IN THE ERA OF LIMITS

A Galveston District History Update, 1976–1986

Bonnie B. Pendergrass, Ph.D., with
Lee F. Pendergrass, Ph.D.,
Editor, PenSEC, Inc.

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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

BERH	Board of Engineers for Rivers and Harbors
CA	Commercial Activities (Program)
CADD	Computer-Aided Design and Drafting
CEQ	Council on Environmental Quality
DE	District Engineer
DOE	Department of Energy
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Administration
FWPCA	Federal Water Pollution Control Act
FY	Fiscal Year
GICA	Gulf Intracoastal Canal Association
GIWW	Gulf Intracoastal Waterway
gpm	gallons per minute
ICP	Industry Capability Program
ISB	Installation Support Book
LMVD	Lower Mississippi Valley Division
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPS	National Park Services
O&M	Operations and Maintenance
OBO	Ore-Bulk-Oil
OCE	Office of the Chief of Engineers
OMB	Office of Management & Budget
PACR	Post-Authorization Change Report
PELCO	Pelican Terminal Corporation
PWA	Public Works Administration
rpm	revolutions per minute
SEIS	Supplemental Environmental Impact Statement
SIPACR	Supplemental Information to the Post-Authorization Change Report
STOP	Stop the Terminal on Pelican
SWD	Southwestern Division
TDPA	Texas Deepwater Port Authority
TP&W	Texas Parks & Wildlife (Department)
TWC	Texas Water Commission
VLCC	Very Large Crude Carriers
USFWS	United States Fish and Wildlife Service
WES	Waterways Experiment Station

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Lee and Bonnie Pendergrass
PenSEC, Inc.
Edmonds, Washington

INTRODUCTION

When the Corps of Engineers was first established, America was a brash, optimistic upstart challenging England. As the nation grew, its optimism and belief in endless opportunities were at times tested. With the maturity of the 1970s and 1980s, the United States now appears to be entering an "era of limits." It no longer has seemingly unlimited resources. The deteriorating environment and the burgeoning federal deficit have tempered optimism with concern.

The Corps, too, is facing more constraints. Many of these grow out of the environmental laws passed in the last two decades, beginning in 1969 with the National Environmental Policy Act (NEPA). Galveston District projects such as Wallisville and the Corpus Christi 45-foot channel exemplify new limits imposed on the Corps.

Other curbing arises from budget constraints, which in turn translates into manpower constraints and limitations on the number of projects the Corps can successfully complete each year. Budget limitations hit a District such as Galveston particularly hard because such a large portion of its budget is for operations and maintenance, particularly dredging, which cannot easily be deferred.

At the same time, the Corps is being asked to do more and more. Its regulatory responsibilities have increased, for example. In a 1989 speech to the American Consulting Engineers Council, Lieutenant General Henry J. Hatch, Jr., Chief of Engineers, predicted that environmental engineering will be the major growth area for the Corps in the 1990s. The Corps will also be doing more design-build work because agencies are requesting it. The 1990 budget request for the Corps was 35 percent lower than in fiscal year 1989.[1] However, more money would not necessarily assure that more Corps' projects would be completed. At one time, Americans believed that any engineering problem could be solved or any project completed if enough money were available. Although many people still believe this, environmental issues can indefinitely stall or kill a project no matter how much money is made available.

Because of this "era of limits," both the military leadership and civilians in the Galveston District have often been frustrated by court battles, delays while local sponsors try to raise their share of project costs, and by cutbacks and consolidations which not too long ago threatened the very existence of the District. At times, this contributed to a "siege mentality" in the District, an attitude reinforced by the loyalty most employees feel toward the Corps. The decade 1976 to 1986 was not "business as usual" for the Galveston District; it was one of the most difficult periods of change in its history. Attitudes, strategies and procedures developed in these years will help carry the District into the 21st century.

REFERENCE NOTES

[1]Seattle *Daily Journal of Commerce*, July 26, 1989.

Chapter I

A MULTITUDE OF MISSIONS

The Galveston District was founded amid the prosperity and optimism that characterized Texas in the 1880s. Whether building a seawall in the wake of a devastating hurricane, designing military projects, dredging navigation channels or fighting floods, the District's "can do" attitude reflected the brash confidence for which Texans are known. But in the 1970s and 1980s, both Texas and the District entered a new "era of limits." Fewer resources and more regulations marked a change from the District's earlier history, making it more difficult to accomplish its traditional missions.

The Galveston District has been shaped as much by geography and environment as by the engineering and military tradition of which it is a part. Of the five Districts within the Dallas-headquarted Southwestern Division of the Corps of Engineers, only the Galveston District is concerned primarily with coastal activities.[3] The District includes 400 miles of coastline, 720 miles of shallow draft channels, 260 miles of deep draft channels and seven jettied entrance channels serving a dozen major ports. It extends inland about 100 miles. Understandably, navigation and flood control have dominated the District's agenda. Together, career military men and civilians in the Corps have battled hurricanes and floods, created and maintained deep draft channels and ports, and developed programs to prevent beach and shore erosion.

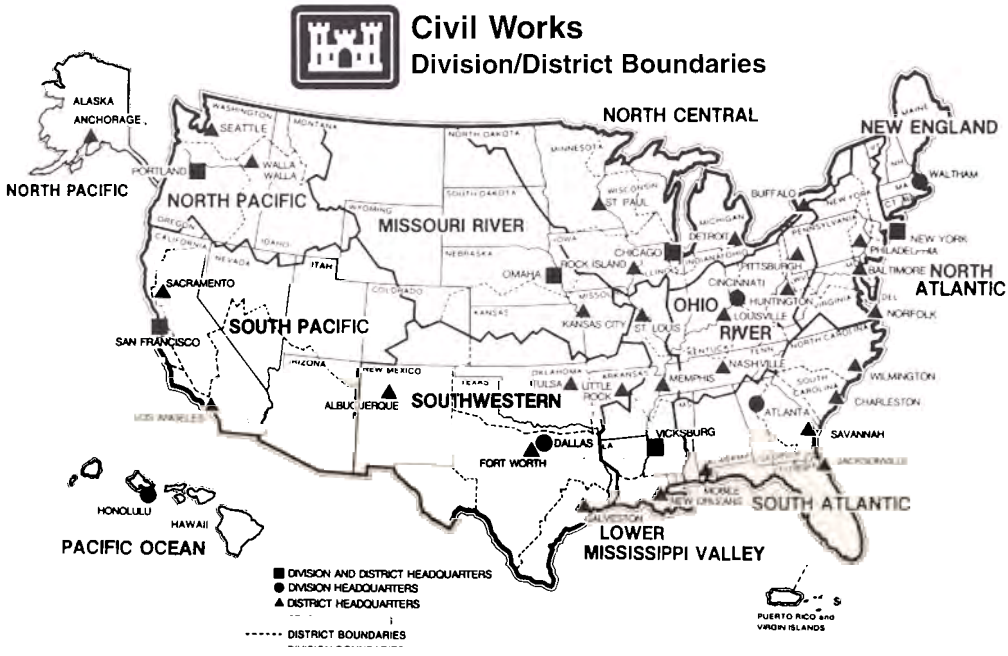
While the District, one of the oldest in the Corps, it best known for its civil works activities, it also has had a military mission. This mission underlies the

The Engineer Corps should be composed of officers of no ordinary merit & talents. To be a skilful Engineer requires long practice, severe discipline of mind, and a rare combination of talents & acquirements.

—John C. Calhoun,
Secretary of War, 1820[1]

The events during the storm could not be described. Women and children were crowded into the Tremont Hotel ... and all night these unfortunates were bemoaning their losses of kindred and fortune ... The City of Galveston is now entirely submerged and cut off from communication.

—James C. Timmins
to the *New York Times*,
September 10, 1900,
following the 1900 hurricane[2]



Civil works divisions of the Corps of Engineers are shown on this map. The Galveston District is in the Southwestern Division.

The Corps of Engineers was part of the Continental Army before the Battle of Bunker Hill.

entire history of the Corps, one of the country's earliest military organizations. In fact, the Corps is one year older than the nation. When the Continental Congress organized the new Continental Army on June 16, 1775, just one day before the Battle of Bunker Hill, the resolution provided General George Washington with one chief engineer and two assistants. An actual Corps of Engineers, however, was not formally established until 1779.

Engineering efforts during the Revolutionary War were confined primarily to reconnaissance, mapping and building defensive fortifications. Once the peace treaty with the British was signed in 1783, the Corps disbanded. After an 11-year hiatus, it was recreated in 1794 as the Corps of Artillerists and Engineers to build coastal fortifications. In 1802, the technical base for the Corps of Engineers as we know it today was provided by President Thomas Jefferson, who persuaded Congress to establish a military academy at West Point to provide the nation with professionals trained in engineering who would serve the country both in and out of uniform.

The responsibilities of the Corps expanded in 1824 with passage of the General Survey Act, which formalized the use of army engineers in civil engineering work and authorized surveys of roads and canals of national importance. With funds appropriated under the 1824 Rivers and Harbors Act, the Corps began clearing snags and sandbars from the Ohio and Mississippi rivers to facilitate navigation. This became one of the most notable Corps responsibilities.

The ability of the Corps to perform its duties depended upon the congressional authorization and appropriations process. Technically, the Corps does not initiate projects, though the public generally does not understand this. Instead, projects are initiated by local governmental sponsors acting through their congressional representatives. This has been particularly true in the 20th century. Congress first approves the projects as part of the authorization process, but this does not mean that money is available to begin design or construction. A project may be authorized for years before Congress appropriates funds for implementation. When money is appropriated, the Corps serves a dual role, functioning as an engineering consultant to Congress and overseeing implementation. The Corps may either do the work itself or, as it has tended to do more recently, contract it out. As the role of the Corps has expanded, including its role in Texas, so has its need for appropriations for both operations and maintenance (O&M) and new construction.[4]

Some of the early appropriations for the Corps, however, were for neither O&M nor new construction. Topographical officers, called geographers during the Revolution and later called topographical engineers, served as surveyors, explorers and cartographers.[5] They accelerated the movement of Americans into the trans-Mississippi West, but the Corps was not particularly interested in Texas until the United States annexed Texas in 1845 and war with Mexico seemed imminent. By then, Galveston was already a bustling port, no longer home only to Karankawa Indians or the notorious pirate Jean Lafitte. First discovered by

Europeans when Cabeza de Vaca was cast ashore in 1528, and named for Conde de Galvez, a former governor of Louisiana, Galveston Island was one of only five settlements in Texas with more than 1,000 people.[6] Even then, commerce handled by the port exceeded $1 million per year.

The 28-mile-long island and the port were strategically located along the Texas coast, but their geography also presented special problems. The island itself was extraordinarily low; the highest point was 8.7 feet above the Gulf. This subjected Galveston to heavy flooding during tropical storms, which would hit the coast between June and October.[7] The island, particularly the eastern tip, was also subject to erosion from ocean currents and prevailing easterly winds. At the same time, two sandbars obstructed entrance to the port from the Gulf, preventing the port from becoming a true deep draft harbor. Large, ocean-going vessels had to lighter offshore; that is, unload their cargo onto smaller vessels drawing less than 12 or 13 feet of water over the bars. This cost both money and time.

Following the Mexican War, which ended in early 1848, there was a brief flurry of federal interest in the Texas Gulf Coast after Texas became a U.S. territory. Interest in the coast waned, however, as attention turned to inland railroad routes instead. Under the Rivers and Harbors Act of 1852, the Corps surveyed Galveston Harbor, but no money was appropriated to remove the bar at the entrance despite a proposal in 1853 by Lieutenant Walter H. Stevens to construct a breakwater to reduce shoaling.

The pirate Jean Lafitte (pictured) and Spanish explorer Cabeza de Vaca were early visitors to Galveston.

The Galveston District follows the curve of the Texas coastline and reaches approximately 100 miles inland.

Navigability at the mouth of the harbor deteriorated further during the Civil War when Texas was part of the Confederacy. A chain-and-pile blockage across Galveston Channel by the North accelerated shoaling. By 1867, only 9.5 feet of water covered the inner bar at mean low tide. The outer bar was still about 12 feet below the water.

The year 1867 also marked the beginning of continuous federal involvement along the Texas coast. It also marks a dramatic increase in civil works appropriations in the wake of the Civil War. Between 1866 and 1882, Congress passed and the president signed 16 rivers and harbors bills. During this period, appropriations increased from $3.7 million in 1866 to $18.7 million in 1882.[8] With the passage of the Rivers and Harbors Act in 1867, the Corps, under the direction of the New Orleans Engineer Office—a regional office established under Corps postwar decentralization—began seriously investigating ways to increase channel depth at Galveston. Two other projects also were sporadically investigated in the

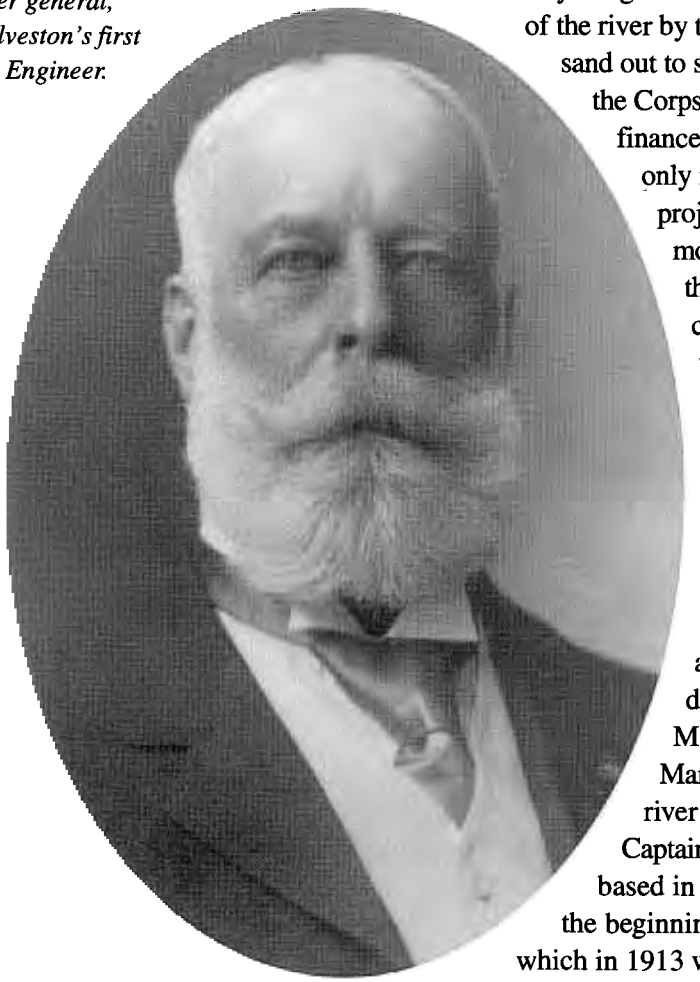
next two decades. One would provide a navigable route through Galveston Bay and Buffalo Bayou to Houston—40 miles above Galveston—and create a rival to the Port of Galveston. The other would connect inland waters along the margin of the Gulf of Mexico—a Gulf Intracoastal Waterway.

Upper right: Shown here during construction, the first jetties off Galveston Island were gabions. Some were destroyed in the 1877 storm.

None of the Galveston projects were immediately realized. Despite expenditures of nearly $500,000, by 1880 the Galveston Channel was still only 12 feet deep at the outer bar. A violent storm in 1877 destroyed some of the gabion jetty system that was being constructed to fight shoaling. The open waters of the Gulf slowed construction and the general consensus in 1880 was that the jetty still was not long enough to increase the depth over the outer bar. Throughout Texas, pressure grew for a solution.

The completion of "the most difficult piece of engineering in river hydraulics" at the mouth of the Mississippi River convinced Texans that a remedy was possible. Despite Corps dredging, the channel from New Orleans to the Gulf of Mexico filled again and again with debris and sand until the brilliant engineer, James Eads, proposed building jetties to contain the river and deepen it. The swifter current created by the greater volume of water contained within the banks of the river by the jetties would naturally carry debris and sand out to sea. Many engineers, including members of the Corps, were skeptical. Eventually, Eads offered to finance the project himself; he would be reimbursed only if it worked. By 1879, four years after the project began, the river had dredged itself, removing a sandbar obstructing the mouth of the Mississippi and creating a 31-foot-deep channel to New Orleans. Eads' success was widely publicized.[9]

Below: In 1880, Major Samuel M. Mansfield, who later reached the rank of brigadier general, was Galveston's first District Engineer.



In order to facilitate their own harbor development and ensure that a fair share of the appropriations was duly received, Galvestonians became convinced that it was important to have a high-ranking army engineer in Galveston. Local citizens and businessmen were vocal in their demands and *The Galveston Daily News* took up the drumbeat. In February 1880, 40-year-old Major (later Brigadier General) Samuel M. Mansfield arrived in Galveston to take over river and harbor improvements in Texas from Captain (later Major) Charles W. Howell, who was based in New Orleans. Mansfield's arrival marked the beginning of the regional Galveston Engineer Office, which in 1913 would become the Galveston District.

Under Mansfield, who would serve in the post for nearly seven years, the Engineer Office in Galveston promptly became involved in a number of projects up and down the Texas coast. Under the 1880 Rivers and Harbors Act, $175,000 became available to improve Galveston Harbor. However, construction of a south jetty failed to produce the 18-foot depth over the bar that Galvestonians expected by the fall of 1883. One of the reasons was that a similar jetty to the north had not yet been constructed. Galvestonians were understandably disappointed and frustrated. After the Texas Legislature authorized coastal cities to issue bonds for harbor improvement in April 1883, the city had issued $100,000 in city bonds to help fiance the project. Many local citizens, like many engineers in the Corps, believed that there was no engineering problem that could not be solved if enough dollars were available.

Construction of the Galveston jetties was repeatedly plagued by work stoppages when appropriations ran out; between August 1882 and August 1886, for example, no money at all was appropriated for Galveston Harbor. Finally, in 1890, Congress acknowledged the folly of spreading appropriations too thin. It began to concentrate upon a few larger, better harbors, including Galveston. By 1897, under the direction of the Corps, both the north and south jetties had been completed. Together, they were the longest jetties in the world. The depth over the outer bar was now 25.5 feet and over the inner bar, 26 feet. Galveston was a deep water port, a very real threat to Houston, which had built a thriving barge business during the years sandbars obstructed the entrance to Galveston Harbor. Houston city fathers mounted a campaign to deepen the Galveston Ship Channel and Buffalo Bayou so Houston, too, would be a deep water port.

The Corps built the longest jetties in the world to protect Galveston shipping. By 1897, the north and south jetties were complete, and Galveston was a deep water port.

By 1897, the Galveston Engineer Office had seen other changes as well. Mansfield was followed in November 1886 by Major (later Major General) Oswald H. Ernst, who served for three years. In November 1889, Major Charles J. Allen assumed the post, serving until February 1893. During this time, there was a basic organizational change, too. In 1888, Divisions became a new organizational unit of the Corps, the management level between the Office of the Chief of Engineers (OCE) in Washington, D.C. and the engineer offices or districts. The Galveston Engineer Office became part of the Gulf of Mexico Division in New Orleans.

In 1895, the Galveston Engineer Office added military work to its civil responsibilities for the first time. Work on fortifications accelerated as relations with Spain deteriorated. The Spanish-American War broke out in April 1898. During the war, additional army officers reinforced the usual Galveston Corps contingent. They mined Galveston Harbor, installed searchlights and continued work on the batteries protecting Galveston Island. Theodore

Roosevelt and his famed Rough Riders loaded ships in Galveston enroute to Cuba. In 1898 and 1899, three major installations were garrisoned: Fort San Jacinto, named for the decisive battle in the Texas War of Independence and located on the east end of the island; Fort Crockett, named for a hero of the Alamo and located on the Galveston waterfront between 45th Street and 53rd Street; and Fort Travis, named for another hero of the Alamo and located on Bolivar Point across the channel from Galveston Island. Civilian engineers continued to be the largest portion of Corps staff, though its top leadership was military.

Upper right: Fort San Jacinto, located on the east end of Galveston Island, had its defenses strengthened during World War II as shown in the Sept. 5, 1942 construction photo of Gun Ring No. 2.

Lower right: The great Galveston hurricane of 1900 was a greater challenge to the Corps than the Spanish-American War. This scene in the east end shows a single house that survived amid the storm's rubble.

Lower left: Tumbled residences and railroad cars in the east end of Galveston show the force of the great hurricane of 1900.

The hurricane of 1900 and its aftermath proved in many ways to be a greater challenge to the Galveston Engineer Office than the Spanish-American War. One of the worst natural disasters in the nation's history, the storm struck hard late in the afternoon of September 8. The hurricane threatened to destroy the entire port, just as a similar storm in 1875 hit Matagorda Bay and destroyed the prosperous Port of Indianola, perhaps Galveston's chief rival on the Texas coast. Winds in Galveston reached an estimated 120 miles an hour and floodwaters rose to over 16 feet.

The storm devastated the city which had been home to so many firsts in Texas—the first port, the first telegraph, the first Catholic convent, the first electric lights, the first brewery and the first medical college. Rescue parties described the scene they found: "Screaming women, bruised and bleeding, some of them bearing the lifeless forms of children in their arms; men broken-hearted and sobbing, bewailing the loss of their

wives and children; streets filled with floating rubbish, among which there were many bodies of the victims of the storm."[10] Many bodies were swept out to sea; the actual death count was never established, but at least 6,000 people may have died that day. Property damage totaled $25 million. The force of the storm stranded the dredge *General C.B. Comstock* on land more than 4,000 feet from the channel. It was necessary to dredge a channel 50 feet wide in order to float the *Comstock* back into the harbor.

Left: Brig. Gen. Henry M. Robert chaired the Seawall Board which planned the seawall and grade raising to protect the city from storm damage like that occurring in the 1900 hurricane.

The 1900 hurricane which devastated the island introduced a new role for the Corps in Galveston. Previously, the jetties were the most conspicuous example of Corps activity in Galveston, but after the 1900 hurricane the Engineers were to leave an even more noteworthy mark on the city. Faced with the task of rebuilding, the city of "firsts" began with another first; it created a new kind of municipal government. The Galveston Plan, the first city commission form of government, unexpectedly became a symbol of municipal reform and urban progressivism to other parts of the country. In November 1901, the same year the first Texas oil gusher came in, the commissioners appointed a three-member board to develop a plan to raise the elevation of the island and construct a breakwater or seawall to protect the city from storms. The board was chaired by a retired Corps officer, Brigadier General Henry M. Robert, former Division Engineer of the Southwestern Division and, for a very brief time in 1901, Chief of Engineers. The other two members were civilian engineers.

Below: Lt. Gen. Edwin Jadwin, with the rank of captain from 1903 to 1907, was in charge of the Galveston District and oversaw extension of the seawall, jetties and military fortifications.

Two months later, in early 1902, the Robert Board submitted its plan, which included constructing a 17-foot-high, three-mile-long seawall and filling the area behind it. This first section of the seawall, completed in 1904, was entirely paid for by Galveston County. Before it was even finished, Congress authorized and appropriated funds to extend the seawall nearly a mile to protect federal property. This section, unlike the first, was designed and built by the Corps. It was completed in October 1905 while Captain (later Lieutenant General) Edwin Jadwin, who in 1926 would become Chief of Engineers, was District Engineer. Other sections followed; by 1962, the curved face of the seawall extended more than 10 miles and was one of Galveston's top tourist attractions, a dramatic example of a cooperative effort between the public and the Corps. Since its construction, Galveston's seawall has prevented an estimated $127 million in storm damage.[11] At a total construction cost of $14.5 million, it has been a bargain. According to current estimates, in the 1980s it would have cost more than $14 million per mile.[12]

Above: An early photo shows seawall contruction.

Right: The magnitude of the seawall sections is shown in this 1920 photo. Huge steel forms dwarf the workmen during the seawall's eastern extension.

Below: The 1909 hurricane was the first test of the seawall. The 1915 storm proved its effectiveness. This postcard photo shows the seawall after a storm.

The year 1905 also marked creation of a second district in Texas. This was the first of many boundary and jurisdictional shifts affecting Galveston. The new Dallas Engineer Office assumed some of Galveston's rivers and harbors work in Texas. The Galveston office remained responsible for all work on the coast west of Sabine Pass and for tributary streams, with the exception of the Trinity River above its mouth.

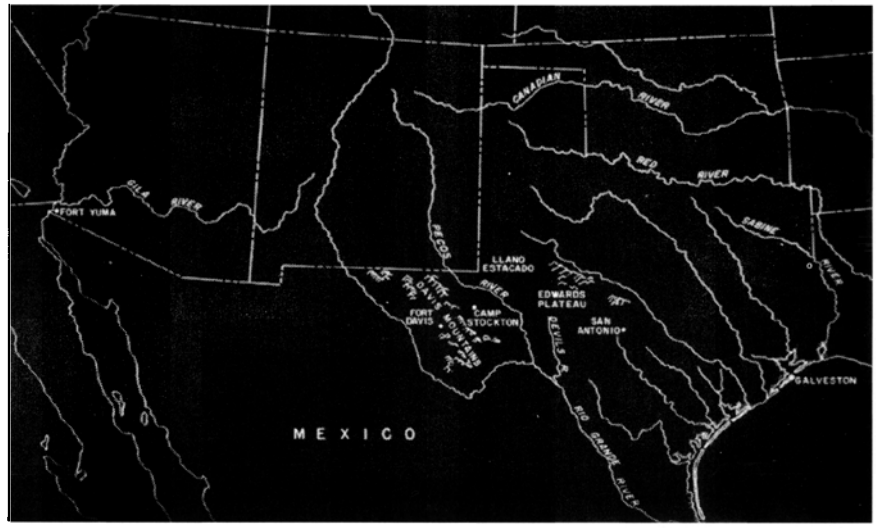
In 1909, the Texas Legislature passed legislation which would have a lasting impact upon the Galveston Engineer Office. The legislation permitted creation of navigation districts empowered to issue bonds. Like similar measures which had been passed by states in the Lower Mississippi Valley, it created a mechanism for initiating and sharing the costs of navigation projects which the federal government and the Corps would not undertake alone.

The first test of the Galveston seawall also came in 1909. It passed easily, though there was some flooding behind the section constructed by the county. The land behind this section sloped downward despite recommendations by the Robert Board that the land behind the seawall be built up. By contrast, the section constructed by the Corps with an embankment which sloped up from the seawall withstood the storm much better. As a result, the county modified its design to conform more closely to the one which had been proposed by the Robert Board and followed by the Corps.

In 1915, as war raged in Europe and the United States wavered between entering the conflict and remaining neutral, the seawall was more severely tested.

Waves as high as 21 feet battered the city for 40 hours. Three hundred feet of beach in front of the seawall washed away, but the seawall itself was only chipped in two places, the result of the anchor of a schooner catching on the toe of the wall as the ship was tossed over the wall and battered to bits. In the midst of war, the seawall could be viewed as a military engineering project as much as a civil works project. Not only did it protect the second-busiest port in the United States;[13] it also protected Fort Crockett, where heavy artillery troops trained before embarking for the European front once America entered "the Great War" two years later.[14]

Following the war, the Dallas District was dissolved in 1919 and Galveston again became responsible for all river and harbor improvements in Texas. Its staff and budget grew. Administratively, however, Galveston—now called a District—was still under the Division in New Orleans. The transfer of responsibility back to the Galveston District was soon followed by a further expansion of District responsibilities with construction of the Gulf Intracoastal Waterway. As early as 1873, Congress had recognized the merits of a sheltered or land-protected inland waterway for barges and other craft too small to navigate the Gulf of Mexico. In that year, Congress authorized a survey to locate an inland waterway route from the Mississippi River to the Rio Grande. It was not until the mid-1920s, however, that construction began on a 100-foot-wide, nine-foot-deep waterway between New Orleans and Galveston.[15]



Rivers of the Galveston District

By 1933, dredging of the Texas Gulf Intracoastal Waterway was about 40 percent complete. With this increased workload, the District was relieved of responsibility in 1935 for the Red River watershed and for the Brazos River above Old Washington, 232 miles above the river's mouth. By 1941, the "Big Ditch"—as navigators called it—extended southeast to St. George Sound in Florida and southwest to Corpus Christi. By 1949, it extended to the very tip of Texas, opening Brownsville to barges from points as distant as the Great Lakes and Florida. The "Big Ditch" became the "Thousand Mile Miracle," moving petroleum, sulphur, iron and steel, and agricultural commodities. The Galveston District was responsible for operating and maintaining through dredging the entire Texas portion of the waterway, from Port Arthur with "its skyline of refinery towers and tall silver chimneys spouting blue smoke" to Padre Island, crowned by wind-formed dunes and today a popular playground for college students. The 423 miles of main channel and 141 miles of tributary channels tied together the many deep draft ports along the Texas coast and served the Texas "Golden Triangle"—500 square miles of oil-rich prairie bounded by Beaumont, Orange and Port Arthur.

In the 1930s and 1940s, the Galveston District's future activities were also being linked with flood control. The Southwestern Division's creation in 1937 was a result of evolving federal responsibility for flood control dating back to 1908.

A dredge works to open the final stages of the Sabine River to Galveston Bay segment of the Gulf Intracoastal Waterway in 1934.

President Theodore Roosevelt's Inland Waterways Commission urged that federal plans for navigation of streams should take flood control into account.[16] Disastrous floods on the Mississippi River in 1927 and along the Ohio River in the early 1930s ultimately made flood control a national, rather than a local, concern. The Flood Control Act of 1936 put the Corps of Engineers in charge of flood control throughout the nation.

The 1936 Flood Control Act had a major impact upon the Galveston District. The act made the District responsible for investigating most of the major rivers in Texas and New Mexico. Between 1936 and 1941, the Galveston District conducted flood control studies on 16 river systems, including all major rivers in Texas. These reports became the basis for extensive flood control after World War II. Yet according to the reminiscences of General Bruce Clarke, retired, who as a Captain in the 1930s was Assistant District Engineer, the Flood Control Act of 1936 was not widely heralded in Texas. According to General Clarke, whose son would later serve as District Engineer in Galveston, the attitude most Texans held was, "We don't care about floods; we just need water."[17] While Texas had endured a long history of flooding along rivers emptying into the Gulf, including the Brazos, Trinity, Guadalupe, San Antonio, Neches, Nueces, San Jacinto and Colorado, 1930s Depression Texas was also part of the Dust Bowl. In a state as vast as Texas, geographic differences meant that the foremost interests and concerns of the Galveston District did not always coincide with the broader-based programs of the Division.

Among organizational changes made as World War II loomed were the abolition of the Gulf of Mexico Division in New Orleans and the transfer of the districts under its command, including Galveston, to the Southwestern Division. The change became effective on January 15, 1941. It nearly doubled the Division's territory because the Galveston District encompassed all of Texas below the Red River drainage system.

The District itself was also changing. In 1940, five employees from the Galveston District opened a suboffice in San Antonio, headquarters of the Fourth Air Corps, but then moved to Dallas. Traditionally, the Quartermaster Corps was responsible for constructing troop housing, while the Engineers concentrated on

The Gulf Intracoastal Waterway from New Orleans to Brownsville was 40 percent complete in 1933. This map shows the location of the waterway.

fortifications, roads, bridges and combat-related activities. The monumental construction task facing the military as it readied for war, however, threatened to overwhelm the Quartermaster Corps. Congressional support grew to transfer all construction responsibilities to the Engineers. As appropriations for civil works activities dwindled, the Corps, including the Galveston District, was eager to take on new assignments. The Corps was tested first with a series of airport construction projects for the Civil Aeronautics Authority and then with construction projects for the Army Air Force. In addition to their strong performance on these projects, the Corps also had another edge over the Quartermaster Corps. The Corps Real Estate Division's work on reservoir projects had acquainted it with land values and acquisition procedures, both important if the country were to construct more military facilities and mobilize quickly.

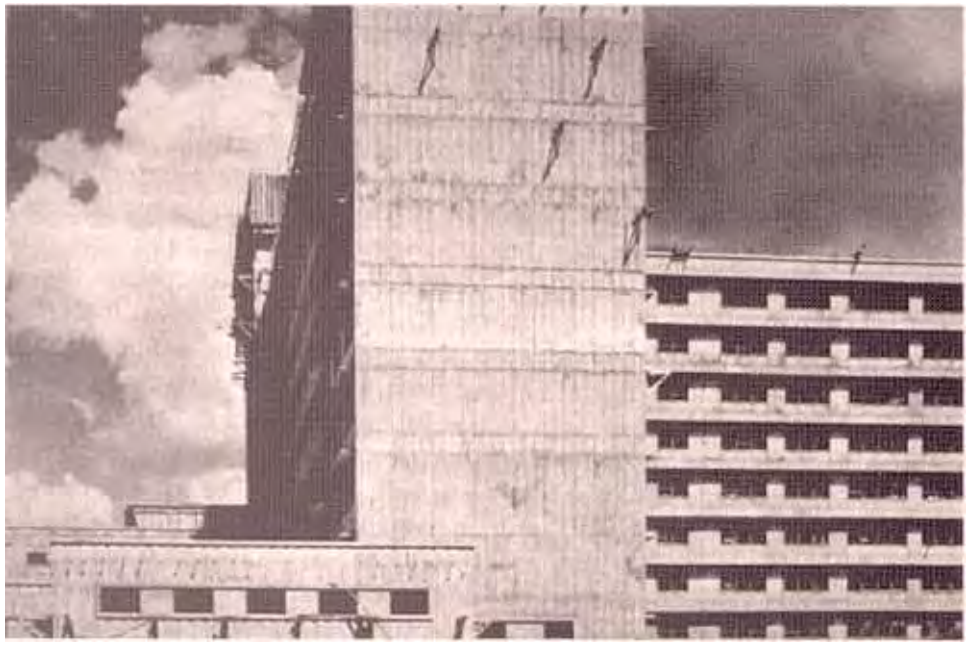
BUFFALO BAYOU AND TRIBUTARIES

Between 1936 and 1940, the Galveston District was involved in flood control studies. The study of Buffalo Bayou and its tributaries was to safeguard the city of Houston.

In December 1941, a new San Antonio District assumed construction work on Army Air Force projects previously handled by the Galveston District. However, Galveston continued to play an important role in military preparedness. The District installed coastline batteries at harbors such as Brownsville, Port Aransas, Sabine, Cameron and Burrwood. Emplacements for 155-mm guns were built at strategic locations to protect shipping in the Houston and Galveston ports from submarine attacks. At Fort Crockett, the Corps modernized and reinforced Battery Hoskins. It built new batteries at Fort San Jacinto and Fort Travis. During the war, the value of airfields, hospitals, army camps and fortifications built by the District totaled $225 million.

War changed the District's priorities. There were few flood control projects during the war, except for Barker Dam in Houston. Buffalo Bayou, part of the Houston Ship Channel, had always been a source of floods, and by 1930 urbanization had worsened the natural drainage of the bayou. In December 1935, part of the city flooded. As a result of the disastrous Buffalo Bayou flood, Congress directed the Chief of Engineers to develop a plan to improve the Houston Ship Channel, protect it from siltation, and provide flood control on Buffalo Bayou and its main tributaries—Brays Bayou and White Oak Bayou. The 1939 Flood Control Act authorized implementation of the plan developed by the Galveston District, a plan which included Barker and Addicks reservoirs.[18] Although work on all of the proposed measures was never completed, construction on Barker Dam began in 1943 to impound water from floods. As the war drew to a close, the Corps began master planning for other flood control projects as well.

At the end of World War II, the Denison District was abolished; in April 1945, it became a suboffice of the Tulsa District. However, the Denison District's responsibility over the upper Trinity River and all of Denison's unfinished military projects were transferred—not to the Tulsa District—but to the Galveston District.



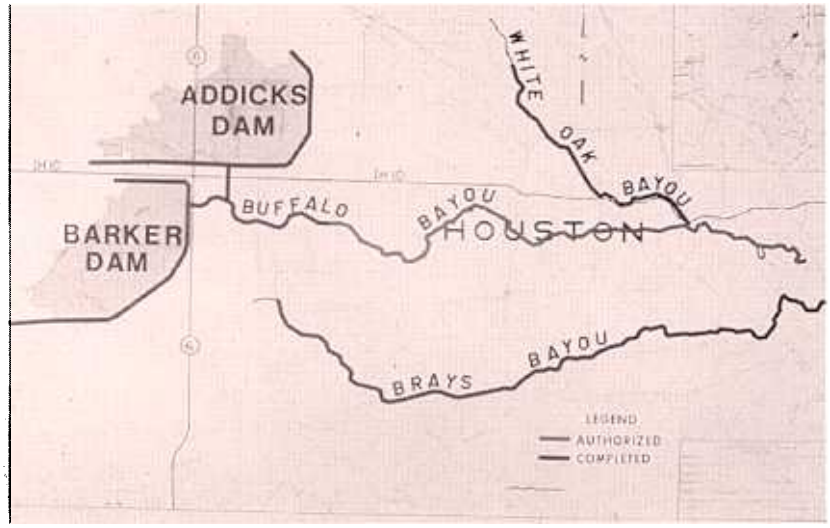
The Galveston District built the original Army Air Force facilities near San Antonio.

As soon as the war ended, the Southwestern Division and its Districts renewed reservoir construction interrupted by the war. The Galveston District resumed or started work on a large number of reservoirs, mostly in the upper portions of Texas on the Brazos and Trinity rivers. Work on Addicks Dam began in 1946, necessitated by accelerated growth around Houston during the war. Altogether, Congress authorized 13 reservoirs in the Galveston District in the postwar-era 1944 to 1950.

With the Galveston District's workload shifting to north central Texas, the District opened a suboffice in Fort Worth to improve management and coordination. Budget constraints nearly closed the Fort Worth office in 1946, but it survived until a severe flood in Fort Worth in 1949 gave added urgency to setting up a full-fledged District there. In the meantime, a feasibility study ordered by the Division concluded that the Galveston District had grown too large because of its flood control work. In 1949, the District's combined military and civil budget was the third largest in the Corps. It was also the third-largest District geographically in the United States—a District larger than the New England, North Atlantic or Lower Mississippi Divisions. In March 1950, the Southwestern Division Engineer announced the establishment of a new District at Fort Worth to take over flood control and water conservation projects previously handled by the Galveston District in central and northern Texas. The Galveston District's civil works were now limited to a stretch along the Texas Gulf Coast approximately 100 miles wide. It would, however, continue to handle military projects in the civil works territory of the Fort Worth District. The birth of the Fort Worth District would ultimately lead to rivalry between Fort Worth and Galveston, the District which fathered it.

Continued flooding in Houston along Buffalo Bayou spurred construction of control measures in the city.

When the Korean conflict began in June 1950, the Galveston District, relieved of most of its reservoir projects, was able to proceed faster with military construction in Texas, but the military buildup was so demanding that the Fort Worth District received some responsibility for military projects. During the war, the Galveston District renovated six bases: Victoria, Harlingen, Ellington, Laredo and Laughlin, Texas, and Lake Charles, Louisiana. By the end of the Korean War, the value of the military projects in which the Galveston District had participated had grown from the $225 million of World War II to $350 million.[19]



Construction of Addicks and Barker reservoirs was designed to help abate flooding. The drawing above shows the flood-retention reservoirs' locations.

The mid-1950s, the Eisenhower years, brought austerity to the civil works programs funded by Congress; Republican administrations typically are less supportive of large-scale civil works projects than Democratic administrations. In these years, the Corps, including the Galveston District, had more difficulty retaining technically trained personnel. The civil works boundaries of the Galveston and Fort Worth Districts were also realigned, giving Fort Worth a portion of Galveston's territory in central Texas. The two Districts had overlapped, creating public confusion and raising jurisdictional questions. Yet the realignment seemed to benefit and strengthen the Fort Worth District more than the Galveston District.

In 1961, President John F. Kennedy brought to the White House a new attitude toward water projects. The new president promised a high level of federal activity in water and power projects and a program of new starts. The Kennedy administration's extravagant approach to water policy was a direct contrast to the philosophy of the Eisenhower years.[20] This attitude enabled the Galveston District to facilitate shipping on the Gulf Coast through a number of deep draft channelization and maintenance projects in the early 1960s. The best-known of the deep draft channels in the Southwest was the 51-mile-long Houston Ship Channel, but there were seven other deep draft channelization projects as well—Sabine-Neches, Corpus Christi, Matagorda, Galveston Harbor, Texas City, Freeport Harbor and Brownsville. Forty-foot ship channels were completed for the Port of Corpus Christi in 1966; Texas City, 1966; Houston, 1967; and the Sabine-Neches Waterway, 1972. Among Galveston's other routine responsibilities were shallow draft channels, hurricane protection and levee maintenance. Regular dredging along the Gulf Intracoastal

Left: Districts of the Southwestern Division

In 1961, President John F. Kennedy sought to spur navigation and power projects.

Waterway from the Sabine River to Port Isabel, Texas, made up the District's largest single project.

Construction of so many reservoirs in the Southwest added another dimension to operations and maintenance in the District—recreation. Throughout the U.S., the public used Corps-constructed reservoirs increasingly for boating, fishing, picnicking and other leisure activities. In the Flood Control Act of 1944, Congress recognized the recreation potential of reservoir projects and acknowledged the government's responsibility to make them available for public use. Because the Corps still regarded flood control as its major objective, it placed a low priority on recreation during this time. The affluence of the 1950s, however, made recreational areas increasingly important to the general public.

The Corps was more interested in an area of growing responsibility—hurricane flood protection. In 1955, Congress passed Public Law 71, which provided for hurricane studies along the Gulf Coast. The Galveston District began to study to determine the feasibility of protecting individual localities from hurricane tidal flooding. Three projects resulted: the Port Arthur and Vicinity, the Texas City and Vicinity, and the Freeport and Vicinity flood protection projects.

In September 1961, Hurricane Carla struck the Gulf Coast, dumping nearly 16 inches of rain on the area in four days. The damage was so great that Congress, in the aftermath of the storm, also provided funds for a Texas Gulf Coast Hurricane Study. In 1964, the Galveston District began looking for ways to reduce flood damage along the Texas coastline with a barrier protection system along the shoreline. The newer measure replaced the earlier system of providing protection on a localized basis. The District divided the coastline into five areas, centering each on a major bay: Galveston, Matagorda, Corpus Christi, Sabine Lake and Laguna Madre. Attention focused on Galveston Bay, the most populous, and the Corps Waterways Experiment Station (WES) in Vicksburg assisted by building a model of the bay. The model generated a wealth of data, but the required 20 percent funding by local interests was not forthcoming, so no structures were built. The arrival of Hurricane Beulah in September 1967 and Hurricane Celia in August 1970 reminded Galvestonians once again of the importance of completing these projects.

In the 1960s and early 1970s, two events shaped the Galveston District more than any others. First, in June 1961, military construction responsibilities of the Galveston District were transferred to the Fort Worth District.[21] As a result, the Galveston District's major effort once again was directed toward the civil works program in the Texas coastal zone from the Sabine River to the Mexican border. Also related to this was the fact that the Galveston District did not get National Aeronautics and Space Administration construction in the 1960s. Construction of the Manned Spacecraft Center in Houston, later renamed the Johnson Space Center, went instead to the Fort Worth District since the new facility was not a conventional civil works project.[22]

This intensified the rivalry between the two Districts because Fort Worth's success seemed to come at Galveston's expense; as Fort Worth was growing,

Galveston was losing administrative, engineering and technical personnel.[23] Also, a feeling persisted among many District personnel, though they were perhaps reluctant to admit it, that military construction projects were more prestigious than civil works projects. Given the strong military heritage of the Corps and the fact that military construction projects in the Southwestern Division were "large and varied, ranging from mundane projects to some of the most exotic in the United States,"[24] this feeling was perhaps understandable, though not necessarily correct.

A second major factor was the passage of a series of laws addressing water pollution and water management. The Federal Water Pollution Control Act (FWPCA) of 1972 implemented Section 404, requiring permits for placement of any dredged or fill material in U.S. waters or adjacent wetlands. Section 10 of the 1899 Rivers and Harbors Act—the "Refuse Act"—first established the basis for the regulatory and permitting authority of the Corps over the nation's waterways. This act, however, had always been given a narrow interpretation and the Corps had limited itself to measures having a direct impact on navigation.[25] Section 404 significantly broadened the Corps jurisdictional responsibilities for issuing permits.

The same year, Congress passed and the president signed the Marine Protection, Research and Sanctuaries Act, which regulated ocean dumping of dredged disposal material. The following year, Section 7 of the Endangered Species Act of 1973 required the U.S. Fish and Wildlife Service to investigate the effect of proposed dredging on the habitats of endangered species such as the whooping crane. Then, in 1977, the Clean Water Act amended the FWPCA, making it even tougher.

The Johnson Space Center (shown in a late 1980's photo) in Houston was constructed by the Fort Worth District, intensifying the rivalry between the two districts.

But perhaps the most far-reaching new law was the National Environmental Policy Act (NEPA), which was passed in 1969. The Corps, of course, had always been concerned with the environment, going back to the early 19th century when its engineers documented flora and fauna and worked to preserve such wilderness areas as Yellowstone. But over the years, many people came to view the Corps as a ravager of the environment and not necessarily its protector. Acknowledging this perception in 1978, the Chief of Engineers, Lieutenant General John W. Morris made a distinction between the earlier and later missions of the Corps. He argued that the Corps carried out many vital missions from 1900 to 1970, but termed them "developmental" rather than "environmental" in nature, reflecting the country's obsession with growth and technology during those years.[26] In the early 1900s, industrialization and development were man's allies. Nature ravaged the countryside with floods and dust storms, while spreading diseases and spoiling food. Dams, pesticides, pharmaceuticals and similar interventions held out the hope of a more civilized existence. But attitudes changed once nature's excesses had been tamed.[27]

The Corps, dependent as it is upon congressional funding, typically mirrors national sentiments. But this time the Corps, including the Galveston District, did not immediately know how to respond to NEPA, even though the Corps had begun reorganizing its own planning structure to place greater emphasis on

environmental considerations even before the passage of NEPA. In 1966, the Chief of Engineers, Lieutenant General Frederick W. Cassidy, established a recreation and environmental branch within OCE's Planning Division and made environmental quality a major goal of the Corps. His successor, Lieutenant General Frederick J. Clarke, made environmental initiatives a theme of his tenure and created an Environmental Advisory Board of outside experts to help define the environmental responsibilities of the Corps.[28]

Environmental laws redefined the role of the Corps in pollution control and the preservation of wetlands and endangered species.

Still, the Corps was not fully prepared for the far-reaching ramifications of NEPA. By their own admission, Corps personnel in the Galveston District took nearly three years to come to grips with NEPA and the changes in Corps regulatory functions.[29] Before NEPA, regulations required the District to evaluate permit applications on the basis of broad "general public interest" criteria. After NEPA, District Engineers had to determine whether a requested permit would lead to activities which would "significantly affect the quality of the human environment."[30] If so, the District had to prepare an environmental impact statement, potentially both time-consuming and expensive. District personnel had to interact both with the public and other agencies as never before. This included agencies having jurisdiction over fish and wildlife, water quality, recreation, agriculture, and historical and archaeological sites with their accompanying artifacts. NEPA introduced much more complexity into civil works.

NEPA raised other concerns within the Corps. Perhaps these were best articulated by Major General Charles I. McGinnis, who from August 1, 1974 to June 16, 1977 was Commander of the Southwestern Division. In an August 25, 1975 letter to the Deputy Chief of Engineers, Major General John W. Morris, McGinnis wrote:

> *"At the risk of stark heresy, I question the recently stated objective of working toward environmental recognition for the Corps. I fear that such an objective will deflect us from our traditional posture of professionalism. That the motivation necessary to obtain field performance in support of this objective will result in subordination of [balanced] judgement, which is our greatest remaining asset."*[31]

In other words, McGinnis worried that the combined pressure to respond to NEPA requirements and local interests could cause the Corps to compromise the soundest engineering answer in favor of an environmental solution. This trade-off, in McGinnis' opinion, would usually be at the expense of economic efficiency. In a later interview, he suggested that the Corps might "sometimes confuse the national objectives with the desires of the people directly impacted by a project." McGinnis concluded, "I would give the guy who has to live with the project top priority in his thinking, and I would give a lesser priority to a person who is attempting to influence national thinking but in a sort of a detached way."[32]

Perhaps no project more dramatically illustrated the difficulties of not only the Galveston District but the entire Corps in reconciling these demands than Wallisville. The ambitious, multipurpose project included an earthen dam, reservoir, and navigation lock to fight saltwater intrusion, provide a water supply to Houston, and create parks and recreational facilities. Congress authorized the project in October 1962 and construction began in 1966. In April 1971, when

the reservoir was nearly three-quarters complete, six parties filed suits against the Corps to stop the project. Had the District violated the 1969 law by not making a comprehensive study of the environmental impact of the reservoir, even though design and planning occurred about 10 years before NEPA passed? In November 1973, U.S. District Judge Carl O. Bue suspended construction of the reservoir. This put the entire project in limbo as the Galveston District moved into the decade from 1976 to 1986. It is this decade which illustrates how the Galveston District began to come to grips with one of the greatest challenges confronting the Army Engineers—the environmental issue—and at the same time continued to respond to other traditional duties and responsibilities.

When the Corps of Engineers was first involved with water resources planning, engineers dominated the planning process. Beginning in the mid-1930s, economists took over. Then, in the 1970s, environmentalists who warned that the nation's limited resources had to be protected superseded the economists.[33] As the District worked to adjust to these new priorities, it began to experience the "era of limits" firsthand. While there had been other periods in the District's history in which it was short of money and staff, the constraints of the 1970s and 1980s were felt more keenly because the demands on the District were greater than ever before.

Gen. Charles McGinnis warned of environmental concerns compromising sound engineering solutions.

Left: Wallisville controversies and lawsuits illustrated the difficulty of reconciling engineering and environmental solutions. This map shows the redesign of Wallisville Lake.

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[1]John C. Calhoun, Secretary of War, August 9, 1820, in *The Papers of John C. Calhoun,* Vol. V, 1820-1821, W. Edwin Hemphill, ed. (University of South Carolina Press, 1971), p. 318. Spelling as in original.

[2]James C. Timmins, visiting Galveston from Houston, *New York Times,* September 10, 1900.

[3]The other Districts in the Southwestern Division are Albuquerque (1935), Tulsa (1939), Little Rock (1881, 1937) and Fort Worth (1950). For histories of these Districts, see Nathan J. Sewell, *The First Thirty-six Years: A History of the Albuquerque District, 1935-1971* (Albuquerque, New Mexico: U.S. Army Engineer District, 1973); Michael Welsh, *A Mission in the Desert* (Albuquerque, New Mexico: U.S. Army Engineer District, 1985); William B. Settle, Jr., *The Dawning, A New Day for the Southwest* (Tulsa, Oklahoma: U.S. Army Engineer District, 1975); Floyd M. Clay, *A History of the Little Rock District* (Little Rock, Arkansas: U.S. Army Engineer District, 1971); and D. Clayton Brown, *Rivers, Rockets and Readiness: Army Engineers in the Sunbelt* (Fort Worth, Texas: U.S. Army Engineer District, 1979). There are a total of 10 Divisions in the United States plus three others—Huntsville, Europe and the Pacific Ocean. Of these three, only the Pacific Ocean Division has Districts.

[4]For a general history of the Corps, see *The History of the US Army Corps of Engineers* (U.S. Army Corps of Engineers, n.d.). Also see W. Stull Holt, *The Office of the Chief of Engineers of the Army: Its Non-Military History, Activities and Organization* (Baltimore, 1923); Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressing Conservation Movement, 1890-1920* (Cambridge, 1959); and Martin Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering: Politics and Technology in the Army Corps of Engineers, 1850-1950," *Technology and Culture*, v. 26, no. 1 (January 1985), 1-33. The *Annual Reports of the Chief of Engineers* are also useful.

[5]For 25 years between 1838 and 1863, the topographical engineers functioned independently as the Corps of Topographical Engineers. In 1863, they were absorbed once again by the Corps of Engineers. For more information on the Corps of Topographical Engineers, see Forest G. Hill, *Roads, Rails and Waterways: The Army Engineers and Early Transportation* (Westport, Connecticut: Greenwood Press, Publishers, 1977; reprint, Norman, Oklahoma: University of Oklahoma Press, 1957), and Frank N. Schubert (ed.), *The Nation Builders: A Sesquicentennial History of the Corps of Topographical Engineers, 1838-1863* (Fort Belvoir, Virginia: U.S. Army Corps of Engineers, 1988).

[6]T.J. Fehrenbach, *Lone Star: A History of Texas and Texans* (New York: The Macmillan Company, 1968), pp. 126, 319-320. For the flavor of the history of Galveston, see Howard Barnstone, *The Galveston That Was* (Houston: Museum of Fine Arts, 1966); Earl Wesley Fornell, *The Galveston Era: The Texas Crescent on the Eve of Secession* (Austin: University of Texas Press, 1961); Francis Sheridan, *Galveston Island: The Journal of Francis C. Sheridan 1839-1840*, ed. Willis W. Pratt (Austin: University of Texas Press, 1954); and David G. McComb, *Galveston: A History* (Austin: University of Texas Press, 1986).

[7]Lynn M. Alperin, *Custodians of the Coast: History of the United States Army Engineers at Galveston* (Galveston: Galveston District, U.S. Army Corps of Engineers, 1977), p. 238.

[8]Martin Reuss and Paul K. Walker, *Financing Water Resources Development: A Brief History* (U.S. Army Corps of Engineers: Office of the Chief of Engineers History Division, 1983), p. 12. Also see Edward L. Pross, "A History of Rivers and Harbors Appropriation Bills, 1866-1933," Ph.D. dissertation, Ohio State University, 1938.

[9]Joseph E. Vollmar, Jr., "James B. Eads and the Great St. Louis Bridge," in *Engineering and Humanities*, James H. Schaub and Sheila K. Dickison with M.D. Morris (New York: John Wiley & Sons), pp. 336-337.

[10]*New York Times*, September 11, 1900.

[11]District Engineer Jon C. Vanden Bosch, speech to Galveston Rotary Club, November 9, 1977, Galveston Archives, RG 77, Box 1101, Public Affairs Office, File 401-07.

[12]Public Affairs Office Press Release #29, December 27, 1985, File 412-05, News Release & Media File, June 1-December 31, 1986, Public Affairs Office, Galveston District.

[13]Vanden Bosch, Speech to Galveston Rotary Club, November 9, 1977.

[14]Alperin, *Custodians of the Coast*, p. 185.

[15]For a more detailed early chronology, see Lynn M. Alperin, *History of the Gulf Intracoastal Waterway*, Navigation History NWS-83-9 (National Waterways Study, January 1983), pp. 59-61. Also see Charles F. Baehr, "The Gulf Intracoastal Waterway," (March 3, 1967), Galveston District Archives, RG 77, Box 857. The waterway is now 12 feet deep and 125 feet wide.

[16]D. Clayton Brown, *The Southwestern Division: 50 Years of Service*, p. 2.

[17]Interview with General Bruce C. Clarke, Retired, May 11, 1987, McLean, Virginia, by Lee F. Pendergrass.

[18]Vanden Bosch, speech to Kiwanis Club of Houston, June 28, 1978, Galveston District Archives, RG 77, Box 1101, Public Affairs Office, File 401-07.

[19]Vanden Bosch, speech to Galveston Rotary Club, November 9, 1977.

[20]See, for examples, the analysis by historian Ann Hodges Morgan in *Robert S. Kerr: The Senate Years* (Norman, Oklahoma: University of Oklahoma Press, 1977). On page 172, Morgan contrasts the Kennedy Administration's "generous program of appropriations" with "the penury of the Eisenhower years." Kerr chaired the Senate Select Committee on Natural Water Resources, established in 1959. The Kerr Committee's 1961 report stressed greater cooperation between the federal government and the states and led to a number of developments in the water resources field.

[21]Brown, *The Southwestern Division,* p. 79; Alperin, *Custodians of the Coast*, p. 206.

[22]*The History of the US Army Corps of Engineers*, pp. 105-106.

[23]Brown, *The Southwestern Division*, p. 79.

[24]Ibid., p. 93.

[25]Albert E. Cowdrey, "Pioneering Environmental Law: The Army Corps of Engineers and the Refuse Act," *Pacific Historical Review,* 44 (August 1975), 331-349.

[26]J. W. Morris, "The Corps of Engineers and the American Environment: Past, Present and Future," Civil Works, Environment (IV), Box 46, Folder 21, Research Collections, Office of History, Fort Belvoir, Virginia. Hereafter cited as CW IV-46-21, RC/HO.

[27]Gregg Easterbrook, "Cleaning Up," *Newsweek*, 114 (July 24, 1989), 29.

[28]Cowdrey, "Pioneering Environmental Law," 346.

[29]Interview with George Rochen, Galveston District, March 17, 1987, by Lee F. Pendergrass. For a somewhat different view of Corps reaction to NEPA, however, see Daniel A. Mazmanian and Jeanne Nienaber, *Can Organizations Change? Environmental Protection, Citizen Participation, and the Corps of Engineers* (Brookings Institution, 1979).

[30]Garrett Power, "The Fox in The Chicken Coop: The Regulatory Program of the U.S. Army Corps of Engineers," *Virginia Law Review*, 63 (May 1977), 530.

[31]Quoted in Martin Reuss interview with Charles I. McGinnis, November 5, 1979, Oral History Career Interview (edited draft), OCE Archives, Ft. Belvoir, Virginia, p. 43.

[32]Ibid., pp. 43-44.

[33]Vanden Bosch speech, December 3, 1976.

Chapter II

WALLISVILLE: THE ENVIRONMENTAL CHALLENGE

In the 19th century and in the the first half of the 20th century, Corps civil works projects reflected a public mood that favored development over the environment. In the 1960s, people gradually became more aware of the need to protect the environment. They began to recognize nature's limited ability to recover quickly from man's intrusion; the benefits and costs of proposed projects need to be weighed more carefully in the "era of limits." The Office of the Chief of Engineers (OCE), perhaps because of its proximity to the national political scene, may have perceived this trend toward environmentalism before the Divisions or Districts did. Districts, closer to local constituents and accustomed to responding to local interests, were slower to adjust and recognize that the Corps must be more selective in choosing projects. Perhaps no project in the District better reveals the throes attending change than Wallisville, which became one of the most controversial of all the District's projects.

... institutions, economic systems, and agencies within democratic governments almost always reflect the predominant economic and social forces of their age; very rarely indeed can a government agency give complete deference to the values of a future generation in preference to those of the current generation.

—Lt. Gen. J.W. Morris, Chief of Engineers, 1978[1]

The Corps has always had critics. Yet until the 1960s, the Corps, including the Galveston District, generally—though not always—enjoyed wide support for its projects.[3] In the 1960s, however, the critics became more vocal, charging that the Corps was obsessed with trying to carry out civil works tasks which the public no longer wanted. They echoed earlier critics who charged that the Corps is a typical mature, stagnant and conservative bureaucracy both unwilling and unable to change.[4] Yet in the wake of the 1969 National Environmental Policy Act (NEPA), the Corps gradually adjusted its procedures and goals to reflect new values. In the opinion of some, the Corps' response went "well beyond minimal adaptation. It represent[ed] an innovative and progressive response pattern to new demands."[5] The Galveston District was affected more than many other Corps Districts because of the number of permits it processed, the environmentally sensitive coastline and wetlands in its jurisdiction, and its high profile because of civil works projects such as Wallisville.

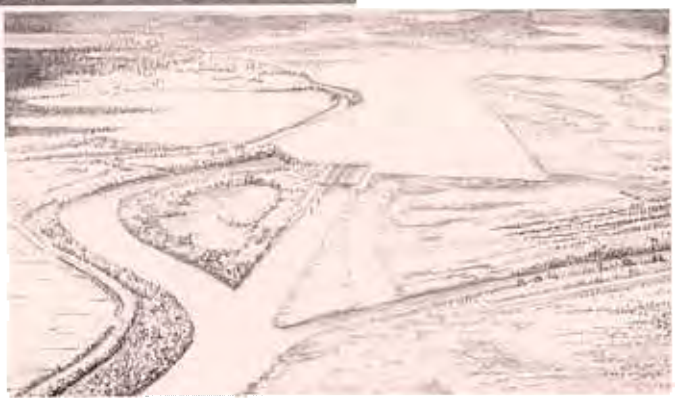
... the Corps [is] one of the relatively few organizations that the Federal Government charged with exercising balanced judgment ... In trying to do this, the Corps finds itself very lonesome on some occasions.

—Maj. Gen. Charles I. McGinnis, Former Southwestern Division Engineer, 1979[2]

The battle over Wallisville waged in the courts for years. In the end, the courts supported the position of the Corps and allowed the project to go ahead. By that time, however, the project had been scaled back and the funding relationship between the Corps and local sponsors had changed. Ultimately, OCE concluded in 1988 that Wallisville had turned into a single-purpose project no longer eligible for Corps funding. Delays killed the project when it would not die any other way; by the time it worked its way through the courts, conditions were no longer the same.

Lt. Gen. J.W. Morris cited difficulty of the Corps in making judgment calls on the environment.

Wallisville left in its wake bitter feelings on both sides. Two individuals personify the two sides of the issue. William Wooley, who arrived at the Galveston District in 1974 from the Omaha District to serve as Chief of the Planning Branch,[6] ardently believed in the Wallisville project and the correctness of the District's planning and engineering studies and environmental impact statements. The other side was personified by Wooley's nemesis, B.C. Robison, columnist for the *Houston Post.*



Critics of Wallisville accused the Corps of being unwilling and unable to meet environmental concerns. The drawing shows the proposed locks and channel. The photo shows the locks sitting high and dry when the project halted due to environmental concerns.

The Wallisville project was not unique in its ability to arouse both defenders and critics. Other Districts and Divisions, such as the New England Division with its Dickey-Lincoln project, which would have dammed a white water river in Maine for power generation, also faced controversy. Yet few projects prompted such scathing prose or, in the view of its proponents, such misguided diatribes as the Wallisville project. In a series of articles in the *Houston Post*, Robison likened Wallisville to "a slowly growing cancer" and called it "a scam and a scandal," a "squalid epic" in the history of the Corps, a "boondoggle." He concluded that the true legacy of Wallisville has been "bloated, deceptive promises of benefits, manipulated statistics, congressional chicanery, inaccurately calculated costs, the subversion of federal environmental law, and the specter of enormous and irreparable damage to the state's most productive estuary, Galveston Bay."[7] Engineers such as Wooley found such attacks particularly frustrating because they could not fight back in the press unless they were specifically asked to comment.

Although the District viewed Wallisville as a separate project, a position which the courts would ultimately uphold, in the minds of many people Wallisville began as part of a much larger and even more ambitious project, the Trinity River project.[8] The earliest settlers in the Dallas-Fort Worth area dreamed of a Trinity Barge Canal which would link Fort Worth with the Gulf of Mexico. Congress appropriated funds to begin construction in 1902, but World War I interrupted work on several locks and dams along the river. Once the war was over, construction did not resume, in part because of excellent rail service to Dallas-Fort Worth. Yet the concept of the Trinity River project was never abandoned by its most ardent supporters. The project gained new life in a series of studies in the 1950s. The first, commissioned by supporters of the Trinity project, was conducted by private consultants in 1957 and showed a benefit-cost

Right: The Trinity River project would have made Dallas-Galveston Bay barge traffic possible. Shown are locks on the river around 1912.

ratio of 2.9-to-1.0. In the wake of the results of this study, the following year Congress authorized the Galveston and Fort Worth Districts to undertake a more comprehensive study. The project would include a channel for flood control, navigation and recreation, and four multipurpose reservoirs, none of which were at Wallisville.[9]

The study, completed by the two Districts in 1962, showed a benefit-cost ratio of 1.6-to-1.0. The same year, Congress authorized the full project but did not appropriate any money for it. Instead, it asked the Corps to once again review navigation costs. The re-evaluation, completed in 1968, showed a benefit-cost ratio of 1.5-to-1.0 based on 1967 costs.

Meanwhile, work was well underway on another project—one which would eventually be just as controversial as the Trinity River project. It was Wallisville. In subsequent years, several careers would be affected by events surrounding Wallisville. In fact, by the time it was authorized, Wallisville may already have claimed a victim within the Galveston District—Colonel Harold C. Brown, District Engineer, who recommended against the project as first designed.[10]

Col. Harold C. Brown

The problem Brown faced stemmed from the District's traditional responsiveness to local needs. The Trinity River project, as initially conceived in the 1950s, did not include a reservoir at Wallisville, but rice farmers in the area became concerned about saltwater intrusion up the navigation channel. At the time, the Corps was dredging the channel to Liberty from six to nine feet. The District, responding to the farmers' concerns, concluded that the best solution would be another reservoir, one located at Wallisville, south of Liberty, Texas.

The Galveston District Engineer, Colonel Brown, who assumed command of the District in August 1960 after much of the planning for Wallisville was done, convened public hearings in December. Public opposition was overwhelming. Brown, too, questioned the proposed design. First, he felt that the 2,000-acre wildlife refuge proposed by the Fish and Wildlife Service as part of the project was too expensive when compared to its benefits. Second, he questioned the evaporation rates, feeling they were too low and consequently overstated the water yield from the project. He forwarded his written objections to the Southwestern Division, but the Division did not send them on to the Chief of Engineers. Instead, the Division reported to the Chief of Engineers that the merits of the project were clear and that opposition was essentially confined to residents who might lose their land as a result of the project. Eight months later, in October 1961, having served barely a year of a normal three year tour of duty in the District, Brown was transferred.[11]

Almost exactly one year later, and seven years before NEPA, Congress authorized Wallisville.[12] Local sponsors were the Trinity River Authority (TRA), the city of Houston and the Chambers-Liberty Counties Navigation District. In Texas, state law gives administration of water management affairs and river basins to river basin authorities such as TRA, founded in 1955. These authorities are essentially instruments of the state. The project, estimated to cost about $35 million, would dam the Trinity River near the Chambers County town of

The Wallisville project was authorized in 1962. Because of environmental concerns, the pool was reduced to 5,600 acres from the 19,700 acres first authorized.

Wallisville, east of Houston, and create a shallow four-foot-deep, 19,700-acre reservoir. Located 3.9 miles above the mouth of the Trinity, the reservoir created by the squat 39,200-foot-long dam would store 58,000 acre-feet of water. The project also included an 84- by 600-foot navigation lock in a cutoff channel at mile 28.3, and an extension of a channel to Liberty, Texas, from mile 23.2 to mile 33.6.[13]

The Corps established five major benefits from the project: (1) an industrial water supply for Houston; (2) control of saltwater intrusion, which was damaging rice crops; (3) improved navigation; (4) increased recreation; and (5) fish and wildlife enhancement. The Corps and the city of Houston projected that water consumption would double by the year 2010. Houston could not continue to draw down groundwater; subsidence was a concern. The reservoir created behind the dam at Wallisville could provide an alternative source of good quality, inexpensive water. At the same time, the project would reduce saltwater intrusion, caused in part by the nearly century-old navigation channel up to Liberty. The navigation lock would enhance and increase river traffic. In addition, the earthen dam would create a 19,700-acre reservoir or lake for boating, fishing and other recreational activities. The Corps analysis also showed that fishing would be great because of the enhanced environment the project would provide for freshwater fish.

Construction began on Wallisville in 1966. In 1967, the Corps signed a contract with the three local sponsors in which the sponsor agreed to pay 16 percent of the construction cost and 10 percent of the operation and maintenance cost of the project. But Wallisville's fate soon became inextricably linked with NEPA when it became law on January 1, 1970. NEPA created the Council on Environmental Quality (CEQ) and required that the environmental effects of a project be thoroughly evaluated in an environmental impact statement (EIS). The act imposed both substantive and procedural burdens on agencies, but only the latter had well-defined sanctions—court injunctions if an agency failed to consider all available information and weigh the implications of its actions before proceeding. Section 102 (c), which required an EIS, became the grounds upon which environmentalists initiated court challenges of water projects.[14] NEPA not only pertained to new projects, but also to authorized projects already under construction.

NEPA significantly affected the Galveston District, and the Corps as a whole, in at least six ways. First, although the Corps had always been aware of environmental issues, NEPA brought these issues to the forefront as never before. Second, it changed the size and mix of Corps staff. The Corps began to employ a full array of environmental experts to help comply with NEPA's planning and monitoring requirements. These included biologists, geologists, recreation specialists, wildlife management authorities, hydrologists and environmental lawyers. Major General Charles McGinnis, who was the Division Engineer for the Southwestern Division between August 1974 and mid-June 1977, looked back later and described the implications: "What we do in the contract construction field is directly translatable into the ability of our

senior people to function well in time of conflict ... [I]n my judgement you should look to those functions which are most useful and most directly translatable to our wartime mission as members of the green suit Army ... [In the 1970s we hired] ... hundreds and hundreds of people who have no skills that are useful in the event of war."[15]

The other changes brought about by NEPA were perhaps even more significant. It compelled the Corps to deal directly with the public to a much greater extent because of the public meetings mandated by NEPA. It also required much greater coordination and cooperation with other federal, state and local agencies. NEPA impacted the Districts in a fifth way as well. It raised the cost of projects and extended the time between initial studies and construction. In the opinion of Joe Trahan, Chief of Engineering for the Galveston Division, environmental considerations increase project costs 25 to 30 percent and add six to seven years to a project.[16] And finally, NEPA introduced an era of litigation unequaled in Corps history.

The legal wrangling over Wallisville, which would occupy the Galveston District for over a decade and a half, began in 1971. In 1971, a consortium of environmentalists, including the Sierra Club and the Audubon Society, sued to halt construction of the Trinity River navigation project and the Wallisville Reservoir because the Corps had not filed an adequate EIS. They argued that work on the project should stop at least until the effect of the reservoir upon breeding and nursery grounds for shrimp, crabs and a fish known as menhaden could be determined.[17] At the time, the District was in the process of writing the EIS and the Wallisville project was nearly 70 percent complete. Three months later, the Galveston District completed the EIS on Wallisville and filed it with the District Court and with CEQ, the three-member council appointed by the president to advise him on environmental policies and programs.

Joe Trahan, Galveston District Engineering Chief

Construction proceeded through 1972. Then, on February 16, 1973, the Federal District Court in Houston enjoined the project because an EIS for the *entire* Trinity River project had not been prepared. In the eyes of the court, the Wallisville project had grown out of the original Trinity River project and therefore was part of the larger and more ambitious project. Wallisville opponents had tried to obtain a copy of Colonel Brown's 1961 report to enter into evidence, but neither the Galveston District nor the Southwestern Division would release it. As it turned out, opponents were able to stop work on both the $1.3 billion Trinity River project and on Wallisville without the report. The District and the sponsors immediately appealed to the Fifth Circuit Court of Appeals in New Orleans, arguing that Wallisville was an independent project. A month later, the Trinity River project itself received a major blow when the TRA's attempt to pass a bond issue to fund its share of the project was rejected by more than a six-to-one margin. Extensive publicity surrounding the court ruling against Wallisville the previous month may have influenced the outcome.[18]

Meanwhile, the battle over Wallisville continued in legal briefs and arguments. In August 1974, eighteen months after the district court enjoined Wallisville, a federal appeals court, second only to the U.S. Supreme Court in authority, reversed and remanded the case, sending it back to the lower court. The appeals court held that the Wallisville project was not part of the Trinity River project, but was a separate project just as the Corps contended. However, the court ruled that the District must prepare a final or supplemental environmental impact statement on Wallisville before construction could resume. The "damned injunction" stayed in place.[19]

The plaintiffs who had filed the original suit requested rehearing, but it was denied. Yet the fight was far from over. Opponents proposed alternatives to the Corps plan. John D. Degani, field supervisor of the U.S. Fish and Wildlife Service in Fort Worth, promoted a smaller impoundment, contending that it would cause less environmental damage. Only 3,300 acres of wetlands would be underwater instead of 19,700 acres and the impact on fish and wildlife, especially estuarine or river mouth fish, would be less. The remainder of the land which had already been acquired by the Corps could be used for a park. The Corps countered that it had studied and rejected the alternative before construction even began on Wallisville.

Col. Don McCoy, District Engineer

The Galveston District's frustration finally boiled to the surface. District Engineer Colonel Don S. McCoy was quoted as saying, "I'm a little fed up with these two-bit Fish and Wildlife types. They're trying to preempt a decision and we don't operate that way. They're trying to cook up a little two-bit power play."[20] In his anger, he also took a back-handed, and presumably intentional, slap at Degani by saying, "I normally deal with their [Fish and Wildlife] higher-echelon people in Albuquerque," though McCoy said that he would meet with Degani.[21]

As the argument over Wallisville continued, the debate attracted attention elsewhere within the Corps. The Assistant Secretary of the Interior, Nathaniel Reed, made it plain he backed Degani's alternative and communicated such to Victor Veysey, Assistant Secretary of the Army for Civil Works. "The growing spirit of cooperation between the Corps and the Service is not enhanced by outbursts such as that attributed to Col. McCoy," Reed told Veysey. McCoy would not comment directly, but said that the allegations were "not at all representative of my efforts to coordinate our project with other federal and state agencies."[22]

This entire episode is intriguing, not only for the light it sheds on the strained relationship between the District and other federal agencies, but for the light it throws on relationships between a District such as Galveston and higher echelons in the Corps. In hindsight, former Southwestern Division Engineer McGinnis, who subsequently moved on to OCE, spoke of "tensions between the Corps' top echelon, which is pushing for greater citizen participation, and many of the district engineers, who are comfortable with the status quo."[23] Having to expose their project plans to stringent and often hostile scrutiny by potential opponents who often proved both strident and persistent was not a prospect District Engineers faced with enthusiasm. While Districts that were experiencing environmentalist-inspired litigation perhaps eventually proved more willing to modify their practices

regarding citizen participation and cooperation with other agencies, in the mid-1970s many of these Districts, including Galveston, were still trying to adjust to the new style NEPA dictated.

Sometimes Districts during this transition became overly cautious, preceding very slowly. This may have been true in the Galveston District, which in 1976 was continuing to work on the EIS ordered by the court. Doug Graham, who as Chief of the Engineering Division in the District, had overseen preparation of the original Wallisville EIS and seemed to feel personally responsible for the injunction. As a result, he wanted to make sure that all bases were covered before going back to the court with the revised or amended EIS. In hindsight, some within the Corps believe this was an unfortunate decision. Instead of "throwing a patch on the environmental statement and getting on with the construction," Graham and his staff, by deciding to review the entire project, compounded the delay. Navigation and commerce on the Trinity River changed, and the ways to calculate recreational and water supply benefits changed. As a result, as it analyzed the data, the District "found that the old project that we had under construction was really not the project to build to fit today's situation." The District began to move toward a redesigned project.[24]

Doug Graham, Engineering Division Chief

Col. Jon C. Vanden Bosch, District Engineer

While this work was underway, the District seemed to be moving toward improved relations with the public and with other agencies. In his January 1977 quarterly report to the Division, District Engineer Col. Jon C. Vanden Bosch noted that he had introduced a new format for public meetings in which project engineers were leading discussion groups or workshop session at public meetings.[25]

Six months later, Vanden Bosch reported that he had briefed fish and wildlife agencies and local sponsors. He continued, "While it appears that we can formulate a plan alleviating the environmental concerns of the other agencies, increases in project cost estimates and major shifts in the cost apportionment are causing considerable concern among the sponsors." In his July letter, Vanden Bosch added, "Because of Congressman [Jack] Brooks' personal interest in the Wallisville Project, I am carefully coordinating our study findings as well as the meeting arrangements with him." While predicting that an advance draft on the Wallisville project would be available for review in early 1978, at the same time Vanden Bosch reported that the public meeting scheduled for August had been postponed until October. This would allow more time for internal review and give Vanden Bosch time to meet with "special interest groups," presumably the local sponsors.[26]

During these delays, hostility toward federally funded water projects was growing, at least within the White House. In February 1977, barely a month after

Right: U.S Representative Jack Brooks

his inauguration, Washington outsider Jimmy Carter put Congress on notice that he wanted to cut all funding for 19 water projects. Carter saw this as an early volley in his battle to curb inflation and the budget deficit by eliminating waste and federal pork barrel projects. A cost-benefit analysis applying an interest rate of 6.75 percent swelled the so-called "hit list" of unacceptable projects to 80. Carter reluctantly conceded that the list would have to be winnowed. On April 18, 1977, the president announced his unalterable opposition to 18 projects. While Wallisville was not on the list, dams were clearly a White House target.

Wrangling and behind the scenes maneuvering continued through the summer and into the fall, with Carter promising to veto any appropriations bill which included the 18 projects. The House, although dominated by Democrats, dropped only one of the 18, and added money for a dozen new projects. The Senate passed a very similar bill. However, afraid that the House would not have the necessary two-thirds majority vote to override a veto, House Majority Leader Thomas P. O'Neill proposed a compromise. The House-Senate conference committee agreed to take nine water projects out of the 1978 appropriations bill and also drop funding for the Clinch River breeder reactor, another project Carter abhorred. Carter, to the absolute shock of many of his supporters, signed the bill. Yet he had not obtained a guarantee that the projects would not re-emerge in the next year's appropriations bill.[27] Writing his memoirs after being defeated for a second term, Carter concluded in hindsight, "The compromise bill should have been vetoed ... I regretted [signing the act] as much as any budget decision I made as President."[28] Clearly, times were changing and funding could not be taken for granted on any project.

During these machinations in Washington, Galveston District engineers continued to work on the Wallisville EIS, but by October the District decided to postpone the public meeting again, this time until December. Local sponsors asked that another alternative be considered because of their concerns with cost apportionment. Vanden Bosch was now predicting that the draft would be completed in April 1978. He added, "Some feedback from OCE concerning cost-sharing for a reformulated project becomes increasingly urgent."[29]

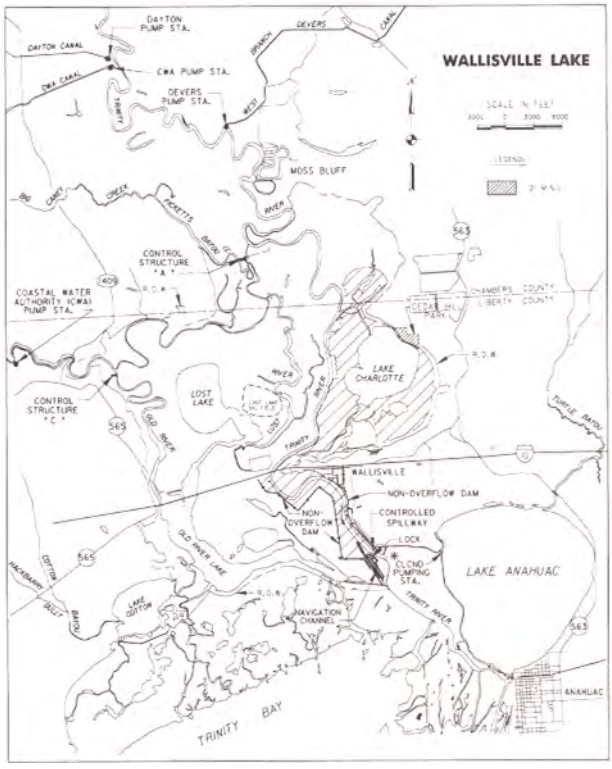
Finally, on December 10, 1977, the District held the public meeting. Two hundred people attended. At the meeting, the District presented information on alternative plans. Of these, Plan 2A, which reduced the area of the reservoir from 19,700 acres to 5,600 acres, received considerable support from the sponsors. It resembled the scaled-down alternative which had been proposed by the Fish and Wildlife Service. At the same time, still another alternative, incorporating a temporary non-impoundment barrier, emerged from the meeting. This, too, would have to be analyzed in the EIS. By July 1978, the District reported that local

sponsors were offering qualified support, contingent upon continuation of the existing cost-sharing contract and acceptability of the project design presented in the planning report. At this time, an advance draft of the planning report was being reviewed within the District and the EIS which would accompany the planning report through all stages of review was also nearly done. The District planned to submit the planning report and EIS sometime in July 1979.[30]

Though the District was releasing a number of EISs in the late 1970s, the EIS for Wallisville was repeatedly delayed as the project was modified and redesigned. It was not issued in 1979, nor in 1980. In April 1981, Judge Carl Bue, Jr., the same district court judge in Houston who issued the original injunction stopping Wallisville, granted the government's motion for limited permit action on a part of Trinity River-Lake Livingston, but the 1973 injunction against Wallisville remained in place because an EIS still had not been submitted. It was late 1981 before the EIS mandated by the court was finally released to the public.[32] The Post-Authorization Change Report (PACR) and the 200-page EIS accompanying it dropped the number of heavily touted benefits of the Wallisville project from five to three. Neither navigation nor fish and wildlife enhancement were listed any longer as significant contributions of the project.

This photo of Wallisville in 1978 shows construction done before the project was halted.

Within three months, it was clear that the District faced a new torrent of debate. Most disconcerting of all was the criticism that materialized within the Corps itself. The Corps' Board of Engineers for Rivers and Harbors (BERH) concluded in December 1981, that "potential inadequacies still remain in the EIS in those same areas of concern by the Federal Courts."[33]



Revised Wallisville project

Established in 1902, the BERH serves as an independent review group within the Corps. It is a permanent advisory board which reviews all Corps projects before the Chief of Engineers decides whether or not to transmit them to Congress. It consists of seven officers, one a resident member, the other six usually Division Engineer officers on duty at OCE. In 1971, the board established an Environmental Division to assist in assessing projects within the context of NEPA.[34] The board often reviewed District projects favorably, but it was clear that this time the board was not compliant. BEHR staff criticized the 1981 EIS for double-counting water benefits, exaggerating recreation benefits, failing to mitigate environmental damage, and neglecting to consider impacts on Galveston Bay.[35]

The District claimed that Wallisville would result in a water supply of 320 million gallons per day—180 million gallons saved because Houston would no longer have to use part of its authorized diversion from Lake Livingston for saltwater control plus 140 million gallons when Wallisville became the withdrawal point for water impounded upstream at Lake Livingston. Critics charged that the District was double-counting because the 180 million gallons used for salinity control did not belong to the city of Houston and therefore was not charged to the city as part of the water it was entitled by law to take. Hence, there was no savings of 180 million gallons to credit to Wallisville. Several years later, a local newspaper columnist offered the Spilled Milkshake Theory of water rights to poke holes in the Corps argument:

> *Imagine a boy and girl at a soda fountain after school, sharing one milkshake with two straws. The girl accidentally bumps the glass, and spills half the shake on the counter. Does the boy say: "dam [sic], Bettylou, that was your half of the shake you spilled."? Of course not; they share what remains in the glass.*[36]

In other words, the city of Houston's share of water in Lake Livingston was based on the water remaining *after* water is spilled to control saltwater intrusion.

Critics also believed that the recreation benefits of the project were overstated because the shallow reservoir would quickly become clogged with weeds and other vegetation. In turn, this would raise a host of new environmental problems. In particular, the reservoir would act as a settling basin, keeping sediments and organic and inorganic nutrients from marshes around the Trinity River from reaching Galveston Bay. This posed a potential threat to fish, shrimp and shellfish in the bay because their food supply would dwindle.[37] The District, of course, disagreed. Several years later, Wooley explained the Corps view by drawing an analogy. "You've got to remember, this dam is only four feet high," he said. "It's not a Grand Coulee ... it's like putting a teacup at the end of a hose. Once the teacup is full, the rest of the water runs around."[38]

The changes and deficiencies in the 1981 report suggested that the redesigned Wallisville project was entirely new. Therefore, it failed to comply with the 1973 court order and the District would have to go back to Congress for reauthorization.

Reauthorization presented several potential problems for the Galveston District. First, it could suggest that Plan 2A was indeed an entirely new project requiring still another EIS. This would mean still further delays in construction. Second, it raised questions about the validity of the 1960s cost-sharing contract between the Corps and local sponsors. Under new federal regulations, the local sponsors' contribution would significantly increase to 70 percent.

Opponents of Wallisville subsequently claimed that the Galveston District concluded that it had to "patch things up" and reinstate the navigation and wildlife benefits. Galveston engineers brought back the lost benefits in 1982 in a 17-page document providing supplemental information to the 1981 report (SIPACR). Bob Bass, a biologist with the Galveston District, was asked to write the supplemental report. He refused, believing that additional environmental studies were needed to prepare the report. Wooley disagreed. Working with Dr. Walter Gallaher, Environmental Chief of the Southwestern Division, and his Dallas staff, Wooley was able to generate a report in several weeks. In July 1982, it was sent to OCE.[39]

The SIPACR became perhaps the most controversial document ever produced by the District for two reasons. First, it reinstated the navigation, fish and wildlife benefits. The 1981 PACR concluded that fish and wildlife losses would total $989,000. The SIPACR forecasted a $122,000 annual fish and wildlife benefit.[40] Second, the SIPACR was not circulated for public review. The District contended that it was a document for internal use only. Wooley described it as "a 'what-if' staff paper," nothing more than "a working paper."[41] Neither the Fish and Wildlife Service nor National Marine Fisheries saw the report, nor did the Corps' own BERH. Yet somehow the report got to Washington, D.C.

In July 1982, U.S. Representative Jack Brooks of Beaumont introduced legislation which referred to the SIPACR, thereby putting the document before Congress. In 1983, Congress appropriated money for the scaled-down Wallisville project. But since the modified project was still considered part of the original Wallisville project and the original contract with the local sponsors, the injunction was still in place.

Wallisville critics were outraged by what they termed the Washington "short circuit." Clearly, Wallisville was taking its toll in the way the Corps was perceived by both the public and project sponsors. Colonel Alan Laubscher, who became District Engineer in 1982, articulated this in his six-month report to the Division:

> *My concern is the perception that may be growing that the Corps does not always stand behind its agreements. One case in point, with which you are very familiar, is the decision on the Wallisville Lake project. In this particular case, our action might be interpreted as a breach of a Corps agreement with a local sponsor ... I stress the word "interpreted," because I have been assured that our actions ... are fully within the law in a legal sense. However, I believe perceptions are important and I firmly believe that the "word" of the Corps should be carefully guarded. I am suggesting that in similar situations, perhaps in addition to the legality of our decisions, greater emphasis should be placed on perceptions that may arise from our actions.*[42]

Col. Alan Laubscher

Laubscher also acknowledged policy differences between the Corps and other agencies, particularly the U.S. Fish and Wildlife Service (USFWS) which

had a different view of mitigation measures than the Corps. He wrote:

> *Mitigation has been considered mandatory only when required to tip the public interest review scales in favor of the applicant. However, the USFWS appears to be of the basic opinion that all environmental impacts should be mitigated regardless of the public interest balance. This difference in philosophy results in obvious conflicts between our agencies. I believe the issue is appropriate to be considered at the policy level ...* [43]

In fact, differences between the Corps and USFWS extended beyond philosophy. As part of the U.S. Department of the Interior, USFWS was heir to long-standing mistrust between the Corps and Interior. Former Southwestern Division Engineer McGinnis capsulized a commonly held view within the Corps: "The Department of Interior [has] coveted the Corps civil works role for many years ... The Corps' civil functions have always been successful vis-a-via those of the Department of Interior, and Interior has always wanted to take control of the entire [civil works] function."[44] Neither the Galveston District nor the USFWS were surprised to find themselves on opposite sides in the courtroom.

Maj. Gen. Robert J. Dacey

When the District and the local sponsors filed a request before Judge Bue in January 1985 to lift the original 1973 injunction, the Sierra Club, Audubon Society and other environmental groups fought back. Citing Bass' refusal to revise the PACR and claiming that the reinstatement of navigation benefits bordered on mendacity, they argued that the injunction should be continued. The hearing was scheduled for August in Houston. Hoping for a favorable decision, the District meanwhile completed design of the first increment of work, the nonoverflow dam, and continued with plans and specifications so that construction could begin soon after the injunction was lifted. One of the focal points of the hearing, which began in August, was how the SIPACR reached Congress. Among the witnesses was Major General Robert J. Dacey, who was Division Engineer of the Southwestern Division at the time the SIPACR was prepared. It was Dacey, who by the time of the hearing was Assistant Chief of Engineers, who signed the Wallisville record of decision certifying that the Corps had followed proper procedures on the project.[45] He could not, however, explain how the SIPACR reached Congress. Nor could engineers in the Galveston District explain the mystery. They insisted that the SIPACR was intended to be only an internal document. Wooley was quoted as saying, "I don't know how it got to Congress. We don't knowingly do the wrong thing."[46] He did believe, however, that somehow the NEPA process had "jumped the track" at the Chief of Engineers' office.[47]

A second focal point of the hearing was the validity of the conclusions reached in the SIPACR. One of the witnesses called by the plaintiffs was Allan J. Mueller of the USFWS. Also called to testify was Don Moore, an environmental supervisor with the National Marine Fisheries Service in Galveston. Both concluded that the environmental impacts of the Wallisville

project had been underestimated by the District and the benefits overstated, particularly since the reservoir initially would be only two feet deep. Depth would gradually increase to four feet as the need for water in Houston grew more acute. Handwritten notes made by District biologist Bob Bass shortly after he resisted rewriting the 1981 report also became part of the court documents.[48] This time, a significant difference of opinion within the District became public record, unlike 25 years earlier when Colonel Brown's difference of opinion over Wallisville remained an internal matter.

Wallisville's contribution to fish and wildlife enhancement was particularly controversial. The Corps contended that wildlife habitats around the site would decline nearly 30 percent if the project were not completed. This figure was based on the assumption that if the Corps did not complete the project, the land would be turned over to private development, which would occur without concern for the environment.[49] Critics countered that environmental laws already on the books assured that private developers, even if they took over the site, would not be granted free rein.

Courtroom debate also centered around the need for additional water for the city of Houston and its cost. Supporters conceded that the cited cost of three cents per thousand gallons did not include treatment or delivery. The costs were also distorted because the cheap water reflected, to a large extent, the federal government paying much of the cost of the project. Opponents pointed out that in 1979, the city of Houston voted down another source for water, a diversionary canal from Luce Bayou, south of Lake Livingston, to Houston, because it could not be demonstrated that the demand for water was there.[50] They also argued that because the Wallisville reservoir would act as a settling basin for sediments and organic and inorganic nutrients which would normally flow to Galveston Bay—and because the reservoir would be so shallow—the quality of the water would be poor. According to them, Vanden Bosch, who had been Galveston District Engineer from June 1976 until his retirement from the Army in May 1979, and who then moved to become public works director for the city of Houston, had privately conceded that the quality of water would be marginal. But, because he had presided over the redesign of Wallisville in the late 1970s as District Engineer, he had to remain publicly committed to the project. In summary, the plaintiffs' basic argument was that the SIPACR was a desperate attempt to finagle congressional approval for a project that after 24 years still failed to demonstrate its merits.

In March 1986, the injunction was continued with comments on procedural irregularities. In his ruling, Judge Bue took the District to task for its "legislative legerdemain." He ruled that both Congress and the Corps failed to follow their own laws and regulations on environmental procedures. The judge concluded that the District still had not complied with NEPA because the SIPACR had not been through prescribed public scrutiny before Congress acted.

The Corps and the local sponsors appealed to the Fifth U.S. Circuit Court of Appeals in New Orleans, arguing that the environmental evaluation of Wallisville was adequate. By now, other parties had joined the fray. The Texas Parks and Wildlife Department filed a friend-of-the-court brief arguing that key environmental findings on Wallisville were "unsound" and that the Corps should have to do further environmental study. The Department also charged that in violation of federal law, the state agency had never been given a chance to review the 1982 report before it went to Congress.

The appeal was filed in April 1986. Briefs were prepared and oral arguments presented in February 1987. The brief filed by attorneys for the local sponsors, the Trinity River Authority and the Chambers-Liberty Counties Navigation District, presented three basic arguments. First, it had not been shown that the PACR-EIS issued in 1981 was deficient under NEPA. Second, Congress could and did authorize the modifications in 1983 without interfering with the on-going NEPA process and project review. Although Congress referred to the SIPACR, the reference was gratuitous and unnecessary because Wallisville was still the same project which was described in the PACR-EIS. The SIPACR simply re-evaluated economic data and the cost-benefit ratio; it did not change the configuration, the method of operation or the environmental effects of the project. Third, because the SIPACR simply quantified environmental impacts that had already been discussed at length in the PACR-EIS, there was no need to circulate it as a Supplemental Environmental Impact Statement (SEIS).[51]

Congressman Brooks with Wallisville Ranger Charles Craddock

In May 1987, a three-judge panel of the Fifth Circuit Court of Appeals in New Orleans gave the go-ahead to proceed on Wallisville after 15 years of delay. The judges ruled that the Corps did not have to prepare an SEIS for Wallisville; that the Corps' handling of the supplemental information following congressional action authorizing the project prior to final processing under NEPA was reasonable; that the final impact statement was adequate; and that Congress did not have to reauthorize the project.

Environmentalists were in shock. The Houston Sierra Club vowed that it would ask the full 5th Circuit Court to review the decision. Harold Scarlett, the environmental writer for the *Houston Post,* wrote that the ruling, if unchallenged, would "tear gaping holes" in NEPA and the Fish and Wildlife Coordination Act, which are supposed to protect the nation's environment. An environmental lawyer reviewing the decision termed the rulings "pretty scary—damn scary." Another attorney concluded that Wallisville won "not so much in the courts as in the political process."[52] Denial of the request for a rehearing would open the way to an appeal to the U.S. Supreme Court.

Yet there were signs that the battle might ultimately be decided, not on the legal front, but on the economic front. In 1987, the city of Houston formally presented to the public its Master Water Plan consisting of three separate plans for long-term water supply. The first alternative would draw water from the Toledo Bend Reservoir on the Sabine River between Texas and Louisiana. To deliver that water to Houston would require cutting a channel through the Big Thicket region, another environmentally sensitive area, at an estimated cost of $600 million. The other two alternatives developed by the city's engineering consultants included Wallisville. One incorporated both Toledo Bend and either Wallisville Dam or an inflatable saltwater barrier at Wallisville.[53] The other would build Wallisville plus two reservoirs on the Brazos River. If Houston were eventually to select the Toledo Bend alternative, one of the main justifications for Wallisville would vanish unless Houston chose to use Wallisville as an interim measure to defer

the $600 million expenditure for Toledo Bend. At a public hearing on the Master Water Plan in June 1987, a Corps spokesman conceded that Wallisville would die without support from Houston.[54]

Corps participation is equally important. Congressman Jack Brooks included $4 million in an appropriations bill for fiscal year 1988 (which began October 1, 1987) to restart construction on Wallisville. Since 1973, Congress had appropriated funds only for maintenance of the stalled project. The Reagan budget for 1988 included another $170,000 for maintenance, but nothing for construction. Brooks was able to push the construction appropriation for Wallisville through the House in June, but the Senate did not include it in its version. Its fate ended up in the hands of the House-Senate conference committee responsible for resolving differences between the two versions of the bill.[55]

In May 1987, the court gave the go-ahead to proceed on Wallisville after 15 years of delay. Interstate 10 and the reservoir can be seen in the September 1987 photo.

Four million dollars, of course, was not enough to complete construction. Corps projects, however, have traditionally been funded piecemeal. Critics point out that the Corps is the only major federal agency utilizing year-by-year funding, thus concealing the long-term commitments it makes on behalf of the federal treasury.[56] President Carter was also uncomfortable with this approach and tried to insist that the full cost of a dam or other Corps project be covered in the budget when the project is first approved.[57] This stance contributed to the breach between the president and the Democratic leadership. Carter eventually gave in. In 1987, Corps projects were still funded in the customary way. Yet as the Republican administration of Ronald Reagan confronted the reality of a growing budget deficit, there was clearly less enthusiasm for Corps water projects.

Given this sentiment, in September 1987 the Corps suggested for the first time that it might no longer participate in Wallisville. In letters to the local sponsors and to the Texas congressional delegation, the Acting Assistant Secretary of the Army for Civil Works, John Doyle, Jr., neatly summarized OCE's new perspective:

> *Initially, water supply and salinity control provided only 26 percent of the project benefits, while navigation provided 42 percent of the project benefits. Because of project modifications, ... water supply and salinity control now provide 85 percent of the project benefits and navigation provides 1 percent ... Consequently, the project is now primarily a single-purpose water supply project. This type of project traditionally has been the responsibility of non-Federal interests. Accordingly, I am not optimistic that this type of project will gain the budgetary support it would need within the Administration in order for construction to be resumed.*[58]

While some observers saw this simply as a "trial balloon" floated by the Corps on behalf of the Reagan administration to seen what the reaction would be, it had the potential to begin a whole new legal round in the battle over Wallisville. Local sponsors might challenge the Corps' right to pull out of the project.[59] In other words, former allies could find themselves at odds with each other after fighting side by side against an environmental coalition for nearly two decades.

The reason for the potential rift was money. The original 1967 cost-sharing contract called for local sponsors to pay about 16 percent of Wallisville's construction cost. When Congress reauthorized the project in 1983 after release of the SIPACR, it specified that this cost-sharing contract would still apply. In 1986, however, in the final hours before adjournment the 99th Congress passed the first major omnibus water resource development authorization bill, H.R. 6, since 1970. The cost-sharing provisions of the Water Resources Development Act of 1986 marked a major departure from traditional federal water funding policies. It was a reform which William Gianelli, the Army's Assistant Secretary for Civil Works from April 1981 to May 1984, had promoted during his tenure.[60] Under the act, local sponsors must pay a much larger share of construction costs. If the new formula were applied to Wallisville, the local share could be as high as 70 to 75 percent, or even 100 percent if the project were reclassified as being only a water supply project.[61] The local sponsors would have to contribute millions of dollars more to Wallisville if it were subject to the new cost-sharing provisions.

Following the May ruling by the Fifth Circuit Court of Appeals, the state also reinjected itself into the fray. The three-member Texas Water Commission (TWC) in early July 1987 instructed its executive director to re-examine the state's certification of Wallisville. TWC's predecessor, the Texas Department of Water Resources, certified in 1983 that Wallisville, as described in the PACR, would not violate state water quality standards. If the state could show that the project which Congress subsequently reauthorized was not the project described in the PACR, TWC possibly could stall the project on a technicality.[62]

It seemed as though Wallisville was a "legislative Lazarus" that would not die,[63] but by the end of 1988, if it was not dead, it was certainly comatose. When OCE ruled that the project had become a single-purpose water project for the city of Houston, it was no longer eligible for federal funding assistance. With the entire financial burden placed squarely on the local sponsors, the chances of the project ever being completed diminished dramatically.

While there were undoubtedly self-serving axes being ground on both sides of the Wallisville Dam issue, there were a number of historical factors underlying the controversy which help to explain the District's position. The District clearly was caught off guard by the reaction Wallisville provoked in the aftermath of NEPA. In the District's traditional view, Wallisville was one more project in a long chain of civil works projects endorsed by Texans and Congress. Faced with a project which suddenly was not that promotable in light of the objections raised by a newly vocal and well-organized environmental contingent, the District initially did not know how to respond.

The Corps can only carry out those missions which Congress and the president prescribe, and in the 19th and early 20th century, most of those were intended first and foremost to develop natural resources and promote economic growth. Environmental preservation was never a dominant priority for the United States for the first half of the 20th century, and therefore it was not and could not be made a prominent mission of the Corps. Given this historical role, environmentalism initially was viewed by many as anti-growth.[64] Indeed, former Texas Governor Price Daniel, a Wallisville landowner and supporter, suggested as much when he argued that the same organizations that opposed Wallisville would also have opposed the highly successful Houston Ship Channel and probably would have called it, too, "an idiotic venture of a pack of troglodytes playing engineers."[65]

Wallisville was just one of a number of lawsuits brought against Corps projects. Often the challenged projects were conceived and justified under criteria established decades earlier. In other words, as one Chief of Engineers pointed out, "At times the Corps has been placed in the position of defending the past against the present; trying to explain what were rational decisions at the time, but decisions vulnerable to present-day analysis."[66] In this same vein, General McGinnis, who after serving as Division Engineer of the Southwestern Division from July 1974 to June 1977 became Director of Civil Works, has argued, "Our circumstances have changed, and I think you have to say this in defense of the Corps and in defense of the country's past leadership: environmental problems have become problems with a burgeoning population. When our population was small ... we were entirely willing to accept [some problems]. As population has grown, that is no longer the case." He also suggested that many environmental organizations, and even some federal agencies such as USFWS, "enjoy the luxury of a single point of view, a single mission and a single purpose." With many constituents and a variety of interests to serve, the Galveston District does not have this luxury. The Galveston District is also in a state where "Water is high-order politics ... "[87]

Wallisville began with great promise, but the Galveston District, like other Districts, did not realize at first just how much NEPA changed the rules. Suddenly they were "working in the environment of the fishbowl"[68] with every assumption and every recommendation open to questions. Once the environmentalists moved to the courts to stop Wallisville, positions hardened on both sides and accommodation became increasingly difficult. As Engineering Chief Trahan notes, "Engineers are not trained to compromise. They are not trained for defeat. They are trained for steadfastness and victory ... That's the greatest difficulty for engineers in today's world. They have to compromise if they're to achieve anything."[69] While the Corps eventually prevailed in the courts, it was a Pyrrhic victory. It consumed a tremendous amount of resources as the District first wrote a lengthy EIS, then held public meetings and defended its conclusions. Later, the battle would strain relationships between the District and other federal agencies, and between the District and other parts of the Corps, most noticeably the BEHR and OCE, and between the Corps and Wallisville's local sponsors.

REFERENCE NOTES

[1]Lt. Gen. J.W. Morris, "The Corps of Engineers and the American Environment: Past, Present, and Future," Civil Works, Environment (IV), Box 461, Folder 21, Research Collections, Office of History, Ft. Belvoir, Virginia. Hereafter cited as CW IV-46-21, RC/HO.

[2]Interview with Maj. Gen. Charles I. McGinnis by Martin Reuss, November 5, 1979, pp. 22-23, Oral History Career Interview (edited draft), Archives, Ft. Belvoir, Virginia. Hereafter cited as McGinnis interview.

[3]Perhaps the most notorious example of a Corps project which did not enjoy widespread public support is the Tennessee-Tombigbee Waterway, though it was finally constructed.

[4]The list of Corps critics is long. Among the most notable are Arthur Maass, *Muddy Waters: The Army Engineers and the Nation's Rivers* (Cambridge, Mass., 1951); Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (New York, 1969), 199-218; Arthur E. Morgan, *Dams and Other Disasters: A Century of the Army Corps of Engineers in Civil Works* (Boston, 1971); William O. Douglas, "The Public Be Dammed," *Playboy*, 26 (July 1969), 143-182; George Reiger, "Proposition XIII," *Field and Stream*, 84 (October 1979), 56, 162-175; Elizabeth Drew, "Dam Outrage: The Story of the Army Engineers," *The Atlantic Monthly*, 225 (April 1970), 51-62; and Representative Henry S. Reuss, "Needed: An About-Face for the Corps of Engineers," *Readers Digest*, 99 (November 1971), 129-132. Maass, in time, seems to have tempered his view of the Corps. See interview with Arthur Maass by Matrin Reuss, *Water Resources People and Issues* (Office of the Chief of Engineers, U.S. Army Corps of Engineers, 1989). Interestingly, Maass donated his papers, not to a university library, but to the Corps archives, Ft. Belvoir, Virginia. One of the most recent additions to the list of critics is Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking, 1986).

[5]Daniel A. Mazmanian and Mordecai Lee, "Tradition Be Damned! The Army Corps of Engineers Is Changing," *Public Administration Review* (March/April 1975), pp. 166-172; Daniel A. Mazmanian and Jeanne Nienaber, *Can Organizations Change? Environmental Protection, Citizen Participation, and the Corps of Engineers* (Brookings Institution, 1979). Quote from "Tradition Be Damned!", p. 171.

[6]At that time, the Planning Branch was part of the Engineering Division. Planning did not become a Division of its own until June 1986.

[7]B.C. Robison, "Wallisville Dam: A Scandal in Disguise," *Houston Post*, October 19, 1986; October 22, 1986; October 24, 1986.

[8]Even the Corps itself sometimes cannot maintain the distinction. The official Corps history of the Southwestern Division contains the following statement about the suit brought by the Sierra Club in 1971 to stop Wallisville: "This suit was of great interest to the Trinity waterway supporters because, even though Wallisville was funded separately from the rest of the project, it was a vital link in the master plan." See D. Clayton Brown, *The Southwestern Division: 50 Years of Service*, p. 119. Major General Charles McGinnis, onetime Southwestern Division Engineer, essentially made the same point: "The [Wallisville] project was in and out of the Trinity project. It had been developed separately and yet it was in the same river basin. There was some physical interaction between the projects ... [Wallisville] would make some contributions to other facets of the Trinity River system which were desired [by the Trinity River Authority] and which were supportive of the fundamental Trinity project as it is generally known." See McGinnis interview, p. 48.

[9]The four reservoirs were Tennessee Colony, Aubrey (now Ray Roberts), Lakeview (now Joe Pool), and Roanoke. See Brown, *The Southwestern Division*, p. 113.

[10]See Brown, *The Southwestern Division*, p. 127, where this point is made.

[11]Brown, *The Southwestern Division*, pp. 111-117. The implication, of course, is that Brown was abruptly transferred because of his position on Wallisville. However, Brown had also voiced opposition to proposals to transfer Galveston District functions to the Fort Worth District.

[12]Rivers and Harbors Act of October 23, 1962, Pub. L. No. 87-874, 76 Stat. 1173.

[13]The *Annual Reports of the Chief of Engineers on Civil Works Activities* cite not only project costs, but also include brief project descriptions. See, for example, *Fiscal Year 1977, Annual Report of the Chief of Engineers on Civil Works Activities*, Volume II, pp. 15-12 and 15-13.

[14]The word "environmentalist" is a concise and convenient label, but it should not suggest that all who call themselves environmentalists share a common mind-set and agenda. Nor should it suggest that those who oppose them support wholesale destruction of the natural environment. The environmental movement is very diverse, composed of people who have a variety of motivations and who sometimes disagree over tactics and goals.

[15]McGinnis interview, pp. 35-37.

[16]Interview with Joe Trahan, Galveston, Texas, March 16, 1987, by Lee Pendergrass. Hereafter cited as Trahan interview.

[17]The other parties to the lawsuit in addition to the Sierra Club and the Audubon Society were the Houston Sportsman's Club, the Texas Shrimp Association, and two fishermen. Other members of the Houston-based coalition which would fight Wallisville included the League of Women Voters of Houston, the Galveston Bay Conservation and Preservation Association, and the Outdoor Nature Club. See Brown, *The Southwestern Division*, p. 119.

[18]Brown, *The Southwestern Division,* pp. 119-120.

[19]Quote is from interview with William Wooley, Galveston, Texas, March 17, 1987 by Lee F. Pendergrass. Hereafter cited as Wooley interview.

[20]Quoted by Ed Fowler, "Move to Drop Wallisville Dam Called 2-Bit Play," *Houston Chronicle*, January 18, 1976. Also see similar quote in report by Harold Scarlett, "Wallisville Dam Change Backed; Engineer Flayed." *Houston Post*, February 11, 1976.

[21]Fowler, "Move to Drop Wallisville," *Houston Chronicle,* January 18, 1976.

[22]Quoted by Scarlett, "Wallisville Dam Change Backed," *Houston Post*, February 11, 1976.

[23]McGinnis interview.

[24]Quotes are from Wooley interview.

[25]Letter from Col. Jon C. Vanden Bosch, Galveston District Engineer, to Maj. Gen. Charles I. McGinnis, Division Engineer, January 21, 1977, District Engineer Correspondence File, Galveston District.

[26]Letter from Col. Jon C. Vanden Bosch to Brig. Gen. James C. Donovan, Division Engineer, July 28, 1977, District Engineer Correspondence Files, Galveston District.

[27]This account is drawn largely from Reisner, *Cadillac Desert*, pp. 324-332, but numerous newspaper reports confirm the basic story. See also Jimmy Carter, *Keeping Faith: Memoirs of a President* (New York: Bantam Books, 1982), pp. 78-79.

[28]Carter, *Keeping Faith*, p. 79.

[29]Letter from Col. Jon C. Vanden Bosch to Brig. Gen. James C. Donovan, District Engineer, October 28, 1977, District Engineer Correspondence Files, Galveston District.

[30]Letter from Lt. Col. Robert L. Oliver, Acting District Engineer, to Brig. Gen. James C. Donovan, Division Engineer, July 3, 1978, District Engineer Correspondence Files, Galveston District. Although the letter indicates that the EIS will be completed in July 1978, this appears to be a typographical error judging from the wording of the sentence and the actual release date, which was even later than 1979.

[31]*Houston Chronicle*, August 26, 1985.

[32]The press releases contained in News Release & Media Files 412-05, Public Affairs Office, Galveston District, give a good idea of the number of EISs and the frequency with which they were being issued. Public Affairs issued a press release every time an EIS was completed.

[33]Quoted in Plaintiffs' Pretrial Brief (1985), *Sierra Club, Inc., et al.*, vs. *John O. Marsh, Secretary of the Army, et al.*, Civil Action No. 71-H-983, p. 2. Court case hereafter cited as *Sierra Club* vs. *Marsh.*

[34]Maass, *Muddy Waters*, p. 23; Thomas M. Clement, Jr., Glenn Lopez, and Pamela T. Mountain, "Engineering a Victory for Our Environment: A Citizens' Guide to the U.S. Army Corps of Engineers" (Washington, D.C.: Institute for the Study of Health and Society, July 7, 1971), n.p.

[35]For a description of the BEHR findings and to see how Wallisville opponents planned to use these findings in court, see: In the United States District Court for the Southern District of Texas, Houston Division, *Sierra Club, Inc., et al.,* vs. *John O. Marsh, et al.,* Civil Action Plaintiffs' Pretrial Brief, n.d. In written comments to the authors on the draft of this chapter, Wooley emphasized that these were the findings of BEHR "staff."

[36]B.C. Robison, "Master Water Plan Showdown Begins," *Houston Post*, June 9, 1987.

[37]Robison, "Wallisville Dam," *Houston Post*, October 20, 1986; October 23, 1986.

[38]Quoted in Stephen Harrigan, "Worked to Death," 16, *Texas Monthly* (October 1988): 198-199.

[39]Brief of Appellants Trinity River Authority of Texas and Chambers-Liberty Counties Navigation District, *Sierra Club* vs. *Marsh*, No. 86-2247 in the United States Court of Appeals for the Fifth Circuit, August 22, 1986, pp. 19, 21-22.

[40]The differences between the 1981 PACR and the SIPACR are summarized in a table in "Wallisville Lake Project, Texas Supplemental Information to Post-Authorization Change Report," (Galveston District: U.S. Army Corps of Engineers, July 1982), p. 9.

[41]Wooley interview.

[42]Letter from Col. Alan E. Laubscher, Galveston District Engineer, to Maj. Gen. Hugh G. Robinson, Division Engineer, July 13, 1983, District Engineer Correspondence File, Galveston District.

[43]Letter from Col. Alan L. Laubscher to Brig. Gen. Robert J. Dacey, Division Engineer, January 12, 1984, file 228-10, Installation Historical File, Periodic Letter to Division Engineer, 1984 file, District Engineer Office, Galveston District.

[44]McGinnis interview, pp. 30-31.

[45]Harold Scarlett, "Biologist Ordered to Ignore Subpoena from Reservoir Foes," *Houston Post*, November 22, 1985.

[46]Quoted in Robinson, "Wallisville Dam," *Houston Post*, October 22, 1986.

[47]Wooley interview.

[48]For a copy of Bass' handwritten notes, see Plaintiffs' Pretrial Brief (1985), *Sierra Club* vs. *Marsh*, Appendix G.

[49]*Houston Chronicle*, November 21, 1985.

[50]B.C. Robison, "Wallisville Dam," *Houston Post*, October 20, 1986.

[51]Brief of Appellants Trinity River Authority of Texas and Chambers-Liberty Counties Navigation District, *Sierra Club* vs. *Marsh*, No. 86-2247 in the United States Court of Appeals for the Fifth Circuit, August 22, 1986.

[52]Harold Scarlett, "Panel's Ruling on Wallisville Reservoir a Major Mistake," *Houston Post*, May 17, 1987.

[53]The Japanese-built inflatable rubber dams come in 300-foot sections. Maximum height is about 16 feet. A dam 10 feet high would cost, according to the manufacturer, about $3,000 per linear foot, excluding installation. The dam would be inflated only in periods of low river flow to prevent saltwater intrusion up the river. Normally it would lie flat on the Trinity River bottom. See *Houston Post*, August 7, 1987; August 23, 1987.

[54]Kim Cobb and Bill Dawson, "Consultant's Proposal Backs Building Wallisville Reservoir," *Houston Chronicle*, June 11, 1987.

[55]Bill Dawson, "Wallisville Project Dealt Setback," *Houston Chronicle,* September 17, 1987.

[56]Mazmanian and Lee, "Tradition Be Damned!", pp. 166-167.

[57]Carter, *Keeping Faith*, p. 79.

[58]Letter from John S. Doyle, Jr., acting Assistant Secretary of the Army (Civil Works) to Paul Crutchfield, General Manager, Chambers-Liberty Counties Navigation District, September 19, 1987, in Public Affairs Office Files, Galveston District.

[59]See comments by Sam Scott, Wallisville project manager for the Trinity River Authority, cited by Bill Dawson, "Groups Studying Support of Reservoir," *Houston Chronicle*, August 21, 1987.

[60]Interview with William R. Gainelli by Martin Reuss, *Water Resources People and Issues* (Office of the Chief of Engineers, U.S. Army Corps of Engineers, August 1985).

[61]For a summary of the major provisions, see Brian Sullivan, "House, Senate Approve H.R. 6," (U.S. Army Corps of Engineers, Office of the Chief of Engineers)

Engineer Update, Vol. 10, No. 11 (November 1986), pp. 1, 6. Also see Bill Dawson, "Groups Studying Support of Reservoir," *Houston Chronicle*, August 21, 1987.

[62]Harold Scarlett, "Commission to Review Wallisville Certification," *Houston Post*, July 2, 1987; Beverly Miller, "Commission Re-Examines Wallisville Certification," *North County Citizen* (South Harris, Texas), July 8, 1987.

[63]The phrase is used by Albert E. Cowdrey to describe the Refuse Act, but it echoes the sentiments of environmentalists fighting Wallisville. See Albert E. Cowdrey, "Pioneering Environmental Law: The Army Corps of Engineers and the Refuse Act," *Pacific Historical Review*, 44 (August 1975), 334.

[64]This belief is still commonly held today. Wooley, for example, terms the environmentalists "anti-development." Quote from Wooley interview.

[65]Price Daniel, "Wallisville Dam: The Other Side's Case," *Houston Post*, November 9, 1986.

[66]Morris, "The Corps of Engineers and the American Environment," p. 8.

[67]McGinnis interview, pp. 2, 21-22.

[68]Trahan interview.

[69]Ibid.

Chapter III

DREDGING, HARBOR MAINTENANCE & NAVIGATION

Just as the environmental and financial pressures surrounding Wallisville ultimately tested the relationship between the Corps and local sponsors, so, too, were long-established working relationships affected by changes in dredging policy. The way in which the Galveston District exercises its responsibility for navigable waterways has changed in the wake of environmental concerns. At times, these changes, particularly those affecting dredged material disposal, strained the relationship between the Corps and local sponsors such as the Port of Corpus Christi. Yet the Texas coast and its navigable waterways are so closely linked with the economic well-being of Texas that there has always been an incentive to reach an accommodation.

Nearly three-fourths of all goods leaving Texas are shipped by water.[2] The major users are the petroleum and petroleum refining industries. In 1978, these two activities accounted for approximately 60 percent of all waterborne commerce in Texas. Chemical and nonmetallic mineral industries accounted for 34 percent.[3] The District is responsible for dredging and helping to maintain the harbors and shallow and deep draft waterways through which most of this commerce moves. It is also responsible under Section 10 of the Rivers and Harbors Act of 1899 for issuing permits to applicants for deepening or widening these harbors and channels and disposing of the dredged material. Dredging and related operations and maintenance (O&M) costs are the largest percentage of the District's annual budget.[4] Operations and maintenance "housekeeping" is not as glamorous or exciting as design and construction of new projects, but it may be the most important of all the District's activities.

In the early 1970s, O&M appropriations for the Galveston District did not keep pace with inflation as the cost of fuel pushed up the cost of dredging. All of the major navigation channels were shoaling, and the District was under pressure from both port authorities and politicians to restore authorized channel dimensions. Colonel Don McCoy, who became Galveston District Engineer in June 1973, fought during his entire three years at Galveston to increase the annual O&M budget and to expeditiously award contracts so that the money would be spent within that same fiscal year. Outspoken and blunt, McCoy did not

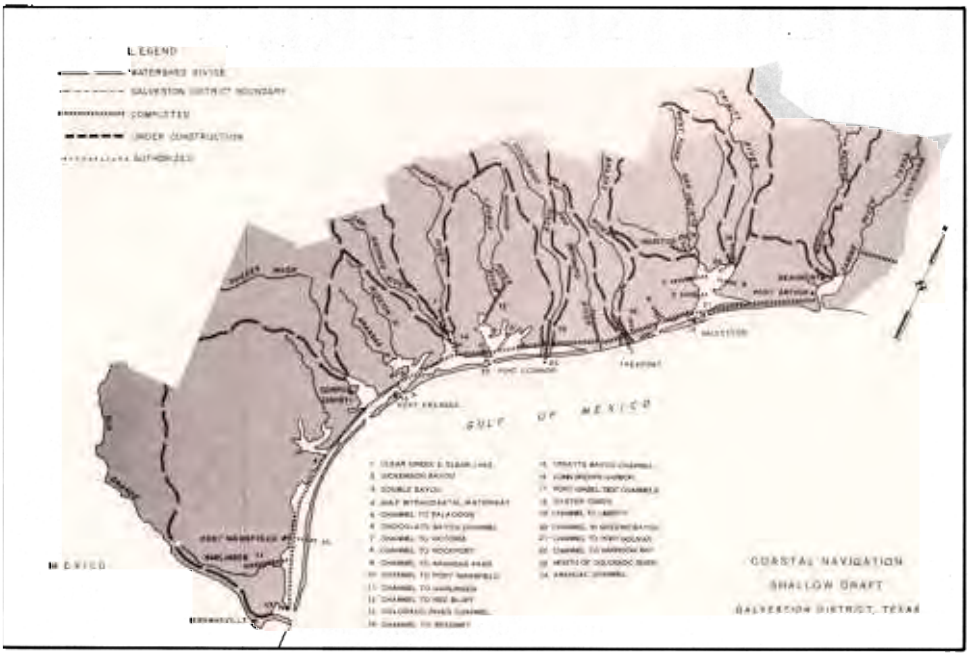
Texas is a great land, I'm sure. It's got ever-thin' a man might want—free land, free cattle, beautiful rivers, and mountains too, I hear, in the west. But one thing it ain't got is a safe harbor. None.

It had fine big bays, best in the world. Galveston, Matagorda, Corpus, Laguna Madre. I been in 'em all, and they ain't none better. Only one thing wrong with 'em. No way you can get into 'em. God made Hisse'f these perfect bays, then guarded them with strings of sandbars, half-assed islands, marshes, and ever' other kind of impediment you could imagine.

This is maybe the most dangerous coastline in the whole damned world. Look at the wrecks we'll see when we try to get into one of them bays. Wrecks everywhere. First steamboat tried it, wrecked. Next steamboat, went aground, and you'll see it rottin' there if'n we're driven to Matagorda. The coast of Texas is hell in salt water.

—Sailor in 1831,
James A. Michener's *Texas*[1]

In the 1830s, the Texas coast was a nightmare for navigators. Shown is a print of the Port of Galveston in 1825.



In addition to 260 miles of deep water channels, the Galveston District maintains 720 miles of shallow draft channels.

hesitate to take on other Districts, the Division, and even OCE in order to get more funds for Galveston.[5]

Eventually, McCoy won the support of Southwestern Division Engineer Charles McGinnis, who assumed command of the Division in July 1974, a year after McCoy was named District Engineer. As McGinnis recalls, "Don McCoy confronted me rather enthusiastically I guess, or antagonistically, with the fact that shoaling was occurring in most of [the Texas] channels ... Name a port on the Texas coast, and we were in trouble." When Major General John Morris, director of Civil Works, visited the Division a few months later, "Colonel McCoy- - again, rather pugnaciously—confronted General Morris with the problems he faced in resources to open the waterways of the Galveston District. General Morris promised when he got back [to Washington, D.C.] to try and provide another million dollars to help [McCoy] in this. But he was rather testy in his advise to me to look first to resources available within the division. And frankly, I couldn't quarrel with that guidance. I thought that was right. He was short on resources and it was going to be difficult for him to take money away from another division to give to SWD."[6]

So in an unusual move McGinnis shifted money from other Districts to Galveston in order to bolster Galveston's O&M budget. Most of the additional money came from the Little Rock District, which was changing from a design-construct district to an operating district emphasizing recreational areas. McGinnis justified his decision by citing the Puritan ethic: "I felt very keenly that ... we had to get our work done before we could afford to play, and that if

Right: Hopper dredges like the McFarland *(shown) helped keep channels open.*

we were unable to move the international commerce of the United States, ... that we should correct that condition before we threw resources in a massive way into recreation."[7] McGinnis also took money in lesser amounts from the Tulsa and Fort Worth Districts.

The decision was not a politically popular one. Other District engineers were upset because the Division had interfered with their planning for the year, and politicians were upset because funds were being withdrawn from projects benefiting their constituents. McGinnis learned that once money is budgeted for a particular project, it is difficult to get it back even if circumstances change. The next time he put together a budget, he allocated more money to O&M up front. Much of the credit must go to McCoy, who considered his successful fight for more O&M money his most important achievement as District Engineer. When he left the District at the end of May 1976, the O&M budget had nearly tripled from 1973.[8]

Yet the District still faced financial limitations. Personnel constraints were imposed for fiscal year 1978 and projected for fiscal year 1979. District Engineer Jon Vanden Bosch, who succeeded McCoy, would try to make up for this by increasing the amount of civil work contracting, but this clearly was not the District's preference. In fiscal year 1978, the District budget included removing 50 million cubic yards of shoal material. If stacked onto a city block 300 feet by 260 feet, the pile would reach 3.47 miles into the sky.[9] But near the end of that fiscal year, Vanden Bosch conceded that the District was losing ground. In a speech before the Gulf Intracoastal Canal Association, he acknowledged, "The operation and maintenance program ... costs continue to spiral as a result of inflation and environmental considerations ... Each new season seems to introduce new environmental problems or regulations which drive up the cost of doing work and increase the time required for work maintenance."[10]

Brig. Gen. James Donovan

The hopper dredge Mackenzie *was the oldest hopper dredge in the Corps' fleet.*

By 1979, Southwestern Division Engineer Brigadier General James Donovan was expressing to General Morris new concerns over the Galveston District's ability to accomplish its dredging mission. Donovan was not only voicing his own uneasiness; he was also echoing the uneasiness of the new District Engineer, James Sigler, who assumed command of the District in mid-1979. The money available for fiscal year 1980 for new operations and maintenance contracts would meet only 60 percent of the need in the District. The Gulf Intracoastal Waterway would be most severely impacted and Donovan warned, "I expect some serious problems possibly before the end of the year."[11]

During the early 1970s, not only a shortage of money, but also a shortage of dredges hampered the Galveston District. When McCoy assumed command, the District claimed the distinction of operating both the oldest and newest hopper dredges in the Corps' fleet—the *Mackenzie*, launched in 1924, and the *McFarland*, first assigned to the District in 1967. Hopper dredges operate much like giant

The Mackenzie *sank in Bolivar Roads after a tanker rammed the dredge in April 1974.*

vacuum cleaners and are used in entrance and jetty channels where waves and currents restrict the operation of hydraulic pipeline dredges, which are more suited to protected inshore channels.

Then, in April 1974, the 50-year-old *Mackenzie*, while dredging in Galveston Channel, was struck by a foreign tanker which had first collided with a research vessel. The *Mackenzie* had survived enemy attacks in the South Pacific during World War II and had been raised after sinking in a 147-mile-per-hour typhoon, but this time it was too badly damaged. Within minutes the *Mackenzie* sank to the bottom of the entrance to Galveston Bay.[12] Soon after, the Lower Mississippi Valley Division (LMVD) preempted the *McFarland* to help dredge the Mississippi after high flows in 1973 and 1974 dramatically accelerated shoaling. This left the District without a dredge and without money to hire one, and undoubtedly contributed to McCoy's combative posture with McGinnis and Morris.[13]

The Corps subsequently transferred the aging hopper dredge *Gerig* to Galveston,[14] though the District viewed this as only a temporary solution. At the end of 1977, the Corps spent $2.3 million renovating the *Gerig* for the Galveston District, but this expenditure was necessary just to keep the dredge operational for another year.[15] In 1977, the District had high hopes that a new dredge would be built for the Texas Gulf Coast, but higher priority was given to a dredge for LMVD.[16]

In February 1981, barely three years after its overhaul, the *Gerig* was retired, a victim of age and politics. In 1977, Congress passed and President Carter signed Public Law 95-269, which began a five-year test of privatization. The Industry Capability Program (ICP) opened entrance channel dredging to private contractors and mandated a sharp reduction of the Corps' hopper dredge fleet. The program was implemented quickly. By fiscal year 1979, the Galveston District, albeit reluctantly, was promising to give 52 percent of its hopper dredge work—$7.2 million worth—to private dredging companies.[17] By fiscal year 1980, the *Gerig*'s retirement was imminent. For the first time since 1944–1947, after the hopper dredge *Galveston* sank with the loss of 11 lives in a 1943 hurricane, the District would not have a dredge of its own.[18] The District would have to contract all dredging, a situation which Southwestern Division Engineer Donovan felt severely limited the Galveston District's flexibility in routine dredging and hampered its ability to respond to emergencies requiring a hopper dredge. The District needed the new medium dredge which was under construction, but the Southwestern Division could not prevail over LMVD, particularly when the push toward privatization continued under the Reagan administration.[19] It was a program both Democratic President Carter

The dredge Gerig *was overhauled before retirement.*

and his Republican successor supported; as they hoped, costs of dredging did indeed drop at first due to competition.

Dredging by either the District or outside dredge operators can trigger heated debate. Until the 1960s, the public paid little attention to the major dredging permits the District issued each year. Pelican Island, now the site of a popular waterfront park, several industries, and Texas A&M University at Galveston, was built primarily of dredged material from Galveston Bay. The environmental movement, however, raised questions about the impact of dredging and dredge material upon marine life and wetlands. Disposal of dredge material became a major issue in three separate projects at Corpus Christi.

The 34-mile-long Corpus Christi Ship Channel is one of the deep water ports and channels along the Texas coast which the District maintains through dredging. The others are Galveston Harbor, 14 miles; Houston and the Houston Ship Channel, 51 miles; Freeport Harbor, 7 miles; the Sabine-Neches Waterway, 75 miles; the Texas City Channel, 9 miles; the Matagorda Ship Channel, 25 miles; and Brownsville (Brazos Harbor), 25 miles. Of these, the ports of Corpus Christi and Houston are the largest. Much of Corpus Christi's growth can be attributed to Duane Orr, a man with a personality as strong and assertive as that of his contemporary, McCoy.

Pelican Island, shown in the above photo, was largely built from material dredged from the ship channel.

Duane Orr at a Gulf Intracoastal Canal Association convention in New Orleans, October 1988.

Orr's career spanned over 40 years at the Port of Corpus Christi. He became District Engineer for the port (the Nueces County Navigation District No. 1) in 1948.[20] In that capacity, he worked closely with the Corps. In 1968, when he became Director of Industrial Development and Port Planning, his relationship with the Galveston District became even closer. Orr's office was responsible for obtaining all Corps of Engineers permits for port projects.

By the 1970s, the port was pushing three separate projects. The port hoped all three projects could proceed in parallel. The first was maintenance of the existing 40-foot-deep ship channel, which in some areas near shore was so badly silted that it was only 22 feet deep. The port was responsible for providing disposal areas for the material dredged by Corps contractors. The second, authorized by Congress in 1968, would deepen the channel from the Gulf to Corpus Christi to 45 feet. Construction, which began in 1972, had to be done in stages so maintenance of portions of the old 40-foot channel and construction of the new proceeded concurrently. As segments of the 45-foot project were completed, rules and regulations for the old 40-foot project were superseded by agreements made for the new project. Specifically, for the 45-foot project the port had to provide not only disposal areas, but also confining levees or other structures; unconfined open-water disposal was no longer

The Port of Corpus Christi grew during the 1970s.

acceptable if any other option existed. Land acquisition and levee construction associated with disposal threatened to increase project costs significantly. These costs would be borne, not by the federal government, but by the port. Equally important from the port's point of view, however, was that the new disposal requirements meant that the dredged material would no longer be used to build up more real estate for the port.

As Director, Orr also oversaw the conception, planning and promotion of a third project, "Deeport," a multipurpose deep draft inshore port. The first phase of the project would provide depths of 70 to 80 feet from the Gulf to Harbor Island near Port Aransas, Texas, for Very Large Crude Carriers (VLCCs). The second and third phases of the project would provide 60 feet of depth further up the channel for Ore-Bulk-Oil (OBO) vessels. Eventually, environmental and economic considerations shelved this project, but Orr remained convinced right up to the time of his early retirement from the port in 1978 that "Deeport" was a viable project unfairly done in by environmentalists.[21] In 1978, Orr was replaced with a former Galveston District Engineer, Colonel Nolan Rhodes, though the port retained Orr as a consultant until mid-1983.

Though Orr eventually blamed the Corps for not fighting the environmentalists harder, during the struggle to obtain the necessary authority to deepen the 40-foot-deep Corpus Christi Ship channel to 45 feet and construct a deep water port at Harbor Island, he tended to view the Corps as a traditional ally.[22] More than a decade later, McCoy still recalled a public hearing in Corpus Christi which began at 9 o'clock in the morning. At 2 o'clock the following morning he was still there listening to the public and answering questions.[23] Still, Orr and the port commissioners had their differences with District Engineer McCoy and his predecessor, Colonel Rhodes. They could not agree on tactics. At times, the port seemed willing to delay dredging temporarily and gamble that the next District Engineer would be more sympathetic.[24]

Deeport map

In June 1976, Doug Graham, Chief of the Engineering Division in the District, wrote a 29-page memo to "DE," presumably the new District Engineer, Colonel Jon Vanden Bosch, McCoy's successor. In the memo, Graham listed the stumbling blocks with the port commissioners as he saw them. First, the port would not accept limitations on filling wetlands or bay bottoms to obtain developable lands. Second, the commissioners were unwilling to devote any developable lands to disposal of maintenance dredging. Third, they would not invest any more money than absolutely necessary in disposal areas or levees. Fourth, they confused their ownership or "patent" rights to submerged lands with the right to fill them. Fifth, the Commission was seldom available to act as a body—all members had other compelling interests. Thus, a great deal of responsibility but only limited authority was being delegated to Orr.[25]

By December 1976, Vanden Bosch had settled into his assignment as District Engineer and in a letter to Orr reminded him that any permit for deep draft improvements to Harbor Island "involves consideration of the total public interest." This evaluation would have to include hard, up-to-date economic data from the port, regardless of whether the investment "is public, private or both."[26]

The entire dredging and disposal issue at Corpus Christi, as well as at other sites along the Texas coast, was complicated by the myriad of laws and regulations governing dredging and by the number of agencies involved in the review process prior to issuing a permit. These laws included not only the National Environmental Policy Act (NEPA), but also Section 404 of the Federal Water Pollution Control Act, amended in 1977 to the Clean Water Act. Section 404 authorized the Secretary of the Army, acting through the Chief of Engineers, to regulate the discharge of dredged and fill material. The Corps tried to restrict the scope of Section 404 to the same waters covered by the Rivers and Harbors Act, but the courts broadened the interpretation of the law to include wetlands. The new regulations, published in 1975, significantly increased the Galveston District's workload. Other laws impacting dredging included the Marine Sanctuaries Act and the Fish and Wildlife Coordination Act of 1958. The latter would turn mitigation lands over to the Texas Parks and Wildlife Department (TP&WD) to manage as natural areas.

Sometimes it seemed not only that there were more and more regulations, but that the existing regulations kept changing. In 1979, for example, OCE issued new regulations which said that local interests either had to provide containment levees themselves or pay the Corps in advance for them. This shift in policy affected 21 active navigation project sponsors in the Galveston District.[27] The new requirements increased the costs which these sponsors would have to bear and eventually placed Galveston in a potentially awkward position because not all Districts handled the new requirements the same way. OCE approved interim funding by Galveston as long as local sponsors agreed to reimburse the Corps later.[28] The new District Engineer, James Sigler, summarized his concerns this way:

> *Of concern to me ... are indications that the regulations are not being implemented uniformly Corpswide. As well as we can determine, [Galveston] is the only district that had any interim funding in FY 79. Additionally, in one or more instances where the Corps was threatened with legal action ... it is our understanding that OCE instructed the levees to be constructed at*

Col. James Sigler

federal expense. I think it is only a matter of time before the various sponsors begin to compare notes nationally and the Corps may be subject to strong criticism for the [inconsistent] manner in which the regulation is apparently being implemented.[29]

The Port of Corpus Christi was one of the local sponsors applying for temporary relief through interim funding.[30]

As it faced this welter of laws and regulation, the Port of Corpus Christi discovered it was vulnerable on another front. The 45-foot project became tangled in a debate over farmland versus wetlands. The debate had an ironic twist since the Corps had frequently argued that dredged material, rather than jeopardizing wetlands, created new wetlands. In 1980, the 45-foot project was completed to within a mile of the main turning basin, but disposal of dredged material from the inner harbor remained an issue.

A plan developed in 1975 suggested using a leveed portion of Nueces Bay along the northeastern side of Corpus Christi as a disposal site, but Fish and Wildlife forced this idea to be scrapped. Two hundred irate citizens fought a second alternative, using upland acreage or farmland north of Nueces Bay for disposal.

By mid-1980, the District clearly recognized that finding a disposal plan acceptable to everyone was the major problem delaying dredging of the inner harbor and completion of the 45-foot channel. Furthermore, the overwhelming public disapproval of the use of farmlands as disposal areas roused congressional interest. An interagency meeting in July 1980, attended by representatives of Senators Lloyd Bentsen and John Tower and Congressman Joe Wyatt concluded that it might be possible to use Nueces Bay if damage to the bay ecosystem could be offset by mitigation measures in the area. Study of these measures by the Galveston District would delay the project at least a year, but the District felt it had no choice.[31] Both the District and the Division, dependent upon Congress for appropriations, were acutely aware that "Senators Tower and Bentson and several other congressmen are vitally interested in this project."[32] The 45-foot project was a political hot potato. An accommodation had to be reached.

Right: Public hearings on the 45-foot project in September 1981 allowed alternative voices to be heard. Eight hundred people attended.

By early spring 1981, the Corps was working hard to develop an acceptable disposal plan so the Corpus Christi 45-foot project could be completed. The District awarded a contract in early February 1981 to study the benefits of diverting Nueces River flows to compensate for using wetlands for disposal of dredged material. Preliminary data indicated that the benefits to wildlife habitats would be smaller than initially expected because Nueces River flows

available for diversion were less than initially predicted. Nevertheless, the District hoped a more comprehensive study, possibly yielding more favorable conclusions, could be completed by July.[33]

By August 1981, the study of disposal alternatives and mitigation measures was nearly complete despite continuing conflict with the U.S. Fish and Wildlife Service. The District held the first public hearing on the Corpus Christi Inner Harbor Disposal Study in September 1981. Eight hundred people attended. Of the various disposal alternatives studied, the Nueces River diversion/Nueces Delta mitigation plan was presented as the tentatively preferred plan.

It would be another two years before dredging of the inner harbor began. Both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service opposed the plan, and the EPA also questioned it. EPA asked the Galveston District to evaluate a combination of disposal alternatives to reduce the size of the disposal area in the Bay. The Habitat Evaluation Procedure analysis, jointly conducted by federal and state fish and wildlife agencies, indicated that about 91 percent of the habitat losses occurring under the Nueces Bay disposal plan would be compensated for by the river diversion mitigation plan. Though opponents argued that this out-of-kind mitigation was not an acceptable form of mitigation, the Galveston District disagreed.

In June 1982, the District finally issued the "Final Supplement to the Final Environmental Statement" four months later than the planned February release date. Near the end of the year, the District issued a "Supplemental Information Report to the Final Supplement to the Final Environmental Statement."[34] Under the disposal plan finally adopted, the Port of Corpus Christi's maintenance dredging disposal area which the port expected to use for 50 years became the disposal site for the new 45-foot project dredged materials as well. The result: Corpus Christi's dredge disposal area will be full in 25 years instead of 50. Despite misgivings by Orr, who continued to oppose concessions even after leaving the port, the District and the port settled for an interim solution which would get the project moving again. By 1987, even Orr conceded that the 45-foot project was a "bright star" for the port.[35]

Disposal plans acceptable to everyone were a major problem on the Corpus Christi 45-foot channel project. Areas like the Tule Lake disposal area (shown) allowed the inner harbor and channel to be dredged.

Like Wallisville, the Corpus Christi 45-foot channel and inner harbor project spans nearly a quarter century. In 1987, the Corpus Christi project was still only 64 percent complete, with work scheduled to continue until at least 1990.[36] With a typical project in the District taking 20 years or more from initial planning through construction, engineers in the District may work on a project for years, only to retire before it is completed. Staff turnover, rising costs due to inflation, and changes in rules and regulations all compounded the problems caused by repeated delays. Orr and the Corps shared this frustration.

Corpus Christi's third project, the onshore oil terminal at Harbor Island (also called Levingston Island), ultimately fared less well than the other two projects. Conceived in the oil boom years and given impetus in the oil crisis of the late 1970s, it died when the energy crisis passed and when the Reagan administration deregulated oil and gas prices. The project was controversial and divisive from the time the Nueces County Navigation District first applied for a channel-

enlarging permit in the area of Harbor Island in 1972. In the spring of 1977, the Galveston District issued a public notice that the Nueces County Navigation District had applied for a permit to construct a deep draft onshore port at Harbor Island. Depth was to be 60 feet, perhaps as much as 70 to 75 feet. Though the port was to be constructed with nonfederal funds,[37] it still needed a Corps permit.

In November 1977, the Corps held a public meeting in Corpus Christi to discuss plans for accommodating deep draft vessels at Harbor Island. Prior to the public meeting, the District held information meetings in shopping malls and public buildings, met with civic groups, and was interviewed by radio, television and newspaper reporters. In addition, it purchased newspaper ads to explain the project. More than 1,500 people attended the meeting.[38]

Harbor Island "Deeport" oil terminal proposal did not fare well and was later abandoned.

The District also received petitions and form letters with more than 3,500 signatures, plus an additional 277 individual letters voicing opinions on the project. Yet eventually it was not public opinion which caused the project to be dropped. In mid-1980, the *Corpus Christi Caller* concluded in an editorial:

> *Deepwater ports may be an idea whose time has come and gone while we were debating the question. The economics no longer seem viable—and that goes for the Harbor Island onshore project here as well [as offshore projects]. If the economic trend continues, as seems likely, we may in coming years have reason to be grateful that delays prevented us from getting over our heads in projects of doubtful future and uncertain costs—financial and environmental.*[39]

Shortly afterward, the "Deeport" project was abandoned. Cost estimates had risen from an initial $214 million to $500 million to as high as $1 billion.[40]

Another project also killed by the change in oil conditions was the Galveston superport project, though the struggle to survive continued much longer. Galveston Wharves, a company which had been a presence in Galveston since 1854, filed a permit application with the Galveston District in 1978 to deepen the existing Galveston Channel from its upper end to a point approximately 15 miles offshore. Together with the Pelican Terminal Corporation (PELCO),[41] Galveston Wharves planned to deepen the 40-foot channel to a working draft of 50 feet, or an actual total depth of 54 to 56 feet. This added draft would allow supertankers as large as 300,000 dead-weight tons to enter the channel fully loaded instead of just three-quarters full. Two 35-inch pipelines would connect the two-berth oil terminal on Pelican Island to a tank farm in Texas City. Estimated construction cost ranged from $300 million to $450 million.

The District filed the final EIS on the project with EPA on September 29, 1979. The EIS totalled 26 volumes. Public concern quickly surfaced over the possible effects of a fire or explosion from an oil tanker while in port. The District asked one of the research laboratories at the Corps' Waterways Experiment Station (WES) in Vicksburg to help assess the impact of such an accident. Satisfied with the answer, Galveston District Engineer James Sigler approved five permits for the project in

July 1980. It was a decision welcomed by PELCO and most Galveston businessmen. Like the Corpus Christi projects, the Pelican Island superport project had powerful political support. The Southwestern Division Engineer, Major General Hugh Robinson, wrote to OCE in March 1981: "In view of the active lobbying efforts at all Corps levels on behalf of the proposed Pelican Terminal/Galveston Deepwater Port project, ... I am convinced that we will continue to receive considerable pressure from the local interests to expedite our feasibility study schedule on the Galveston deepwater port and the Houston Ship Channel portions of the Galveston Bay Area navigation study."[42]

The Galveston superport project on Pelican Island was also doomed to failure.

On the other side of the issue, however, as on several other projects, was a consortium of environmentalists who were unhappy with the District's decision to approve the permits. In April 1980, even before the permits had been issued, a coalition called Stop the Terminal on Pelican (STOP) put a referendum before voters which would have banned ships of more than 80,000 dead-weight tons with flammable cargoes from waters within the city limits. The referendum was defeated by only 685 votes.[43] Then, in the summer of 1981, the Environmental Defense Fund, the Sierra Club, the Galveston Bay Conservation and Preservation Association, and the Texas Environmental Coalition sued to force the District to rescind the permits for the proposed superport. The arguments were familiar ones. They were particularly concerned with the effect a large oil spill would have on the Galveston Bay ecosystem.[44] They did not, however, oppose oil projects completely. The plaintiffs favored an offshore facility instead, arguing that if there were a spill, there would be more time to react and clean it up.

Indeed, there was such an offshore facility in the works at the same time that the Pelican Island oil terminal was being planned. In fact, eventually there were three separate proposals to build a crude oil receiving facility in the Gulf off Freeport. The first proposal, Seadock, died in 1977 after the major partners backed out, claiming that the requirements of the license which they had been issued were too difficult to meet. Seadock was followed by the Texas Deepwater Port Authority (TDPA), a state agency created by the Texas Legislature in 1977. TPDA died in November 1980 after it failed to get sufficient oil company backing. This was followed almost immediately by the scaled-down version consisting of a single monobuoy facility located 12 miles off Freeport. The $700 million to $800 million facility would be the receiving end of an undersea pipeline through which supertankers would pump foreign oil to an onshore tank farm or refinery.[45] Because the project came under the Deepwater Port Act applying to U.S., not state, waters, the U.S. Department of Transportation rather than the Corps issued the

Col. Sigler and Maj. Gen. Hugh Robinson

Freeport Ship Channel in 1985

most important licenses and permits. The Corps had only a minor role—the permit for the pipeline going to shore. Yet by the end of 1981, a crude oil surplus, the drop in demand and skyrocketing costs had doomed the proposed offshore facility. Louisiana's LOOP, already under construction, would be the only deepwater oil terminal along the Gulf Coast.

With the demise of the Harbor Island and Freeport oil projects, the Corps may have avoided a significant change in its role. In their preliminary stages, both of these projects were funded entirely with private money. District Engineer Vanden Bosch saw a new inclination to at least try to get projects underway without federal money. Yet he also predicted that, after the fact, these investors would try to get their Congressmen to introduce bills to reimburse at least a portion of the cost of their projects. For example, if a project required a depth of 55 feet, and the Corps had conducted an earlier study recommending an increase in depth from 45 to 50 feet, the investors could argue that the cost of the first five feet of dredging should be paid for by the Corps. In 1979, near the end of his three years in Galveston as District Engineer, Vanden Bosch predicted that the Corps could find itself out of the construction business. Instead, it could find itself acting "like most other federal agencies, as a grant agency like HEW," just doling out money. The Corps would become an entirely different type of agency.[46] While Vanden Bosch's observation proved at the very least to be premature, if these projects come back to life in the future, the District may indeed find itself playing a somewhat different role than in the past.

A tanker carries raw materials into the industrial area at the Port of Corpus Christi.

While prospects for many oil-related projects dimmed as the oil economy changed, the Pelican Island project remained on hold, delayed by the appeals process. The case went to trial in October 1981 in federal district court in Galveston before Judge Hugh Gibson. District Engineer Sigler was called by the plaintiffs and testified for an entire day. The District was represented by Justice Department attorneys, who called no witnesses, claiming that the merits of the project spoke for themselves.[47] Post-trial briefs were filed in November,

with closing oral arguments presented in early December. In early February 1982, Judge Gibson ruled that while the Corps study of the project was "less than perfect," it clearly complied with NEPA. He concluded, "To require reconsideration of the project ... would amount to an impermissible substitution of the court's judgment for the expert judgment of [the Corps]." He approved construction of the onshore superport.[48] PELCO felt construction should be completed absolutely no later than November 1984; they hoped it could be finished as soon as December 1983.

The Sierra Club Legal Defense Fund began weighing a possible appeal to the Fifth U.S. Circuit Court of Appeals in New Orleans. Then, in an unusual move, Galveston Wharves and PELCO filed an appeal with the Fifth District Court, even though they had won the case. Certain that the Sierra Club would eventually file an appeal and hoping to avoid further delays, PELCO decided to expedite the appeal process. While dredging was to begin in June, final arguments were not heard before the three-judge panel in the Fifth District Court until the end of July. In August, one of the three PELCO partners backed out of the project, claiming that the venture would take too long to complete.

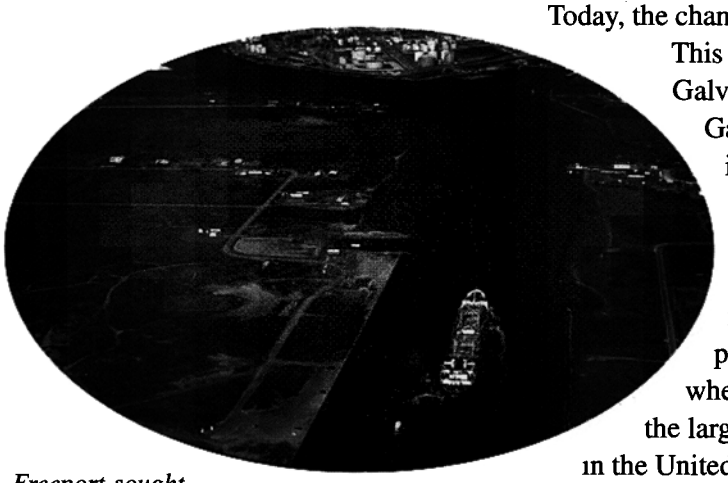
Pelican Island, on the other side of the Galveston Ship Channel from the Port of Galveston, was the proposed site of the PELCO oil terminal.

It was January 1983 before the court ruling came. It put the project in limbo. The court ordered the Galveston District to rework its EIS, addressing the consequences of a "worst case" oil spill in Galveston Bay and the impacts of proposed coal and grain facilities at the superport. After nearly 10 years of planning and expenditures totaling more than $20 million, PELCO was no closer to starting construction.[49]

In June 1983, Colonel Alan L. Laubscher, the newest Galveston District Engineer, announced that the District would indeed rework portions of the EIS. The District advertised for public comment on what issues should be addressed in the supplement. The two-volume draft supplement was finally issued in December 1985. By then, however, the bottom had dropped out of the oil market, the Port of Galveston had just finished the worst year in its history, and the project was no longer economically viable, at least for the immediate future.[50] It stayed alive longer than projects such as the Freeport offshore terminal because Pelican Island had the potential to handle other commodities besides oil.

While considerable attention in the decade from 1976 to 1986 was paid to Corpus Christi, Galveston Harbor and Freeport because of the proposed oil terminal, Corpus Christi was not the only port to have other deep draft projects underway. Freeport, for example, had been seeking a deeper port since the 1960s. There was also activity involving the other deep water ports or channels along the Gulf Coast—the Houston Ship Channel, the Texas City Channel, the Sabine-Neches Waterway, the Matagorda Ship Channel, and Brownsville.

Of these, the Houston Ship Channel is the best-known deep draft channel in the Southwest. In the 1830s, when naturalist John James Audubon visited Galveston, Galveston Bay and the channel to Houston were navigable only at high tide. In 1870, a six-foot channel was cut through the middle of the bay.[51] Today, the channel to Houston is 40 feet deep and 400 feet wide. This channel was one of three principal elements in the Galveston Bay Area Navigation Study, which included Galveston, Houston and Texas City.[52] Galveston Bay is a working bay plied by fishing boats and merchant ships, and ringed by refineries. More than half of the chemicals produced in the United States come from the area around Galveston Bay. Thirty percent of the nation's petroleum industry is located there. Twenty percent of the people who live in Texas live somewhere along the bay's margin. Galveston Bay is also the largest estuary on the Texas coast, the seventh largest in the United States. Its 600 square miles are a mixture of fresh- and saltwater. Freshwater enters the bay from the San Jacinto River and, to a greater extent, from the Trinity River. Saltwater tide flows in through a gap called Bolivar Roads between Galveston Island and Bolivar Peninsula. The Houston Ship Channel runs from the buoy outside of Bolivar Roads all the way to the turning basin at the Port of Houston.[53]



Freeport sought deeper water for an oil terminal.

Proposals in the Galveston Channel/Houston Ship Channel portion of the Galveston Bay Area Navigation Study included enlarging the Houston Ship Channel to depths up to 50 feet and widths up to 800 feet. District Engineer Sigler reported that "final conclusions will depend principally on the magnitude of the benefits stemming from dry bulk and crude oil commerce and the ability to both economically and environmentally dispose of the dredged material."[54] Yet there was clearly a political element to the study as well. In separate meetings with the Galveston District Engineer, both Congressman Jack Fields and officials of the Port of Houston expressed concern about Houston's ability to compete with other Texas ports—and with New Orleans and Baton Rouge—if the channel were not deepened. The study would eventually recommend channel improvements, including widening the channel to 600 feet to increase navigation safety, though collisions and groundings had declined in the 1980s because of the drop in overall tonnage moved through the channel. The channel would be deepened 10 feet, from 40 feet to 50 feet.

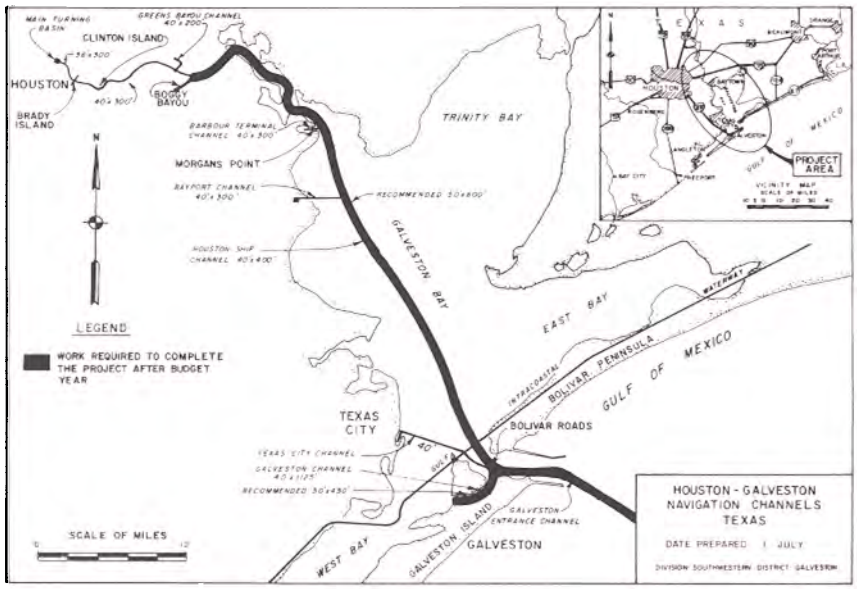
The opposition to the project was led by many of the members of the Galveston Bay Foundation. The foundation is an alliance of indi-viduals and corporations whose stated purpose is to monitor the welfare of the bay. They are concerned that the Houston Ship Channel project will increase turbidity in Galveston Bay, increase saltwater flow from the Gulf, and disturb toxic pollutants in the sediment of the channel and bay. The District's five-volume EIS

Right: The busy life of the Houston Ship Channel

on the project disputes these claims.[55] As of the end of 1988, dredging had not begun on the 50-foot Houston Ship Channel project.

The Texas City Channel portion of the Galveston Bay Area Navigation Study was unique in its integration of O&M with new work. It included widening and deepening the Texas City Industrial Canal, widening the main turning basin, and constructing confining levees for a 500-acre disposal area. The District's 1981 Interim Draft Report recommended modifying the existing 40-by 400-foot waterway, making it 50 by 525 feet.

At the same time that the District was working on the Galveston Bay Area Navigation Study, it was studying the feasibility of deep water at the Port of Freeport. These studies were entirely independent of Seadock and the other proposed offshore oil projects near Freeport. The Brazos River Harbor Navigation District first submitted a proposal to deepen the 30-foot-deep port in 1962. The River and Harbor Act of 1970 authorized the project, but no money for construction of the 45-foot project was appropriated until 1985 when President Reagan signed a supplemental appropriations bill. The money, however, could not be released until a cost-sharing formula was agreed upon. Finally, in November 1986, the Water Resources Conservation, Development and Infrastructure Improvement and Rehabilitation Act released funds for the Freeport 45-foot project. It had been on the Corps drawing boards for nearly 20 years.[56]



Above: Galveston Bay provides passageway for vessels bound for Galveston, Texas City and Houston.

Left: Galveston Bay is a working bay used by fishing boats and merchant ships. Its 600 square miles are a mixture of fresh and saltwater.

The Corps has often been accused of being too pro-growth and development, sometimes supporting projects of marginal merit. Yet the Corps is equally exposed to criticism when it discourages a project. The proposed deep port for Matagorda Bay in Calhoun County provides an example. In 1979, when the Galveston District recommended against extending or enlarging the Matagorda Ship Channel because there were no clear economic benefits, the Port Lavaca Commissioners launched a personal attack upon District Engineer Vanden Bosch. They charged that Vanden Bosch suffered from a "negative attitude" and went so far as to suggest that money to do further studies of the Matagorda

Texas City Ship Channel

Ship Channel had been funneled to a Corps pet project instead. They openly acknowledged that they looked forward to Vanden Bosch's departure and hoped that with the new command would come a change in attitude.[57] Their hopes, however, were not fulfilled when Colonel Sigler succeeded Colonel Vanden Bosch. The project, in the opinion of the District, still lacked sufficient economic benefits to warrant the expenditure of at least $800,000 for a more detailed feasibility study.[58] While projects with much higher cost-benefit ratios were being dropped, Port Lavaca was not in a strong position to argue.

The changing conditions in the oil market not only affected a number of individual projects; they also greatly increased the District's workload. In December 1981, the District was receiving a growing number of permit applications for oil and gas exploration activities as a result of the deregulation of oil and gas prices by the Reagan administration. From January 1981 through 1986, applications in process at any time increased from approximately 500 to nearly 700. The Galveston District ranks among the top three Districts in number of permits processed annually—approximately 10 percent of the nation's total.[59] In the early 1980s, this workload and the strain on manpower meant decreased surveillance of illegal activities.

The growing workload also meant that in the decade from 1976 to 1986, the District looked for ways to expedite permits. District Engineer Sigler, for example, participated in a conference in Houston to discuss ways to expedite the permit process. The Wetlands Energy Producers Association, whose members were Gulf Coast oil, gas and pipeline operators, organized to present a unified front at future quarterly meetings. The District also tried to meet with federal and state agencies to discuss applications considered potentially controversial.

Galveston District, located in the Essayons Building, foreground center, manages civil works projects the length of the Texas coast. Pictured at top is the University of Texas Medical Branch at Galveston.

The effort was moderately successful, but was hurt in part by the changing cast of characters at the resource agencies and at the offices of local sponsors. This meant that the Corps repeatedly had to re-establish working relationships. There are 13 ports along the Texas coast; only two—Brownsville and Corpus Christi—had the same port directors in mid-1987 as they had at the start of 1985.[60] Many port directors became scapegoats blamed by port commissioners for falling revenues in the wake of the downturn in oil prices and the Texas economy.

The downturn in oil prices, however, may well have saved the Galveston District from a new round of court battles. Every one of the proposed deep draft projects and onshore or offshore oil terminals faced well-organized opposition. Some, like Pelican Island, actually did go to court. Others, like Harbor Island, undoubtedly would have ended up there if the projects had remained economically viable. The deep draft projects at times strained relationships between the Corps and local sponsors, particularly the Port of Corpus Christi, but the long-standing working relationship between them survived.

The ports, navigation districts, and business and industry needed the Corps. Without the operations and maintenance services provided by the District and without the permits the District issued, economic growth and development would be stymied. This dependence upon the District extended not only to deep draft waterways, but also to shallow draft channels, particularly the Gulf Intracoastal Waterway.

[1]James A. Michener, *Texas* (New York: Fawcett Crest, 1985), pp. 374-375.

[2]"Corpus Christi Hosts 79th Annual GICA Convention." Unidentified clipping, personal files of Duane Orr, former President, Board of Directors, Gulf Intracoastal Canal Association.

[3]*Waterborne Commerce of the United States, Part 2*, provides a breakdown on waterborne commerce in Texas on an annual basis.

[4]For example, the Galveston District's budget proposed in early 1985 by President Reagan for 1986 included $49.5 million for O&M compared to $34.1 million for construction and $2.9 million for general investigations. See the Corps in-house publication *The Sand Castle*, III, 1 (February 1985), p. 1.

[5]McCoy was the only District Engineer in recent times not sued during his command. According to McCoy, people were afraid to sue him. Interview with Colonel Don McCoy (Ret.), Brown & Root, Houston, Texas, by Lee F. and Bonnie Pendergrass, March 23, 1987. Hereafter cited as McCoy interview. Upon leaving the Galveston District, McCoy joined the engineering/construction firm of Brown & Root as Senior Manager of the Heavy Civil and Mining Construction Division.

[6]Interview with Major General Charles I. McGinnis by M. Reuss, November 5, 1979, pp. 32-33, Oral History Career Interview (edited draft), Corps Archives, Ft. Belvoir, Virginia. Hereafter cited as McGinnis interview.

[7]Ibid.

[8]McCoy interview.

[9]Jon C. Vanden Bosch speech to Richmond Rotary Club, October 25, 1977, Galveston District Archives, RG 77, Box 1101, Public Affairs Office, File 401-07.

[10]Vanden Bosch to Intracoastal Canal Association, September 15, 1978, Galveston District Archives, RG 77, Box 1101, Public Affairs Office, File 401-07.

[11]Letter to Lt. Gen. John W. Morris, Chief of Engineers, from Brig. Gen. James C. Donovan, Division Engineer, December 6, 1979, pp. 7-8, RG 77, Box 857, Galveston District Archives.

[12]Lynn M. Alperin, *Custodians of the Coast: History of the United States Army Engineers at Galveston* (Galveston: Galveston District, U.S. Army Corps of Engineers, 1977), pp. 82-83. Thirteen years later, the case involving the sinking of the *Mackenzie* was still in litigation.

[13]McGinnis interview, p. 32.

[14]Letter from Vanden Bosch to Maj. Gen. Charles I. McGinnis, Division Engineer, January 28, 1977, District Engineer Correspondence Files, Galveston District.

[15]Letter from Col. Jon C. Vanden Bosch, Galveston District Engineer, to Brig. Gen. James C. Donovan, Division Engineer, July 28, 1977, District Engineer Correspondence File, Galveston District. For final cost of repair work, see letter from Vanden Bosch to Donovan, March 3, 1976, District Engineer Correspondence File, Galveston District.

[16]Letter from Vanden Bosch to Donovan, October 28, 1977, District Engineer Correspondence Files, Galveston District.

[17]Letter from Vanden Bosch to Donovan, November 7, 1978, District Engineer Correspondence Files, Galveston District. The ICP was designed to "test the market" to see whether private contractors were interested in doing the work and whether their prices were competitive.

[18]Letter from Col. James M. Sigler, District Engineer, to Brig. Gen. James C. Donovan, Division Engineer, March 6, 1980; letter from Donovan to Lt. Gen. John W. Morris, Chief of Engineers, March 28, 1980, RG 77, Box 857, Galveston District Archives. Sigler became District Engineer, succeeding Vanden Bosch, in mid-1979.

[19]Letter to Lt. Gen. Morris from Brig. Gen. James C. Donovan, December 6, 1979, p. 8, RG 77, Box 857, Galveston District Archives.

[20]The official name of the Post of Corpus Christi was Nueces County Navigation District No. 1. The District, which operated the port, was renamed the Port of Corpus Christi Authority in 1981.

[21]Interview with Duane Orr, Corpus Christi, by Lee F. and Bonnie Pendergrass, March 20, 1987. Hereafter cited as Orr interview.

[22]Orr interview.

[23]McCoy interview.

[24]See "Corpus Christi Ship Channel—Summary of Status," Memo to "DE" from D.T. Graham, June 14, 1976, p. 8, Galveston District Archives, RG 77, Box 566, File 1517-08, Correspondence Folder #5.

[25]Ibid., pp. 8-9.

[26]Letter to Duane Orr, Port of Corpus Christi, from Jon C. Vanden Bosch, District Engineer, December 9, 1976, Galveston District Archives, RG 77, Box 566, File 151-08, Correspondence Folder #5.

[27]Letter from Vanden Bosch to Brig. Gen. James C. Donovan, March 1, 1979, District Engineer Correspondence Files, Galveston District.

[28]Letter to Brig. Gen. James C. Donovan, Southwestern Division Engineer, from Col. James M. Sigler, Galveston District Engineer, July 3, 1979. pp. 1-2, RG 77, Box 857, Galveston District Archives.

[29]Letter to Brig. Gen. James C. Donovan, Southwestern Division Engineer, from Col. James M. Sigler, Galveston District Engineer, November 7, 1979, p. 7, RG 77, Box 857, Galveston District Archives. Sigler's concern was relayed verbatim to OCE, except for underlining the word "any" for emphasis. See letter to Chief of Engineers from Donovan, December 6, 1979, p. 8, RG 77, Box 857, Galveston District Archives. Eventually the levee funding policy, EC 1130-2-161, was abandoned.

[30]Letter to Donovan from Sigler, July 3, 1979, pp. 1-2, RG 77, Box 857, "Periodic Letter to Division Engineer," Galveston District Archives.

[31]Letter to Brig. Gen. Hugh C. Robinson, Southwest Division Engineer, from Col. James M. Sigler, Galveston District Engineer, November 6, 1980, p. 3, Galveston District Archives, RG 77, Box 857, Periodic Letter to Division Engineer.

[32]Letter from Hugh G. Robinson, Southwestern Division, to Lt. Gen. Joseph K. Bratton, Commander, Corps of Engineers, August 17, 1981, in Galveston District Office Correspondence.

[33]The contract awarded in February 1981 to study diversion of Nueces River flows went to Espey, Huston and Associates, Inc.

[34]Final Supplement to Final Environmental Statement, Corpus Christi Ship Channel, Texas, 45-Foot Project, Inner Harbor Reach (Galveston: U.S. Army Engineer District, June 1982); Supplemental Information Report to Final Supplement to Final Environmental Statement, Corpus Christi Ship Channel, Texas, 45-Foot Project, Inner Harbor Reach (Galveston: U.S. Army Engineer District, December 1982). Both reports are located in the office of Marcus de la Rosa, Galveston District.

[35]Orr interview.

[36]"Statement of Harry G. Plomarity, Executive Director, Port of Corpus Christi, Before Senate Subcommittee on Energy and Water Development, March 31, 1987," from Port of Corpus Christi Files.

[37]Five refinery companies were underwriting the project: the Coastal Corporation, Champlin Petroleum Corporation, American Petrofina, Southwestern Refining Company, and Sun Petroleum Company.

[38]Letter to Brig. Gen. James C. Donovan, Southwestern Division Engineer, from Col. Jon C. Vanden Bosch, Galveston District Engineer, March 3, 1978, p. 1, RG 77, Box 857, Galveston District Archives.

[39]*Corpus Christi Caller*, May 22, 1980.

[40]Vanden Bosch speech to World Trade Club Board, Dallas, March 10, 1978, Galveston Archives, RG 77, Box 1100, File 401-07.

[41]Three firms made up PELCO—Northville Industries Corporation, CBI Industries, Inc., and Phibro Corporation.

[42]Letter from Hugh Robinson, Southwestern Division Engineer, to Lt. Gen. Joseph K. Bratton, March 31, 1981, Galveston District Correspondence Files.

[43]See reference to referendum in Max Rizley, Jr., "Corps Issues Revision in EIS for PELCO Case," *Galveston Daily News*, December 18, 1985.

[44]Dan Bradford, "Oil Spill Effects Cited at Superport Hearing," *Galveston Daily News*, October 22, 1981.

[45]*Galveston Daily News*, January 13, 1981.

[46]Interview with Col. Jon Vanden Bosch, Galveston District Engineer, by Lynn Alperin, May 16, 1979.

[47]*Corpus Christi Times*, October 29, 1981.

[48]Kelvin Moran, "U.S. Judge Approves Pelican Oil Superport," *Houston Chronicle*, February 4, 1982.

[49]Kathy Thomas, "Court Ruling Keeps Superport Future in Limbo," *Galveston Daily News*, January 25, 1983; Steve Olafson, "Engineers Told to Redo Environmental Report ...," *Houston Post*, January 25, 1983.

[50]The port expected to have a net loss of $3.4 million at the end of 1985. See *Galveston Daily News*, March 10, 1985, and Jack Stengler, "1985 Worst Year in Isle Port History," *Galveston Daily News*, January 29, 1986.

[51]Stephen Harrigan, "Worked to Death," 16, *Texas Monthly*, (October 1988): 132, 192, 199.

[52]The comprehensive Galveston Bay Area Navigation Study actually consisted of several studies. A report was issued first on Texas City, followed by a report on the feasibility of improving the Houston Ship Channel and the Galveston Channel. The second study treated the improvements recommended in the first study as a *fait accompli*. See Draft Feasibility Report and Environmental Impact Statement, *Galveston Bay Area Navigation Study*, 6 vols. (Galveston District, U.S. Army Corps of Engineers, August 1986).

[53]Harrigan, "Worked to Death," pp. 131-132, 192.

[54]Letter to Maj. Gen. Hugh G. Robinson, Southwestern Division Engineer, from Col. James M. Sigler, Galveston District Engineer, March 4, 1981, p. 2, RG 77, Box 857, "Periodic Letter to Division Engineer," Galveston District Archives.

[55]Harrigan, "Worked to Death," pp. 199-200.

[56]*Angleton Times* (Angleton, Texas), August 18, 1985; *Brazosport Facts* (Clute, Texas), August 17, 1985; August 16, 1985; June 20, 1986; June 27, 1986; October 19, 1986; November 7, 1986; November 17, 1986; November 18, 1986.

[57]Lloyd Van Nest, "Report given on Deep Port," *Port Lavaca Wave*, April 27, 1979; *Victoria Advocate*, April 28, 1979.

[58]In November 1976, the District had estimated that such a study would take at least four and one-half years to complete, accounting for the high cost. See *Victoria Advocate*, April 28, 1979.

[59]Public Affairs Office Press Release #28, December 27, 1985, File 412-05, News Release & Media File, June 1–December 31, 1985, Public Affairs Office, Galveston District.

[60]Orr interview.

Chapter IV

THE GIWW AND SHALLOW DRAFT DREDGING

In the "era of limits," shallow draft dredging, like deep draft dredging, was circumscribed by both the shortage of resources and a shortage of environmentally acceptable disposal sites. The disposal site issue shows that the Corps is far from the behemoth its critics claim it is. The Galveston District was very dependent upon the state, which had the responsibility in Texas for securing new sites, and was limited in the pressure it could bring to bear to make the state move quickly. This was sometimes difficult for users of the shallow draft channels, particularly users of the Gulf Intracoastal Waterway (GIWW), to accept.

The 1,200-mile-long GIWW stretches from the Florida panhandle to the Mexican border. At times descriptions of the GIWW border on hyperbole, as when a Texan described it as "a shining strand linking together the jewels of progress into a fabulous necklace along the curving bosom of the Gulf."[3] A varied blend of man-made ditches, winding bayous, quiet rivers, and windswept bays, every now and then the waterway becomes a buoy-marked offshore path in the Gulf. Even when the waterway "goes to sea," islands farther offshore help shield marine traffic from Gulf storms. Yet despite the assets Mother Nature has bestowed upon the waterway, it requires constant maintenance to remain navigable. The longest stretch, 426 miles, traverses the Texas coast and is the responsibility of the Galveston District.

Construction of the waterway began in 1907. It was completed in 1949 with dredging of the section behind Padre Island between Corpus Christi and Brownsville. This was well before environmental assessments were required. The waterway probably would not have been built if it had been compelled to comply with all the environmental regulations of later years; a myriad of court challenges undoubtedly would have confronted a project of that size. Yet, years after it was built, the lack of an environmental impact statement (EIS) put the GIWW at risk. Because there were no local sponsors of the original project, no local entity had the responsibility to provide disposal areas for dredged material during ongoing maintenance. According to Galveston District Engineer

The Gulf Intracoastal Waterway may be one of the best kept secrets in the State of Texas. One of the definitions in Webster's New Collegiate Dictionary refers to a canal as " ... any of various faint narrow markings on the Planet Mars." I suspect that the majority of Texans are as knowledgeable of the Gulf Intracoastal Waterways as they are the markings on Mars.

—Phillip L. Wilson,
Gulf Intracoastal
Canal Association
Board of Directors[1]

"You know, this waterway is like a mule. Slow, sort of unbeautiful, and it can give you unpleasant surprises now and then. But it's—well, useful."

—Captain Jimmy Lee,
towboat operator[2]

Top left: The Gulf Intracoastal Waterway winds past High Island, on the Bolivar Peninsula.

Bottom left: Dredges make the final cut of the Gulf Intracoastal Waterway in the Laguna Madre, 1949.

Col. Don McCoy, at least one innovative lawyer tried to take the District to court for not having an EIS and tried to shut down the GIWW.[4] If the lawyer had not been persuaded to reconsider, the economic impact would have shaken the entire state.

Forty percent of Texas' port receipts come from goods shipped along the GIWW. Twenty percent of the gross state product is linked to the waterway, along with 145,000 jobs.[5] The GIWW is arguably the most important transportation route in the state. It also has recreational value. A 1980 survey of recreational boat owners in Texas concluded that at least 2.4 million recreational boat trips a year originate on Texas coastal waters; 79 percent of these use the GIWW.[6]

Boat captains plying the GIWW expect a channel never less than 12 feet deep and 125 feet wide.[7] To keep the waterway open along the Texas coast, the Galveston District oversees the dredging of millions of cubic yards of silt annually. If that material from one year of dredging were piled on a city block in downtown Galveston, the mound would be as tall as Pike's Peak—14,110 feet high.[8] This material must be put somewhere, but in the early 1970s open water or "over the bank" disposal was increasingly unacceptable to environmentalists. A nonfederal local sponsor was needed to acquire disposal sites for stretches of the waterway not falling under the jurisdiction of local port authorities.

The result was the Texas Coastal Waterway Act of 1975. The State Department of Highways, renamed the State Department of Highways and Public Transportation, became the agency representing the state in its sponsorship of the GIWW. It became responsible for finding land disposal sites for the Corps, but often the Legislature failed to appropriate money to buy the sites. The reason for this was rooted in part in a contract dispute which began as soon as the act passed. The agreement included holding the federal government free of any legal damages resulting from operations or maintenance along the waterway. In essence, this created a conflict between the contract and the Texas constitution, which prohibits pledging the credit of the state as the contract required.

Above: Dredging activity on the GIWW keeps the waterway to its 12-foot depth.

Right: Keeping the Gulf Intracoastal Waterway maintained through Matagorda Bay created problems over disposal sites for the dredged material.

The bureaucratic bickering took six years to resolve. As Joe Moseley, a keenly interested observer and executive director of the State of Texas Coast & Marine Council, explained, " ... two very ponderous entities—the Corps and the highway department—" were facing each other. "Both have inertia [and] both are masters of getting their own way."[9] George Rochen, working under Ed McGehee, handled most of the negotiations for the District.[10]

The Texas Legislature appropriated funds in three successive bienniums for purchase of land for dredged material disposal, but the highway department spent none of it because of the legal impasse.[11] By the time the dispute was settled in early 1982, the state had fallen on hard times and adopted a virtual no-growth budget. Instead of receiving $17 million for the next biennium for the waterway, the highway department received only $120,000 for two years for administration related to the Coastal Waterway Act, barely enough to provide minimal staffing.[12] Still, Texas was in a better situation than its neighbor Louisiana, because Texas had at least established in the Department of Highways a vehicle to secure disposal areas; Louisiana had no such arrangements.[13]

By 1986, more than half of the disposal areas available to the District were still in the open waters of the Gulf and bays. The District asked the state to furnish 1,900 acres for new disposal areas, including 400 acres near Freeport, 300 acres near High Island, 300 acres near Bolivar, 100 acres near West Bay and 500 acres near East Matagorda Bay. But with no funds, the highway department had to try to find land already owned by the state near the GIWW or persuade private landowners to donate disposal sites.[14] Why would anyone donate land? Because the dredged material would raise the elevation, and in the process raise land values. This, however, overlooked at least one potential problem. There was little scientific information on the effect dredged material would have on the land.[15] Would it make good pasture? Would cattle eat the grass if the grass grew? Could some disposal sites be used for shrimp farming?[16]

The District needed test sites. The first test of the thin-spread, on-land method of disposal began in 1986 on the Baer Estate in the southern part of Matagorda County with dredge material spread about one foot deep.[17] The selection was not arbitrary. East Matagorda Bay had become one of the most controversial areas along the GIWW. The Corps was accustomed to disposing of silt and sediment from maintenance dredging in the open waters of the bay. When maintenance dredging began in 1983 along that stretch of the GIWW, the state of Texas and local shrimpers accused the District of damaging bay ecology by disposing of dredged material in the open waters of the bay. In particular, they charged that the dredging conflicted with the summer shrimp harvest in the bay. Although an environmental impact statement prepared by the Corps in 1976 recommended that the waterway be dredged every two years, the Corps had not dredged this section for over five years; the buildup of silt and sediment totaled thousands of cubic yards.[18] Fishermen and shrimpers charged that the material was smothering oyster reefs and destroying feeding grounds for shrimp and fish.

One weekend in July 1983, twenty fishing boats symbolically blockaded the GIWW for four hours in protest. The following Monday, they sought a temporary restraining order. In last minute telephone negotiations, Ed McGehee, the Galveston District's Chief of Construction Operations, agreed temporarily to move the dredge 10 miles west. It would return in a month, but by then the peak shrimp season would be over and perhaps an alternative disposal method worked out.

But nothing was resolved during the month-long hiatus. By the end of August, the dredge was back to complete the last 10 mile segment of the waterway. In an evening meeting in a Sargent marina, Herb Maurer, Operations and Maintenance Branch Chief for the Galveston District, told the shrimpers that open-water disposal was the only available option. The meeting, which some described as "boisterous" and others described as "very lively," resolved nothing. A week

This photo shows dredging in East Matagorda Bay in 1983.

later, the East Matagorda Bay shrimpers asked U.S. District Judge Robert O'Conor to issue a temporary restraining order against the Corps. O'Conor, filling in for vacationing Judge Hugh Gibson—the same judge who a year earlier had given the go-ahead for the Pelican Island superport—denied the request. Three days later, however, a state district court temporarily ordered a stop to dredging.

The on-again, off-again pumping of silt into East Matagorda Bay culminated in a courtroom confrontation on September 19, 1983 between the state and the Corps. The District, while defending its methods of dredging and disposal, agreed that ideally it would be preferable to pipe the material to a disposal area surrounded by levees, or to marshland. However, the District pointed out, the state would have to procure the land for such disposal; the Corps was precluded from purchasing land for this purpose.

The court ruled in favor of the Corps and allowed maintenance dredging to continue. In denying the injunction, Judge Gibson ruled that " ... the Corps and the [dredging] company are in sufficient compliance with federal regulation. I am struck with the perennial problem of environmental law: the productive work of man inevitably extracts an environmental price. Whatever damage there has been is more than offset by the essential commercial needs that are satisfied by the waterway."[19] His comments went to the heart of the dilemma facing the District as it tried to balance environmental and commercial considerations.

The case brought to light the need for closer communication and coordination with state agencies. On September 22, District Engineer Alan Laubscher met with the executive director of the Texas Parks and Wildlife Department (TP&WD) and then briefed commissioners in Austin. He hoped that agencies such as the TP&WD and the Department of Highway, once better informed of disposal problems, would help institute legislation to provide money for disposal areas.

More importantly, the Matagorda incident led to the establishment of a Gulf Intracoastal Waterway Advisory Committee in late 1983. The committee's principal charge was to help locate dredged material disposal sites, preferably landside. It was only marginally successful; despite its hopeful beginning, sites which were both accessible and environmentally acceptable proved very difficult to locate.

Composed of nine state agencies representing diverse interests, the committee adopted the following agreement when it was organized:

> *The purpose of the Committee is to enable the State to function as a unit in addressing problems and recommending solutions for the needs of the Gulf Intracoastal Waterway (GIWW), for the protection of the environment and natural resources affected by the waterway, and for the promotion of the economic welfare of the State's interest in the waterway. The immediate object of the Committee is to address the acquisition of disposal sites to assure continued operation of the GIWW.*[20]

including the Corps, the National Audubon Society, the Texas Shrimp Association, and the U.S. Fish and Wildlife Service—organizations which in some cases had been antagonists almost as frequently as they had been allies. Their promise of cooperation reflected the common realization that dredged material disposal was perhaps the most serious environmental issue in Texas, and certainly the most serious in the Galveston District. In fact, shallow draft maintenance may be a more serious issue than deep draft maintenance because, as George Rochen, Chief of Construction Operations in the District, suggested, many shallow draft channels are more environmentally sensitive because of their close proximity to wetlands and shallow bays.[21]

The District remembered the lessons from 1983 three years later. In 1986, when the Corps again dredged the GIWW near Matagorda, the District worked hard to coordinate the dredging and schedule it around the shrimp harvest. Dredging began on February 27 and by mid-March was already nearly two-thirds complete. Most of the material was still being deposited in the bay, but dredging earlier in the year significantly reduced possible adverse impacts.

The District had also taken similar mitigation measures in the past in other areas. It scheduled maintenance dredging in the vicinity of the Aransas National Wildlife Refuge to avoid disturbing the famed whooping cranes, whose numbers have risen from a low of 15 in 1941. In 1951–52, there were 21. By 1981, there were nearly 80, and by 1986 there were 131 even though the GIWW runs through the very heart of their preferred nesting grounds.[22] The District made special arrangements to protect southern bald eagles nesting ad-jacent to the Channel going to Victoria. In 1976, during maintenance dredging of the GIWW near San Antonio Bay, the District installed a half-mile-long floating curtain to prevent sediment from drifting into oyster reefs in the bay. Foam stitched into the top of the bright yellow plastic cur-tain's nylon mesh, vinyl-molded fabric helped it float. Anchors at 50-foot intervals kept it in place.[23]

Above: The whooping crane has made a resurgence—from 15 in 1941 to 131 in 1986.

Left: A yellow "boom" protects oyster beds from dredged sediment.

Despite controversies such as the Matagorda Bay incident, dredging in the District was taking on, as Rick Medina, Corps biologist, put it, "a new look."

This new look showed in two cooperative projects undertaken by the District and the National Marine Fisheries Service (NMFS) in the mid-1980s at Chocolate Bayou and Pelican Spit. Both projects were the result of a 1985 Memorandum of Agreement (MOA) between the NMFS and the Corps, which Medina helped negotiate.[24] The first project involved

The satellite photo (bottom) shows the east end of Galveston Island, Pelican Island, Pelican Spit and part of Bolivar Peninsula.

Above: Dredged material becomes a shrimp "farm."

Right: The shrimp mariculture project yields harvest.

helped negotiate.[24] The first project involved a 15-acre dredged material disposal site in an existing marsh. The Corps transplanted marsh grass to the disposal site and constructed four acres of canals to improve water circulation. In the summer of 1987, NMFS began monitoring the site to determine the success of this fishery enhancement program.

In the second project, at Pelican Spit near Galveston, discharge was directed to the spit to create an emergent area or mud flat. With transplanted marsh grass, the seven-acre site, which is being monitored—like Chocolate Bayou—by NMFS, may also become a fisheries habitat.

Although both of these sites were already available to the Corps for dredged material disposal, the long-term goal of the two projects is to demonstrate that the material can be put to good use. By showing that dredged material can be manipulated to increase fishery values, the Corps hopes that eventually it might gain access to new disposal areas. To this end, the District is also involved in shrimp mariculture in a dredged-material disposal area near Brownsville and in experiments in which dredged material is pumped to unleveed pasture lands such as the Baer site. If the Corps can make disposal more palatable, perhaps it can disperse some of the emotion surrounding the disposal issue.[25]

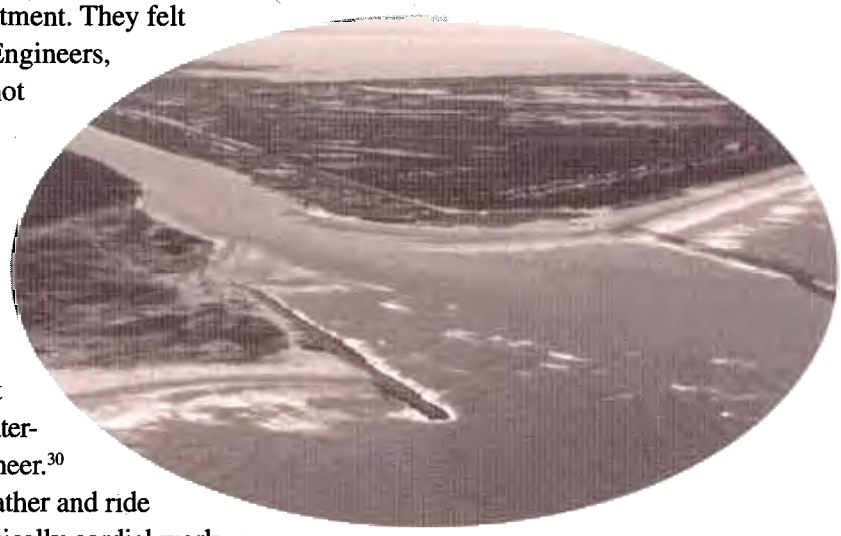
This emotion exists even in the District's own backyard—Galveston. The Matagorda Bay court decision in 1983, for example, was important because the District planned to soon begin dredging near Galveston to remove shoaling caused by Hurricane Alicia. The ruling sharply reduced the likelihood of a similar challenge of the Galveston work.

The 400 miles of the GIWW in Texas is only part of the shallow draft channels which the Galveston District maintains. There are 320 miles of other shallow draft channels as well, for a total of 720 miles. These include the Colorado River Channel, which extends from its junction with the GIWW upstream to the Port of Bay City. In 1977, the District was also in the midst of preconstruction planning for the Mouth of the Colorado River project, both a shallow draft navigation project and a flood control project. The project included a 12- by 100-foot navigation channel to the GIWW, a harbor and turning basin 12 feet deep, and a 15- by 200-foot jettied entrance channel at the mouth of the river. This area is clearly part of the District's shallow draft navigation system,[26] though the GIWW continues to consume about 25 percent of the District's operations and maintenance budget. For this reason, the Gulf Intracoastal Canal Association (GICA) has always been one of the Corps'

Right: "Farm-raised" shrimp—the result of the mariculture project.

strongest supporters. The successor to the Interstate Inland Waterway League, organized in 1905 to promote an interconnected national navigation system, the Association tirelessly promotes the canal.[27]

In the 1970s and early 1980s, members such as Duane Orr began to feel that the Corps was no longer paying as much attention to them as in the past. This perception grew primarily from cuts in the Corps operations and maintenance budget even though Congress, not the Corps, was responsible for the cuts. Certainly, members also had to know that estimates of requirements for maintenance of navigation channels must be made two years in advance for programming purposes, even though the projections might not reflect conditions which actually develop.[28] Frustrated, Association members eventually began to look for other signs of dwindling Corps commitment. They felt slighted, for example, when the Chief of Engineers, Lieutenant General E.R. Heiberg III, did not address their annual convention in 1986. Although members of the Association were aware that he had been ordered to Europe by the Secretary of the Army, they still viewed his absence as a sign that their clout was diminishing.[29] The annual meeting continued, however, to be a "command performance" for the District Engineers responsible for maintaining the waterway, including the Galveston District Engineer.[30]



Jetties guard the mouth of the Colorado River from shoaling.

The Galveston District was able to weather and ride through this difficult time and maintain basically cordial working relationships with the Association because, particularly in Texas, the Association and the Corps share common interests. The District, with Engineers such as Don McCoy, willingly fought long and hard for operations and maintenance funds for the waterway. Even after funds were appropriated, the District often faced a difficult juggling act because of unanticipated crises which needed immediate attention. The year 1980 provides an example: Hurricane Allen caused shoaling along major sections of the GIWW, stopping waterway traffic to south Texas. At some points north of Port Mansfield, the water was barely one foot deep. Deep draft channels, such as the Freeport Ship Channel and the Corpus Christi Ship Channel, also needed to have authorized depths restored in the aftermath of shoaling caused by Hurricane Allen.[31] The District had to shift resources and delay previously scheduled work to meet more immediate and urgent needs.

The Association also knows that it is the Galveston District which has responsibility for the longest segment of the waterway. As a result, Galveston is also a District which has been in the midst of the controversy over dredged material disposal. The Association recognizes that in the debate, the District has done an excellent job representing the interests of the Association and the waterway. This relationship is one of the few not appreciably altered by one of the most sweeping pieces of water resource legislation in the history of the Corps.

This new piece of water resource legislation ushered the Corps into a new era in water resource development. On November 17, 1986, President Reagan signed the Water Resources Development Act of 1986,

Maj. Gen. H.J. Hatch became Chief of Engineers.

Public Law 99-662, the first water resources omnibus bill in 16 years.[32] Major General H.J. Hatch, director of civil works, called the act the greatest cultural change faced by the Corps since 1824 when the River and Harbor Act first involved the Corps in civil navigation improvement projects.[33]

The new law established a true partnership between the federal government and local sponsors by insisting on cost sharing. Beneficiaries of projects must bear the ultimate burden of costs, just as they receive the ultimate economic benefits. The act imposes a "reality test" by requiring 50/50 cost sharing for feasibility studies except when they concern inland waterways already maintained by the Corps. This cost-sharing formula presumes that if local sponsors have to share up-front costs, they will eye potential projects more critically and realistically and choose those which are most important.

Clearly, the act is a product of the Reagan years. While reflecting an increased national awareness of the need to cut federal spending and reduce the national debt, the cost-sharing feature is more commonly viewed as a Republican tenet. It was a long time in the making. Introduced on the first day of the 99th Congress, the bill, H.R. 6, passed the House by an overwhelming margin in November 1985. The Senate passed its own version in March 1986. In June, a House-Senate conference committee began working out the differences between the two versions. The long and complicated legislative process culminated with passage of the compromise measure by 329 to 11 in the House and 84 to 2 in the Senate.[34] The virtual unanimity of the vote testifies, not to common political consensus between Republicans and Democrats, but to the appeal federal water projects have always had for both political parties. With President Reagan threatening to veto any bill which did not reform the way in which water projects were paid for, Congress had little choice but to knuckle under.[35] Even with cost sharing, the federal government will still pay an estimated $11 billion of the $15 billion in total project costs.

The Galveston seawall is an example of cost sharing. Originally built by Galveston County, the extension added in the 1960s was paid in part by local funds and in part by federal funds.

Within the Corps itself, there were varying degrees of enthusiasm over the law. Cost sharing had been one of the major thrusts of William R. Gianelli, Assistant Secretary of the Army for Civil Works, during his three-year tenure, which began in 1981. Assessing his attempts to make nonfederal interests bear a greater share of water resource costs, in 1984 Gianelli felt he was only "minimally successful." He blamed both Congress and his colleagues within the Corps. Not a man who minced words, Gianelli said of Congress:

Congress, particularly certain members of Congress, like very much to demonstrate to their constituency their ability to get large amounts of federal money to build projects in their area ... Congress has had a hard time biting the bullet, so to speak, to require nonfederal interests to pay a larger share of the cost ... [36]

He was even more blunt in his assessment of the Corps:

> *I have never felt that the Corps, including OCE, the Divisions, and the Districts, was very enthusiastic about going out to nonfederal sponsors and asking them to put up the money. This is a natural thing. I am not being unduly critical, but I have believed that while we tried to orchestrate what we wanted done from the standpoint of cost sharing at the [Assistant Secretary of the Army] level, there has not been great enthusiasm in the Corps, particularly in OCE, to pick up that effort and to try to promote it with the field. Instead the Corps passively acceded to whatever we asked be done, but used very little in the way of initiative to further the effort.*[37]

Obviously, Gianelli did not shy from controversy.[38] Gianelli was a Corps outsider, as he himself recognized. A civil engineer who served on active duty with the Corps during World War II, he became a civilian in 1946 and began 10 years of service in the California Engineer's Office. From 1956 to 1960, he served in the California State Department of Water Resources, then formed his own consulting engineering firm. When Ronald Reagan became governor of California in 1967, he chose Gianelli to head the State Department of Water Resources, which supervised completion of the first phase of the California State Water Project, at the time the largest nonfederal water conservation and conveyance project ever built. The first phase alone cost $1.5 billion. Gianelli left government service in 1973, but in April 1981 was lured to Washington D.C. by Reagan, the new resident of the White House. President Reagan selected his former state water resources chief to serve as Assistant Secretary of the Army, overseeing the civil works program of the Corps. Gianelli, perhaps more than any single individual, laid the groundwork for the Water Resources Act which would finally pass two years after he left.

Looking back at his tenure, Gianelli acknowledged that some of the lack of initiative, as he saw it, may have been because of uncertainty in the District on just how far they could go in making overtures to local people. He wished he had spent more time in the Districts. "I really felt that some of the things we were trying to do didn't get down to the District level in the way that I intended ... While OCE is important in terms of the scheme of things, as are the Divisions, the District Engineers are the fellows who are really on the firing line; and I think it would have been helpful to spend more time with them."[39]

The Galveston District would agree. To try to change age-old arrangements with the local sponsors was difficult and placed the District in an awkward position. In his January 1983 periodic letter to the Southwestern Division Engineer, District Engineer Laubscher wrote, "The uncertainties concerning the resolution of [cost sharing and user fees] greatly hinder our dealings with local sponsors as we attempt to ready projects for construction during the planning process. Without planning reports recharging the project development pipeline, the Civil Works construction program will eventually evaporate ... The uncertainties surrounding the cost-sharing issue must be resolved."[40]

On this issue, the District had the full support of the Division. In his final letter to OCE before retiring, Division Engineer Hugh Robinson wrote, "As I have consistently said to Mr. Gianelli, ... it is not a matter of who pays but when—let's not get hung up on the when but be prepared to negotiate the best deal on a

Division Engineer Maj. Gen. Hugh Robinson, right, on a visit to the Galveston District in 1980.

case-by-case basis—50/50 sharing of up-front costs with the balance [of other project and construction costs] to be repaid over say 15 years would be a big seller!! ... The big issue was and still is the Cost Sharing Policy—if Bill [Gianelli] would accept 50% in Navigation, Water Supply, and Hydropower we could really take off. In the meantime we are struggling to maintain our relationships with project sponsors."[41]

If, as Robinson suggested, Gianelli was unwilling to compromise, Congress, on the other hand, was willing. Local sponsors' allotted share of construction costs depends on project purpose and, in some cases, size. As a minimum for commercial ports, sponsors are expected to provide 10 percent of the cost of dredging down to 20 feet, 25 percent of the cost for the next 25 feet, and 50 percent of the cost beyond 45 feet. Sponsors are also expected to provide at least 25 percent of the cost of flood control projects, including land and rights of way. At least five percent must be in cash (except for nonstructural flood control projects). They must bear 50 percent of the costs for recreation projects, 100 percent for hydro-power or municipal/industrial water supply, 35 percent for hurricane or storm damage protection, and up to 25 percent for fish and wildlife enhancement.[42]

The law also had other controversial features. It imposed port user fees for harbor and channel maintenance. The act authorized a fee of four cents per $100 worth of cargo loaded or unloaded at U.S. ports to cover the cost of harbor maintenance dredging and acquisition of disposal areas by nonfederal interests. The act doubled the inland waterways fuel tax by 1995, gradually increasing it from 10 cents to 20 cents. But the law also authorized 262 new water projects. Eight of the new projects are in Texas; of these, seven are in the Galveston District. In addition to the eight new projects (valued at $724.5 million), the act included $143 million in modifications to existing water projects.[43] The new law is changing the way the Galveston District does business, not only in navigation projects, but also in flood control, and it means a likely revival of moribund construction and design activities within the District if local sponsors can pay their share.

While it may be possible to delay a construction project without severe hardship, maintenance of the coastal waterways cannot be indefinitely postponed. To do so jeopardizes the movement of goods vital to Texas and the rest of the country. Whether the District faces cutbacks in operations and maintenance appropriations, as it was before Don McCoy became District Engineer, or shoaling caused by vicious storms, as it was after Hurricane Alicia, or delays caused by environmentalists protesting disposal methods, as it was at Matagorda Bay, the District must keep the waterways open. To meet this commitment, the Corps had juggled resources, engaged in tough negotiations with the state, shrimpers and environmentalists, and cooperated with other agencies to test new ways to mitigate the impacts of shallow draft dredging.

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[4]Interview, Lee F. and Bonnie Pendergrass with Don McCoy. Corpus Christi, Texas, March 24, 1987.

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[8]*The Beaumont Enterprise*, March 2, 1986.

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[11]Wilson, "The Gulf Intracoastal Waterway in Texas."

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[13]Interview, Lee F. and Bonnie Pendergrass with Duane Orr. Corpus Christi, Texas, March 20, 1987. Hereafter cited as Orr interview. Orr also pointed out that disposal along the eastern portion of the GIWW is a less serious problem because many rights of ways for disposal were secured years ago.

[14]Ibid.

[15]The Corps began seriously addressing environmental effects of dredging and disposal in 1973 through research at its Waterways Experience Station in Vicksburg, but many of the research projects take years to complete. For a description, see R.L. Lazor, C. Calhoun, Jr., and T.R. Patin, "The Corps' Environmental Effects of Dredging Programs," *Dredging and Dredged Material Disposal*, Proceedings of the 1984 Dredging Conference, Vol. I, pp. 150-156. Lazor and Calhoun are the Assistant Manager and Manager, respectively, of WES's Environmental Effects of Dredging Programs.

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[28]For comments to this effect, see remarks of District Engineer Vanden Bosch before 1976 Program Review Committee, Portland, Oregon, July 1976, RG 77, Box 1101, Public Affairs Office, Galveston District, File 401-07.

[29]Orr interview. Orr was an officer of the Association and served on the Board of Directors for many years.

[30]For copies of the Galveston District Engineers' remarks before the Association, see the *Annual Proceedings of the Gulf Intracoastal Canal Association.* Copies can be found in the Galveston District library.

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[32]For the complete text of the law, see *Laws of 99th Congress, 2nd Session,* Public Law 99-662 (H.R. 6). November 17, 1986.

[33]*Engineer Update*, Vol. 10, No. 11 (November 1986), p. 6. This is a monthly publication of OCE.

[34]Ibid., p. 1.

[35]For a detailed discussion of the history of the act, see Daniel McCool, *Command of the Waters: Iron Triangles, Federal Water Development, and Indian Water* (Berkeley: University of California Press, 1987), pp. 193-225.

[36]*Water Resources People and Issues: An Interview with William R. Gianelli,* by Martin Reuss, EP 870-1-24 (U.S. Army Corps of Engineers, Office of the Chief of Engineers, August 1985), pp. 15-17.

[37]Ibid., p. 17.

[38]For more information on Gianelli's career, see Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking, 1986). On page 372, Reisner describes Gianelli as "a short, square man with a Vince Lombardi temperament and an American flag perpetually stuck in his lapel." Gianelli would probably appreciate the comparison to Lombardi.

[39]Ibid., pp. 17, 110-111. Quote is from pages 110-111.

[40]Letter, Galveston District Engineer Alan L. Laubscher to Southwestern Division Engineer Hugh G. Robinson, January 11, 1983, District Engineer Correspondence Files, Galveston.

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Chapter V

HURRICANE FLOOD PROTECTION AND FLOOD CONTROL

Hurricane flood protection and flood control projects are among the best examples of the partnership between the Galveston District and local communities which lack the financial wherewithal to undertake the projects themselves. Yet when a decade elapsed with no new water resources act passed by Congress, the Corps found that it, too, was limited—less by technical and financial resources than by congressional reluctance to authorize new hurricane flood protection and flood control projects. The decade 1976 to 1986 was spent primarily completing projects conceived earlier, though several unanticipated projects, most notably Addicks and Barker dams, received emergency attention.

The ordinary citizen in the Galveston District may most appreciate the District during hurricane season. Homeowners in parts of the District build their homes on nine-foot piers, knowing that the underbellies of their homes may be given over to the river. A hurricane crosses the Texas coast about once every two and a half years some time between June and the end of October.[3] But because of the District's hurricane flood protection projects built during the 1970s and 1980s, residents' lives and property are more secure than ever before. However, Mother Nature still has the power to breach the Corps' defenses; the District can only blunt her impact. In her angry wake, the Corps provides mobile homes and travel trailers for storm victims, reopens blocked shipping channels, helps the Federal Emergency Management Administration (FEMA) prepare storm damage surveys, and evaluates the need for more hurricane flood protection projects and planning before the next storm strikes.[4]

Hurricanes ... may grow to be more than 500 miles in diameter, earth's greatest storms. Enormous heat engines, they feed on the ocean's warmth. Evaporated seawater condenses into rain, converting thermal energy into wind power in awesome amounts. The heat energy released by one hurricane in a single day, if converted to electrical energy, would supply the entire United States with power for three years.

—*National Geographic*, September 1980[1]

Ain't nothing wrong here—'cept you ain't got no people, ain't got no lights, everything's a wreck, you probably fixing to get hit by that glass.

You can't go to the bathroom 'cause they ain't no water, you don't want to stay inside because you're scared the damed thing will fall and you can't get outside because everything is falling. Other than that, no problem.

—Resident describing downtown Houston during Hurricane Alicia[2]

Hurricane Alicia batters a Galveston fishing pier in 1983.

Hurricanes are the earth's most dangerous and destructive storms. The Maya and Carib Indian roots of the word "hurricane" mean "evil spirit,"

Alicia ripped siding from Galveston hotel in 1983.

Alicia leveled beach-front homes on the west end of Galveston Island in 1983.

"storm god," or "devil."[5] A hurricane's force is ranked from 1 to 5 on the Saffir-Simpson scale devised by Herbert Saffir, a consulting engineer, and Dr. Robert H. Simpson, a former director of the National Hurricane Center. A storm ranked 1 is minimal; a storm ranked 5, catastrophic. The first has winds of about 75 miles per hour, the later, winds of 155 miles per hour or more. Only three hurricanes in the 20th century have been classed as number 5 storms. Still, since the year 1900, hurricanes have killed more than 13,000 people in the United States and done more than $12 billion in damage along the Atlantic and Gulf coasts. Of those who died, nine out of 10 drowned in the huge walls of water swept ashore with the high winds.[6] For this reason, flood control and hurricane flood protection are irrevocably linked in the Galveston District.

In the decade from 1976 to 1986, the District has responded with both structural and nonstructural approaches to flood control. Of the two, the nonstructural solution has been the more controversial. District Engineer Colonel Alan Laubscher offered an intriguing explanation in a 1982 speech in Houston to flood control operators. Laubscher reminded his audience that " ... Texas was settled by fiercely independent Americans, Europeans and Mexicans who cherished the freedom to develop their own social and political institutions, and carve out their own economic destinies without government interference. Much of this pioneer spirit is still present in today's population, and helps explain the unpopularity of the most economically efficient means of reducing flood damages—restricting or prohibiting development of flood plains."[7]

As Laubscher suggests, the basic concept of nonstructural solutions to flood control is the essence of simplicity: rather than construct levees or reservoirs to contain floodwaters, simply move people out of areas most vulnerable to flooding and zone the areas against further development. Federal buy-outs of property owners, it was argued, would be cheaper in the long term and would have fewer environmental impacts than other options. In addition, the land could be used for recreational purposes for most, if not all, of the year.

It has been Corps policy to look at nonstructural alternatives when developing plans for flood damage reduction since passage of the Water Resources Development Act in 1974. In fact, Southwestern Division Engineer General McGinnis perceived a clear bias toward nonstructural solutions.[8] McGinnis termed the nonstructural solution "a catch-phrase that gained wide acceptance in the environmental community [because] it had the great benefit from the environmentalist point of view of preserving the status quo, and this was the thing that the environmentalists seemed dedicated to accomplishing."[9] McGinnis' main objection was that this was treated as the only solution, instead of just one of many.

> *I often ... likened the Corps' approach to a flood problem as that of a plumber approaching a leaking pipe in the house. Depending on the size of the pipe and the pressure behind it and the location, et cetera, he may elect to use a pipe wrench, he may elect to use a pair of slip-joint pliers, he may elect to use a hacksaw or a tubing cutter—you don't know which tool he's going to take out of his kit to begin to solve the plumbing problem.*
>
> *I felt that as professionals, the Corps of Engineers should have access to its entire kit of tools to solve a flood damage reduction*

problem. But sometimes the right tool would be a dam, sometimes it would be a levee, sometimes it would be simply a warning and evacuation plan, sometimes it would be some combination of these things.[10]

The Galveston District was one of the first to select a nonstructural solution to flood control from the Corps "tool kit." The Burnett, Crystal and Scott Bays project called for the federal government to purchase approximately 750 acres and 448 homes in frequently flooded residential areas of Baytown, Texas, where the elevation had dropped nearly nine feet since 1915.[11] The Geological Survey of the U.S. Department of the Interior attributed the subsidence to the withdrawal of 600 million gallons per day of ground water in the Houston metropolitan area, including 32 million gallons per day from the Baytown area.[12] Both the District and the Division believed that moving 1,550 people under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 was the most cost-effective solution to a difficult problem.

Alicia's storm tides inundated upper Galveston Bay communities, such as Baytown.

In January 1976, the Board of Engineers for Rivers and Harbors recommended that the plan to evacuate the 50-year flood plain be implemented at an estimated total cost of $16,980,000. Federal and nonfederal interests would share the cost based upon some formula to be determined later. The report was forwarded to the Chief of Engineers for further evaluation, then to the governor of Texas and various federal agencies. After reviews at these levels, the recommendations went to the Secretary of the Army, the Office of Management and Budget and, finally, to Congress.[13]

By September 1978, the final environmental statement had been filed with the EPA. Plans called for converting the land into a natural area, with possible development of nature areas, bird sanctuaries, green belts, wildlife areas, nature walks, and other uses consistent with the high-flood potential. Estimated acquisition cost had risen to $30 million. The city of Baytown, the local sponsoring agency, would pay 20 percent of the final cost; the federal government would pay the remainder.[14]

By the end of 1979, however, the project was, according to District Engineer Colonel Sigler, "on the back burner."[15] The project floundered on local disagreement over the value of the land to be purchased. People in the community who were not living in the flood plain were being asked to help buy out those who did live in the flood plain; the community was divided over what the property was worth. Some believed, fairly or unfairly, that their neighbors would receive a windfall. When the city held a bond election in July 1979 to provide local funding for the project, it failed by a 60/40 percent margin.[16]

Subsidence allowed Alicia's storm waters to wash in and flood these homes in the Baytown area.

The path of Hurricane Alicia is shown.

In September 1979, Sigler met with the local sponsor and Congressman Bob Eckhardt to discuss possible legislative relief from local cost sharing. The only feasible option was to reduce the scope of the project if the local sponsor would assure that it would finance its share.[17] Meanwhile, the District completed the final supplement to the environmental statement and issued it in November 1979. The only major revision was the cost of the original Baytown project, which had jumped from nearly $17 million to $39.1 million in less than five years. The schedule called for completion of advanced engineering and design by 1980, to be followed by the start of acquisition of property when Congress appropriated funds. Eventually, federal money became available, but in the end, the local issues could not be resolved. Partially protected by the 15-year-old National Flood Insurance program, the local residents decided to stay. The Corps placed the project in its inactive category.

The Corps was very familiar with the flood insurance program because it conducted flood insurance studies for the Federal Insurance Administration. While doing these studies, particularly in the vicinity of Sabine Lake and in Orange County in east Texas, Galveston District engineers found that their design figures for surge elevation differed from those used by the neighboring New Orleans District, suggesting a difference in methodology. It was an issue which concerned Colonel Vanden Bosch, Galveston's District Engineer, who felt that the public was eager to take advantage of any apparent weaknesses in flood insurance study results or in the flood insurance program as a whole. The differences in the numbers of the Galveston and New Orleans Districts could raise questions about the objectivity, credibility and analytical techniques of the Corps and, indirectly, its client, the Federal Insurance Administration.[18] The Office of the Chief of Engineers (OCE) eventually handled the coordination between the two districts to resolve differences in approach.[19]

While nonstructural solutions proved difficult to implement, the District pursued structural solutions to flood control with much greater success. In

Right: The map shows hurricane areas protected by the Texas City-La Marque hurricane-flood project.

1979, the District estimated that total damages prevented by various flood control projects completed by the District amounted to $160.8 million.[20] The largest construction projects completed by the District in the past decade have been two hurricane flood protection projects—the Texas City-La Marque project and the Port Arthur and vicinity project.

Above: Floodwalls protect the Texas City waterfront from storm tides.

Left: Port Arthur homes were flooded by Hurricane Carla in 1961.

Lower right: Hurricane Carla devastated Gilchrist, on the Bolivar Peninsula.

Lower left: Carla's waves pound Galveston's seawall, 1961.

Located about nine miles northwest of Galveston, the Texas City-La Marque hurricane flood protection project fronts on the west side of Galveston Bay and protects 36 square miles. The project has a long history, beginning with hurricane flood protection efforts in the early 1930s, when a seawall 12.5 feet high and 9,191 feet long was built in Texas City by the Public Works Administration (PWA). In 1948, Congress authorized a Corps study of the feasibility of making the seawall longer and higher.[21] City streets were staying flooded for 12 hours or more, even after only moderate rainfalls. The problem worsened in the 1950s. After World War II, Texas City's land surface gradually dropped four feet because of extensive use of artesian wells by individuals and industry. This depleted the aquifer lying 1,000 feet below the city. In 1958, Congress authorized the Texas City Hurricane Flood Protection Project in the Flood Control Act of 1958, and Galveston County voters approved the first of several bond issues to help finance a major flood prevention project. In 1960, Congress appropriated federal money to help finance the work and extended the project 1.8 miles to include La Marque.

The following year, before construction had begun, Hurricane Carla struck the Texas coast. It generated tides of over 18 feet and did more than $400 million in damage. It was even more powerful than the great Galveston hurricane of 1900, yet the 1900 storm remains the worst weather disaster in United States history. Because more than 250,000 people were evacuated, only 34 people died during Hurricane Carla, compared to 6,000 in the 1900 storm.[22] In the wake of the storm, the Corps rethought the design of the project and raised the elevation of the floodwalls from 18 to 23 feet. The following year, the cities of La Marque and Texas City pledged support for the improvement of the seawall, and a groundbreaking ceremony was held in April 1962 for the flood protection project.

At least four other major storms struck the Texas coast before the project was complete and fully operational. The first, Hurricane Beulah, hit in mid-September 1967. Its 100-plus tornadoes broke Hurricane Carla's record of 26. Almost

Above: Tropical storm Claudette's rains flooded Dickinson in 1979.

Right: Parking meters poke their heads above Hurricane Beulah's floodwaters in Edinburg, 1967.

the entire area from Matagorda Bay northwest to San Antonio and south to Laredo received at least 10 inches of rain. Many points received more rain in four days than they normally receive in a year. The second, Hurricane Celia, August 2–5, 1970, was unique in that nearly all damage resulted from wind, not from flooding. The third, tropical storm Claudette, passed through the Houston-Galveston area in July 1979. It had neither the 15- to 20-foot storm surge of Carla, the deadly tornadoes of Beulah, nor the hurricane-force winds of Celia, yet damage exceeded $227 million. Claudette set a national record of 42 inches of rainfall in 24 hours.[23] One man reported that he didn't know how bad things were until he threw his cat off the bed in the night and heard a splash as the cat hit the floor.[24] The fourth major storm was Hurricane Allen, one of the largest hurricanes ever to hit the Texas coast. At the start of the 1980 hurricane season, the District felt that its hurricane flood protection projects were far enough along that no emergency measures would be needed that year; it had no way to foresee the fury of Hurricane Allen.[25] It struck on August 10, 1980 at Port Mansfield, north of Brownsville. Wind gusts up to 129 miles per hour resulted in two deaths and $300 million in damage. Nearly 500,000 people were evacuated along the Texas and Louisiana coasts.

Above: Hurricane Celia, 1970, drove fishing boats ashore near Aransas Pass.

Right: Hurricane Celia devastated wide areas of south Texas in 1970.

Hurricanes such as Carla clearly indicated that accelerated development along the coast was creating new potential for hurricane flood damages faster than protection could be provided through local measures.[26] Congress reacted by appropriating funds for the Texas Coast Hurricane Studies, which the Galveston District began in 1964. The primary purpose of the studies was to investigate the feasibility of eliminating or reducing damages from hurricane flooding in long reaches of the Texas coast by providing a coastal barrier protection system along the Gulf. This system would largely replace the system of providing protection on a localized basis. However, where the need for immediate protection was urgent, construction would continue on localized protection, as in the case of Texas City, Port Arthur and Freeport.[27]

By 1976, the Texas City-La Marque hurricane flood protection project begun in 1962 was 80 percent complete. The largest single project underway in the Galveston District, it ringed the Texas City-La Marque area with 1.3 miles of concrete flood walls and 36 miles of earthen levees with elevations from 15 feet above mean sea level on the southern landside to 25 feet in the area fronting Galveston Bay. It also included drainage structures and flood gates, a tide control and navigation structure at Moses Lake, and two pumping plants, one in south Texas City, the other in La Marque. The project was designed to withstand the most severe 100-year storm, a storm which would dump up to nine inches of rain on the area within 24 hours. Cost was shared based on a 70/30 split. The federal government provided 70 percent of the funding; Galveston County and the two cities behind the wall picked up 30 percent. The project was scheduled for completion by 1980, but it was not until September 1982 that construction began on the last phase—the La Marque pump station and drainage structures. Due to inflation and delays, cost estimates had increased from $42 million to more than $60 million.[28] Actual construction costs eventually peaked at $54.6 million.

La Marque pump station drains floodwaters from areas behind the dikes.

The Texas City hurricane flood protection project was a challenging design project for District engineers.[29] The supports for the concrete floodwalls through the industrial area of Texas City included two-foot-square concrete piling 40 feet long and 16-inch piling 60 to 70 feet long.[30] These piles not only had to support the concrete floodwalls, but also withstand the thrust of hurricane-driven waves. District engineers also designed the navigation and flood control guillotine structures.

The two pumping stations, however, are perhaps the most amazing portion of the project. The pump design is based on an ancient Greek invention called the screw of Archimedes; most pumps used for flood control in the United States are centrifugal pumps. The only similar use of the screw pumps is in the Netherlands. The Galveston District chose these pumps because they would be less damaging to the environment, particularly the fish chain. A slow, gentle pumping action permits small aquatic life to pass through the pumps into the large, open reservoirs behind. But even though they are operated at only 25 rpm, their size makes them some of the most powerful pumps in the world. Each weighs over 53,000 pounds, is 53 to 60 feet long and 12 feet in diameter, and is powered by either a 750- or 540-horsepower diesel engine. Each can pump between 125,000 and 132,000 gallons per minute. Operating simultaneously at full capacity, the eight pumps can handle more than one million gallons per minute (gpm).[31] Completed in 1968 at a cost of $15 million, all of which was generated from a local bond issue, the pumps at the Texas City Pump Station turn on automatically when

Ed McGehee, from the Galveston District's Construction-Operations Division, tracks Hurricane Alicia.

the water in the drainage ditches rises to 4.5 feet below sea level. These pumps ran for 24 straight hours during Hurricane Alicia.

Hurricane Alicia struck the Texas coast at Galveston on the night of August 17, 1983. The direction of the storm was unpredictable. One Texas meteorologist compared it to "a gorilla with a machine gun. It goes where it wants to."[32] As sustained winds increased to 74 miles per hour, the storm was upgraded from a tropical storm to a hurricane nearly as powerful as Hurricane Allen was three years earlier. The floodwaters accompanying a hurricane build as low air pressure in a hurricane eye allows the ocean surface to rise near the center of the storm, forming a bulge one or two feet high. Wind-driven water piles onto the bulge as the hurricane rushes to landfall. This storm surge can pound miles of beaches with devastating force, and can be augmented by other waves eight to ten feet tall that slam ashore before, during and after the surge itself.[33]

When the storm did strike, it beat a 300-mile-long path to Dallas, following the path of the 1900 storm. In its wake, it left 10 dead and nearly $1 billion in damage.[34] Nevertheless, 25 miles of seawall and levees, coupled with those amazing screw pumps, protected Texas City from the worst of the storm's fury, preventing an estimated $8 million in damages to local property.[35]

While construction of the La Marque pump station was underway when Hurricane Alicia struck, it was far from done. Planning of the 255,000-gpm pump station at La Marque began after the National Bureau of Fisheries established a 170-acre wetlands area just south of La Marque. The $4.6 million project was the last remaining feature of the Texas City-La Marque hurricane flood protection project to be built. Completed in 1986, the project took more than five years to design and four years to construct.

The basic design concept is straightforward. Perched right on the levee, three 85,000-gpm pumps operate only during a hurricane or heavy rainstorm and pump water from the inland side of the levee back to the seaward side to prevent major flooding. They are designed to protect 2,900 acres from a storm surge so severe that it might occur only once every 100 years. Once the pump station was completed, the seawall gates that once were kept closed were opened so that the tide could flow back into the area, returning 170 acres to wetlands in accordance with plans formulated by the National Bureau of Fisheries.[36] The gates are closed only during major storms. In addition to the three huge 85,000-gpm pumps, two smaller 20,000-gpm pumps keep the ditch system dry so they can be used as collection areas for heavy rains. Three older 35,000-gpm pumps in Drainage District No. 2 near La Marque remain in place to be used in conjunction with the new station in an emergency, giving a combined capacity of over 300,000 gpm.[37] While construction suffered from a number of delays, the end result was a heralded success. Once the Corps completed

Col. Gordon Clarke speaks at the Texas City Hurricane-Flood Protection System dedication, 1987.

A "guillotine" tide gate is a landmark structure on the Freeport Hurricane-Flood Protection System.

construction, the District turned the pumping station over to the county, which operates and maintains it.

The entire Texas City-La Marque flood protection project was dedicated on July 31, 1987. It had taken 25 years to complete. Nine district engineers served their tours of duty in Galveston while the work went on. In the eyes of some, the project ranks with the Galveston seawall or the grade-raising of Galveston Island.[38]

The Freeport and vicinity hurricane flood protection project was another of the District's major projects. The 84th Congress laid the groundwork for the project in 1955 when it called for study of "coastal and tidal areas of the eastern and southern United States ... where severe damages have occurred from hurricane winds and tides." The Galveston District took advantage of the broad authority in Public Law 71 to look at localized protection to prevent loss of human life and property along the Texas coast.[39] Congress subsequently authorized the Freeport protection project in the 1962 Flood Control Act.

The pump station on Port Arthur Hurricane-Flood Protection System moves floodwaters out of Alligator Bayou.

Like the Texas City-La Marque project, the Freeport project was designed to protect against a 100-year storm. Construction began in June 1965. By mid-1975, the $41 million project was about 60 percent complete. The final environmental impact statement on completion of the Freeport hurricane flood protection project was filed with CEQ by 1976; construction was completed in 1981. The federal share of the $41 million hurricane flood protection system was $28.7 million, while the local share was $12.1 million based on a 70/30 split just like the Texas City-La Marque project. Protecting property valued at more than $500 million, it was a bargain even though it exceeded its original estimate of $36.6 million.

The project consisted of 53 miles of improved or rehabilitated earthen levees, including 4.3 miles of new levees and wave barriers from 15 to 21 feet above sea level, drainage structures, two new pumping stations, a gated tide control and

Above: Highland Bayou Diversion Channel flows past FM 2004 in Hitchcock.

Right: Barrier system keeps saltwater out of upper reaches of Taylors Bayou.

navigation structure, and replacement or modification of gravity or guillotine-type tide control and navigation structures, road ramps and other structures. The project protects a 42-square-mile area, including the cites of Freeport, Lake Jackson, Lake Barbara, Clute and Oyster Creek. After completion in 1981, the project was turned over to the Valasco Drainage District for operation and maintenance.

The Port Arthur and vicinity flood protection project was similar in scope. Authorized by Congress in October 1962, construction began in March 1966. Completed in September 1982, five new pumping plants plus seven modified, pre-existing pumping stations together provide over seven million gpm of pumping capacity. Local sponsors contributed 30 percent of the $84 million cost.

Another important District project was the Highland Bayou Diversion Channel. The Highland Bayou flood protection project was designed to protect La Marque and Hitchcock. The project included channel improvements to Highland Bayou and construction of a diversion channel to handle runoff from the upper part of the watershed. By 1976, the first 5.9 miles of the diversion had been dredged, and a contract awarded for constructing another 2.3 miles, plus improvements to the existing bayou. Construction of the $26.6 million project was completed in 1983.

Work started in 1982 on Phase I of the Taylors Bayou flood control and drainage project. The project involves channel rectification on Taylors and Hillebrandt bayous in the Beaumont area. It incorporates a wildlife mitigation plan to manage water levels in several areas used to dispose of material excavated from the channel. About 27 miles of channel will be excavated by hydraulic pipeline dredge; another 6.2 miles will be straightened by drag lines. Another special feature is construction of a water control structure at Star Lake to prevent saltwater from entering the lake. This will improve freshwater wetlands and mitigate for other losses. The $70 million project, which as of 1986 was not yet fully funded, was expected to take until at least 1990 to complete.[40] As of 1988, other authorized coastal flood protection projects included Clear Creek, Buffalo Bayou and tributaries, and Vince and Little Vince bayous, plus six active planning studies.[41]

In addition to pumping stations and levees, the District also uses retention reservoirs to help control flooding. Addicks and Barker are dry-retention reservoirs constructed in the 1940s to prevent flooding along Buffalo Bayou during periods of extremely heavy rainfall in northwest Houston and Harris County. Together, they prevent an estimated $9 million in flood damage each year. Barker Dam, which is basically just a 13.5-mile-long earth embankment,

and its reservoir west of Houston were authorized by Congress as part of the comprehensive Buffalo Bayou and Tributaries flood control project. The reservoir occupies 12,583 acres of land, most of which is leased for grazing and agricultural purposes. The project had never been fully completed, however. Eventually this affected the safety of the dams.

The problem was discovered in 1976–77 during an inspection authorized by Congress and ordered by OCE under the National Dam Safety Act.[42] The act authorized inspection of all nonfederal dams in the aftermath of the collapse of Teton Dam in June 1976. In the Southwestern Division alone, 9,357 dams had to be inventoried and 1,092 had to be actually inspected.[43] Included were the Addicks and Barker dams. Because of local opposition, rectification of Buffalo Bayou had never been fully completed. As a result, floodwaters from the upper Buffalo Bayou watershed were periodically held longer than originally intended at the reservoirs to avoid flooding new suburban developments downstream. Addicks and Barker dams have no spillways. If rainfalls exceed design criteria, floodwaters would flow around the ends of the dams and eventually overtop the end sections, which were about four feet lower than the main embankments. This would subject the main embankments to possible failure. Inspectors discovered significant seepage from the dams. To compound the problem, design criteria for dams and reservoirs were being changed to reflect significant increases in predicted rainfall over what was previously considered possible. The theoretical 1,000-year design storm for the two reservoirs, using current criteria, would drop 42 inches of rain within 72 hours. Signs of seepage, tougher design criteria for new dams and reservoirs, as well as extension and enlargement of the Turkey Creek diversion channel near the toe of Addicks Dam, which seemed to further aggravate potential problems, combined to make repairs imperative. A local television station reported in March 1977, "The District Office of the Corps is taking soil samples to more accurately determine just how serious the problem is and how serious the problem might become ... So far no one has rushed up to put their finger in the dike like the little dutch boy did, but there are a lot of people who have their fingers crossed that the situation will not get any worse."[44]

Right: Water collects behind Addicks Dam after heavy rains.

Reinforcing drilling "mud" flows into Addicks Dam slurry trench.

The District proved equal to the task. In a few short months, it designed repairs to ensure the safety of the dams at both Addicks and Barker and guard against a potentially catastrophic flood threat to the city of Houston. The District's solution was to trench through the top of Addicks Dam to a depth ranging from 45 to 70 feet below the top. The three- to five-foot-wide trench was then back-filled with an impervious "drilling mud" to prevent water seepage through the dam. The trench was constructed in three phases from 1977 through 1979. The first phase was a $1.8 million contract for repairs to an 8,400-foot section of the dam. In some spots, only reinforcements and fill were required. Repairs were also made to the outlet works, including sealing the joints of the five concrete conduits which extend 252 feet through the dam and the drilling of wells through the dam to relieve water pressure under the concrete to protect against a blowout of the dam during high water. There are four pump relief wells with depths up to 38 feet adjacent to the outlet works, plus 36 relief valves and wells in the outlet structure itself.[45] By September 1977, the first construction contract had been awarded.

While Addicks was considered the more critical area of the floodwater retention system, repairs were also made at Barker Dam. It, too, had a slurry trench constructed for seepage control. By the time all phases of work were completed in 1980, the total cost of repairs at the two dams was over $8.5 million; however, in just one week in mid-September of that year, the Addicks and Barker dams prevented $5.3 million in flood damages during heavy rains.[46]

Colonel Vanden Bosch, interviewed just prior to his retirement as Galveston District Engineer in May 1979, considered the Addicks and Barker dam project the most significant of his career as District Engineer. Why? Because given its emergency nature, it was one of the few projects which began and was completed during his command. Typically, projects may take 15 years or more to complete. He particularly praised the Galveston District's Public Affairs Office for the way it handled what could have been a public relations disaster.[47] Vanden Bosch's successor, Colonel James Sigler, who assumed his duties in the District in June 1979, and then Sigler's successor, Colonel Alan Laubscher, had a different perception of the Addicks and Barker dam projects. During Segler's command, further work was scheduled to raise the crest elevation of Addicks and Barker to prevent over-topping. In late 1981, Colonel Sigler announced interim emergency measures to lower the end of the embankments to allow floodwaters to escape while most water was still contained behind the reservoirs. This would prevent possible failure of the main sections of the dams. Plan selection, coordination, funding, design and construction of a more permanent solution would take several years, he warned.[48]

In fact, no permanent design solution was identified by the time he departed three years later. His successor, Colonel Laubscher, wrote to Southwestern Division Engineer Major General Hugh Robinson in July 1983:

> *I am concerned [about] the Corps' ability to make difficult decisions in a timely matter ... [One of] the most prominent examples that come[s] to mind in the Galveston District [is] dam safety at Addicks and Barker Reservoirs ... A review ... indicates to me that there was an inability for all echelons of the Corps to agree on a course of action and then to pursue that course of action to its conclusion ... Changes in guidance/direction ...*

[have] resulted in substantial losses of time and unnecessary expenditures of effort. In particular, it appears counterproductive for a District to coordinate a course of action through all levels in the chain of command, pursue that course of action, and then in the final decision process have the course of action determined inappropriate.[49]

Laubscher's comments reveal once again the tension that sometimes existed between the Districts, which were closest to the local sponsors and most aware of immediate issues within their area, and the Divisions and OCE, which were more removed from local pressures.

It was Colonel Laubscher's successor, Colonel Gordon Clarke, who finally saw a design solution agreed upon.[50] Construction on a permanent solution finally began in 1986, with completion scheduled for 1989. These delays, however, in arriving at a permanent solution in no way diminish the District's accomplishment between 1977 and 1979 when an immediate sense of urgency surrounded the entire project at Addicks and Barker dams.

Total damages prevented by the District's various flood control projects since their completion amount to over $160 million.[51] Oil refineries scattered along the Texas coast, vacation homes and condominiums on Galveston and Padre islands, and the new Houston created during the oil boom of the late 1970s have all benefited. Although eight out of 10 people along the coast have never experienced the direct effects of a major hurricane,[52] the odds increase each year that another major storm will strike the Texas coast.

With the possible exception of Baytown, the Galveston District's hurricane flood protection and flood control projects have been much less controversial than many other District projects.[53] In the Galveston District, the limited ability of local communities to finance their portion of future projects under the cost-sharing formula of the 1986 Water Resources Act is much more likely to indefinitely delay future flood control/hurricane flood protection and flood control projects than environmental issues. The region's history of violent storms and devastating floods makes it difficult to argue against the obvious need to protect lives and property, just as it has often been difficult to argue against both traditional military projects and special national defense projects such as the Strategic Petroleum Reserves. Perhaps this is one reason why the Galveston District wanted military projects as well as civil works projects as part of its workload.

Col. Gordon Clarke signs the Clear Creek local cooperation agreement in June 1986.

[1]Ben Funk, "Hurricane!", *National Geographic*, 158 (September 1980), pp. 349-350.

[2]*Houston Post*, August 19, 1983.

[3]Chester L. Pawlik, John W. Keith, and Jack H. Armstrong, "Texas Coast Hurricane Flood Protection Studies," in *Journal of the Hydraulics Division*, Proceedings of the American Society of Civil Engineers, 93 (November 1967), 147.

[4]District Engineer James M. Sigler to Division Engineer Hugh G. Robinson, p. 8, November 6, 1980, Box 857, Periodic Letter to Division Engineer, RG 77, Galveston District Archives, for this list of activities following Hurricane Allen. There is a distinction between hurricane protection, which generally refers to temporary emergency measures to protect against high winds, and hurricane flood protection, which often refers to capital-intensive permanent structures built in advance to protect against the high waters accompanying a hurricane.

[5]Funk, "Hurricane!", p. 352.

[6]Ibid.

[7]Colonel Alan L. Laubscher speech before the Training Workshop for Flood Control Operators and Decision Makers, Houston, Texas, October 13, 1982, File 401-07, Galveston Public Affairs Office.

[8]General Morris soon thereafter became the Chief of Engineers, and was succeeded by Major General Ernest Graves as Director of Civil Works. In 1977, McGinnis became the Civil Works Director under Morris.

[9]Interview, Martin Reuss with Major General Charles I. McGinnis, November 5, 1979, pp. 24-25 of edited draft, Box 1 of 2, OCE, Ft. Belvoir, Virginia.

[10]Ibid., p. 26.

[11]For an early summary of the project, see *Burnett, Crystal, and Scott Bays and Vicinity, Baytown, Texas, Feasibility Report* (Galveston: Corps of Engineers, 1975).

[12]Press release, September 19, 1978, in File 412-05, News Release & Media File, July 1, 1978–December 31, 1978, in Public Affairs Office, Galveston District. A later press release in November 1979 estimated that only eight to 10 million gallons per day were being withdrawn from the Baytown area.

[13]Press release, January 23, 1976, in File 412-05, News Release & Media File, January 1, 1976–June 30, 1976 in Public Affairs Office, Galveston District. The Baytown project was authorized under the Water Resource Development Act of 1978. It did not, however, appropriate funds for implementation.

[14]Press release, September 12, 1978, File 401-07, Projects Burnett, Crystal & Scott Bays, in Public Affairs Office, Galveston District.

[15]Sigler to Division Engineer Brig. Gen. James C. Donovan, November 6, 1970, p. 6, Periodic Letter to Division Engineer, Box 857, RG 77, Galveston District Archives.

[16]Ibid.

[17]Ibid.

[18]Vanden Bosch to Division Engineer Maj. Gen. Charles I. McGinnis, April 29, 1977, RG 77, pp. 3-4, Galveston District Archives.

[19]Nolan C. Rhodes, Deputy Division Engineer, to Col. Jon Vanden Bosch, District Engineer, June 14, 1977, Periodic Letter to Division Engineer, Box 857, RG 77, Galveston District Archives.

[20]Press release, September 26, 1979, in Public Affairs Office, Galveston District.

[21]The study was authorized by the Flood Control Act of 1948, House Document 347, 85th Congress, 2nd Session.

[22]Walter K. Henry, Dennis M. Driscoll, and J. Patrick McCormack, *Hurricanes on the Texas Coast* (Texas A&M University: College of Geosciences, July 1975), p. 10.

[23]Henry, et al., *Hurricanes on the Texas Coast*, p. 8-10; *Report on Tropical Storm Claudette, 24-27 July 1979* (Galveston District: U.S. Army Corps of Engineers, 1980).

[24]William H. MacLeish, "Our Barrier Islands Are the Key Issue in 1980, the 'Year of the Coast'," *Smithsonian*, 11 (September 1980), p. 50. For information on hurricanes Carla, Beulah and Celia, also see Lynn M. Alperin, *Custodians of the Coast: History of*

the United States Army Engineers at Galveston (Galveston District: U.S. Army Corps of Engineers, 1977), pp. 258-263.

[25]District Engineer James W. Sigler to Division Engineer James C. Donovan, March 6, 1980, p. 2., Periodic Letter to Division Engineer, Box 857, RG 77, Galveston District Archives.

[26]The proposed extension of the western end of the levee system to Hitchcock from La Marque is a subsequent example of the ongoing problems of providing protection through local measures. Congress authorized the extension in the Flood Control Act of 1968. The local sponsors, however, arguing environmental and economic concerns, withdrew assurances of their support in June 1974 and this "dogleg levee" died.

[27]For a detailed discussion, see Pawlik, et al., "Texas Coast Hurricane Flood Protection Studies," pp. 147-168; W. M. Murphy and C. W. Geelan, "Hurricane Flood Protection for Texas City, Texas," *Journal of the Waterways and Harbors Division*, ASCE, Vol. 93, No. WW2, Proc. Paper 5248, May 1967, pp. 157-179.

[28]*Texas City Sun*, July 6, 1983.

[29]For a technical discussion of design considerations, see Albert B. Davis, Jr., *Design of Hurricane Flood Protection Works* (Galveston, Texas: Corps of Engineers, n.d.). The publication is based on a paper delivered by Davis, Chief of the Planning & Reports Branch, in November 1962 before the Eighth Conference on Coastal Engineering.

[30]Press release, September 14, 1979, in Public Affairs Office, Galveston District.

[31]*Texas City Sun*, July 6, 1983.

[32]*Houston Post*, August 1983, quoting Steve Harned, meteorologist.

[33]Funk, "Hurricane!", p. 352.

[34]*Houston Post*, August 19, 1983; August 20, 1983.

[35]*Texas City Sun*, July 31, 1987.

[36]*La Marque Times*, October 15, 1986.

[37]Ibid.

[38]For local reports on the dedication ceremony, see the *Texas City Sun*, July 31, 1987 and the *Galveston Daily News*, August 1, 1987.

[39]Alperin, *Custodians of the Coast*, p. 229; Act of June 15, 1955, ch. 140, 69 Stat. 132.

[40]The Annual Report of the Chief of Engineers summarizes the status of projects such as this. See, for example, *Report of the Galveston District 1986, Fiscal Year Annual Report of the Chief of Engineers on Civil Works Activities Extract* (Galveston District: U.S. Army Corps of Engineers), pp. 15-10 and 15-11.

[41]U.S. Army Corps of Engineers, *Water Resources Development in Texas 1988*, pp. 93-98. For more specific project information, see in particular *Buffalo Bayou and Tributaries, Texas. Communication from the Assistant Secretary of the Army (Civil Works) Transmitting a Corps of Engineers Report ...* , September 7, 1979, 96th Congress, 1st Session, House Document No. 96-182 (Washington: U.S. Government Printing Office, 1979).

[42]National Dam Safety Act, Public Law 92-367, August 8, 1972, in 86 Stat. 506, 33 U.S.C. 467.

[43]Division Engineer Brig. Gen. James C. Donovan to Lt. Gen. John W. Morris, Chief of Engineers, March 28, 1980, p. 3, Periodic Letter to Division Engineer, Box 857, RG 77, Galveston District Archives.

[44]"Transcript of Addicks Reservoir Story," Channel 2, KRPC-TV, March 16, 1977, reported by Alan Parcell, in Files 401-07, Public Affairs Office, Galveston District.

[45]Press release, September 2, 1977, in File 412-05, News Release & Media File, July 1, 1977–December 31, 1977; Press release, October 3, 1978, in Public Affairs Office, Galveston District.

[46]Press release September 26, 1979, in File 412-05, News Release and Media File, July 31, 1979–December 31, 1979, in Public Affairs Office, Galveston District.

[47]Interview, Lynn Alperin with Col. Jon Vanden Bosch. Galveston, Texas, May 16, 1979.

[48]See press release, November 19, 1981, and attachment, "Background Information on Buffalo Bayou and Tributaries, Texas, Addicks and Barker Dams Dam Safety—Protection of the Dams from the Spillway Design Flood (November 2, 1981), in File 412-05, News Release & Media File, Public Affairs Office, Galveston District.

[49]Laubscher to Robinson, July 13, 1983, pp. 1-2, File 228-10, Periodic Letter to Division Engineer, 1982, in Executive Office of Commander, Galveston District.

[50]In March 1985, a joint design conference was held between Corps headquarters, the Southwestern Division, and the Galveston District to discuss design alternatives prior to beginning final design and construction. See District Engineer Gordon Clarke to Division Engineer Robert J. Dacey, June 17, 1985, File 228-10, Commander's Executive Office, Galveston District.

[51]Press release, September 26, 1977, in Public Affairs Office, Galveston District.

[52]MacLeish, "Our Barrier Islands," p. 47.

[53]By contrast, hurricane flood protection projects in several other districts have been extremely controversial. For example, the New Orleans District's Lake Pontchartrain hurricane flood protection project was enjoined by the courts.

Chapter VI

THE MANAGEMENT AND ORGANIZATIONAL CHALLENGE

The Corps is indeed undergoing many changes in response to new external demands. Its standard operating procedures are changing; its norms and values are changing; its outputs are changing ... this goes well beyond minimal adaptation. It represents an innovative and progressive response pattern to new demands.[1]

In the public mind, the Galveston District is best known for its navigation work, flood control and hurricane protection. Yet the District also has less-public missions, including supporting other Districts in their military mission and acquiring real estate and rights-of-way for the military and federal agencies such as the National Park Service (NPS), which is part of the Department of the Interior, and of Energy (DOE). These assignments shed light on the relationship between the Galveston District and other Districts, and between the Galveston District and federal agencies. Also shown is how important assignments can become to a civil works District like Galveston, which in the decade 1976 to 1986 saw civil work shrink and felt threatened by reorganization.

The reduction in civil works projects was due in part to tight operations and maintenance budgets during the Carter years, which hurt the District's dredging and navigation programs. The Industry Capability Program (ICP) and, later, the Commercial Activities (CA) Program, shifted work from the District to contractors.[2] Tough environmental issues slowed or indefinitely delayed design and construction of new projects. Uncertainties about cost sharing and user fees hampered attempts to work with local sponsors to plan and ready projects for construction. In 1983, District Engineer Alan Laubscher called cost sharing and user fees "major unresolved civil works issues." As he was well aware, "Without planning reports recharging the project development pipeline, the Civil Works construction program will eventually evaporate."[3] The District hoped that military projects would help it remain vital and viable as the civil workload fell.

In 1962–63, Galveston's military work had been assigned to Fort Worth as part of an administrative realignment of military construction boundaries. After OCE transferred construction responsibility for ICBM silos from the Divisions and Districts to the Army Corps of Engineers Ballistic Missile Construction Office (CEBMCO) in early 1961, the workload of many Districts declined. The realignment consolidated this dwindling workload by restricting military construction responsibility to only 17 Districts. In the Southwestern Division, the Fort Worth District was given all military construction responsibility.[4] Then, in 1981, the Tulsa District was brought back into the military construction fold. Selected design projects were transferred from Fort Worth to Tulsa in September 1981. The goal was to assign full responsibility for military construction in Arkansas and Oklahoma to the Tulsa District by July 1982.[5] The Galveston District also hoped to be brought back into the military construction fold by being assigned all military construction work for either Fort Polk or Fort Sam Houston.

In a letter to Southwestern District Engineer Hugh Robinson, Galveston District Engineer Alan Laubscher emphasized his belief that "sharing the growing military construction with the traditionally nonmilitary program districts [such as Galveston] ... is a sound approach" beneficial to everyone.[6] It would sustain viable districts during lean periods and preserve engineering expertise throughout the Corps. In that way, the Corps would maintain "vertical construction skill."[7] Galveston's proximity to Fort Polk and the knowledge gained in developing the Installation Support Book (ISB) for Fort Sam Houston made the District a logical choice to pick up all military work for the two installations.

While the District had supported the Fort Worth District on military projects, the District generally had been frustrated in its earlier attempts to secure a more active role in strictly military projects. The volume of work could be large. Projected military workload for the Southwestern Division for each of fiscal years 1978 and 1979, for example, was $150 to $175 million.[8] Yet in the decade 1976 to 1986, the District would generally remain frustrated, playing limited roles in some military construction projects, bypassed for most. The District no longer had the same experience and depth in military projects that it had in civil works.

TABLE 1

Galveston District Military Design & Planning, 1982–87[11]

Mobilization Planning	**Design Cost**
Fort Sam Houston	$220,000
Corpus Christi Army Depot	196,000
Gulf Outport	6,000
Estimated Construction Cost	
Bergstrom Air Force Base	
Sound Suppression Support Facility	450,000
Brooks Air Force Base	
Vehicle Repair Facility (Partial Design)	2,500,000
Randolph Air Force Base	
Vehicle Repair Facility	2,900,000
Fort Hood	
Low-Water Crossings (8)	1,900,000
Utility Projects (14)	1,400,000
Water Storage Reservoir	400,000
Fencing	50,000
Coat Underground Tanks	200,000
Vehicle Wash Racks (2)	140,000
Fort Polk	
Family Housing Storm Drainage System	3,000,000
Dyess Air Force Base	
Fuel Tank Covers	150,000
Red River Army Depot	
Storage Facility	3,000,000
Longhorn Army Ammunition Plant	
Road & Railroad Rehabilitation	1,500,000
Louisiana Army Ammunition Plant	
Blast Barricade, Gas Storage Bldg. & Pesticide Bldg.	1,000,000

There were minor military design missions assigned through the Fort Worth District, but both Districts eventually conceded that the arrangement did not work well. Galveston was to provide general support to Fort Worth for mobilization, but the Galveston District was unable to continue its assigned responsibilities in Mobilization Master Planning and its work on the Installation Support Books because of inadequate funds which translated into manpower constraints.[9] New assignments typically require more people. Lack of a consistent, predictable workload also was a problem. The amount of military engineering and design work and its urgency could fluctuate widely. In fiscal year 1984, the District had progressed to design for six different Army and Air Force facilities. Total construction cost was estimated at $10 million, with nearly $500,000 for design.[10] Yet by 1986, both Districts conceded that coordination was difficult, schedules were tough to meet, and, in general, farming out work from Fort Worth proved uneconomical. As Table 1 indicates, none of the projects were "big budget" by military standards.

The District maintained some military design expertise, but the projects were all small, such as parking lots and a sewage processing plant for Fort Hood. It also was peripherally involved in other support of the military mission. The District's Procurement & Supply Division provided procurement support to the Houston Recruiting District. And, although Galveston was not the lead District, it was a player in the siting of a Navy Homeport in Texas.

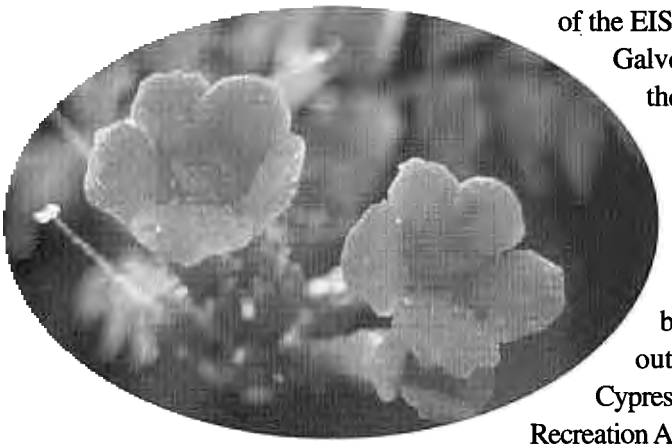
Work underway on the Navy Homeport, Ingleside is observed.

A cattle egret surveys its domain in the Big Thicket.

Corpus Christi and Galveston vied for the Homeport. The Reagan administration wanted a Navy task force for quick reaction to events in the Caribbean and in Central and South America. This task force, the *USS Wisconsin* Surface Action Group, needed a home base along the Gulf Coast. Proposals, due in January 1985, had to offer a site with a mandatory water depth of 45 feet. This brought into sharp focus the relative lack of progress on channel deepening projects at many Gulf Coast ports due to a funding impasse. Few ports could provide a water depth of more than 40 feet.[12]

Corpus Christi won the competition; Galveston received consolation prize of five naval ships—two frigates, two minesweepers and a patrol vessel. They would be based at a $33 million, 80-acre naval facility near the U.S. Coast Guard at Fort Point.[13] An estimated $14 to $25 million annually would pour into the local Galveston-Houston economy.[14]

While the Mobile District took the lead on the Navy EIS work, in December 1985, the Galveston District attended a pre-scoping meeting with other federal agencies and the Navy's contractors. By the end of January 1986, Galveston had agreed with Mobile on the extent of Galveston's involvement in writing the EIS for the Navy Homeport, had set a schedule to assure the timeliness of various parts



Brilliant orange trumpet creepers splash color throughout the Big Thicket.

of the EIS, and had actually started work on the draft. The Galveston District was also responsible for processing the permit applications for both sites.

The District was also a key player at two other types of sites, each vastly different from the Navy sites. In 1974, Congress authorized creation of the Big Thicket National Preserve. Responsibility for acquiring the land fell to the National Park Service, but the NPS did not have enough personnel to carry out this acquisition as well the acquisition of the Big Cypress National Preserve and the Cuyahoga Valley National Recreation Area which were authorized at the same time. So the NPS turned to the Corps.

A Memorandum of Understanding between the NPS and the Corps in April 1975 made the Corps responsible for land acquisition. It was a massive undertaking. The Big Thicket encompasses nearly 86,000 acres in seven southeast Texas counties and two river basins. It stretches approximately 46 miles north-south and 48 miles east-west. Caddo Indians from the north and the Atakapas to the south called it the Big Woods. Early Spanish settlers and Anglo-Americans avoided these "impenetrable woods." During the Civil War, many Big Thicket citizens went deep into these woods to avoid conscription. After the war, lumbering cut the size of the Big Woods from 3.5 million acres to less than 300,000 acres, of which about one-fourth is in the national preserve. Today, scientists call the Big Thicket a "biological crossroads," "an American ark," and "North America's best-equipped ecological laboratory." The area averages 60 inches of rain per year. The biological variety is astounding; reindeer moss from the Arctic grows within sight of subtropical palmetto from the Everglades; desert cactus and yucca grow near trillium and rhododendron from the Appalachians. The variety of birds, fish and other animals is equally impressive. The Big Thicket is also located in the midst of vast energy resources. By making it a preserve rather than a national park, Congress has voted to allow controlled extraction of minerals and other resources.

While the Memorandum of Understanding was between the NPS and the Fort Worth District, the Galveston District was tapped to help. The Corps' mission was fourfold: surveying the boundaries of the 12 units constituting the preserve; mapping; appraisal to determine the government's offer to each landowner; and acquisition once a price was agreed upon.[15] If a price could not be agreed upon, the government had the right to acquire title through condemnation; the courts determine fair value.

By July 1987, agreement had been reached on 757 tracts out of nearly 1,500. These tracts cover 46,650 acres. An additional 574 tracts involving 33,436 acres had been acquired through condemnation. Slightly over 200 tracts involving about 5,900 acres remained to be acquired, most of it along the Neches River.[16]

The Galveston District's real estate office also helped acquire property for the Department of Energy's (DOE's) Strategic Petroleum Reserves. In the era of the oil crisis, when projects such as Seadock were being pushed, the federal government was also trying to stockpile oil for a national emergency. Three sites in Texas met the geologic requirements for storage—Bryan Mound, Big Hill and Allen Dome.[17] The Declaration of Taking for the Bryan Mound site at Freeport,

Texas was filed in April 1977.[18] In October, the DOE began filling the Bryan Mound Petroleum Reserve at a rate of 36,000 barrels per day; by April 1978, the caverns held 22.5 million barrels of oil.[19] However, an offshore brine disposal pipeline and three brine disposal well sites were also needed as part of the project. Acquisition of the right-of-way for the DOE Bryan Mound Project was essentially completed once the government filed a Declaration of Taking for the offshore brine disposal pipeline in October 1978. A permit for this pipeline and brine diffuser was issued to the DOE in October for discharge 12.5 miles offshore instead of five miles offshore as originally planned. Work continued on the terms of acquisition on three brine disposal well sites.[20]

Two more sites still needed to be acquired in the Galveston District—Big Hill and Allen Dome, both along the Texas Gulf Coast. In addition to the sites themselves, approximately 100–120 miles of pipeline right-of-way were needed. The U.S. Attorney's Office filed a Declaration of Taking in December 1982 for approximately 240 acres of the most significant land on the salt dome at Big Hill. The court granted immediate possession on December 28, 1982 to enable the DOE to begin construction on schedule.[21] The work for the DOE represented four to five man-years of effort for the District.

Big Hill, near Freeport, is one of Texas' two strategic petroleum reserve sites.

Map locates Bryan Mound Strategic Petroleum Reserve site.

However, the Office of Management and Budget (OMB) mandated manpower cuts in civil works personnel in the Corps. In 1981, the Corps announced that support functions for other agencies, most notably for the DOE, would be terminated. The Corps' civil works force of 28,235 people was to be reduced by 790 by September 30, 1981, and by an additional 2,205 by September 30, 1982. This would not necessarily translate into a reduction in overall personnel. As expected with the Reagan administration's emphasis on military preparedness, there would be an increase in military construction and service functions.[22] The OMB manifesto clearly put a District such as Galveston, with a civil works mission, at a disadvantage compared to a District such as Fort Worth, with a military mission. This threatened to reawaken in the Galveston District some old resentments toward the Fort Worth District.

Occasional friction and competition between Districts are inevitable, but centralization in the early 1980s accentuated these feelings. Galveston's personnel and payroll duties were transferred to the Fort Worth District.[23] The District also lost its printing plant. In the reorganization/reduction, Galveston lost its internal soils exploration and testing capability as well. This work would be farmed out as part of the Commercial Activities program,[24] just like more and more of the District's dredging work and more and more of the District's engineering and design work was being contracted out. The District would play more of an administrative and management role and would rely more heavily

upon outside consultants. Yet this poses potential risks, as Colonel Sigler recognized:

> *If you charge the federal government with the mission to be responsible for the design of certain public works, [it] can't just oversee it. There has got to be some expertise within that organization up to the state of the art and with a good knowledge of what good design should consist of. The only way you can do that is with practical hands on experience, so you have to have a certain amount of the design done by the government agency itself.*[25]

In an era of reductions, the argument was a hard sell.

Numbers help tell the story of the "trauma associated with resource cutbacks" and a hiring freeze.[26] In 1976, the District had 560 civilian employees and nine military. Retiring the Galveston District's hopper dredges meant cutting about 90 people from the staff. Today, there are only four hopper dredges in the entire Corps, and these are primarily for national defense. More cutbacks followed. Between January 1, 1981 and October 20, 1981, Galveston's full-time permanent staff fell by 62 people—they then numbered 406. With attrition and the transfer of Finance and Accounting and Personnel to Fort Worth, Galveston estimated that its workforce would be down to 349 people by April 1982.[27] Eventually, the workforce stabilized at about 400, well below its peak.[28]

The cutbacks affected even those who remained. Their workloads often increased and, perhaps more importantly, opportunities for advancement became somewhat limited. This was particularly difficult at a time when the District was pushed to encourage equal employment. The District was startled when a class action discrimination suit was filed against it in October 1977 by five female employees. The U.S. District Court for the Southern District of Texas dismissed the suit in June 1979 and assessed court costs against the plaintiffs,[29] but the suit clearly made the District more aware of equal employment opportunity. The District Engineer's periodic letters to the Division Engineer began to regularly include reports on the progress of the EEO program.[30]

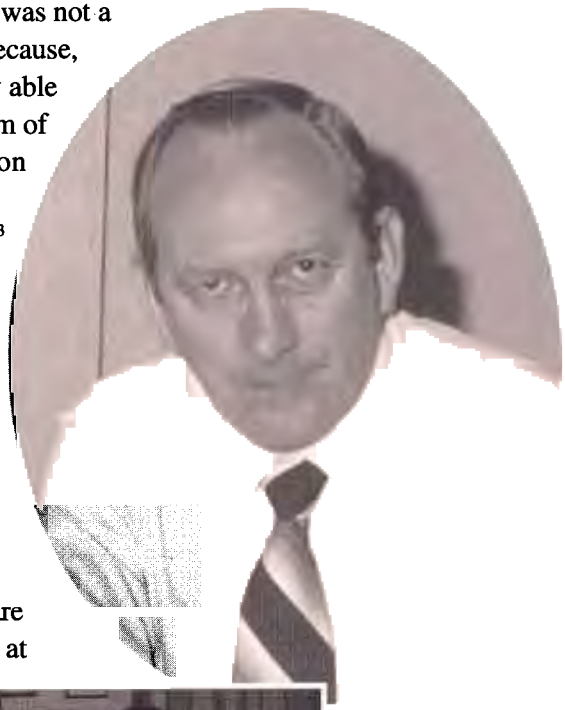
The composition of the work force was changing in another way as well. As construction work in the District declined 30 to 35 percent and as a multidisciplinary approach to project planning was emphasized, there were fewer designers and engineers and more lawyers, biologists, archaeologists and computer specialists.[31] Between 1976 and 1986, the District acelerated the computerization trend which began earlier. New technologies required new training programs. Computer-aided design and drafting (CADD) and a steady stream of new software and hardware for project management, cost estimating, word processing, and desktop publishing challenged even the most experienced staffers.

Right: Joe Trahan became chief of the Engineering Division.

In 1986, these staffers also saw a belated organizational change. In June 1986, the Galveston District finally formed a separate Planning Division. It was one of the last District's to do so. There were two reasons for this. First, the Planning Branch had been part of the Engineering Division.[32] The Chief of the

Engineering Division, Doug Graham, and his successor, Joe Trahan, both preferred to keep the Engineering Division intact. Second, there was not a great deal of urgency to move Planning out of Engineering because, according to Chief of Planning Bill Wooley, he was generally able to work well within the Engineering Division with a minimum of interference. The push to organize a separate Planning Division came from Lieutenant General E.R. Heiberg III at OCE, with support from Division Engineer Major General J.B. Hilmes.[33] With creation of the Planning Division, the Environmental Resources Branch became part of Planning.

Several other changes occurred about the same time. The Permit Branch was renamed the Regulatory Branch. Procurement and Supply was renamed the Contracting Division, and Program Development became the Program Management Office.[34] Although the boundaries of the District have not changed over the past decade, these organizational and title changes acknowledge the evolving nature of Corps assignments.



Bill Wooley, chief of the Planning Division

In addition to the main District office in Galveston, there are five area offices providing local contact points. The offices are at Port Arthur, Corpus Christi, Brownsville, Fort Point and Houston. In addition, Project Engineers are assigned to the sites of major projects. Field offices operate at the Brazos River floodgates, the Colorado River locks, the Addicks and Barker reservoirs, and Wallisville Lake. With increasing emphasis upon the recreational value of District projects, rangers have also become a more important part of the out-of-office team.

Ed McGehee, chief of Construction Operations, Col. Jon Vanden Bosch and George Powledge, foundations and materials chief, collaborate.

The personalities and temperaments of Galveston's District Engineers over the past decade have been as varied as the work the District does. Sometimes the focus and emphasis changed, but all had the same basic goal: service to the region consistent with Corps tradition.

This tradition was exemplified by Colonel Don McCoy, who inherited the Wallisville project and much of the turmoil surrounding the court cases. By his own admission outspoken and gruff, McCoy did not hesitate to take on Corps opponents. An avid hunter, outdoorsman and self-avowed environmentalist, McCoy was truly convinced of the merits of the Wallisville project. His greatest achivement during his command, however, was fighting to preserve operations and maintenance functions within the District by fighting for more money.[35]

Colonel Jon Vanden Bosch succeeded McCoy in 1976 and served until May 31, 1979. Tall, handsome and distinguished, his style contrasted with McCoy's. After retiring from the service and spending five years with a private engineering firm,[36] Vanden Bosch became Public Works Director for the city of Houston; Wallisville continued to haunt him.

Colonel James M. Sigler's three-year command at Galveston lasted from June 1979 through May 1982. He felt that a District Engineer must be "externally oriented" in his day-to-day duties. Believing that it is difficult to be a good manager if more than eight or nine people report to a particular individual, he pushed responsibility for day-to-day decisions onto the Chiefs of the Galveston District's four Divisions. He also, by his own admission, resisted putting pencil to paper, except to sign something, and in fact was fairly successful in getting other people to do the writing.[37] Sigler ultimately became a principal in a Texas consulting engineering company.

Colonel Alan L. Laubscher served from June 1982 through June 1985. He managed several major projects and regulatory matters, including the Mouth of the Colorado River project and the Bakersport permit. Laubscher's command in some ways was the most difficult of the decade in the District. Other Galveston District Engineers felt beseiged by outsiders, but Laubscher felt beseiged from within because of changes and consolidation in the District. Yet the changes he made helped assure that the Galveston District would not be absorbed by Fort Worth. Unlike McCoy, Vanden Bosch and Sigler, all of whom retired from the Army after spending three years at Galveston, Laubscher did not view the Galveston District as the culmination of his military career. He took over the Engineer Topographic Laboratory command after leaving Galveston.

Col. Alan Laubscher and Senator John Tower on an inspection tour following Hurricane Alicia.

Colonel Gordon Clarke, who was District Engineer from mid-1985 to October 1987, was born in Galveston and spent the first four months of his life there. As he grew up and heard his military father reminisce about his own years in Galveston,[38] Clarke never dreamed that someday he would return. Clarke believed that his command was characterized by an "open style of management." He emphasized communication between staff members as a way to break down barriers between "fiefdoms," as he called them, within the District. Overall, Clarke believed the District was "healthy"—the most frequently used adjective when talking about the District during his command.[39]

Colonel John A. Tudela assumed command of the Galveston District on October 5, 1987. A native of La Paz, Bolivia and fluent in six languages, Tudela marked a change from previous District Engineers because of his experience with diplomatic missions and foreign policy as a military attache to Mexico, as a military assistant to Secretary of State Henry Kissinger, and special assistant to NATO Commander, General Bernard Rogers. His diplomatic skills served him well as local sponsors and the District adjusted to the new ground rules laid out in the 1986 Water Resources Act, and to changes at OCE. For example, Lt. Gen. Henry J. Hatch, a former Galveston resident who played on the beaches as a boy, became the new Chief of Engineers in 1988, replacing Lieutenant General E.R. Heiberg III, who retired. Hatch had been Director of Civil Works.[40]

In change-of-command ceremonies on September 8, 1989, Colonel Tudela turned over the District to Colonel Brink P. Miller, a native Texan. Tudela was assigned to Puerto Rico as U.S. Garrison Commander for Puerto Rico and the Virgin Islands.[41] His successor, the 41st Galveston District Engineer, would see the District move into its long-awaited new headquarters building. This building

would be the first permanent home the District had in its more than 100-year history on the island.[42] The design contract for the District's new $12 million office building was awarded in April 1987, but as of 1990 construction had not begun.

The new building was first proposed over a decade ago. In 1981, the District began considering relocating to the old Public Health Hospital facility in Galveston when the District's lease on its present office came up for renewal in 1984.[43] When a new building became an option, the District considered financing the building through a private developer who would own the building, then lease it back to the Corps as the New Orleans District was doing with its new building. OMB, however, foreclosed this option;[44] the building would be built on government-owned land on Galveston Island. The site eventually selected was Fort Point, where the District already had an area office. The initial plan was to move the Fort Point office during construction to the Post Office Building in Galveston, where the District was headquartered from 1938 to 1974. Instead, it eventually moved to rented quarters along the seawall without waiting for groundbreaking on the new headquarters.

The new building is functional, but not architecturally unique. While the initial renderings and sketches showed a building with a curved facade and interesting entry, OCE informed the District that Corps buildings are rectangular and that the District's new headquarters will conform to that standard.[45]

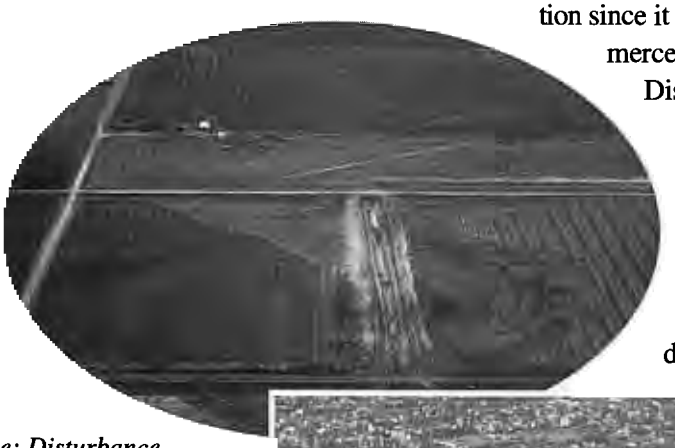
Top: The bunker-like concrete structure (center) housed the Fort Point Area Office.

Bottom: The drawing shows new district headquarters building.

As the District readied to move into its new building during the 1990s, symbolically it also prepared itself to move into the next century. Its future agenda will clearly be shaped by environmental issues. Congress and, in turn, the Corps will have to reconcile the continuing degradation of air, soil and water with the shrinking number of resources available to try to solve these problems. The Galveston District will be affected more than many Districts because of its many miles of coastline and hundreds of acres of wetlands. Wetlands are a vital natural resource, providing wildlife habitats, flood storage, groundwater recharging, and natural water filtration and purification; they have become a major part of the Galveston District's regulatory responsibilities.

Shrinking wetlands are attracting national attention. In 1977, the country was losing wetlands at the rate of 300,000 acres per year.[46] By 1982, despite passage of the Clean Water Act in 1977, the country was losing 458,000 acres of wetlands per year.[47] In December 1985, the Supreme Court unamimously approved a broad definition of the word "wetlands" and thus confirmed the authority of the Corps over millions of acres of privately owned property adjacent to navigable waters. If a piece of private property fits the court-approved definition of "wetlands," a federal permit is required before the wetlands can be filled.[48] The Supreme Court's ruling clarified the District's jurisdiction over wetlands such as Pond

No. 12 near Weslaco in the Rio Grande Valley. In 1984, the Corps learned that someone had dredged a channel through the middle of the pond and was draining water from it even though the pond was the seasonal home of migratory birds. The District, however, was not certain that this 30-acre pothole was within its jurisdiction since it was not crucial to interstate or foreign commerce.[49] Pond No. 12 now clearly falls within the District's purview.



The issue of wetlands preservation also affects projects such as the channelization of Taylors Bayou in Jefferson County, a project that began on paper over 40 years ago, but did not progress beyond an idea until after the city of Beaumont flooded in the 1960s. Some residents believed the flooding problem could be solved if the Galveston District would channelize Taylors Bayou. The channel would hold water that was found in the bayou. In its EIS, the District acknowledged that this meant that some of the marsh would become dry land, and that other parts would become a muddy reservoir unsuited to waterfowl and game fish such as bass and bluegill.[50]

Above: Disturbance of wetlands, such as ditching of Pond 12 near Weslaco, is now a Corps concern.

Right: The Essayons Building was located between the ship channel and The University of Texas Medical Branch on the east end of Galveston Island.

With a proposed project such as the Taylors Bayou channelization, the District must work to implement its plans and perform its regulatory functions while achieving consensus among a variety of factions. The task is made more difficult because, as Dale Hall of the U.S. Fish and Wildlife Service wrote, "The Corps autonomously regulates the development of wetlands on the one hand, and then encourages wetland development through the civil works function on the other." He described it as "wetlands schizophrenia."[51] In Texas, the Corps' task is even more difficult—as late as 1987, the state still did not have a coastal zone management plan. This often put the Galveston District squarely in the middle between developers and environmentalists when it was time to issue permits;[52] Texas did not provide the guidelines as many other states did.

In 1990, the future of wetlands preservation became even more clouded. In July 1990, the U.S. Court of Claims ruled that Corps of Engineers denial of a wetlands permit for an oceanfront development in New Jersey represented

a "taking" of the property, and ordered the Corps to pay the developer $3 million. By refusing a permit which would have allowed the developer to fill 12.5 acres of wetlands, the Corps cut the value of the property to $1,000 an acre or less. Another court made a similar decision involving Florida wetlands. As a result, the Corps may ultimately have to readjust its attitude. While the Corps has said, "Business will go on as usual in the [wetlands regulatory] program until we get guidance from an appellate court,"[53] the Galveston District, like other Districts, "may have to be more cognizant of the risk of a taking."[54]

Despite controversy and cutbacks, the Galveston District has an annual budget of approximately $100 million. The District is one of Galveston's largest employers, pouring thousands of dollars into the local economy each year. To outsiders, the District seems to breed astonishing loyalty among its 400-plus employees. It also seems at times reluctant to brook criticism; on some occasions, a "seige mentality" has swept the District, particularly when attacked by the press and in the courts, but also when OCE has dictated changes in response to administration policy. However, the disappointments—losing staff and failing to acquire a significant number of military design projects to supplement civil works—have been offset by successes. The District remains one of the busiest civil works Districts in the nation; its winning tradition continues.

[1]Daniel A. Mazmanian and Mordecai Lee, "Tradition Be Damned! The Army Corps of Engineers Is Changing," *Public Administration Review*, 35 (March/April 1975), p. 171.

[2]Many in the Corps felt that the Commercial Activities Program failed to consider the "big picture" and cost-effective alternatives to outside contracting. See, for example, Alan L. Laubscher to Maj. Gen. Hugh G. Robinson, Southwestern Division Engineer, January 11, 1983, District Engineer's Office, Galveston District.

[3]Ibid. Also see the reference to "the problem of a falling Civil workload" in Robinson to Lt. Gen. J.K. Bratton, July 28, 1983, File 228-10, Installation Historical File, Periodic Letter to Division Engineer, 1983, DDE File, District Engineer's Office, Galveston District.

[4]D. Clayton Brown, *The Southwestern Division: 50 Years of Service* , pp. 77-79.

[5]Southwestern Division Engineer Hugh G. Robinson to Lt. Gen. Joseph K. Bratton, August 17, 1981, Box 857, Periodic Letter to Division Engineer, Galveston District Archives.

[6]Ibid.

[7]Interview, Lee F. and Bonnie Pendergrass with Col. James Sigler (Ret.), Houston, Texas, March 24, 1987. Hereafter cited as Sigler interview.

[8]Brig. Gen. James C. Donovan to Lt. Gen. John W. Morris, November 28, 1977, Box 857, Periodic Letter to Division Engineer, Galveston District Archives.

[8]Laubscher to Robinson, July 23, 1983, Galveston District Office.

[10]Draft, Laubscher to Brig. Gen. Robert J. Dacey, December 22, 1983. The figures were deleted in the final letter, January 12, 1984, Col. Clarke's files, Galveston District.

[11]Handwritten list to authors from Galveston District, March 26, 1987.

[12]*Dredging and Port Construction* (January 1985).

[13]Joseph Mosley detailed the background of the competition for the Homeport in an interview with the authors, Corpus Christi, Texas, March 20, 1987.

[14]*Galveston Daily News*, July 1, 1985; March 14, 1987.

[15]The 12 units consist of eight land units and four river or stream corridors. The land units are Turkey Creek, Beech Creek, Hickory Creek Savannah, Lance Rosier, Loblolly, Beaumont, Neches Bottom and Jack Gore Baygall, and Big Sandy. The four river or stream corridors are Little Pine Island Bayou, Menard Creek, and two Neches River corridors.

[16]"Big Thicket National Preserve Corps of Engineers Real Estate Mission," (September 1987), correspondence to authors from Bill Jewell, Galveston District. The National Park Service has many informative publications on Big Thicket.

[17]Jon Vanden Bosch to Donovan, November 7, 1978.

[18]Charles McGinnis to John W. Morris, May 19, 1977. At this time, the Department of Energy had not been created. Its predecessor was the Federal Energy Administration.

[19]Donovan to Morris, March 24, 1978.

[20]Vanden Bosch to Donovan, November 7, 1978.

[21]Laubscher, January 11, 1983.

[22]*Journal of Commerce*, May 5, 1981, in File 401-07, OCE Clips, Coal & Gas Exports—Deepwater Ports, in Public Affairs Office, Galveston District.

[23]The Albuquerque personnel management, finance and accounting functions were also transferred to Fort Worth. The Little Rock District's finance and accounting functions were consoldiated in the Tulsa District. See Maj. Gen. Hugh G. Robinson to Lt. Gen. J.K. Bratton, February 18, 1983, File 228-10, Installation Historical File, Periodic Letter to Division Engineer, District Engineer's Office, Galveston.

[24]Laubscher to Robinson, January 13, 1983; interview, Lee F. Pendergrass with Col. Gordon Clarke, Galveston, Texas, March 26, 1987. Hereafter cited as Gordon Clarke interview.

[25]Sigler interview.

[26]Quote from Maj. Gen. Hugh G. Robinson to Lt. Gen. Joseph K. Bratton, December 10, 1981.

[27]Staffing figures from Col. James M. Sigler to Maj. Gen. Hugh G. Robinson, November 5, 1981, Attachments, Box 857, Periodic Letter to Division Engineer, Galveston District Archives.

[28]Jon C. Vanden Bosch, Speech to Kiwanis Club of Houston, June 28, 1978, RG 77, Box 1101, Galveston District Public Affairs Office, File 401-07.

[29]*Galveston Daily News*, June 27, 1979; Col. James M. Sigler to Brig. Gen. James C. Donovan, July 3, 1979, Box 857, Periodic Letter to Division Engineer, Galveston District Archives.

[30]For example, see Col. Jon C. Vanden Bosch to Brig. Gen. James C. Donovan, March 1, 1979, Box 8857, Periodic Letter to Division Engineer, Galveston District Archives.

[31]Estimate of decline in construction work is from interview, Lee F. Pendergrass with Joe Trahan, Galveston, Texas, March 16, 1987.

[32]The Planning Branch consisted of five operating sections—Navigation Planning, Economics and Social Analysis, Regional Planning, Post-authorization Planning, and Coastal Planning.

[33]Interview, Lee F. and Bonnie Pendergrass with William C. Wooley, Galveston, Texas, March 16, 1987/March 17, 1987.

[34]Gordon Clarke interview.

[35]Interview, Lee and Bonnie Pendergrass with Col. Don McCoy (Ret.), Houston, Texas, March 24, 1987.

[36]*Houston Post*, November 20, 1985.

[37]Sigler interview.

[38]For some of those reminiscences, see interview with Clarke's father, Gen. Bruce Clarke (Ret.), with Lee F. Pendergrass, McLean, Virginia, May 11, 1987.

[39]Gordon Clarke interview.

[40]*The Sand Castle*, Vol. 6, No. 3 (May/June, 1988).

[41]*The Sand Castle*, Vol. 7, No. 8 (August 1989), p. 1.

[42]*Galveston Daily News*, May 12, 1987.

[43]District Engineer James M. Sigler to Division Engineer Hugh G. Robinson, July 1, 1981.

[44]District Engineer Gordon Clarke to Division Engineer J.B. Hilmes, January 14, 1986, District Engineer Correspondence, District Engineer's Office, Galveston.

[45]District Engineer Gordon Clarke to authors.

[46]The figure is from Senate floor debates on the Clean Water Act of 1977, as quoted in Dale Hall, "Evaluation of the Clean Water Act of 1977," unpublished paper, p. 20. Hall, a member of the U.S. Fish and Wildlife Service in Texas, gave the authors a copy of the paper during a meeting in 1987.

[47]Ibid., p. 28.

[48]James J. Kilpatrick, "Striking a Blow for the Wetlands," *Houston Chronicle*, January 11, 1986. For a history of the Corps' resistance to broadening its jurisdiction under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 and the subsequent Clean Water Act of 1977, see Jeffrey K. Stine, "Regulating Wetlands in the 1970s: U.S. Army Corps of Engineers and the Environmental Organizations," *Journal of Forest History*, 27 (April 1983), pp. 60-75. Also see Hall, "Evaluation of the Clean Water Act of 1977."

[49]*Houston Chronicle*, January 16, 1986; *Galveston Daily News*, January 18, 1986; *Star Telegram* (Fort Worth, Texas), July 14, 1986.

[50]Billy Halfin, "Federal Policy Confusion Endangering Duck Wetlands, *Houston Sportsmen Conservationists* (April 1988), in Press Clippings, Public Affairs Office, Galveston District.

[51]Hall, "Evolution of the Clean Water Act of 1977," p. 28.

[52]Gordon Clarke interview.

[53]Quoted in *Engineering News Record*, August 9, 1990, p. 24.

[54]Ibid.

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INDEX

N

O

P

Q

R

S

T

U

V

W