The Panama Canal was officially opened on August 15, 1914 with the passing of the SS Ancon.

Previous to this, no single effort in American history had exacted such a price in dollars or in human life. The American expenditures from 1904 to 1914 totaled $352 million. Together the French and American expenditures totaled $639 million. It took 34 years from the initial effort in 1880 to actually open the Canal in 1914. They estimate that over 80,000 people took part in the construction and that over 30,000 lives were lost in both French and American efforts.

The history of the Panama Canal begins in the 16th century. In 1524 it was suggested to Charles the V that by creating a passage through Panama, the trips to move the incredible riches of Peru, Ecuador, and Asia to the ports of Spain would be made significantly shorter and at the same time lower the risks. A survey of the isthmus was ordered and subsequently a working plan for a canal was drawn up in 1529. The wars in Europe and the thirsts for the control of kingdoms in the Mediterranean Sea simply put the project on permanent hold.

Various surveys done between 1850 and 1875 showed that only two routes were practical, the one across Panama and another across Nicaragua. In 1876 an international company was organized; two years later it obtained a concession from the Colombian government to dig a canal across the isthmus. The international company failed, and in 1880 a French company was organized by Ferdinand Marie de Lesseps, the builder of the Suez Canal.

In 1879, de Lesseps proposed a sea level canal through Panama. With the success he had with
the construction of the Suez Canal in Egypt just ten years earlier, de Lesseps was confident he would complete the water circle around the world.

Time and mileage would be dramatically reduced when travelling from the Atlantic to the Pacific ocean or vice versa. For example, it would save a total of 18,000 miles on a trip from New York to San Francisco.

In 1899 the US Congress created an Isthmian Canal Commission to examine the possibilities of a Central American canal and to recommend a route. The commission first decided on a route through Nicaragua, but later reversed its decision. The Lesseps company offered its assets to the United States at a price of $40 million. The United States and the new state of Panama signed the Hay-Bunau-Varilla treaty, by which the United States guaranteed the independence of Panama and secured a perpetual lease on a 10-mile strip for the canal. Panama was to be compensated by an initial payment of $10 million and an annuity of $250,000, beginning in 1913. This strip is now known as the Canal Zone.

The length of the Panama Canal is approximately 51 miles. A trip along the canal from its Atlantic entrance would take you through a 7 mile dredged channel in Limón Bay. The canal then proceeds for a distance of 11.5 miles to the Gatun Locks. This series of three locks raise ships 26 metres to Gatun Lake. It continues south through a channel in Gatun Lake for 32 miles to Gamboa, where the Culebra Cut begins. This channel through the cut is 8 miles long and 150 metres wide. At the end of this cut are the locks at Pedro Miguel. The Pedro Miguel locks lower ships 9.4 metres to a lake which then takes you to the Miraflores Locks which lower ships 16 metres to sea level at the canals Pacific terminus in the bay of Panama. A pictorial view of the canals route can be seen below.

The Panama Canal was constructed in two stages. The first between 1881 and 1888, being the work carried out by the French company headed by de Lessop and secondly the work by the Americans which eventually completed the canals construction between 1904 and 1914.

The contract for the canals construction was signed on March 12th, 1881, and it was agreed the work would be carried out for 512 million French francs, but the contract was conditional in the sense it was not to become binding until two years had elapsed.

During 1882 the excavation of the Culebra Cut was started, but due to the lack of organization there were no tracks available to remove the spoil that the excavators were producing. After the problems had been overcome, the highest peaks of the cut were attacked. As work proceeded, the worry of landslides and what slope should be adopted to avoid them became a major concern.
In 1883 it was realized there was a tidal range of 20 feet at the Pacific, whereas, the Atlantic range was only about 1 foot. It was concluded that this difference in levels would be a danger to navigation. It was proposed that a tidal lock should be constructed at Panama to preserve the level from there to Colon. This plan would save about 10 million cubic metres of excavation.

The French company started to run into financial difficulties during 1885 and even applied to the French government to issue lottery bonds, as this had been successful during the construction of the Suez canal when that project was at the point of failure through lack of money. Rumours of these difficulties caused increased interest within the American government.

A report made by the Americans in 1886 noted that housing for the workforce was under construction and a great deal of plant was available. Unfortunately the plant required to construct the canal was in short supply, there were too few dredgers, the French excavators were too light and were stopped by large boulders and too much work was being done by hand. The turnover of the labour force was immense, as the men wanted to return home to spend the savings they had accumulated and because of the inadequate medical care that was available.

It was realised that the solution to all the problems encountered, was that the construction of a high-level lock canal would reduce an enormous volume of excavation and prevent the landslides.

The abandonment of the scheme at this stage would cause financial ruin for all the investors and a severe blow to the French. It was suggested that the original plan should be modified and the lock system should be employed.

Eventually, in 1899 the French attempt at constructing the Panama Canal was seen to be a failure. However, they had excavated a total of 59.75 million cubic metres which included 14.255 million cubic metres from the Culebra Cut. This lowered the peak by 102 metres. The value of work completed by the French was about $ 25 million. When the French left, they left behind a considerable amount of machinery housing and a hospital. The reasons behind the French failing to complete the project were due to disease carrying mosquitos and the inadequacy of their machinery.

The construction of the canal was recommenced by the Americans in 1904. The first step on the agenda was to improve the standard of living and ensure ill health would be a thing of the past.

The first American steam shovel started work on the Culebra cut on 11th November 1904. By December 1905 there were 2,600 men at work in the Culebra cut.

Sidings and tracks for the spoil wagons had been laid, the dredging at both the Atlantic and Pacific portions of the canal were being carried out and a survey of the area for the largest dam along the canal had been started.
It wasn't until June 1906 that the decision on type of canal was decided. It was to be a lock canal. This would enable the river Chagres to form a lake.

Peak excavation within the Culebra cut exceeded 512,500 cubic metres of material in the first three months of 1907 and the total workforce exceeded 39,000. The rock was broken up by dynamite, of which up to 4,535,000 kilogrammes were used every year.

The plant used in the Culebra cut included in excess of 100 Bucyrus steam shovels each capable of excavating approximately 920 cubic metres in an eight-hour day.

More than 4,000 wagons were used for the removal of the excavated material. Each wagon was capable of carrying 15 cubic metres of material. These wagons were hauled by 160 locomotives and unloaded by 30 Lidgerwood unloaders.

What makes the Panama Canal remarkable is not only the sheer size of the effort, but its self suficiency. The dam at Gatun, is able to generate the electricity to run all the motors which operate the canal as well as the locomotives in charge of towing the ships through the canal. No force is required to adjust the water level between the locks except gravity. As the lock operates, the water simply flows into the locks from the lakes or flows out to the sea level channels. The canal also relies on the overabundant rainfall of the area to compensate for the loss of the 52 million gallons of fresh water consumed during each crossing.

Despite the limit in ship size, the canal is still one of the most highly travelled waterways in the world, handling over 12,000 ships per year. The 51-mile crossing takes about nine hours to complete, an immense time saving when compared with rounding the tip of South America.

Until the early 1970's the Panama Canal Company made considerable profits. After a period of nearly 60 years the loss in profit required the increase of tolls 3 times in 4 years. Much of the equipment, some of which dates back too 1914, now requires expensive modifications, simply to continue moving its present rate of traffic.

The original plan for the Panama Canal was evolved from many years of engineering study, but it was unfortunate that it had not been based on marine operating experience.

Sources

1. http://www.eclipse.co.uk/~sl5763/panama.htm