



**The Mississippi River  
& Tributaries Project:  
History of the Lower  
Mississippi River Levee System**



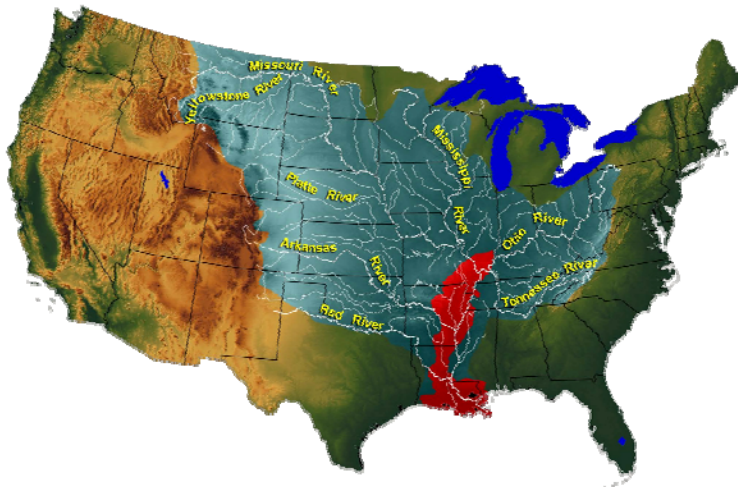
**Information Paper**  
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# The Mississippi River & Tributaries Project

## Levees

The Mississippi River & Tributaries (MR&T) project was authorized by the 1928 Flood Control Act. Prosecuted by the Mississippi River Commission under the supervision of the Office of the Chief of Engineers, the resultant MR&T project employs a variety of engineering techniques, including an extensive levee system to prevent disastrous overflows on developed alluvial lands; floodways to safely divert excess flows past critical reaches so that the levee system will not be unduly stressed; channel improvements and stabilization features to protect the integrity of flood control measures and to ensure proper alignment and depth of the navigation channel; and tributary basin improvements, to include levees, headwater reservoirs, and pumping stations, that maximize the benefits realized on the main stem by expanding flood protection coverage and improving drainage into adjacent areas within the alluvial valley.



Since its initiation, the MR&T program has brought an unprecedented degree of flood protection to the approximate four million people living in the 35,000 square-mile project area within the lower Mississippi Valley. The nation has contributed nearly \$13 billion toward the planning, construction, operation, and maintenance of the project. To date the nation has received a 24 to 1 return on that investment, including \$306 billion in flood damages prevented. Such astounding figures place the MR&T

project among the most successful and cost-effective public works projects in the history of the United States.

### MR&T Levee System

Levees are the backbone of the MR&T project flood control plan. The system protects the vast expanse of the developed alluvial valley from periodic overflows of the Mississippi River. The main stem levee system begins at the head of the alluvial valley at Cape Girardeau, Missouri, and continues to Venice, Louisiana, approximately 10 miles above the Head of Passes near the Gulf of Mexico. The MR&T levee system includes 3,787 miles of authorized embankments and floodwalls. Of this number, nearly 2,216 miles are along the main stem Mississippi River and the



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remaining levees are backwater, tributary and floodway levees. No project levee built to Mississippi River Commission standards has ever failed, despite significant floods in 1937, 1945, 1950, 1973, 1975, 1979, 1983 and 1997.

The grade and section of the present levee system dwarfs by comparison those of the levee system that was overwhelmed during the 1927 flood. In addition to higher and wider levees, the MR&T levee system design incorporates technological breakthroughs from the science of soil mechanics that take into account the type, condition and moisture content of material used in the construction of the levees. The integrity of the current levee system is enhanced by advancements in the design, construction, installation and maintenance of seepage control measures, to include landside berms, drainage trenches, drainage blankets and relief wells. More than 1,000 miles of articulated concrete mattress revetment also protect the levee system by preventing erosion.

In an effort to further guarantee the soundness of the levee system, levee districts and other local sponsors implement strict annual levee maintenance programs with their own labor and funds. Activities include mowing, clearing brush and trees, filling holes, restore rain washed areas, clearing drainage ditches, correcting drainage problems and spraying chemicals to control noxious and unwanted growth. Personnel from the Corps of Engineers ensure that maintenance requirements are met through annual inspections. These inspections are also used to identify any deficiencies and weak spots in the levee system so that immediate corrective actions can be taken. The addition of 15-foot wide, all-weather access roadways on top of the levee system aids federal personnel and local levee districts during the inspection process and during flood-fighting operations.





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To maximize protection from floods, current levee grades provide for freeboard--the distance between the project design flood flowline and the top of the levee. The presently authorized freeboard is a minimum of three feet above the project design flood on the Mississippi River levees below Cairo, Illinois, and two feet on the Atchafalaya basin floodway levees. Levee grades between Cape Girardeau and Cairo and along the south banks of the Arkansas and Red rivers provide for a three-foot minimum freeboard over the maximum tributary flood meeting the maximum flood of record on the Mississippi River, with provisions to ensure that the same flood meeting the project design flood will not overtop the levee. In the vicinity of New Orleans, Louisiana, project levees are authorized up to 5.7 feet of freeboard because of the increased danger to the urban areas from wave wash and storm surges that are common along coastal areas.



When flood stages begin to approach project design flood dimensions, additional project features, such as floodways, reservoirs and backwater areas, are operated to control and convey potentially damaging floodwaters to relieve stress on the levee system. For a synopsis of how the MR&T project features convey the project design flood, please see "Mississippi River & Tributaries Project: Understanding the Project Design Flood."

### **Levee Evolution Prior to the MR&T Project**

Approximately 59 years before the signing of the Declaration of Independence, 85 years before the creation of the Corps of Engineers, and 200 years before the first federal flood control act, the French began constructing the first levee on the Mississippi River in 1717 to protect the fledgling city of New Orleans from high water. That original levee was only three feet high and 5,400 feet long. The French, and later the Spanish, extended the modest levee system up the river, but progress was slow with the bulk of the work left to the landowners along the river.

With the extension of American political control over the Mississippi Valley brought about by the Louisiana Purchase, the U.S. government moved to facilitate trade and develop the region's rich economic potential through settlement. New settlers adopted aggressive flood-control tactics to protect their new settlements from inundation. Rather than only settling those lands less



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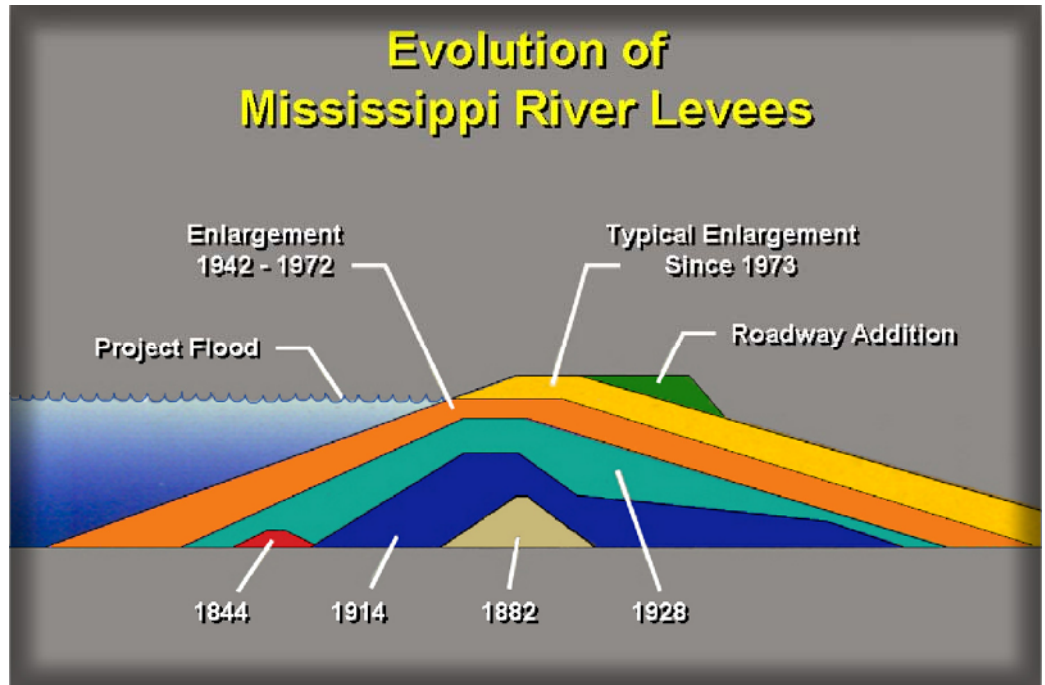
## Levees

susceptible to overflow, the new frontiersmen also reclaimed lands well within the floodplain and constructed levees to protect them. They soon realized the difficult nature of the job. In addition to the original expense of their construction, the inadequate levee system required continual maintenance, repair and improvement. To that end, the landowners of

the lower Mississippi Valley committed ever-increasing resources to the task of protecting their lands from overflow. By 1812, cleared fields extended along the Mississippi to the northern boundary of Louisiana with the levees extending for 155 miles on east bank and 185 miles on the west bank; by 1844 levees on the west bank extended from 20 miles below New Orleans to the mouth of the Arkansas River.

The construction of levees had paralleled the growth of commerce. As the lower Mississippi Valley became more prosperous, the landowners grew increasingly anxious to protect their investments. Through the mid-nineteenth century, riparian landholders assumed sole responsibility for the construction and maintenance of levees, but in 1849 Louisiana led a congressional fight to secure the transfer of swamp and overflowed lands to the states of the Mississippi Valley, culminating in the Swamp Land Grants of 1849 and 1850. Revenue raised from the sale of those lands paid for further levee improvements and encouraged the organization of levee districts throughout the lower valley. Over time, these districts acquired substantial authority, including the power of eminent domain, the power of taxation within carefully defined limits, and corporate authority.

By 1858, the levee line on the west bank extended intermittently from south of New Orleans to Cairo, Illinois. On the east bank, the levees stretched from south of New Orleans to Baton Rouge and along the Yazoo front. Local interests, however, struggled to promote a unified levee system under the strictest of financial constraints. Such efforts lacked centralized coordination and mostly failed, because, as noted by James P. Kemper, a longtime student of the Mississippi River, "floodwaters will not respect political boundaries."





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The formation of the Mississippi River Commission on June 28, 1879, certainly marked the beginning of a new era in levee development. With its creation, the federal government now appeared as an active agent on the river capable of transcending regional issues that had long hampered the development of a more effective levee system. The commission, however, almost immediately was victimized by congressional legislation that prohibited the construction of levees with federal funds for the specific purpose of protecting property from overflow.

In 1882, the commission adopted a levee policy that sought to join the unconnected lengths of levees into a continuous line. This policy was one of restraint in the interest of navigation that rested on the theory that the confinement of floodwaters would periodically flush out the channel and remove sand bars and other obstructions to navigation while still providing the incidental benefit of protection from overflow. Following the passage of the 1882 rivers and harbors legislation that authorized the new policy, the Mississippi River Commission began coordinating local efforts, setting standards and specifications for levee construction, and allocating federal funds to the cash-strapped levee districts. The levee districts, in turn, provided rights of way for federally sponsored levee work. Successive record-breaking floods in 1912 and 1913, though, precipitated a crisis in the lower Mississippi Valley. Federal assistance with the levee system had remained limited to work done in the interest of navigation, commerce and the postal service, although the Mississippi River Commission continued to regard the levees lines as necessary for flood protection.



In 1914, the commission established a new grade and section based on the 1912 and 1913 floods. A typical levee along the Yazoo front in 1882 was only eight-feet high and contained approximately 31,500 cubic yards of material per mile. Under the 1914 grade and section that same levee would be 22 feet high and contain 421,000 cubic yards of material. The tremendous expense incurred by local interests caused by periodic inundation, combined with the cost of building, maintaining and repairing the levee system, was becoming prohibitive. Between 1882 and 1914, local interests had expended in excess of \$91 million on levee construction to protect themselves from the ravages of the river—a figure that exceeded federal expenditures on the



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levee system. With establishment of the 1914 grade and section, local interests were being expected to contribute even more. Out of complete self-preservation, landowners in the lower Mississippi Valley launched a massive campaign directed at obtaining greater federal commitment to their flood problem.



In 1917, Congress answered their pleas and passed the first federal flood control act, which authorized \$45 million dollars over a 10-year period to carry out the plans of the Mississippi River Commission. The act finally allowed for the expenditure of federal funds for the express and sole purpose of flood control and also eased the burden of local interests by only requiring local interests to contribute at least one-third of levee construction costs. After the passage of this act and the subsequent 1923 flood control act, levee construction continued at an unprecedented pace, and by the close of 1926 the levee system was nearing completion.



In the fall of 1926, though, a vicious weather pattern stalled over much of the Mississippi River drainage basin, swelling the river and its tributaries. The rain saturated surrounding lands to the point that any additional precipitation immediately turned into runoff. Heavy rains continued from December

through early spring, and in early January the first of three waves of floodwaters approached the lower Mississippi Valley. By late April 1927, nearly 23,000 square miles of the valley were under water.

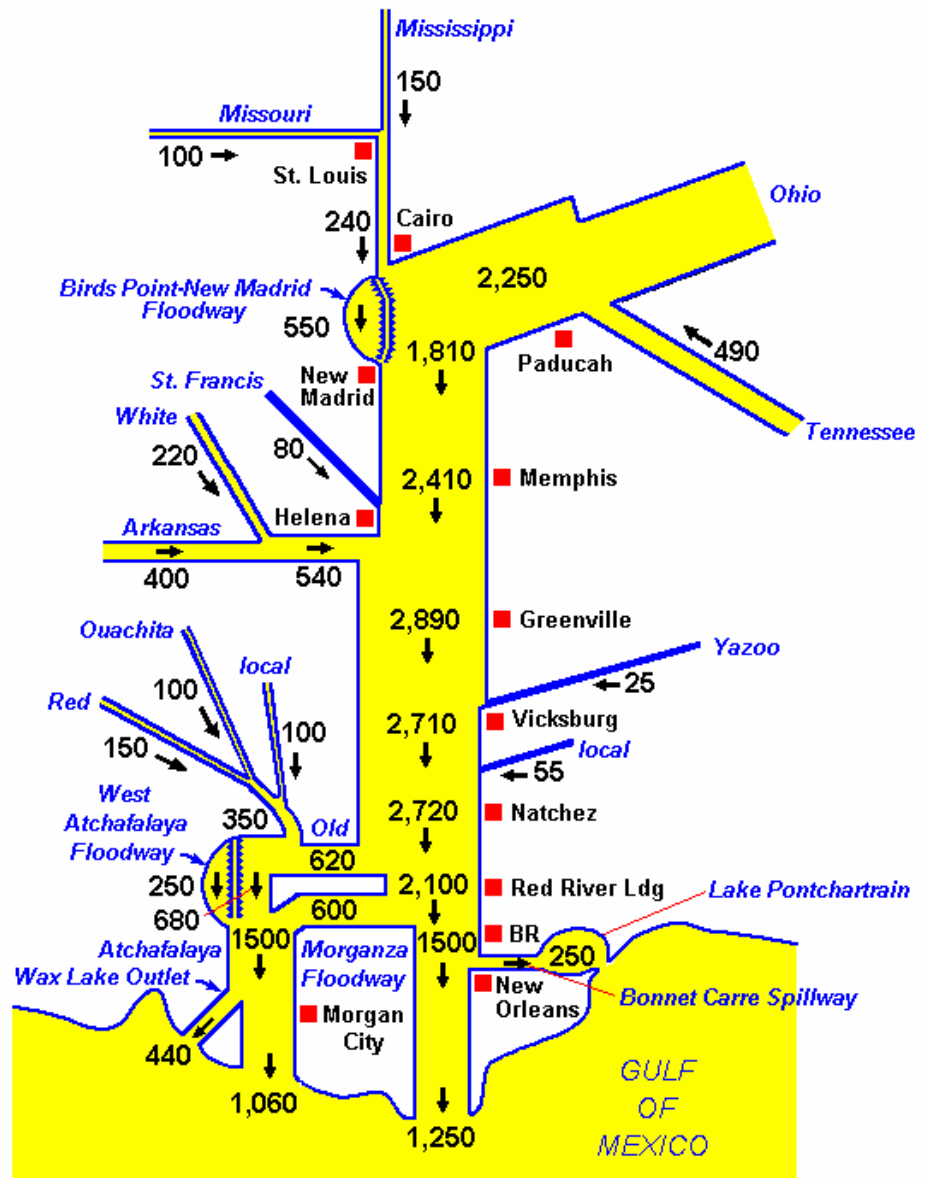


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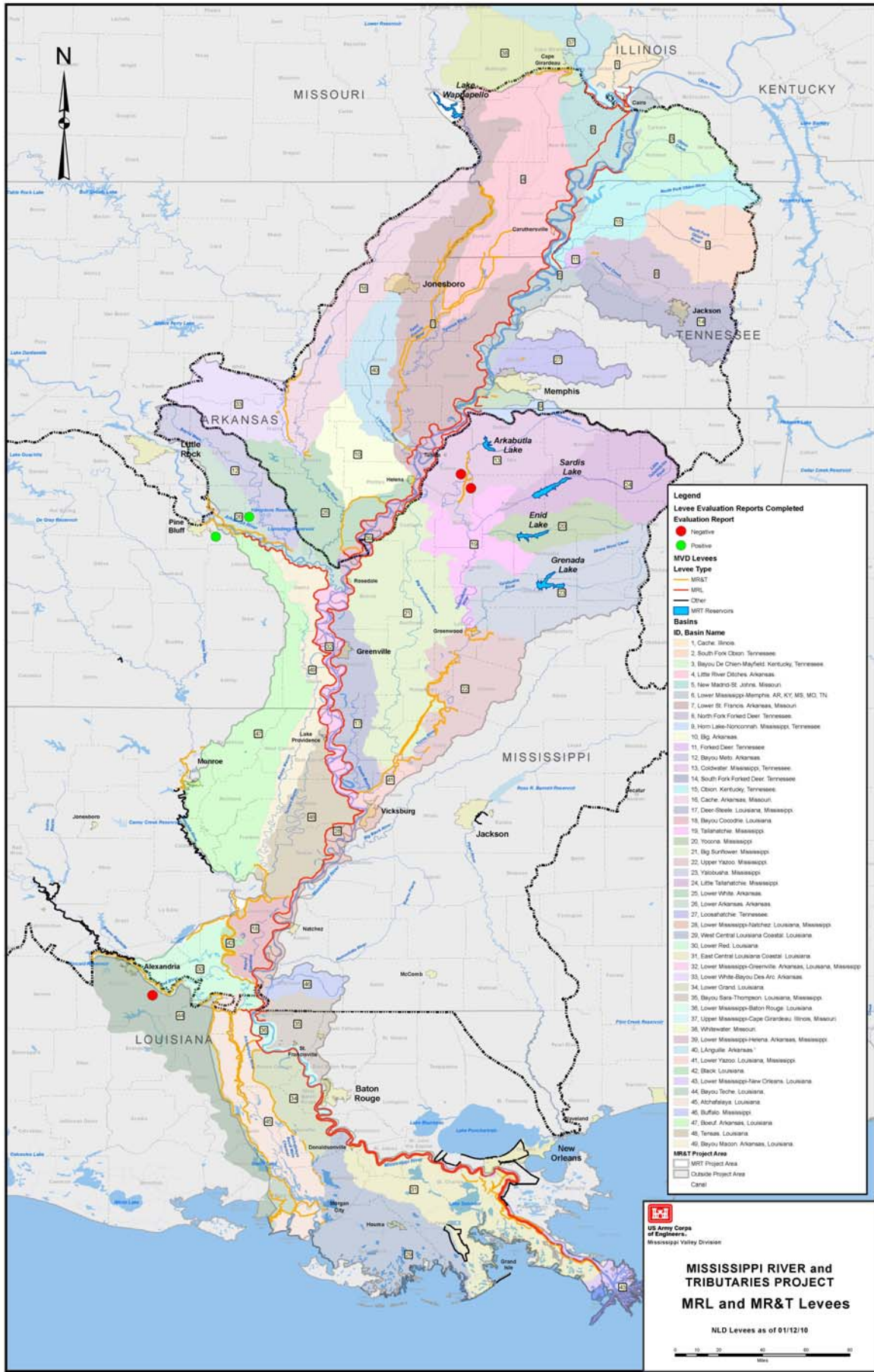
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Following the devastating 1927 flood, the nation was galvanized in its support for a comprehensive and unified system of public works within the lower Mississippi Valley that would provide enhanced protection from floods and an equally efficient navigation channel. Prior to that tragic flood event, the control of floods on the lower Mississippi was attempted by building levees high enough to withstand the last great flood of record.

Since the inception of the MR&T project in 1928, however, the comprehensive flood control program is designed to control the "project design flood." In addition to adding the supplemental engineering techniques to the flood control system, the 1928 Flood Control Act also authorized higher levee grades and stronger levee sections. The 1928 levee grade has seen been revised following comprehensive reviews of the project in 1941, 1956 and 1973.







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