Paraiso in the French days. This was the site of one of the locks in the 18-lock Canal scheme when the French were at work. On April 23, 1904, the United States made the memorable purchase at $40,000,000, and on May 4, 1904, the property was turned over to the Americans.

Paraiso in the days of American occupancy, showing Ancon Hill in the distance. The cranes which are also visible, show the beginning of the work at Pedro Miguel Lock. The French had none of the big tools, up-to-date machinery, steam shovels, cranes, etc., but with the equipment which they had they took out 78,000,000 cubic yards of spoil, of which 30,000,000 cubic yards was useful to the Americans.
The Cut at Pas Obispo looking south June 30, 1910. The greater part of the excavating in this section had to be done through solid rock, and thousands of pounds of dynamite were used. It was in this section that the premature explosion occurred in 1908.

Steam shovel 218 buried under fall of rock, west side of Canal, near Las Cascades. This shovel was working on the bottom of the canal when destroyed, May 31, 1912. Several steam shovels have been destroyed in this manner and a number of men injured and killed.
A close view of the suspension bridge across the Canal near Empire. This bridge is used for vehicles and foot passengers, but will be taken down when the Canal is completed. There will be no bridge across the Canal, except the pontoon bridge near Paraiso, which will be swung over against the east side of the Canal when not in use.

Ninety-five ton steam shovel at work in Culebra Cut. One hundred steam shovels have been used in the Canal work. Culebra Cut is a term officially applied to that part of the Canal between Bas Obispo on the north and Pedro Miguel on the south, a distance of about nine miles. The width of the Cut is 300 feet at the bottom.
A great many difficulties have been encountered and overcome in building the Canal. The greatest difficulty in the excavating was due to slides and breaks, which closed the drainage ditches, upset the steam shovels, and covered the tracks. The water that was not carried off by the diversion channels, entered the Cut, necessitating pumping.
The side of the Cut at Gold Hill, where the deepest cutting was done. When this photograph was taken the steam shovels had 30 feet further to go at this point.
Culebra Cut near Culebra village, as it appeared October 1, 1912. You will note in the picture the manner of terracing the sides of the Cut. This was done as a preventive measure against the slides.
In the rainy season, two streams of considerable size originally crossed the route of the Canal in the Culebra Cut section, one of which was the Camacho River, now called the Camacho diversion. To prevent these streams from flooding the Cut, new channels were dug, paralleling the banks of the Canal, through which their flows were diverted. In this case it was necessary to dig a tunnel, which is shown above, to conduct the water through the hill.

Culebra Cut looking south from Gold and Contractor's Hills taken at a time when the Cut was practically free of material brought in by Cucaracha slide.
Loaded work train crossing the high trestle over the Canal at Paraíso. This bridge, known as No. 57 1/2, is to be taken down as soon as the pontoon bridge a little above this point is constructed, as it obstructs navigation of the Canal.

Section of Culebra Cut in the vicinity of Las Cascadas after completion. Various small slides have occurred all along the banks in this part of the Canal.
Completed section of Culebra Cut looking north from Canette. Steam shovels are excavating in slide material. Bottom is to grade.

Culebra Cut between Gold and Contractor's Hills after the removal of construction tracks.
Culebra Cut, south of Cucaracha slide, after the channel began to fill.
Railroad crossing at Paraíso in the distance.

Close view of high rock bank of Culebra Cut after the water was let in. The thin white line about midway up the bank to the right marks the ultimate water level.
General view of engine house and yard at Paraiso in 1906. This yard was dismantled several years ago, and yards were established at Pedro Miguel and Las Cascadas.

Engine house and yard at Las Cascadas. A very busy scene was presented in the morning when a hundred or more of the engines were leaving the yard to begin their daily work of pulling dirt trains out of the Cut to the dumping grounds.
The most modern machinery that brains could invent, or money buy, has been used on the Canal work. In many cases the practical knowledge of the Canal engineers has been applied to various machines after purchase, with the result that a higher degree of efficiency has been obtained from them than their manufacturers guaranteed. Among the several inventions induced by the Canal work, is the track shifting machine, shown above, which lifts a section of the track, including the ties, with one motion, and by another, throws it from three to nine feet to one side. This machine does the work of several hundred men.
Men shifting track. The old way before the track shifting machine was invented, and put into use.

Revolving steam shovel. A few of these machines were used to advantage, but larger ones were used for the heavy work.

Rock channeler at work. These machines were used in Pedro Miguel Lock, where the natural foundation was hard trap rock. They cut grooves into this rock to the required depth for the installation of the floor culverts, after which the material was blasted loose, the aim being not to disturb the rock between the culvert trenches. They were also used in the Canal near Bas Obispo where the excavation was through solid rock.
Locomotive cranes were a useful adjunct to the Canal work. This one is operating a clamshell bucket, so named from its resemblance to the bivalve.

The American machine which moves mountains. One of the 100 steam shovels engaged in the Canal work, holding in its dipper a rock of many tons' weight. With the advent of these machines King Yardage became a household word in the Canal Zone. The American operators take a personal pride in their work, and the world's record for steam shovel excavation is said to be held on the Isthmus.
Excavated material is transported in several kinds of cars, one of which is the Western Dump Car, shown in the picture. In some of the cars, the body is held upright by a chain grip, which, when released, allows the body to tip, emptying the contents. Others are dumped by air.

An unloading machine at work on a train of Lidgerwood flat cars. The unloader, actuated by steam from the locomotive, pulls the plow by a steel cable which coils around a drum. A man rides the plow, and signals the movements with a flag.
An earth spreader at work. After the cars have been unloaded, an earth spreader comes along and levels off the ground.

In order to dispose of the material from the Cut, large dump had to be established. The site of this one, known as Miraflores dump, was formerly a swamp, but it has now been built up to a height of more than 40 feet. A large amount of the excavated material was used in building the Dam at Gatun and the Naos Island breakwater on the Pacific side. The spoil from Culebra Cut has been carried all the way from five to twenty-four miles.
A loaded train of Lidgerwood flat cars coming out of the Cut at Pedro Miguel. During the latter part of the excavation, the Cut was at such a depth below the surrounding levels that long inclines had to be built, up which the dirt trains were pulled by two and three locomotives.

Two wrecking cranes picking up a steam shovel. These machines range in capacity from 15 to 100 tons, and are kept under steam day and night, ready for any emergency in the transportation service.
Power stations are situated at various points along the Canal to furnish power to the electrically-operated machinery, as well as to light the Canal Zone settlements. The building shown in the picture is the Miraflores station which supplied power to the construction machinery at Pedro Miguel and Miraflores Locks. It is an oil-burning plant but can be converted to a steam plant at any time. Many of the industrial plants and all passenger locomotives are equipped with oil burners.

The corral at Ancon. Corrals are located at all of the Zone settlements, and there are about 650 animals in the Canal service, including 377 mules. The majority of them were brought from the United States, and all hay and feed comes from the States.
The immense amount of machinery used on the Canal work required exceptionally complete repair facilities. This is the Gorgona shops, the largest on the Canal, where repairs were made to every kind of equipment, except steam shovels, from clocks to locomotives. These shops have been dismantled and moved as the waters of the Gatun Lake will cover this site. The permanent repair shops will be located at Balboa.

Repair shops at Empire, showing the native village in the background. All major repairs to steam shovels were made at these shops. Steam shovels were inspected daily and the minor repairs were done in the field.
Many slides have developed during the latter part of the Canal work which have caused a great deal of damage and the excavation of much more material than was formerly estimated. This view shows a break on the west bank at Culebra which encroached on the village of Culebra to such an extent that it was necessary to move a large number of buildings, including the hotel and Y. M. C. A. Clubhouse.

A break in the east bank of the Canal near Bas Obispo. This was caused by high water in the diversion channel, which broke through the separation wall, carrying into the Canal over 190,000 cubic yards of material, and flooding it for some distance. The disastrous effect on the railroad is clearly shown.
This shows where the slides on either bank have encroached upon the prism of the Canal to such an extent as to almost effect a closure.

Telling effects of the slide in the west bank at Culebra. Most of this has now been cleared away, and the danger of similar trouble at this point has largely passed, because of the method adopted of terracing the upper levels to relieve the weight on the banks.
Cucaracha slide before the destruction of Gamboa dike. Some of these movements of material into the Cut are designated slides; others are called breaks. The one at Cucaracha typifies the normal or gravity slide.
Steam shovels working in the slide at Cucaracha. This slide showed evidence of activity as far back as 1887, when the French were at work on the Canal, and has been a source of trouble ever since.

This graphically portrays the result of a slide which has nearly buried a steam shovel. Colonel Gaillard, the Division Engineer, in charge of operations in Culebra Cut said: "I know of no single thing that has done so much to complicate the engineering problems of our work or to hinder and curtail the yardage output as the slides." Colonel George W. Goethals, Chairman and Chief Engineer, said: "The only way to overcome the slides is by unremitting excavation."