

## Top 10 Achievements & Millennium Monuments

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The anticipation of "the year 2000" and the start of the 21st century also brought on a great deal of reflection about the events and achievements of the 20th century. ASCE demonstrated how civil engineers enhanced the quality of life with two special events: the Millennium Challenge in 1999, and the Monuments of the Millennium in 2000.

The Millennium Challenge canvassed ASCE members in late 1999 to determine the 10 civil engineering achievements that had the greatest positive impact on life in the 20th century. Rather than individual projects, they chose to recognize broad categories of achievements.

The Monuments of the Millennium are international or national projects that represent many of these achievements. The Monuments, chosen in early 2000 by a distinguished panel of civil engineers, demonstrate a combination of technical engineering achievement, courage and inspiration, and a dramatic influence on the development of the communities in which they're located.

Here are the 10 greatest civil engineering achievements as ranked by ASCE's members in 1999, and the related Monuments of the Millennium as selected in 2000. Click on each of the monument names to learn more in depth about each:



### Airport Design and Development

Monument: [Kansai International Airport](#)

Before 1945, any level field was looked upon as a viable landing strip for airplanes, and it was generally believed that the presence of a gas pump made an airport ready for commercial traffic. After World War II, the advent of integrated, engineered systems of paved landing surfaces, flood lit runways, and terminal complexes made passenger convenience, airline efficiency, economy in construction and operational safety the cornerstones for the rehabilitation and development of airports worldwide. This new concept of design and development of airports with the end-user in mind transformed the use of aircraft technology from a novel form of postal and military transportation into an economic powerhouse. Today, airports employ millions of people worldwide, allow for efficient transport of fresh food, mail, packages and other goods, and provide affordable and convenient business and vacation travel. Through the use of local businesses for airplane maintenance, food catering to airlines, and ground transportation to and from airports, surrounding communities thrive. Retail shops, hotels and restaurants in and around airports ensure that aviation dollars are channeled throughout communities.

### Dams

Monument: [Hoover Dam](#)

People around the world need and use far more water than societies of the past; people use water for drinking, washing, cooking, waste removal, heating and cooling, and irrigation. During the 20th century, harnessing water by building dams was recognized as a way to meet an unprecedented demand for low-cost, widely available energy sources to aid in the production of goods and services for the consuming public. Dams continue to play an integral role in our daily lives, providing a range of benefits including flood control, hydroelectric power, and water for irrigation, recreation, and fish and wildlife enhancements. Dams spur industrial growth and provide navigation routes in developing nations. As the world's population increases and the need for food multiplies, it is likely, even in the face of increased environmental sensitivity, which dams will continue to be built during the 21st century.

### Interstate Highway System

Monument: [The system overall](#)

Established as a national priority by President Dwight D. Eisenhower, the nation's interstate highway system revolutionized travel, economies and the daily standard of living in North America by providing an efficient means of direct, high-speed transportation for individuals and businesses across the United States and into Canada and Mexico. The 42,800-mile system, built on a North-South/East-West grid, has hundreds of bridges, overpasses, interchanges and thousands of miles of pavement. Following the prototype of the Pennsylvania Turnpike, completed in 1940, the interstate highway system is fully access controlled, with all intersections at different grades and access provided through interchange ramps. There are more than 55,000 grade separations and other bridges, and curves are engineered for safe turns. The system carries 20 percent of traffic, although it only covers 1 percent of the United States, and is credited with saving more than 187,000 lives and preventing 12 million injuries. It is estimated that the Interstate Highway System saved \$6 for every \$1 spent on its construction.

### Long-Span Bridges

Monument: [Golden Gate Bridge](#)

Bridges of increasing size and span have created phenomenal changes in the social patterns and economic conditions of regions by effectively eliminating water barriers between communities. They open new routes of communication between disintegrated and isolated communities, provide safe and efficient access to work, schools and recreation for people, and spur economic growth by facilitating trade within and between regions. From the late 19th century through the early 20th century, the use of steel enabled the production of increasingly longer, continuous main spans traversing large, deep bodies of water. As the symbolic soul of cities, bridges shape a city's character and, in turn, are shaped by the lives of the people served by them.

### Rail Transportation

## Monument: [Eurotunnel](#)

Rail transportation was the first efficient cross-country mode of transportation for both passengers and cargo. Rail remains a major method of transporting goods throughout the nation, and in many developed nations remains the primary mode of passenger travel. Rail transportation generated hundreds of spin-off industries, ranging from rail cars and signal equipment to toy trains, and contributed to the growth and dominance of the U.S. iron and steel industries in the early part of the 20th century.

## Sanitary Landfills/Solid Waste Disposal

### Monument: Sanitary waste disposal advances overall

As American society changed from an agrarian culture to an industrialized nation, people moved to cities for work, in hopes of improving their quality of life. The subsequent increase in urban population density had a great impact on garbage disposal practices. The rural custom of placing waste in fields or beside roadways led to the piling up of garbage in the streets, waterways and vacant lots, and in open pits. This type of garbage disposal brought with it odor, rodents, pestilence, and most importantly, a serious public health problem. By 1946, the responsibility for garbage disposal shifted from scavengers to scientifically minded civil engineers whose experimentation with various ways to properly dispose of waste, including feeding it to hogs, open pit burning, and incineration, led to the widespread use of sanitary landfills.

## Skyscrapers

### Monument: [Empire State Building](#)

In the 19th century, buildings generally did not exceed 16 stories high because the strength and thickness of their mandatory bearing walls limited them. Built upward, instead of outward, skyscrapers of the 20th and 21st century have solved many of the problems of rapid urbanization, including increasing population and land cost. Skyscrapers release land at ground level, opening up space for plazas, fountains and arcades, creating a lively street and outdoor life, and promoting better human interaction. Tall buildings were made possible by such innovations as the electric elevator, advances in structural steel making, and advances in heating, ventilation, air conditioning and electrical systems.

## Wastewater Treatment

### Monument: [Chicago Wastewater System](#)

From the earliest times through the 19th century, people lived in filth, disposing of garbage and raw sewage by dumping it into streets, alleys and waterways. As a result, they often suffered from such deadly diseases as cholera and typhus. Until the early 1900s, America's urban wastewater, including industrial waste, was dumped into the nation's waterways. Few municipalities treated wastewater, as it was widely believed that running water purified itself. Ironically, with the implementation of water treatment supply systems, the need for uncontaminated water supplies decreased, and the nation's waterways became more polluted. As recently as 1968, the city of St. Louis discharged 300 million gallons per day of raw waste into the Mississippi River. By 1972, only one-third of U.S. waterways remained safe for drinking and fishing. With the advent of wastewater treatment, cities became much more equipped to deal with population influx. Such innovations as activated sludge treatment allow for the maintenance of high levels of water quality. Wastewater treatment led to an increase in life expectancy, reduction in infant mortality and morbidity, control and prevention of communicable diseases, and improvements to the aquatic environment, enabling the public to enjoy water sports and maintain a healthy ecosystem for marine life.

## Water Supply and Distribution

### Monument: [California State Water Project](#)

The collection, storage, treatment, transmission and distribution of water played a significant role in urbanization, population growth and commercial agriculture and land use. Today, storage and distribution systems enable semi-arid and arid regions to store water for later use during periods of high precipitation. Clean, potable water piped from afar led to the development of such large cities as Las Vegas, and the suburban areas around Chicago and Los Angeles. The development and distribution of large water delivery systems, in conjunction with the development of collection, removal and treatment systems, enabled people to move from large cities to suburban communities and helped well-dependant, rural communities to prosper. During the 20th century, water supply and distribution systems have led to an increase in life expectancy, reduction in infant mortality and morbidity, and improvements in environmental quality in developed countries. It is estimated that in the year 2000, 2.2 billion people in developing countries will die due to the lack of safe drinking water. The transfer of civil engineering knowledge to ensure safe water supplies through the collection, treatment and distribution of surface, ground and wastewater is imperative for the continued economic growth and development of nations in the 21st century.

## Water Transportation

### Monument: [Panama Canal](#)

The impact of canals and ports on economic and commercial development around the world is unsurpassed. Passageways between bodies of water connect continents and create efficient interstate portals for cargo ships. Canals and ports harness the capacity of water to carry extra large, bulky cargo, spurring economic growth, agricultural development, commerce and trade in all nations. As cargo ships increase in size, engineers are developing new ways to expand ports, including dredging.