify the project.[28]

Frustrated by the district's study of the restoration mission, environmental groups



The Kissimmee River in its natural state, prior to the Central and Southern Florida project.

led by members of the Sierra Club lobbied Congress to give the Corps an environmental restoration component to their Civil Works projects. Congress responded by adding Section 1135 of the WRDA of 1986. This section gave authority for the Corps to include plans and construction modifications to existing projects for the purpose of improving the quality of the environment in the public interest. Further, to aid the Corps in calculating costs of restoration projects, Congress added wording that reset the method of establishing benefit cost ratios. The new wording permitted the Corps planners to calculate benefits of environmental restoration to offset costs on their projects.[29]

Armed with this authority, the environmentalists lobbied Congress to fund the restoration of the Kissimmee River. During this time the South Florida Water Management District (SFWMD), formerly the Central and Southern Florida Flood Control District, funded a study that demonstrated the possibility and effectiveness of restoration on the river. In 1989, they presented their findings to Governor Robert Martinez who publicly endorsed them. The State of Florida through the SFWMD requested Congress to authorize

a Corps study of the Kissimmee River for possible restoration. Congress complied, and five years after releasing their report, the Jacksonville District was funded in the WRDA of 1990.[30]

The Jacksonville District Report Confirmed Other Reports

The Jacksonville District submitted their study to the Secretary of the Army in April 1992. The report confirmed that the channelizing of the Kissimmee River for flood control and navigational purposes had been successful. However, the engineers found that it also resulted in long-term degradation of the natural ecosystem especially fish, waterfowl, wading birds, and other natural resources. Finally, the District officials observed that wetlands were eliminated or degraded, and overall water quality declined. Ultimately, the report confirmed what environmental groups had been saying for more than two decades: the Kissimmee River channelization was killing Lake Okeechobee (Assistant Secretary of the Army, *Kissimmee River Restoration Study*, US Congress, 2nd sess. H.D. 102-286, dated April 7, 1992, syllabus).

The estimated cost in 1992 dollars was $422.7 million; however, by 2004 it had risen to $587 million. The bulk of the financing was to come from the non-federal partner, SFWMD as agent for the State of Florida.

The state of Florida was to acquire much of the real estate necessary for the project. At the opening ceremony in 1994, Senator Bob Graham (D-Florida) commented that the Kissimmee River Restoration represented not only a historic occasion for engineering but it "is a fundamental change in attitudes and values." The Kissimmee River was only a small part of a much larger project then being discussed and planned that would culminate in an entire ecosystem restoration in the Everglades.[31]

THE COMPREHENSIVE EVERGLADES RESTORATION PLAN

The WRDA of 1990 authorized the Corps to study the original Central and Southern Florida Project and determine if modifications were necessary. This plan resulted in the Chief of Engineers report in 1992 that proposed an ecosystem restoration for the Kissimmee River. Congress went further in 1996 and authorized the Corps to study and develop a comprehensive plan for "restoring, preserving, and protecting the South Florida Ecosystem." This second plan, sometimes referred to as the Restudy, was accomplished in close conjunction with Florida state officials, local governments, and representatives of the Seminole and Miccosukee tribes; the Restudy group formed a strong interdisciplinary team with extensive public involvement. The Jacksonville District spent approximately $4.8 million in three years preparing the Restudy plan for Congress.[32]

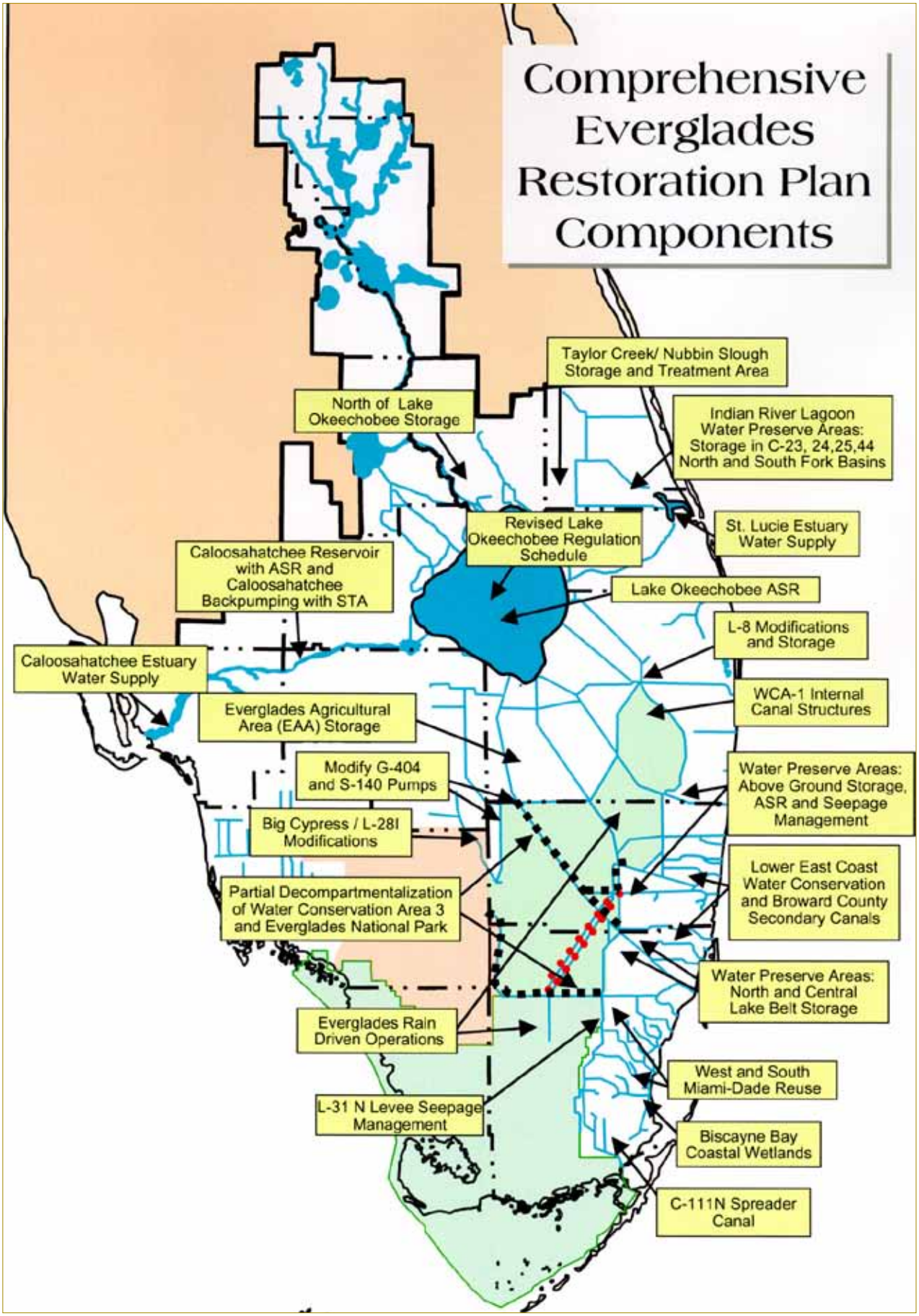
The Restudy was completed in 1999 and a feasibility report presented to Congress by Vice President Al Gore in July of that year. The Comprehensive Everglades Restoration Plan, called CERP, was dubbed the largest ecosystem restoration effort in the world. The plan provided a framework and a guide to restoring and preserving the entire 18,000 square mile

Everglades area. From the Corps' perspective, the plan was the ecological component of the original Central and Southern Florida Project authorized by Congress in 1948. However, the CERP called for substantial changes to the original project, then approximately 60 percent complete.

The plan covered the 16 counties in Central and South Florida and over 20 individual projects that took into consideration flood control and navigational needs, but equally considered water needs of the residents and the restorative needs of the region's ecology. Some of the major components included the creation of large underground water storage areas, the removal of dikes and levees that restrict sheet flow of water to Everglades National Park and Florida Bay, reuse of wastewater, management of Lake Okeechobee as an ecological resource, soil conservation, establishment and management of water preserve areas, invasive plant control, and improved water deliveries to estuaries and marine ecosystems. The plan proposed that funding be set aside for additional studies and pilot projects as they were needed. Ultimately, the plan proposed to save 1.7 billion gallons of water per day that was currently being dumped into the Atlantic Ocean and the Gulf of Mexico. Additionally, the District and the SFWMD drew upon emerging scientific and technological innovations to study models and the impact of various conditions on the region. The District estimated that implementation would take 20 years and cost an estimated $7.8 billion. It was easily the largest Civil Works undertaking ever proposed in the history of the Corps.[33]

The National Election of 2000 and the Everglades Restoration

In a strange dichotomy of events, Palm Beach County, Florida found itself in the national limelight in the fall of 2000. While the country's attention was focused on uncounted ballots in the county in November and December 2000, Congress was passing the largest Army of Corps of Engineers restoration project: The Comprehensive Everglades Restoration Plan (CERP). The Everglades plan worked in conjunction with the Kissimmee River Restoration project already underway. After lengthy negotiations, Congress passed the CERP as part of the Water Resources Development Act of 2000. On December 11, 2000, President Clinton signed the bill into law that authorized the federal government to pay for half the estimated $8 billion for the work. The announcements noted that the state of Florida had already acquired by either purchase or easement nearly 3.4 million acres at a cost of nearly $1.1 billion in the Everglades basins. In the bill, Congress authorized $1.4 billion in projects for the restoration, targeting ten of the more critical projects for immediate action. However, the announcement went almost unnoticed as most of the news media was immersed in the election chaos. Ironically, the headquarters for the Corps primary sponsor, South Florida Water Management District (SFWMD), for the program was also in Palm Beach County. (US Army Corps of Engineers, Jacksonville District, Public Affairs Office, *News Release*: Everglades Plan Approved, $1.4 Billion in Project Authorized Now, dated December 11, 2000 and Office of the Governor of Florida, *News Release*: Governor Jeb Bush and Department of Environmental Protection Secretary David Struths Attend Historic Everglades Bill Signing, dated Monday, December 11, 2000).



There are over twenty individual components to the Comprehensive Everglades Restoration Plan.

Following years of studies, the Corps broke ground on the first CERP project in 2010. In January, work began at Picayune Strand in Collier County. The project, partially funded by ARRA, involves 85 square miles of land that had been drained in the 1960s for proposed residential development. Individual components of the project include a series of plugs in 83 miles of existing canal, 227 miles of road removal, and the construction of three pump stations to help rehydrate the wetlands. The ultimate goal of the project is to restore sheet water flow across the Everglades and restore habitats for 14 threatened or endangered species in 55,000 acres of wetlands and uplands in an area surrounded by Fakahatchee Strand State Preserve, Florida Panther National Wildlife Refuge, and Collier Seminole State Park.[34]

Although not authorized as a CERP component, the Tamiami Trail Project is a major part of the overall effort to restore the ecosystem of South Florida. Constructed in the 1920s to connect the growing population centers of Tampa and Miami, US Highway 41 has been declared a National Scenic Byway. While the 264-mile drive offers breathtaking views of Everglades National Park, it is a devastating impediment for water flowing south across the northern boundary of the Park, which provided the ecological foundation of the Northeast Shark River Slough. The L-29 canal, located just on the northern periphery of the Trail, provides limited flow into the Slough through direct points at 19 sets of culverts. The Tamiami Trail Project will replace a one-mile section of the raised bed roadway with a bridge, allowing for a more natural water flow release. The Corps broke ground on the project in December 2009.

Groundbreaking on the Picayune Strand project in January 2010.

The Kissimmee and Everglades Restoration Projects were the conclusion of more than 30 years of change inside the Corps and the nation. The fact that Congress overwhelmingly supported the expense of such a large restorative project indicates how far the country has come in thinking about the surrounding natural world.

The Corps provided the means to achieve flood control, yet as they drained the swamps and built the levees, Americans became uncomfortable with the absence of natural, free flowing water. Unpredicted growth and droughts provoked citizens to debate whether some changes were necessary at all. Private groups and citizens successfully challenged traditionally held beliefs about use of water for economic and social benefits. Environmental groups employed the media and the courts to challenge Corps' reports and to present different perspectives on water use.

Meanwhile the Corps itself changed. Small beach renourishment and environmental restoration projects grew in the minds of local and national figures until SAD found itself studying, and beginning, one of the most ambitious water projects ever attempted-the Everglades Restoration. The Corps plan found broad public support, just as it exemplified what will be its next largest mission field-environmental restoration.

No longer could Corps projects ignore the environmental impact their work will have. Additionally, the internal workings of the districts in SAD were changing. No longer was closed decision-making acceptable. The public demanded the Corps publish its work on Environmental Impact Statements, collaborate with private and public organizations, and elicit and respond to public commentary on their ideas. The Everglades project confirms Senator Bob Graham's comments that restoration represents a fundamental change in attitudes and values from the past.[35]

A final conclusion regarding environmental restoration and protection could be that this is good work for the Corps of Engineers and for SAD. High quality restoration and protection require high quality engineering. With the Corps' current mix of specialists in biology, water quality, soils, cultural resources, and other areas, it is uniquely suited to take on environmental protection as a major new mission.

OPEN PLANNING AND PERMITTING

Open planning, as initiated by NEPA requirements, has come to dominate in Corps decision making. By the mid-1970s, environmental activists and affected citizen groups had learned how to present strong critiques of project effects and how to attack benefit-cost ratios that had not been well developed.[36] Public meetings became difficult, often with contention and finger pointing.[37] SAD's environmental section officials assisted the districts in preparing for controversial public meetings, especially those for the Tennessee-Tombigbee project and the Russell Lake project in the 1970s.[38]

General Ralph Locurcio, SAD Commander, 1994-1996

During the late 1980s when I was District Engineer in Savannah, I had a permit action for a project on… the White River in Alabama, near…Anniston. I remember going to a public meeting in Alabama with my Deputy, and we thought it was going to be a fairly routine public meeting. It started at noon, and ended at midnight. That was actually the beginning of the Water Wars fight. I was told at that meeting by the people in Alabama that they would only recognize the Mobile District Engineer, and the Savannah District Engineer, as far as they were concerned, had no jurisdiction in Alabama. Even though the watershed was mine, they didn't recognize that. They said, "You need to go home and send the Mobile District Engineer up here, and we'll talk to him." So that was an interesting meeting. After that particular meeting, South Atlantic was involved in Water Wars-related meetings, and they had a team in Georgia and a team in Alabama.

Open planning has been routinely carried out for all projects since the early 1980s. Documents are available to the public and to interest groups, and open, convenient meetings insure citizen involvement in the early planning and decision phases of every project. SAD's assistance with meetings and other public involvement functions has been limited since the mid-1980s to multi-district projects, policy development, and permit actions.[39]

The Corps has long had a major role in managing rivers and streams, primarily for navigation; in many instances, this also included physical and chemical pollution concerns. Congress extended the Corps' role in the late 1960s and early 1970s, and gave Corps districts authority to regulate and protect marshes and water supplies. South Atlantic Division officials implementing the new Corps policies and directives worked closely with districts to develop staff with environmental expertise, and to produce clear protocols to protect and enhance waters and marshlands. Individuals and organizations that wish to develop in, or in some way affect, wetlands or waterways, now must obtain a permit from the appropriate Corps District. Protection of clean water and the environment in general has now become a major mission of the Corps. While permits are applied for, reviewed, and granted in the districts, SAD provides legal and technical guidance when requested by the districts. SAD officials also hear appeals of permit denials by the districts.

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CHAPTER 12 – SAD LOOKS TO THE FUTURE

The years beyond 2011 will be a challenging time for the Corps and for SAD. Missions are evolving, and there appear to be new opportunities in many directions. In particular, the sudden influx of funding during the last decade with ARRA and BRAC will decrease precipitously in the next few years. Moreover, with an economic recession, Corps budgets will be cut and some Civil Works programs, such as recreation and navigation, may operate with reduced funding. It is unlikely that SAD's great programs and accomplishments of the past 50 years will form the missions of the next five decades.

The South Atlantic Division of the Corps of Engineers has, over the last half century, made major contributions to the United States and the Southeast. Its districts, Wilmington, Charleston, Savannah, Jacksonville, and Mobile, have designed and built a significant part of the region's infrastructure, including harbor facilities, canals, and reservoirs. SAD has also designed, constructed, and improved Army installations, Air Force bases, and rocket testing facilities. SAD districts also supported NASA by designing and building America's space infrastructure at Cape Canaveral, Florida. In the last 25 years, SAD coordinated work by its districts and field offices in the Middle East, Africa, the Caribbean, and in Central and South America. Now, SAD is redeveloping its missions to include emergency services for disaster relief, as well as environmental protection and restoration.

There are definite trends in what the Corps and SAD will be working on in the future. The agency's experience in supporting the Army during World War II and the Korean War helped to maintain and grow SAD's engineering and construction management capabilities, allowing SAD to move quickly into developing a new civil works infrastructure for the South in the 1950s. Over the same years, SAD provided NASA's space program with dramatic new engineering and construction projects, types of facilities that had never been designed or built before. This increased the engineering and construction flexibility and the overall capability of the Division.

In the 1980s and 1990s, the civil works and NASA projects had been largely accomplished. SAD searched for new missions and found them in the Support For Others program.

The Support For Others program involves the SAD finding and keeping customers (e.g., other agencies) who will engage and reimburse SAD for carrying out projects. SAD and its districts have long been concerned with satisfying their customers. In the 1950s, 1960s, and 1970s, the major direct customers might be considered to be political officials, federal, state, and local. As the SFO program grew, agencies of all kinds, including international agencies, also could be seen as customers. These SFO customers demand a business-like efficiency and a standard process from the Corps.

Lt. General Robert Flowers, Chief of Engineers, 2000-2004, emphasized this in a Town Hall Meeting discussion in 2004.

> I had an off-site at Fort Belvoir, Va., with the senior leaders, and we had our customers and stakeholders come in and talk to us. Our customers and stakeholders said, "You all aren't listening." They sent two very clear messages. One, "You've got great people in the Corps of Engineers and we love working with them." But the second message was, "Your processes are daunting; we don't understand them. You don't partner like a partner. When we deal with one part of the Corps, it's not like dealing with another part. We're frustrated!"[2]

General Flowers introduced the *Corps 2012* reorganization program in 2003 to meet these customer demands. *Corps 2012* is designed to provide savings in time and money, to speed project delivery to the customer, and to increase quality.

CORPS 2012, STOVE PIPES, LIFE CYCLE PROJECT MANAGEMENT, REGIONALIZATION

The Corps has long recognized that it needs to modernize its work with its customers and its management methods, and many improvements have been made. Over the last 20 years, Corps leadership has pushed especially hard to devise more effective procedures, and to utilize modern technology to its fullest. In 2003, Lt. General Flowers introduced *Corps 2012*.[3] The *Corps 2012* reorganization combines into a coherent program many of the elements of management modernization already in use in some districts and divisions, and it introduces significant new elements used in private sector businesses and organizations. General Flowers, along with key Corps leadership in the divisions, see *Corps 2012* as providing a guidebook for the future. They also see this program as essential for the Corps to survive in the future, where it will be competing for projects. Commenting in 2003, General Flowers explained why he was working to make organizational changes in all parts of the Corps of Engineers.

> So, back to why we're doing this. The nation cannot afford to have what happened to the Civil Aeronautics Board happen to the Corps of Engineers. The CAB was a pretty powerful federal aviation agency. But President Reagan deregulated the airline industry and changed the CAB's environment. They had an opportunity to change their culture, but they said, "We like the way we've always been, so we're not changing."
>
> Where is the Civil Aeronautics Board today? It doesn't exist. They broke 'em up and gave their functions to other federal agencies.[4]

SAD is the review and coordinating office for the work of its district offices, and thus its mission involves leadership for the districts, review of projects, financial administration, and general management. Immediately after World War II, SAD was an important stage in the Corps hierarchy. Projects were planned in the districts, reviewed by SAD, and when

General Robert Flowers, speaking at Town Hall Meeting.

all questions had been addressed, passed on to Headquarters for review. This was the classic "stove pipe" approach to management. It allowed great control, but it took a lot of time, and it had high cost.

Furthermore, planning, engineering, and construction divisions in each of the districts were mirrored by similar groups in SAD and at Headquarters. Therefore, a plan went up the hierarchy and down again; when the plan was approved an engineering design memorandum began the stove pipe trip, and finally sets of scopes of work for construction. There was not just one stove pipe, but many.

Managers recognized the stove pipe system as a problem, and SAD and the districts made several attempts to improve this situation. District planning divisions commonly created teams of specialists from the beginning, enabling plans to move to the engineers faster and with fewer problems.[6] It proved difficult, however, to move away from the security the stove pipe system had in terms of controlling for specifications and quality. A big part of the difficulty, too, was that stove pipes were "turf" that protected staff positions.

> **Lt. General Robert Flowers**
> **Chief of Engineers, 2000–2004**
>
> How did we do things in the past? The district designed a project and sent it up to division. The division looked at it, and they might return it. Once the division approved it, they shipped it up to Headquarters and they looked it over. If Headquarters discovered a policy issue with the project, they sent it all the way back down to the district. All this could take considerable time.[5]

Not all Corps groups were dominated by the stove pipe system, however. MEAPO provided an early example of the power of using teams from the beginning of a project rather than separating functions into stove pipes. MEAPO (Middle East and Africa Project Office) was for a time in the 1980s and early 1990s within SAD. MEAPO was "in the field" and faced relatively difficult assignments. MEAPO had short time schedules, and, since they were building such things as airfields for Saudi Arabia and navy facilities for Egypt, there were high political visibility and pressure for each project to be an unqualified success. MEAPO was continually in "emergency" mode.

MEAPO stayed very busy, especially during its time with SAD, which included Desert Shield prior to the Gulf War. General Sobke, SAD Commander sent Col. William Miller to Saudi Arabia to take command personally, and they worked closely while he was there. This allowed General Sobke and others at SAD to understand the MEAPO way of doing work. Col. Miller talked to Gen. Sobke each night, and he also reported regularly to Gen. Pagonis in Saudi Arabia.[7]

MEAPO stories came back to SAD and to the SAD districts because SAD civilian employees volunteered for duty in Saudi Arabia and would return after three to six months. Stories of selling their capabilities to generals in an entrepreneurial way, and then working together in teams, and collaborating with other units and contractors when they needed to, were quite different from the stove pipe management style still dominant in SAD and other divisions.[8] MEAPO people were different. General Sobke thought of them as "expatriates, they worked in Italy, Turkey, Greece, Saudi Arabia, and Ethiopia. They were a different breed of cat."[9]

Examples showing the potential of new management styles were accumulating, but change was greatly influenced by the J-6 Project at Arnold Engineering Development Center in Tennessee carried out for the Air Force in the late 1980s and early 1990s. As discussed in Chapter 6, Mobile District's design and construction of the complex J-4 and J-5 test facilities had not been managed within schedule or budget, even with careful coordination from SAD. Many thought that issues were magnified by the stove pipe system that characterized these two projects.

As the J-6 Project approached, SAD Engineer Brig. Gen. Forrest Gay worked with the Air Force to allay their concerns. He proposed to manage the $178 million project in a new way. He would avoid stove pipe related delays by using teams from the earliest planning through the final construction. Air Force officials would be on the teams also. Contractors were hired on a Design-Build basis. Contractors, once selected, would were brought into the teams as project partners.

The J-6 Project was finished under budget and ahead of schedule. There were no safety issues, and no post-construction claims. The new management scheme, referred to as Life Cycle Project Management (LCPM), was credited with this success.

Life Cycle Project Management, simplified to Project Management (or just PM), was promoted within the Mobile District and throughout SAD. By the 1990s, the position of Deputy Division Engineer for Program and Project Management (DDE PPM) was created at SAD. Ken Acres (SAD Chief of Engineering) was the first DDE PPM, and John Rushing (SAD Chief of Planning) was the second.[10] Each district had a new position of Deputy Director for Project Management (DDPM).

Some thought there was danger that the group dedicated to Project Management would become insular and would begin to form its own stove pipe extending from district, to division, to Headquarters. General Locurcio noted this possibility when he was District Engineer in Savannah.

John Rushing
SAD Deputy Division Engineer for Programs and Project Management, 1994–1997

From the Division level, we struggled with how we wanted to set up programs and project management because it really was a combination of different people with different skills. It should be made up of folks that had a management background, but it could be also made up of technical people. That's a big difference. As Ken Akers used to describe it, some of it was just scribes and writers. That's what they called a lot of the PMs, and they weren't really able to manage their jobs. They were just managing the paperwork and reporting to higher authority. We tried to get away from that in South Atlantic Division by using our project managers to focus more on accomplishing the work, being sure the work got accomplished by the districts.[11]

> One of the things that I tried to do in Savannah after we set up this project manager system, basically the Corps was going to a district DDPM [Deputy Director Project Management] system where they were going to have a civilian deputy be in charge, be the principal deputy for project management. The thing I did not want to do was to have the DDPM create a new division called project management, which is a new stove pipe, which is the way the Corps is organized today.[12]

Corps 2012 also recognized this potential problem and therefore reorganized the Corps functional divisions. Decision making now flows through different paths. First, *Corps 2012* emphasizes the concept of *One Corps*.[13] *One Corps* is designed to shift the vision of Corps units from a parochial, in-group focus to a view of the interdependence of functional groups (formerly stove pipes) and echelons (district, division, and headquarters). While functional groups and echelons were recognized to have different roles and responsibilities, *One Corps* calls for officers and civilian officials to recognize that the overall team approach is the way to be successful. The teams, as defined by *One Corps*, are often best when they have cross-functional membership, and when they work closely with similar teams at different echelons.

Regional Integration Teams (RIT) and Communities of Practice organizations are also part of the *Corps 2012* push against the insularity of stove pipes. RITs are formed at Headquarters from officials from different functions such as planning, operations, budgeting,

engineering, public affairs, and construction analysis, and legal affairs. A RIT meets to review the activities of a region (a division and its districts), identify issues of concern, recommend solutions, and finally, guide the division and districts so that Headquarters' formal reviews will go smoothly. A Headquarters engineering official, for example, may be sitting on a RIT for SAD and, during a meeting, recognize a potential engineering problem if a division plan (as presented by the planning official on the RIT) goes forward. The engineering official can speak up and suggest plan modifications early in the process; other RIT members can consider the impacts of modifications immediately during the discussion. In theory, RIT members will, over time, learn to recognize issues of other members early in the process, and time devoted to discussions of problems will decline.

Communities of Practice further work against the stove pipe system. The CoP concept collects groups of specialist practitioners (e.g., public affairs officials, archaeologists) at different echelons (Headquarters, divisions, and districts), and in different functional groups (e.g.; regulatory, operations, planning). These groups would have meetings, conference calls, newsletters where they can see issues faced by their opposite numbers in other units. This organization allows exchange of information and development of "Best Practices" for solving common problems. In addition, the CoPs can help the practitioners better understand the *One Corps* vision; they work with, give help to, and get help from others at various levels and in different functional groups.

Regional Business Centers are considered the primary unit for business operations.[14] RBCs are made up of the Division and its districts. A Regional Management Board, with senior representatives from each district and from the division, is chaired by a Director of Regional Business. The Regional Management Board recommends initiatives and decisions to the Division Engineer. The focus for the Regional Management Board is to increase the amount of business (projects) for the RBC, and to insure efficiency and quality. Importantly, the members of the Regional Management Board are appointed to represent different echelons (division and district), but also to provide a variety of technical management, resources, and engineering expertise. That is, the Regional Management Board is cross-functional. Other organizational innovations are also part of *Corps 2012*.

Regionalization is a new, twenty-first century word defining a process that has long been in place at SAD. In Chapter 3 we described how SAD worked to balance district workload by adjusting district boundaries (civil works and military support), and even by assigning major projects across district lines. There were also attempts to close the small Charleston and Wilmington District offices; these attempts failed with Congress. Regional sharing of work was tried, but individual district traditions and Congressional politics limited the success of this attempted efficiency.

Sharing work among districts was difficult. Usually, there were turf considerations between the leaders of different districts. Another problem has been the fact that charge-out rates for specialist positions were different district to district, as were standard overhead

General Walsh
SAD Commander, 2004 to 2006

[Before arriving at SAD] In the San Francisco District, I had 170-190 people. I got a large increase of workload, and I was hiring 20 folks into my district. I briefed the Division Commander, General Scott, and he asked "Well Mike, what are your issues?" I said "Well, I'm trying to bring in 20 new guys and teach them how to be government employees." He just started chuckling and he said "I just came from seeing Colonel Reese, the Commander in Sacramento District, and he's RIFing 40 guys [Reduction in Force]. The Colonel says his biggest problem is firing people. And here you two are 100 miles apart, you're having a hard time hiring and he's having a hard time firing. There's something wrong here." As a District Commander, you're concerned about your district, not someone else's. If I can bring in 20 new folks, that makes be bigger, and if I'm bigger I must be better. After a few more years, I'm recognizing that's incorrect.[15]

and handling fee rates.[16] Actually moving people from one district to another was very costly and usually not so appealing to the officials being moved. Traveling back and forth for meetings is expensive, telephone communication doesn't include documents, and mail collaboration is slow.

General Michael Walsh.

SAD faced a rapidly changing world in the last decade of the twentieth century. Technology was creating new and faster methods of transferring and saving information, images, and voices. Words like cell phones, e-mail, laptops, compact disks, gigabyte, scanning, and virtual reality became household terms. The media began referring to the period as the "information age." Just as the districts looked at changing their methods of doing business, so SAD officials and employees adopted the fast changing technology.

As computers and networks began to appear in SAD and the district offices, new opportunities for work sharing were available. Email communication, transfer of documents, and even virtual meetings using video conferencing became, year by year, more possible and easier to use. Collaboration among officials in different offices within SAD for project management and administration became an element for efficiency by the mid-1990s.

WE HAVE MET THE ENEMY AND HE IS US!
THE TECHNOLOGY REVOLUTION HELPS TRANSFORM THE DIVISION

Computers were not new to SAD districts in the 1990s. Data processing units for payrolls were in districts as far back as the 1960s. In the late 1970s, SAD districts began experimenting with smaller desktop computers, especially for use in field offices and for storing and using operations and maintenance records, and in engineering for complex engineering computations. Gradually, desktop computers came into use, but not always with eager acceptance. As late as December 1991, *Military Engineer* magazine reported that despite an effort to get computers into key individual's hands, there seemed to be a lack of commitment by the Army Corps of Engineers management to use them.[17]

In the mid-1980s, SAD districts began to consolidate their Automated Data Processing Centers and their Administrative Services into a new Information Management Office. For example, the Mobile District consolidated the office automation, communications including data and radio, printing and publishing, records management into several branches under one chief.[18] Shortly afterward, customer assistance centers appeared.[19]

In 1988, SAD district officials began using Computer Aided Design and Drafting (CADD) in their engineering divisions. These desktop drafting computers quickly replaced the draftsman and his T-square and pens. Savannah District engineers and planners estimated that using the system, a draftsman could turn out three times as much work as a manual system. By 1994, the districts were using 3-D mapping that showed the item being drafted in three dimensions.[20]

SAD and the Social Media Revolution

During the last decade, computers have gotten smaller, email can be read on a cell phone, and SAD is capitalizing on these technological innovations. For instance, SAD has its own website, Facebook page, and Twitter account. While security is always a concern, SAD finds value in connecting with its customers and the public through these media. For example, during emergencies such as hurricanes or floods, subscribers to SAD's Twitter account can receive public service announcements and post field observations.

Officials observing the speed, accuracy, and efficiencies gained in the engineering and construction fields were spurred to consider other uses. Electronic mail was available in the early 1990s, and the Mobile District first experimented with using the new medium during their work on the Panama Canal Treaty Implementation in 1992. When fast communication was necessary between District offices on St. Joseph St. in downtown Mobile and the Panama Canal Treaty Implementation Office that moved down the street, officials began to use an area network to link the two offices to each other allowing email use.[21] Within months, the two offices were sending volumes of paper reports by electronic mail for instant review.[22]

By 1996, Jacksonville District made headway in using electronic communications, and they were tasked with setting up the Corps's satellite communications system called

Very Small Aperture Telecommunications (VSAT). VSAT was established to ensure the Corps' ability to communicate via satellite in emergencies anywhere in the world. By this time, main frames and car phones were long gone, as most project managers were using cell phones and personal computers, while planners and engineers were experimenting with Global Information Systems, and exploring the internet.

In 1994, Division Engineer, Brigadier General Ralph Locurcio announced that a thrust of his tour was to use electronic technology to unite SAD districts into a "regional village." Locurcio's idea was to standardize information products and business practices across SAD. Then he planned to link them so each district could communicate with the other, electronically. This involved establishing common e-mail software, graphics, word processing, and spreadsheets across all districts. Additionally, he planned to establish set business practices methods, such as how SAD would carry out their Project Management program. Locurcio saw that "with reduced manpower a reality within South Atlantic Division, we need to be able to tap all available resources to get the job done."[23]

Essentially, Locurcio's idea was to digitize databases to enable better electronic linkages between the districts and ultimately with their customers on the outside. As Savannah District Engineer Wayne W. Boy told his employees in April of 1995, the idea was crucial because, "as the [work] force grows smaller we will focus on the automation of all functions possible to derive maximum efficiency."[24] A Mobile District official keenly observed, "[though] the primary objective is to bring ease and speed of work to the individual worker [the underlying objective is] to produce far more work [that] translates into lower costs and higher income."[25] Locurcio explained further that SAD must reduce redundancies, because in the future "the Corps cannot guarantee job security to those not willing to change."[26]

Unfortunately, Locurcio was several years ahead of the times. His efforts to establish common programs never became reality during his tour (though they did later). He also ran into network limitations between the districts. Some districts were able to establish an area-wide network within their district, but others were not. At the same time, the internet became more readily available, and technology itself put Locurcio's plan into place before the end of the decade. The idea was right, but the method had to await faster technology. Additionally, the program ran into SAD efforts to implement the Corps of Engineers Financial Management Software (CEFMS).

CEFMS was a fully integrated finance and program management system specifically designed for the Corps of Engineers to help Project Managers better control costs. Assistant Secretary for Civil Works Robert Paige, seeing that Life Cycle Project Management needed an up-to-date, technologically advanced software system to work closely with Project Management, initiated work on the program in 1988. The software was first implemented at Huntsville District in December 1993. In May of 1996, all SAD went online.

Training was exhaustive and the changeover very stressful. So much that the Corps monthly newsletter, *Engineer Update*, published articles about districts, such as New Orleans, that devised innovative and humorous ways of dealing with the stress of getting used to the system.[27] As a result of the change over, districts set up help desks. Specially trained officials were tasked to work out CEFMS problems, aid employees with additional training, and work-arounds, as well as providing additional training. One Mobile project

General Ralph Locurcio
SAD Commander, 1994–1996

[When I arrived at SAD] I learned of the problems associated with the small districts like Charleston and Wilmington that were going to have to turn down projects because they didn't have the skill base. So when I got back to Atlanta I thought about that for a while and I came up with the idea that it was my responsibility as the Division Engineer, in terms of adding value to the Division, to find a way to use the internet to link these districts together. Back then, we were talking about a Global Village, and I said I'm going to apply this Global Village idea to the southeast of the United States. I'm going to create a Regional Village. Regional Village ultimately became the different process centers for the Corp. I guess it was [Chief of Engineers LTG] Ballard who picked that up and [LTG] Flowers who brought it to fruition. I always feel like we started that in South Atlantic.

One of the things that I did at a senior leader conference was I started a process of bringing two thirty-something young members from every district to the senior leaders conference so that we always had 10 young people there. We always gave them a think piece to work on. During the first one, the think piece that we gave them was the Regional Village. How would you implement the Regional Village? And the theory in that was that the young people truly understand the internet much better than the gray haired people.

And they put together a group; they called themselves the Village People, interestingly enough. I laughed in the conference; they dressed up as the *Village People*, and showed up and presented a model that eventually became the Regional Village, and they actually designed it. I still have a picture of the *Village People* on my wall here at the university. Kind of funny because they had music and everything.

manager commented, "it seems like a lot of work for the benefits gained," while another bemoaned, "I hope that a year from now I can look back and say it was worth it!"[28] CEFMS, for all the complaints and difficulties, pulled the Corps and SAD into the computer age. All district employees had to learn to use the system, thus they became computer literate.

Using computer networking to gather a project team became more and more common for SAD in the late 1990s and in the new century. *Corps 2012* pushed this process further. Whole divisions in smaller districts (e.g., Real Estate, Planning) were assigned to a division chief in another district. They might work in Savannah District physically, but report to their chief in Mobile District. Even further, the chief in Mobile District might assign the Real Estate official to a project in South Carolina. This system was designed to allow SAD to keep district offices open and viable, while working effectively and efficiently. General Walsh even speculated that district boundaries could be abandoned, and district offices

may become like private sector branch offices that serve particular clients, not a state or a watershed. [29]

General Walsh saw the future of SAD working smoothly with its multiple offices (district offices) in concert. Emergency Services as an ongoing program could be cited as an example of this future. In an emergency, people usually put aside parochial concerns and work together to resolve the need; it is well documented that SAD and other Corps officials do this for hurricane relief and other disaster emergencies. SAD created a regionalized approach to Emergency Services, and it became the national model for other divisions. This approach could be implemented function by function as the stove pipe and district focused culture changes.

Was regionalization successful? Perhaps to a limited extent. The technological advances of networking and videoconferencing certainly enabled a level of better communications. Regionalizing smaller programs, such as Emergency Services or Cultural Resources, has been shown as an efficient use of time and resources. However, there are certain larger programs, such as Contracting or Planning, that require a district-level presence where they can be responsive to the district commander, who is ultimately responsible for the project and is accountable to the customer. Under the command of General Todd Semonite, SAD is now taking a balanced approach to regionalization, searching for the best methods of delivery and regionalizing where it is efficient.[30]

General Walsh
SAD Commander, 2004 to 2006

"How do we become more efficient and effective in the future?" If we continue to become more efficient on a district-by-district level, we'll never get to the area of where we need to be efficient like the large firm that we are. Essentially, the Corps is a $13 billion firm that's run by 42 separate districts, and they run it to the borders of their districts, so you're not going to get the efficiency from that perspective. The Army has told us they are tired of us learning over and over how to do things. Savannah is the barracks center of expertise for the Corps of Engineers, but if you don't know that or are arrogant enough to say "I'm not going to go to Savannah, I'll do it myself," what are you going to learn from the mistakes that you make? It could be mistakes that we had already learned how to address.

USACE CAMPAIGN PLAN: BUILDING STRONG

In 2008, Chief of Engineers Robert L. VanAntwerp (former SAD division engineer) directed the Corps to institute a new management philosophy based on the book *Good to Great*. This new campaign plan was defined as:

- delivering superior performance in all missions;
- setting the standards for our profession;
- having a unique, positive impact on our Nation and other nations;
- built to last evidenced by a strong "bench" at all levels – educated, trained competent, experienced and certified.

In this new philosophy, the path from "Good to Great" is paved with a balanced workforce and certified professionals to carry out the challenge of managing the largest military construction workload since World War II. With thousands of employees reaching retirement, the Corps will require a younger and more diverse workforce. The Corps-wide "Campaign Plan," consisting of a nation-wide DoD and Army strategy, is supported by regional Implementation Plans at Corps Divisions, Operation Plans at Corps Districts, and My Plans for the individual Corps employee. This campaign strategy is a democratic approach to fostering support in each level of an organization and to ensure that individual, district, and division actions are supporting the overall Corps mission.

General Todd Semonite takes command of SAD.

In addition, the Corps' Campaign Plan recognizes that each of its 42 districts is in constant competition for a limited amount of funding. But, each district possesses certain unique capabilities and skill sets. SAD approached its Implementation Plan (I-Plan) with the questions, "What are we good at, what do we have the passion for, and what is the economic engine that supports our work?" Rather than try to provide an unlimited number of services for everybody, the goal is to identify what the organization can do, and do great to support the engineering solutions to the nation.

SAD MISSION:

Provide vital public engineering services in peace and war, to strengthen our nation's security, energize the economy, and reduce risks from disasters.

Under the leadership of General Semonite, SAD developed an I-Team team to identify goals, define the metrics for "Good to Great" success, and develop key tasks for each product line at the agency. Each initiative is tied into the Corps' Campaign Plan and each is assigned an employee "Champion" to oversee that goal's transition from "Good to Great." For example:

> Goal: Deliver enduring and essential water resource solutions through collaboration with its partners and stakeholders.
> Great is: A holistic focus on water resource challenges and opportunities that that reflects coordinated development and management of water, land and related resources while maximizing economic services and environmental quality and ensuring public safety while providing for the safety of vital ecosystems.
> SAD Action: Take steps to transform the Civil Works Planning process in order to efficiently evaluate and propose solutions to water resources problems.
> Purpose of Action: In an effort to transform the Corps planning process into the Twenty-First Century, we will identify impediments to completing feasibility studies within 18 months and propose policy and legal changes needed to achieve that goal. Additionally, the purpose of this action is to undertake clear tasks to improve the competence and capability of planning project delivery teams.

Each supporting task has clear role responsibilities for Corps Headquarters, SAD, and the individual District, along with a set of metrics to measure the goal's progress and ultimate success. Individual tasks may include particular projects such as the Everglades Restoration or harbor deepening, or outlining areas for continuing education and

training.[31] SAD conducted weekly In-Progress Review (IPR) meetings to discuss the I-Plan's development and metric status. The organization then reviews the I-Plan annually to share lessons learned, remove accomplished actions, and identify new ones.

In addition, rather than mandating an Operating Plan (O-Plan) to the individual districts, General Semonite met with the districts on a quarterly basis and encouraged each to develop their own definition of greatness within each business line. "If everybody [in the Corps] were to do that on their own," he said, "from the administrative assistants to the boat drivers, then I think we'd be a better organization across the board."[32] General Semonite has already seen varying levels of success in terms of being a "best value" Corps division, project completion and cost, and customer service and quality.

SAD's I-Plan vision came at the right moment to assist with large-scale BRAC projects. For instance, by having individual actions and metrics associated with the construction of multiple 4-Star Headquarters buildings, SAD was able to actively manage a challenging project completion schedule.

Thinking Outside the Box: Customer-Funding

As of this writing, the nation is suffering from an economic recession that is not expected to recover for several years. With both the BRAC and ARRA funding ending, SAD's workload will retract to pre-2000 levels. What SAD missions will be prioritized? Will recreation areas be closed? Will locks and dams operate on a limited schedule? New solutions and business practices will be required, but perhaps an option is already in place.

Beginning in the 1990s, studies showed that hydroelectric plants operated by the Corps were less reliable than those of private industry. The reason? Many of the dams were constructed over a half-century ago and were suffering from age-related maintenance issues. Because the operations and maintenance money is appropriated on an annual basis, funding for emergency repairs was difficult to acquire. In partnership with the Southeastern Federal Power Customers and the Southeastern Power Administration, SAD worked to develop Memoranda of Agreements to allow customers to fund repairs through their power rates to insure reliability. These public-private partnerships may be the best option for supplementing the cost of Corps services that may otherwise fail to receive Congressional appropriation.

FUTURE MISSIONS FOR SAD

We do not now know what civil works projects might be required by the nation in the twenty-first century. We do know that there is increasing demand for water supplies, and that SAD is in the center of the "Water Wars" disputes ongoing at this time among Alabama, Florida, and Georgia. However these disputes are resolved, it is likely that SAD and the Corps will be involved in important ways. SAD controls, in its reservoirs, most of the available water in the disputed watersheds. Development of new ways to move water from areas of abundance to areas of need could be a massive Corps engineered program. Similarly, the

Corps' knowledge of water resources and engineering might be used to explore new ways to design and build desalinization plants.

As civil works and space facilities programs were becoming less active, SAD searched for new missions and found them in the Support For Others (SFO) program. In this program, the SAD and the districts made themselves available for helping other federal, state, and local agencies on a reimbursable basis. SFO projects can be done internationally, reimbursed by the supported nation, or by US or international agency grant funds. As SAD and the Corps become more efficient in providing customer value and quality services, SFO programs could have a bright future.

Emergency services were developed by SAD (and by the Corps nationally) as an SFO type program. These services are now considered as making up a separate, stand-alone mission. SAD continues to be a national leader in designing, planning, and delivering emergency services, working closely with FEMA and with state and local agencies. It seems likely that the Corps and SAD will continue to advance this mission in the twenty-first century.

Environmental protection and restoration has been a new mission for the Corps, especially SAD. SAD's embracing of the environment as a new mission may be surprising to SAD officials of 30 or more years ago, but in many ways this mission is a logical development. SAD built considerable expertise in archaeological, historical, and ecological resource studies in evaluating environmental effects of its construction projects. The Corps' focus on water resources began with hydrological concerns, but this may have helped the agency's capability to work with ecological and health issues of the nation's wetlands and waterways. SAD's Everglades Restoration project may in the future be seen as the first major example of environmental engineering by the Corps. Certainly, there is a global need for environmental study and restoration. It could be the Corps of Engineers and the South Atlantic Division that become the nation's and the world's experts in rescuing and rebuilding the environment, using their planning, engineering, and management capabilities.

ENDNOTES

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