



## **America's Greatest Projects and Their Engineers V**

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## Introduction

During the past 150 years, Americans have achieved phenomenal success on our way to becoming the greatest nation in the history of the world. Notwithstanding the many inventions that we have created, such as the electric light bulb and the telephone and the airplane and the internet, Americans have been responsible for some of the greatest and most beneficial projects in the modern era. This course is a synopsis of the design and construction of the Hoover Dam, an early twentieth century project that was on the forefront of engineering technology. Conceived following the end of World War I, the period of the 1920's saw a huge contrast in American culture and financial dynamics. The "Roarin' Twenties" gave way, however, to the worst recession in recorded history, and the United States as well as the rest of the world fell into a deep depression. Despite this huge setback, the Hoover Dam Project developed and implemented at a crucial time in American history. This course details the contributions of several engineers, manufacturers, and contractors who participated in one of the greatest and most formidable projects of the twentieth century. It also details the huge impact that this remarkable achievement had on the growth of our nation.

Another purpose of this course, one of a series of America's Greatest Projects and Their Engineers, is to determine how this project benefitted Americans in particular. Clearly, this project has positively impacted the entire world as well as the United States of America. THIS project, like so many other national projects, was on the so-called "drawing board" for several years in development before it was finally initiated.

The Hoover Dam Project is probably considered by most Americans to be strictly a construction project, but there is little doubt that this project would not have been successfully accomplished without administrative support or without the proper planning and design of quality engineers, architects and designers. The strong efforts of dedicated individual engineers as well as the commitments of engineering groups such as the Reclamation Service and the Army Corps of Engineers, combined with the vision and wisdom of quality project managers, all resulted in this project coming to a successful conclusion. This statement is not intended to demean the construction companies or the many manufacturers who were involved in this project, because their foresight and experience were paramount to the success of the Hoover Dam.



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## A. Hoover Dam Approval and Administration

### 1. Early Political Issues

The Hoover Dam proved to be another engineering marvel of the early twentieth century. The continuing life-threatening flooding of the Imperial Valley in Southern California from the Colorado River led to the idea of the need for a dam on the Colorado River to provide flood control. A dam to control the sometimes raging waters of the Colorado River in order to protect rapidly developing property in the Southwestern United States had been in the talking stages for several years. Although several canals were built to distribute the Colorado more uniformly to various arid areas in the Southwest, there were times in the spring and early summer when the river would cause severe damage and loss of life, while in the fall and early winter the river bottoms were visible.

**IN 1917, A YEAR BEFORE** World War I ended, Southern California's Imperial Irrigation District sent a 33-year old lawyer named Phil Swing to Washington to urge Congress and the Department of the Interior (DOI) to build a canal that would deliver water from the Colorado River to the Imperial Valley bordering Arizona and Mexico, one of the nation's driest regions. After two years of Swing's effective lobbying, a congressional committee reported favorably on the canal scheme. Although Swing had been quite effective as a lobbyist, several high-powered landowners in the Imperial Valley sponsored him for the U. S. House of Representatives, believing that Swing would be more effective as a Congressman. Swing was elected to Congress in 1920, and co-sponsored legislation authorizing construction of the so-called All-American Canal, an 80-mile waterway that would stop just short of Mexico. But to the bafflement of Swing and his congressional sponsors, the legislation was defeated because of opposition from a single man: Arthur Powell Davis, Director of the U.S. Reclamation Service, a branch of the Department of the Interior (DOI).

As technologies developed in the areas of irrigation and electricity generation, the possibility of a dam finally became a potential reality in 1922 under then Secretary of Commerce Herbert Hoover. That year the Congress received a report from Reclamation Service Director Davis and Secretary of the Interior Albert Fall proposing that a concrete dam be built in the Black Canyon between the states of Nevada and Arizona.

## 2. Arthur Powell Davis

Arthur Powell Davis was a native of Illinois, and received his degree in Civil Engineering from George Washington University at the age of 27 in 1888. After graduation he worked with an uncle doing topography and hydrographic surveying, primarily in the southwestern states of New Mexico, Arizona, and California. Davis was one of several co-founders of the National Geographic Society, and helped to guide it through its early years, becoming one of the nation's most respected civil engineers along the way. He played a leading role in the analysis, design and construction of numerous dams, canals and irrigation projects around the world, including the Panama Canal, renowned as one of the world's largest and most complex engineering feats. His singular effort to provide the U. S. Government in the early 1890's with dam and canal locations and designs was instrumental in a proposal by Congress in 1902 to pass the Reclamation Act, and the subsequent creation of the Reclamation Service.

Davis also had an intimate understanding of the Colorado Basin because of numerous trips he had undertaken to the area with his uncle, who was the first explorer to unravel, as early as 1869, the mystery behind the still-uncharted upper reaches of the turbulent Colorado River. Davis had come to work for the Reclamation Service in 1905, and had advanced to the position of its director by 1914. He served as the Director of the U. S. Reclamation Service from 1914 until 1923, where he developed the concept of a Colorado River Dam during that period.

Davis had become what may be considered a "technocrat" during his tenure as Director of the Reclamation Service. Davis was the first engineer to recommend design and construction of multi-purpose dams, and he was an early proponent of hydroelectric power plants. His vision of the power plants was that they would be more than self-sustaining, and that they could provide the revenue that would amortize the costs of the entire project.

Davis and his staff of Reclamation engineers outlined development plans for the entire Colorado River basin and presented it to Congress in 1922, with an aim to develop the area and tame the Colorado by building what would eventually become the Hoover Dam, the world's largest hydroelectric installation at the time and a model for dozens of the world's greatest dams. The Industrial Revolution in America had become a major economic force in the last quarter of the 19th Century, and the agrarian culture of the United States was slowly but surely giving way to a much broader national economy. Davis was apparently one of the very few in government service who recognized this trend. However, his ability to raise funds for his Reclamation Service was severely limited due to the infighting between those politicians who supported the farmers of America and those who favored the manufacturers in the big cities.

By opposing the All-American Canal, Davis appeared to violate the basic laws of politics and his own bureaucratic interests. However, Davis realized, as most politicians at that time were reluctant to admit, that America's economic culture was changing. Davis knew that the mission of the Reclamation Service wasn't only to bring water to the vast agricultural society that had been established during the relentless march westward by 19th-century pioneers, but rather to bring progress as well as relief to all communities, urban as well as rural. Davis believed that the Colorado River Project should only be undertaken as part of a much more ambitious program aimed not just at irrigation but also flood control, water storage and power generation.

During his tenure as Director, Reclamation Service outlined development of the entire Colorado River basin and presented them to Congress in 1922. Davis was the first engineer to recommend design and construction of multi-purpose dams, and he was an early proponent of hydroelectric power plants. His vision of the power plants was that they would be more than self-sustaining, and that they could provide the revenue that would amortize the costs of the entire project. He was reluctant to perpetuate the myth that America was once and for all time an agrarian society.

As technologies developed in the areas of electricity generation and irrigation, the possibility of a dam had finally become a potential reality in 1922 under then Secretary of Commerce Herbert Hoover. That year the DOI received a report from Reclamation Service Director Davis and Secretary of the Interior Albert Fall proposing that a concrete dam be built in the Black Canyon between the states of Nevada and Arizona. As the technology of electric power transmission improved, the potential for hydroelectric power from the Colorado River transmitted over long distances became a reality. As with the water supply, the power generated was to be evenly distributed among the states, with the largest recipients being Phoenix, Arizona and Los Angeles, California. One other city that was to benefit greatly was a small community of a few thousand residents called Las Vegas, Nevada. There were seven states which fell within the Colorado River's basin, and at least six of the seven states were required to become signatory to the agreement for the dam's ultimate approval. The river began its 1400 mile journey in the foothills of the Rocky Mountains and ran through seven states and a short stretch of Mexico before emptying into the Gulf of California. Five of the seven states reached an agreement to share both water and electrical power by Thanksgiving of 1922.

Because of his belief that harnessing the Colorado was too complex, costly and important to be undertaken in piecemeal fashion, Davis apparently antagonized many powerful leaders of special-interest groups such as the Imperial Irrigation District as well as major power company executives. When another new political appointee was made Secretary of the Interior and his Reclamation Service was newly named the Bureau of Reclamation in 1923, Davis chose to retire



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