History of the Army Corps of Engineers

The following are excerpts from the 15-chapter "Brief History" of the U.S. Army Corps of Engineers, posted on its official website, www.hq.usace.army.mil/history/brief.htm. Although parts of this History reflect current ideological and "environmentalist" biases, it is nevertheless useful, as an official historical outline of the Corps' indispensible role in infrastructure development and nation-building. We have therefore selected, for our purposes here, the chapters dealing with infrastructure and civil works. For more insightful articles on the history of the Corps, see EIR*, July 9, 2004), and* EIR*, Sept. 9, 2005.*

Chapter 1: The Beginnings to 1815

The history of United States Army engineers can be traced back to June 16, 1775, when the Continental Congress organized an army with a chief engineer and two assistants. Colonel Richard Gridley became General George Washington's first chief engineer; however, it was not until 1779 that Congress created a separate Corps of Engineers. Army engineers, including several French officers, were instrumental in some of the hard-fought battles of the Revolutionary War including Bunker Hill, Saratoga, and the final victory at Yorktown.

At the end of the Revolutionary War, the engineers mustered out of service. In 1794, Congress organized a Corps of Artillerists and Engineers, but it was not until 1802 that it reestablished a separate Corps of Engineers.

The Corps' continuous existence dates from this year. At the same time, Congress established a new military academy at West Point, New York. Until 1866, the superintendent of the academy was always an engineer officer. The first superintendent, Jonathan Williams, also became the chief engineer of the Corps. During the first half of the 19th century, West Point was the major, and for a while, the only engineering school in the country.

From the beginning, many politicians wanted the Corps to contribute to both military construction and works "of a civil nature." Throughout the 19th Century, the Corps supervised the construction of coastal fortifications and mapped much of the American West with the Corps of Topographical Engineers, which enjoyed a separate existence for 25 years (1838-1863). The Corps of Engineers also constructed lighthouses, helped develop jetties and piers for harbors, and carefully mapped the navigation channels.

Chapter 2: Improving the Nation's Transportation System

Although its work on fortifications was important, perhaps the greatest legacy the early Corps of Engineers bestowed to future generations was its work on canals, rivers, and roads. America was a young nation, and rivers were its paths of commerce. They provided routes from western farms to eastern markets and for settlers seeking new homes beyond the Appalachian frontier. The rivers beckoned and enticed, but then could treacherously destroy the dreams of unwary travelers and shippers whose boats were punctured by snags and sawyers or stranded by sandbars. Both commercial development and national defense, as shown during the War of 1812, required more reliable transportation arteries. Out of those unruly streams, engineers carved navigation passages and harbors for a growing nation.

Still, federal assistance for "internal improvements" evolved slowly and haphazardly. . . . In 1824, however, the Supreme Court ruled in *Gibbons v. Ogden* that federal authority covered interstate commerce, including riverine navigation. Shortly thereafter, Congress passed two important laws that, together, marked the beginning of the Corps' continuous involvement in civil works. The General Survey Act authorized the President to have surveys made of routes for roads and canals "of national importance, in a commercial or military point of view, or necessary for the transportation of public mail." The President assigned responsibility for the surveys to the Corps of Engineers. The second act, passed a month later, appropriated $75,000 to improve navigation on the Ohio and Mississippi rivers by removing sandbars, snags, and other obstacles. Subsequently, the act was amended to include other rivers, such as the Missouri. This work, too, was given to the Corps of Engineers—the only formally trained body of engineers in the new republic. . . .

At first a Board of Internal Improvements, headed by an engineer officer, planned surveys and the development of canals, roads, and railroads. The board, the Engineer Department, and the War Department, agreed that national defense and inland transportation were complementary and interdependent. . . .

Much of the work was done by the topographical engineers or "Topogs," who reported to a separate Topographical Bureau in the Engineer Department. In 1838, the topographical engineers became a separate corps, and remained that way until 1863 when they were reunited with the Corps of Engineers. As surveyors, explorers, cartographers, and construction managers, the topographical engineers helped open the nation's interior to commercial development and settlement.

Congress expanded the Army engineers' workload in 1826. New legislation authorized the President to have river surveys made to clean out and deepen selected waterways and to make various other river and harbor improvements. Although the 1824 act to improve the Mississippi and Ohio rivers is often called the first rivers and harbors legislation, the 1826 act was the first to combine authorizations for both surveys and projects, thereby establishing a pattern that continues to the present day.

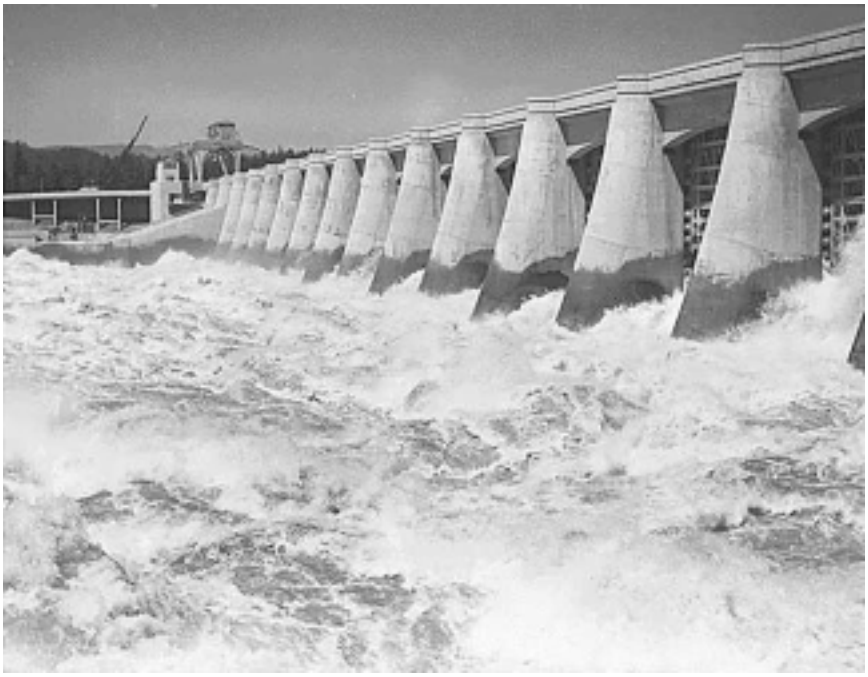
An early project that reflected engineer innovation was the removal of sandbars in the Ohio River. . . . The innovative work to clear the nation's rivers of navigation obstacles continued after the Civil War. . . .

After the Civil War, a special Army Engineer Board concluded that a system of locks and dams on the Ohio River was preferable either to continued dependence on wing dams and dredging, or to the construction of a system of canals to bypass the Ohio's obstacles. Major William E. Merrill, who was in charge of Ohio River improvements, needed to develop a system of river regulation dams that would easily allow passage of coal barges. He concluded that the wicket dam design developed by Jacques Chanoine in France in 1852 would be best, and in 1874 he formally proposed that a series of movable dams, employing Chanoine wickets, be constructed on the Ohio. After Congress approved Merrill's plan in 1877, the Corps began constructing the Davis Island project, just south of Pittsburgh. Completed in 7 years, the 110 by 600-foot lock and 1,223-foot dam were the largest in the world at that time. The Davis Island Lock also was one of the first in the country to use concrete in place of stone masonry. The Corps' success at Davis Island led Congress to authorize extension of the project down the Ohio. Later, the Corps increased the initial 6-foot channel to 9 feet. The project was completed in 1929 at a cost of about $125 million.

Throughout the 19th Century, engineer officers were involved in the construction, maintenance, and rehabilitation of canals and river navigation features. They surveyed the Chesapeake and Ohio, and the Muscle Shoals canal routes in the 1820s. Several prominent Army engineers launched their careers at the revived Muscle Shoals after the Civil War. These included Major William Rice King and Lieutenants William Louis Marshall, later chief of engineers, and George W. Goethals. Goethals designed the Riverton Lock with a low-water lift of 26 feet, the largest yet attempted in the United States when the Muscle Shoals Canal opened in 1911. Successes like these assured that engineers like Goethals would be called on again, as he was for the Panama Canal.

The Corps' canal-building efforts continued in the 20th

Century. After the federal government purchased the Chesapeake and Delaware Canal in 1919, the Corps' Wilmington (Delaware) District directed a reconstruction effort to deepen the channel to 12 feet and add several bridges. Traffic soon increased, and as an immediate result, demands were made to enlarge it. The C&D Ship Canal became part of an intercoastal waterway envisioned to connect existing bodies of water in a line roughly paralleling the coast from Boston, south to Key West, and then west to the Rio Grande. Today, the Corps retains responsibility for this canal and the entire intracoastal waterway of which it is a part.



Franklin Roosevelt Library

President Franklin Roosevelt favored the development of Federal hydropower projects to provide consumers with low-cost energy. This 1938 photo shows a spillway at the Bonneville Power Dam on the Columbia River, in Oregon, which was a Public Works Administration Project of the U.S. Army Corps of Engineers.

Aside from the actual construction and maintenance of canals, locks, and other navigation features, Army engineers performed important survey work. Two important surveys were of the Great Lakes and the Mississippi Delta. The necessity for a good survey of the Great Lakes had long been recognized, for the uncharted lakes posed significant navigation hazards. Army topographers had surveyed some of the Great Lakes as early as 1823, but Congress did not appropriate funds for a systematic survey until 1841. . . . The scientific conclusions of the Mississippi Delta survey gave it an importance in the history of hydraulic engineering out of proportion to the funds invested in it. In September 1850, responding to the pleas of southern congressmen seeking federal assistance to fight the periodic disastrous flooding that struck New Orleans and other lower Mississippi River communities, Congress appropriated $50,000 for a topographical and hydrographical survey of the Mississippi Delta, including a study of the best means of securing a 20-foot navigation channel at the Mississippi's mouth.

Topographical engineer Captain Andrew A. Humphreys initiated the survey and maintained overall supervision of the project, but beginning in 1857 he received the assistance of a young engineer, Second Lieutenant Henry L. Abbot. Abbot's field work proved so indispensable that when the final report was published in 1861, Humphreys named Abbot as its coauthor. Officially called the Report Upon The Physics and Hydraulics of the Mississippi River, the survey is often simply referred to as the Humphreys Abbot report.

The two Army engineers submitted a report full of new details about the lower Mississippi Basin. From just south of the junction of the Mississippi and Ohio rivers to where the Mississippi empties into the Gulf of Mexico, they obtained data on river flow, channel cross sections, and general topographical and geological features. After examining some 15 different formulas and finding each lacking, they began to develop their own formula to measure the flow of water in rivers, one that subsequently also proved faulty. Most important, it failed to take into account the degree of roughness of the slopes of a river channel. Still, their work stimulated other hydraulic engineers, and further research led to important theoretical discoveries. The report obtained the respect of engineers around the world. The conclusions of Humphreys and Abbot decidedly influenced the development of river engineering and the evolution of the Corps of Engineers. . . .

In the 19th Century, the Corps of Engineers also constructed roads. The most famous project was the Cumberland or National Road that was constructed between 1811 and 1841. The road extended from Cumberland, Maryland, across the Appalachian ridges of western Pennsylvania to Wheeling, and then across the midsections of Ohio and Indiana to Vandalia, Illinois. The Corps' involvement on the road occurred in large part because civilian superintendents failed. Congress authorized the Treasury Department to build the road in 1806, but in the following years the Treasury Department was accused of inefficient, costly, and unsatisfactory progress on the project. In 1825, President John Quincy Adams turned the responsibility over to the War Department.

In constructing the National Road, the Corps applied the

techniques developed in England by John McAdam, and it engaged in some innovative bridge building. At Brownsville, Pennsylvania, Captain Richard Delafield, a future chief engineer, built the first bridge in the United States with a cast-iron superstructure, an 80-foot span that remains in use today. By 1840 engineer officers had overseen construction of 268 miles of macadamized surface with bridges across all but the widest rivers.

Engineer officers also superintended railroad work after 1824. They surveyed railroad routes and, once construction commenced, the War Department loaned engineers to various railroad companies. Thus, with the permission of the chief engineer, Captain William G. McNeill entered the service of the Baltimore and Ohio Railroad in 1828 to supervise the surveying and construction of a railroad line. In October 1829, the Baltimore and Ohio Railroad began laying track under the supervision of Lieutenant George W. Whistler. By 1830 many officers were being granted furloughs to work on railroads, in either construction or surveying activities. Finally, in 1838, Congress passed legislation that prohibited granting leave to Army officers to allow them temporary employment with private companies.

In the 1850s, westward expansion generated interest in a rail link from the Mississippi to the Pacific coast, and topographical engineer officers surveyed and evaluated four alternative routes for the road, gathering a great deal of scientific information at the same time. The Corps of Engineers sponsored two more surveys after the Civil War in an effort to gather knowledge about the American West. One survey, led by a civilian, Clarence King, explored the 40th parallel route across the "Great Basin" that extended from the eastern slope of the Sierra Nevada to the western fringes of Wyoming and Colorado, while Major George M. Wheeler led another scientific expedition into the Southwest. Both expeditions produced a wealth of data on the natural history of the West.

Chapter 4: Responding To the Needs of a Growing Nation

In the early 19th Century, the Corps constructed many projects in support of the Department of the Treasury. For instance, the Corps built three customs houses and more than half a dozen marine hospitals (to treat merchant seamen). These hospitals were built at such places as Napoleon, Arkansas; Paducah and Louisville, Kentucky; and Natchez, Mississippi. Also for the Department of Treasury, the Corps built a number of lighthouses. Between 1831 and 1851, engineer officers were regularly engaged in this duty, which often involved extraordinarily difficult and perilous construction challenges. In 1852 Congress established a Lighthouse Board, which included engineer officers, to superintend lighthouse construction. Eventually, Corps officers supervised the construction of dozens of lighthouses along the nation's coasts, including the Great Lakes.

The Corps also contributed substantially to the construction of many public buildings and monuments in Washington, D.C. This work began as early as 1822, when Isaac Roberdeau, a topographical engineer, supervised installation of cast iron pipes to bring spring water to the White House and surrounding executive offices. In 1853, responsibility for constructing permanent water supply facilities for Washington fell upon Lieutenant Montgomery C. Meigs. His project included two bridges, later to carry traffic as well as water pipes over Cabin John and Rock creeks. Both bridges were engineering feats in their day. The Cabin John Bridge, built between 1857 and 1864, remained the world's longest masonry arch for more than 40 years and is still in use.

In 1867 Congress gave control of public parks and monuments to the Office of Public Buildings and Grounds under the chief of engineers, and in 1878 replaced Washington's elected government with a three-man commission. An Army engineer holding the title of engineer commissioner for the District of Columbia, served on that board, and had responsibility for the city's physical plant until Congress approved the district's current home rule charter in 1967. During the last half of the 19th Century, the Corps improved navigation on the Potomac River and its tributaries; expanded the local water supply system; completed the Washington Monument; helped design and construct numerous structures including the Executive Office Building, the Lincoln Memorial, the Library of Congress, and the Government Printing Office; undertook swamp reclamation which resulted in the Tidal Basin; and developed Rock Creek Park as a major urban recreation area.

Despite continuing congressional reservations about federal involvement, the Corps became involved in flood control after the Civil War. Particularly on large rivers such as the Mississippi, floods impaired commerce, destroyed property, and cost lives. In 1879 Congress created the Mississippi River Commission, composed of seven people: three from the Corps including the commission president, three from civilian life including at least two civil engineers, and one from the U.S. Coast and Geodetic Survey. Congress created the commission to insure that the best advice from both the military and civilian communities was heard on the subject of improving the Mississippi River for navigation and flood control. . . .

Chapter 6: Multipurpose Development

Neglected waterways, demands for hydropower throughout the country, and calls for irrigation projects in the West drew attention to the nation's water resources at the beginning of the 20th Century. Multipurpose partisans advocated the application of scientific management to insure efficient water use. This meant a program of basinwide development that would address all potential applications

of the resource.

Unlike the West, where irrigation became the focus of attention, the East was more concerned over hydropower development. Beginning in the early 1880s, when a plant in Appleton, Wisconsin first used falling water to produce electricity, the construction of hydroelectric dams on the nation's waterways proliferated. These private dams threatened navigation and forced Congress, acting through the Corps of Engineers, to regulate dam construction. The Rivers and Harbors Acts of 1890 and 1899 required that dam sites and plans be approved by the Secretary of War and the Corps of Engineers before construction. The General Dam Act of 1906 empowered the Federal government to compel dam owners to construct, operate, and maintain navigation facilities without compensation whenever necessary at hydroelectric power sites.

Private interests developed most power projects before World War I. The Corps of Engineers did install a power station substructure at Lock and Dam #1 on the upper Mississippi River. The government later leased the power facility to the Ford Motor Company. In 1919, the Corps began construction of Dam #2 later renamed Wilson Dam as a hydroelectric facility at Muscle Shoals on the Tennessee River. Support for the facility, which was intended to supply power for nitrate production, declined with the end of World War I, and its completion was threatened. However, by 1925 that project was substantially finished.

President Franklin Roosevelt favored the development of federal hydropower projects to provide consumers with low-cost energy. During the New Deal, the Corps participated in three major hydroelectric power projects: Passamaquoddy Tidal Power Project in Maine, Bonneville Dam on the Columbia River, and Fort Peck Dam on the Missouri River. In 1937, Congress created the Bonneville Power Administration to dispose of the power and set the rates for the power generated at Bonneville Dam. . . .

Following World II . . . Congress authorized major systems involving hydroelectric power on the Columbia and Snake rivers in the Pacific Northwest, and the Missouri and the Arkansas rivers. . . . By 1975, Corps projects—the largest on the Columbia and Snake rivers—were producing 27% of the total U.S. hydropower and 4.4% of all electrical energy output.