CHAPTER VIII

PERMANENT CANAL BUILDINGS

The simple wooden buildings in which the canal force was housed during the period of construction were designed and erected with the expectation that they would withstand the effects of the climate for ten or twelve years. Under constant watchfulness and care they have met this expectation, but without those safeguards they would not have lasted more than half as long. Their most destructive enemy, next to the rotting effects of the damp climate, is the isthmus ant, almost infinite in variety, illimitable in numbers, and untiring and really diabolical in activity.

Left at the mercy of this enemy, working in unison with the dampness of the climate, a wooden house has a very poor chance for more than a few years of existence. The temporary commission buildings were saved from rapid deterioration and decay by incessant watchfulness, prompt repair, and unceasing warfare upon ants. Large sums were spent each year for these purposes, and by means of them the buildings as a whole were in such good condition when the task neared completion that they might have been kept in use for several years longer. Many of them, in those settlements that were not on the abandoned side of the canal, in-
cluding the towns at both entrances and Gatun, Pedro Miguel, and Corozal, will be kept in use till they are replaced by permanent structures of concrete.

Whole towns, containing populations varying from a few hundred up to seven thousand, have either vanished from sight or will disappear within a year. Their buildings will either be demolished or taken apart, transported to the sites of permanent towns, and put together again for temporary use, either by the civilian force of the canal or by the military contingent. This change can be made at a cost of about one-third of the first cost of the buildings. In the original erection of them and in repairs the commission expended over $10,250,000.

All permanent buildings will be of concrete, both for civil and military uses. For the administrative and operating force of the canal a group of buildings will be erected on a site between Ancon and Sosa Hills. The main structure will be the administration, or canal headquarters, building. This will stand on a knoll, about seventy-five feet above the plain below, on which the other buildings will be arranged, commanding a fine view of the Pacific entrance and terminal piers. It was designed by Austin W. Lord, of New York, and is classic in style. It will be three stories in height, with a frontage of about 327 feet and a depth at the wing ends of 182 feet. It will be constructed of concrete blocks about a steel framework, and the surface of the blocks will be covered with cement stucco. Its roof will be covered with dark-red vitreous tiles. There will be a square pier colonnade along the front and end
elevations, rising from the first-floor level to the second-floor ceiling, protecting the building against sun and rain. The principal entrance, facing Sosa Hill, will be enclosed by massive end bays and pylons, and will be reached by a grand flight of steps and ramps from the plain below. The rear of the building, with its central wing and two end wings, will enclose a large court, treated as a patio, which will serve as carriage entrance to the building, with a porte-cochère at the central wing.

The three floors will be divided into office-rooms, about a central rotunda 43 feet in diameter. The entire floor area will be 67,000 square feet, in addition to the space occupied by halls, stairways, elevators, toilets, etc. The basement, with an area of 20,000 square feet, will be used as a storage vault for canal archives. The total building area at the grade line is 23,000 square feet. The total cost is not to exceed $375,000. Work on the site began in February, 1913.

On the plain lying seventy-five feet below the site of the administration building, a town site for other permanent buildings has been planned. This plain was formerly a swamp, and was raised to an elevation twenty feet above sea-level by material from Culebra Cut and by hydraulic fill from the excavation for the terminal structures at Balboa. On this will be erected quarters of different types for employes, accommodating one, two, and four families each; a police-station; post-office; chief sanitary office; fire-station; dispensary; telephone building; club-house; hotel; lodge hall; church; commissary; and schoolhouse. All these struc-
tures will be ranged on either side of a central avenue, extending on a direct axis from the approach to the administration building through the town site, and terminating in a grove of mango-trees at the foot of Sosa Hill. All buildings will be of concrete blocks, and of the same general style of architecture as the administration building. They will be connected with one another by a continuous arcade, which will serve as protection against sun and rain. There will be included in the plan a baseball-field, tennis-courts, and a band-stand.

Permanent structures, also of concrete blocks, will be erected for the marine contingent and for the military force with a minimum strength of 7,000 men. It is proposed to place the marine camp on Ancon Hill, on the elevated plateau in front of the quarry which has been used to obtain crushed stone for the concrete in the Pacific locks. This site overlooks that of the administration building, and is second in attractiveness and beauty of prospect to no other within the Canal Zone. It is estimated that $400,000 will be necessary to construct barracks for 500 marines. The camp will be used as an advance post by the Navy Department, and the marines quartered there will not be considered as part of the defence force of the canal.

It is proposed to erect on the filled area in Panama Bay, known as the Balboa Dump, quarters for 8 companies of coast artillery, 872 men, at an estimated cost of $536,000; on Culebra Island an outpost guard building, at an estimated cost of $40,000; on Toro Point quarters for two companies, at an estimated
cost of $200,000; and for a like force at Margarita Island at the same estimated cost; making the total expenditure for the coast artillery barracks $976,000.

The site for the camp for mobile troops in the interior of the Canal Zone has not been decided finally. Two locations are under consideration, one on the high ground on the east side of Culebra Cut, north of Gold Hill, and the other on the filled ground near Miraflores. In one or the other of these locations barracks will be constructed of concrete blocks for three regiments of infantry, one squadron of cavalry, and one battalion of field (mountain) artillery, at an estimated cost of about $4,000,000.

There will be permanent settlements of concrete construction, ultimately, at Pedro Miguel for employes of the Pacific locks, and at Gatun for employes of the Atlantic locks.
CHAPTER IX

TERMINAL FACILITIES, DRY-DOCKS, AND REPAIR-SHOPS

The terminals of the canal in both oceans will be equipped with such facilities as will make them most serviceable to the military and naval needs of the United States and most attractive to the shipping of the world. There are under construction at both entrances systems of concrete piers with a length of not less than 1,000 feet, a width of 200 feet, and slips 300 feet wide between them. Dock and wharf construction is of permanent character, either of reinforced concrete or steel protected by concrete. The dock-sheds will have steel frames suitably protected against corrosion, and a roof covering either of concrete or of other material capable of resisting indefinitely climatic effects. In addition to berthing space for large vessels, the piers will be provided with ample landing room for launches and smaller boats.

The docks will be provided with standard-gauge railroad tracks for the convenient handling of cargo. Each dock-shed will be provided along each side with a longitudinal steel girder to which blocks and lines may be attached to assist in the handling of cargo. The depth of water alongside the Cristobal docks will be 41 feet, and alongside the Balboa docks 45 feet above
mean sea-level, the increased depth at the latter being necessary because of the extreme tidal oscillation in the Bay of Panama.

At Balboa there will be a length of 2,200 feet of uncovered docks immediately in front of the repair-shops, which in time of peace will be available for commercial use. In time of war it will be available for berthing vessels requiring repairs. The Balboa piers will be at right angles with the axis of the canal channel, with their ends about 2,650 feet away from it.

Only one pier will be built at first at either terminal. If later the commercial requirements of the canal demand them, four others will be added. The pier at Cristobal is behind a mole and breakwater extending 3,085 feet from the shore-line and paralleling the boundary-line between Canal Zone and Panama waters. The wharves on both sides will not be equipped with cargo cranes until canal operations show the character and amount of freight that will have to be handled.

The establishment of dry-docks and repair-shops of ample capacities to meet all demands was considered by the fortifications board as a necessary part of the scheme of national defence. Such action was considered by the canal commission also to be a necessary part of the operation of the canal. An agreement was reached to place both dry-docks and repair-shops at the Pacific terminal, since the chief demand for them would be at that point. The dry-docks, excavation for which began in January, 1913, are situated behind Sosa Hill, at Balboa, and the repair-shops will be near by on the site of the old marine repair-shop of the
First of the permanent docks at Cristobal. Vessels of the Atlantic Squadron, U. S. N., first to make landing, January 14, 1913. Officers and men taking observation train to see canal.

Letting the Pacific Ocean into the canal, May 18, 1913. Sixteen tons of dynamite were used in the explosion which destroyed the dike.
French company. The main dry-dock will be capable of accommodating any vessel that can pass through the canal locks. It will have a usable length of 1,000 feet, a depth over the keel blocks of 35 feet at mean sea-level, and an entrance width of 110 feet. The entrance will be closed by mitre-gates similar to those used in the locks. The dry-dock will have a rock foundation, and its sides will be lined with concrete. Its equipment will include a forty-ton locomotive crane, with a travel on both sides.

For vessels of smaller type, an auxiliary dry-dock will be built near the main one, in lieu of the marine railways originally contemplated. It will have a usable length of 350 feet, a width of 80 feet, and a depth over the keel blocks of 13½ feet at mean sea-level. It will be provided with a floating caisson. The forty-ton locomotive crane and the pumping plant on the main dry-dock will be utilized for this dock also. The work of providing space for these dry-docks, as well as for the new shops, required the excavation of about 300,000 cubic yards of material from the northwest face of Sosa Hill. The excavated material was used in filling the site for the shops and terminal yard.

On the Atlantic side, where it is thought only limited repair facilities will be required, it is proposed to retain the old French dry-dock at Mount Hope, which has a usable length of 300 feet, a width at entrance of 50 feet, and a depth over the sill of 13 feet at mean sea-level. It was the opinion of the board in charge of the dock projects that the commercial requirements in sight would not warrant the construction of a dry-
dock at Cristobal capable of accommodating large vessels, in view of the building of a dry-dock at Balboa, to which any large vessel on the Atlantic side could be taken and returned in case it was found necessary to dock it for repairs.

Both dry-docks and repair-shops have been placed so as to secure protection against naval bombardment, and at the same time give vessels convenient access to the shop water-front. With these ends in view, the dry-docks have been located on a rocky ledge forming the base of Sosa Hill, and the main repair-shops in an area 600 feet wide, between the dry-dock and the repair wharf. The shop buildings are of steel frame, open on the sides for ventilation and light, with a reinforced concrete tile roof, and fully equipped for convenient and economical handling with overhead electric travelling cranes. The shop equipment includes a two-story fire-proof storehouse, 400 feet by 120 feet, for general supplies required in the manufacturing and repair work. Installed in the shops will be all of the machinery, tools, etc., used during canal construction which have a permanent value. In addition, new tools will be installed, especially adapted for large marine work. Tools will be driven by electric motors, individual motors being provided for special tools, and group drives being adapted where practicable. These shops are intended to handle all the repair work for the canal equipment as well as for the Panama Railroad, all commercial work, and all naval work.

For the handling of the lock-gate leaves, as well as for other canal requirements and commercial and gen-
eral wrecking purposes, two powerful floating cranes of two hundred and fifty gross tons capacity have been ordered of a manufacturing firm in Germany, and they will be delivered about January 1, 1915.

For handling vessels of the largest size at Cristobal and Balboa two high-power harbor tugs will be provided, and for the transportation of coal, fuel oil, and fresh water alongside of vessels a sufficient number of barges and lighters will be placed in service. Steel barges, now in use by the canal commission, after the necessary modifications have been made, will be placed in the barge and lighter service. A tender for passengers and mail will be furnished at each terminus also, provided the business justifies it.
CHAPTER X

FOOD, COAL, OIL, AND OTHER SUPPLIES

In addition to the terminal facilities described in the foregoing chapter the United States Government has decreed that all vessels passing through the canal shall have the opportunity to purchase at reasonable and stated prices all supplies that they may need, cold storage and general articles of food, coal and oil for fuel and other purposes, fresh water, or anything else held in stock by the government for the supply of its canal, naval, and military forces. For the first time in its history the United States Government will go into commercial business.

The main object is to attract shipping to the canal by holding out inducements to use it. If the owners of vessels desiring to pass through it can be assured that they can obtain at Panama and Colon supplies of all kinds, and get all necessary repairs made, at moderate prices, completely safeguarding them against extortion in all respects, the advantages of the route will be greatly enhanced. Vessels making long voyages can cut their coal-bunker space in half, and also their cold-storage and food-supply spaces, gaining thereby more room for freight.

While it was a new departure for the United States
Government to go into the public supply business, the step was a logical one. In constructing the canal it had been engaged in that business on its own account for ten years or more. It had, in order to feed its army of employes, erected a large cold-storage plant, a central commissary or great department store, with a line of branch stores, a bakery and laundry and other necessary agencies. These were used, not only to meet the wants of its employes, but of marine and military camps, and of visiting naval vessels. It was obliged to keep on hand supplies of coal for naval vessels as well as for its own work.

With the opening of the canal to traffic, the demand for supplies for government purposes will continue and must be met. The operating force of the canal, estimated at 1,500 men; the military contingent, with a minimum force of 7,000 men; the marine force of 1,500 men, and the operating force of the Panama Railroad must be fed and otherwise cared for. The coal supply for the navy must be greatly increased, and a fuel-oil supply provided. By including all persons in need of food and other necessities in a single body, to be supplied from a central plant, a great saving in operating expenses is effected, and consequently in the cost of supplies to the "ultimate consumer." The central commissary, with its laundry, bakery, etc., makes unnecessary separate establishments of the kind in the military and marine camps, and thereby saves the government money.

To extend all these privileges to the vessels of all nations passing through the canal includes them in the
benefits conferred and makes the Panama route both an economical and an attractive one, and thereby aids it in its direct competition with the Suez Canal.

It is the policy of the United States Government to keep complete control of the terminals, water-frontage, and transportation by land and water across the isthmus, and to this end no land, nor land under water, near the terminals that may later be needed by the United States will be leased. It is not the policy to attempt to monopolize the fuel business, and every means has been taken to encourage the establishment of private coal and oil depots on the isthmus under proper conditions. The duplication of plants for private coal and oil stations is undesirable, and therefore the government plants are being so laid out as to afford ample wharf room, and to provide modern coal handling machinery for unloading colliers into the coal pile and reloading coal to lighters or barges.

The Navy Department requires that there be kept at all times on the isthmus 100,000 tons of coal at the Atlantic terminus, and 50,000 tons at the Pacific terminus. This supply could not be maintained at a reasonable price through individuals or companies. The government must be its own purchaser. As a storage basis for this supply a basin will be constructed at Cristobal with a capacity of 290,000 tons, and one at Balboa with a capacity of 160,000 tons. In each place the basin will be made of reinforced concrete, in which approximately half of the coal will be stored under water for use in time of war, and the other half above water, to be added to and taken from continually
for the ordinary uses of commercial and government vessels. It is also planned to lease parts of the storage basins to such private coaling companies as may wish to maintain their own coal stores on the isthmus; but in such cases all of the handling will be done by the government plant, a suitable charge being made for the service.

The coaling plant at the Atlantic entrance will be situated on the north end of the island formed by the old French canal, the American canal, and the Mindi River. It will be reached from the mainland by means of a bridge to be built by the Panama Railroad over the French canal south of the dry-dock shops. The storage basin will be opposite Dock No. 13, at Mount Hope, and it will be 1,000 feet long and 250 feet wide. The bottom of the basin will be 19 feet below mean tide, and the elevation of the decks of the wharves 10 feet above mean tide. There will be 41 feet depth of water alongside the wharves. The wharves will be founded upon steel cylinders filled with reinforced concrete, resting upon hard rock. The maximum tidal oscillation in Limon Bay is 2.65 feet.

For this type of storage basin, at least two layouts of coaling plant are feasible; the first being that in which the loading and unloading wharves occupy opposite sides of the basin parallel with one another, with the coal piles between them, and the second that in which the unloading wharf will be at right angles to the loading wharf. The normal capacity will be 240,000 tons, capable of increase to 290,000 tons by piling coal to 10 feet above normal height.
The coaling plant at the Pacific entrance will be on the quay wall south of the entrance to the large dry-dock. The size of the basin will be 500 feet long and 250 feet wide for one design of plant, and the same length and 340 feet wide for a second design. The extreme tidal difference here is 21.8 feet. As at the Atlantic entrance, the loading wharf will be founded upon concrete cylinders resting upon hard rock; the unloading wharf will be gravity section concrete wall resting on rock. The normal capacity of the Balboa plant will be 135,000 tons, capable of increase to 160,000 tons by piling coal 10 feet above normal height.

The layout is somewhat different from that at the Atlantic entrance, although the methods of handling the coal will be similar. The unloading wharf will be situated at the outer end of the dry-dock slip, while the line of the loading wharf makes an angle of about forty-five degrees with that of the unloading wharf, running out toward the canal prism from the end of the unloading wharf.

A certain ground area will be set aside for the storage of coal by individuals or companies, and this area will be served by the government handling machinery with the same effectiveness as coal in the government storage basin.

This arrangement will obviate the necessity of any dredging, wharf construction, or purchase of coal-handling machinery by private owners and companies, and at the same time will enable them to obtain the benefits of the rapid coal-handling machinery to be purchased by the United States. The cost of taking
coal in and out of storage, and of the wharfage facilities and dredging thus availed of, will be apportioned at a reasonable price per ton to all individuals and companies alike on an equitable basis. For the area to be occupied by the coal pile a rental charge based upon the cost of fitting up the area for private coal storage will be charged in addition. Assurance of satisfactory service can be given by the canal authorities. It is expected that the government coaling plant will be in operation before January 1, 1915. Suitable temporary arrangements will be made to take care of any business originating before the permanent plant is completed. Such a permanent plant will require no outlay for improvements on the part of individuals and companies, and will enable them to participate in the coal business on what appear to be more advantageous terms than if they should each proceed with the construction and installation of their own docks and coal piles and coal-handling machinery.

Similar facilities will be provided for furnishing vessels with fuel oil. Two large oil tanks will be installed at each end of the canal. By the time the canal is ready for operation the United States will have an oil pipe line across the isthmus with the necessary pumping plants, and dock space will be provided at each end of the canal for vessels to deliver or receive fuel oil. Pumps of suitable capacity will also be provided to pump oil from the water-front to tanks in the vicinity or at points along the canal line. Individuals and companies desiring to enter this business can make application for revocable licenses covering the plats
of ground more or less removed from the water-front which can be assigned for the erection of oil tanks. Under the Taft agreement with Panama, coal and oil for fuel for canal use and for supplying vessels using the canal may enter the Canal Zone without the payment of duty to Panama.

The Navy Department is erecting a high-power wireless telegraph station at a point situated about midway of the isthmus. It is near the site of the old town of San Pablo, now underneath Gatun Lake.

The site is from sixty to one hundred and ten feet above the normal level of Gatun Lake, accessible by means of the Panama Railroad, and near to the electric transmission and telegraph and telephone lines which will follow the right of way of the railroad. In addition to this high-power station, which will be capable of communicating with points at a distance of three thousand miles, there will be stations of less power at Porto Bello and Colon, where the navy now maintains stations, and one at Balboa, near the Pacific entrance to the canal. The status of wireless telegraph communication on the isthmus has been fixed by the President in accordance with the following recommendation of the joint board of the army and navy appointed for that purpose:

That no private or commercial wireless installations be permitted in the Canal Zone.

That an understanding be reached with Panama to prevent the establishment of private and commercial wireless installations in its territory.

That the Navy Department shall have authority to
install, maintain, and operate under its jurisdiction a high-power wireless station in the Canal Zone, to be used in connection with its other stations in the Atlantic and Pacific, and for controlling the movements of its fleets in waters adjacent to the Panama Canal.

That wireless stations under the jurisdiction of the Navy Department shall be opened to the public service and shall transmit commercial business under such regulations as the President of the United States may prescribe.
CHAPTER XI

FORTIFICATIONS

All information in this chapter is derived from the public writings and utterances of various army authorities, including H. L. Stimson, ex-Secretary of War; Major-General Leonard Wood, Chief of Staff; Brigadier-General Bixby, Chief of Engineers; Colonel Rogers Birnie, acting Chief of Ordnance; Brigadier-General E. M. Weaver, Chief of Coast Artillery; Colonel Edward Burr, Assistant to Chief of Engineers, and others.

The information derived from the army officers named was given by them in hearings before a subcommittee of the House Committee on Appropriations, in January, 1913, and published as a congressional document.

The defences of the canal will be divided into two general parts: first, the protection by heavy fortifications of the entrances in both oceans; second, by field-works about the locks and a mobile force of troops with a minimum strength of 7,000 men. The fortifications at the Atlantic entrance will be placed on Toro Point, on the west side of Colon Bay, from which the West Breakwater extends for a distance of two miles into the bay, and on Margarita Island, on the east side, which is about one mile north of Colon, is nearly opposite Toro Point, and is outside the two breakwaters.
On the Pacific side the fortifications will be placed on three small islands, Flamenco, Perico, and Naos, lying in the Bay of Panama, about three miles from Balboa, and abreast of the entrance to the canal. The armament of these fortifications will be of more powerful and effective types than those installed in any other locality in the world. On the Atlantic side, on Margarita Island, it will include two 14-inch and two 6-inch guns on Toro Point, two 14-inch, two 6-inch, and eight mortars; and at Manzanilla Point, city of Colon, two 6-inch guns. On the Pacific side it will include one 16-inch gun on Flamenco, the outermost of the three islands; one 14-inch gun each on Perico and Naos islands, two 6-inch guns also on Naos and some 12-inch mortars of a new and powerful type. There will also be at both entrances 6-inch guns and howitzers to protect the forts on the land side and submarines at the entrances.

In regard to the adequacy of the defences the general board of the navy, in a report published in 1912, said:

The General Board believes that the proposed fortifications at the termini of the Isthmian Canal would be invaluable in assisting the transfer of a United States fleet from one ocean to the other, through the canal, in the face of an opposing fleet. The function of the fortifications in this particular is precisely the same at the canal termini as it is at any fortified place from which a fleet may have to issue in the face of an enemy's fleet.

Guns mounted on shore are on an unsinkable and steady platform, and they can be provided with un-
limited protection and accurate range-finding devices. Guns mounted on board ship are on a sinkable, unsteady platform, their protection is limited, and range-finding devices on board ship have a very limited range of accuracy. The shore gun of equal power has thus a great advantage over the ship gun which is universally recognized, and this advantage is increased if the former be mounted on disappearing carriages, as are the seacoast guns of the United States. The mere statement of these elementary facts is a sufficient proof of the value of seacoast guns to assist a fleet in passing out from behind them to engage a waiting hostile fleet outside, provided the shore guns are mounted in advance of, or abreast, the point where the ship channel joins the open sea. Even if somewhat retired from that point they would be useful, but to a less extent.

At the Pacific terminus of the canal, there are outlying islands that afford sites for fortifications, the usefulness of which in assisting the egress of a fleet in the face of opposition is universally admitted, as far as the General Board knows; but there has been unfavorable criticism of the possibility of fortifications at the Atlantic end to serve this purpose. The General Board regards these criticisms as unfounded and believes, on the contrary, that the conditions at the Atlantic terminus of the canal are unusually favorable for the emplacement of guns that would be of assistance to a fleet issuing in the face of hostile ships.

On both sides of Limon Bay, in which the canal terminates at the Atlantic end, there are excellent sites for forts, well advanced on outlying points. The line joining these sites is 3,000 yards in front of the point where the canal prism reaches a low water depth sufficient for battleships, and Limon Bay from this point outward is wide enough for a formation of eight ships abreast. The outer end of the most advanced
breakwater proposed is only 600 yards in front of the line joining the sites for the forts; and as long as ships remain behind the breakwater, it will afford them a considerable amount of protection from the enemy's fire, while they will themselves be able to fire over it. In order to make his fire effective against the issuing ships the enemy must come within the effective fire of the fortifications. Under these circumstances, it is impossible to deny the usefulness of fortifications in assisting the issue of a fleet against opposition. The conditions in this respect at the Atlantic end of the canal are incomparably better than those existing at Sandy Hook, whose forts nobody would dream of dismantling.

On the same point of the adequacy General Weaver, in his testimony before the subcommittee of the Committee on Appropriations, January 16, 1913, made reply to a criticism that had been raised frequently about the Pacific fortifications.

I think that the defenses are wholly adequate. The only question I have noted raised as to the adequacy of the defense has been as to whether guns would not be mounted by an enemy on Taboga Island, and as to whether an enemy's ship could not stand behind Taboga Island, and as to whether these land guns and naval guns could not from there control the water area in front of the Pacific terminus. The new type of mortars that the Ordnance Department is making for the fortifications at Panama will have a range of 20,000 yards. They will cover the water well over beyond Taboga Island, and have under fire all of Taboga Island and the water for a considerable distance beyond the outermost shore lines of Taboga Island. It is about 12,000 yards from the fortifications at the canal terminus to Taboga Island. The mortars will
reach 8,000 yards beyond Taboga. The 16-inch gun on Flamenco will have a range of 20,000 yards. The 14-inch guns on Perico and Naos Islands will have ranges of 18,400 yards. The 6-inch guns on Naos Island and on the mainland have a range of 6,000 yards, and are well placed to oppose any attempt at landing on the islands on which the fortifications are located.

On the Atlantic side the defense is, in my opinion, equally adequate. At Fort Randolph, on Margarita Island, there are eight mortars of the new type, two 14-inch guns and two 6-inch guns. That armament will protect the Margarita Island side of the entrance, and it also controls the waters to the south. On the Toro Point side at Fort Sherman, we have eight mortars, two 14-inch guns, and two 6-inch guns. There are in addition two 6-inch guns provided at Manzanilla Point, city of Colon. In my opinion, this armament is entirely adequate for the defense of the Atlantic side.

We have what we consider a wholly adequate mining defense for the approaches to each canal terminus. The waters on both sides lend themselves admirably to mine defense. There are no swift currents and the water is not excessively deep. The narrowness of the approaches and the absence of fog make range finding easy and accurate. We know exactly the line on which approach must be made.

The fortifications at both entrances were assigned names in advance of construction by the Secretary of War, Henry L. Stimson, in January, 1912. The forts and batteries comprising them on Toro Point were named Fort Sherman, in honor of General W. T. Sherman, U. S. A., who died February 14, 1891; those on Margarita Island, Fort Randolph, in honor of Major-
General Wallace F. Randolph, U. S. A., who died September 9, 1910; and those at Manzanilla Point, Colon, Fort De Lesseps, in honor of Count Ferdinand de Lesseps, who died December 7, 1894; those on the three islands in Panama Bay, Fort Grant, in honor of General U. S. Grant, U. S. A., who died July 23, 1885; and those at Balboa, Fort Amador, in honor of Doctor Manuel Amador Guerrero, first President of the Panama Republic, who died May 2, 1909. The batteries in the forts were named as follows:

FORT GRANT MILITARY RESERVATION

Battery Newton, in honor of Major-General John Newton, U. S. Vols. (Brigadier-General, Chief of Engineers, U. S. A.), who died May 1, 1895.


Battery Buell, in honor of Major-General Don Carlos Buell, U. S. Vols. (Colonel, Assistant Adjutant-General, U. S. A.), who died November 19, 1898.

Battery Burnside, in honor of Major-General Ambrose E. Burnside, U. S. Vols. (First Lieutenant, Third U. S. Artillery), who died September 13, 1881.


FORT AMADOR MILITARY RESERVATION

FORT SHERMAN MILITARY RESERVATION

Battery Howard, in honor of Major-General Oliver O. Howard, U. S. A., who died October 26, 1909.


Battery Kilpatrick, in honor of Major-General Judson Kilpatrick, U. S. Vols. (Captain, First Artillery), who died December 2, 1881.

FORT RANDOLPH MILITARY RESERVATION


Battery Weed, in honor of Brigadier-General Stephen H. Weed, U. S. Vols. (Captain, Fifth U. S. Artillery), who was killed in action, July 2, 1863, at Gettysburg, Pa.

FORT DE LESSEPS MILITARY RESERVATION

Battery Morgan, in honor of Brigadier-General Charles H. Morgan, U. S. Vols. (Major, Fourth Artillery), who died December 20, 1875.
CHAPTER XII

THE CANAL ZONE A MILITARY RESERVATION

As an important factor in the plan of canal defence the entire Canal Zone, with the exception of about seven square miles, has been made a military reservation. The act passed by Congress* and approved by President Taft on August 24, 1912, “for the opening, maintenance, protection and operation of the Panama Canal, and the sanitation and government of the Canal Zone,” authorized the President “to declare by Executive Order that all land and land under water within the limits of the Canal Zone is necessary for the construction, maintenance, operation, sanitation, or protection of the Panama Canal, and to extinguish, by agreement when advisable, all claims and titles of adverse claimants and occupants. Upon failure to secure by agreement title to any such parcel of land or land under water the adverse claim or occupancy shall be disposed of and title thereto secured in the United States and compensation therefor fixed and paid in the manner provided in the aforesaid treaty with the Republic of Panama, or such modification of such treaty as may hereafter be made.”

Exercising the authority thus conferred, President Taft, on December 5, 1912, issued an executive order

*Appendix C.

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in accordance with the terms of the act. In a subsequent order, issued on February 18, 1913, he exempted from the area defined in the preceding order the land known as the Sabanas, a tract comprising approximately seven square miles, lying between the city of Panama and the northeast boundary of the Canal Zone and bordering on the Pacific Ocean. It is a rolling country of fields and hills, and is occupied sparsely by the country residences of the more wealthy citizens of Panama city. Its fields, or sabanas, are used for grazing purposes mainly. Morgan and his piratical army marched over them when they advanced to the sacking of Old Panama in 1671, and on the northeastern portion of them the battle between his forces and those of the city was fought. It was not much of a battle, for the Panama army, which marched forth with much noise of drums and imposing display of banners, turned tail after the first clash of arms and fled in a panic back into the city, where they made a brief and futile resistance.

The Canal Zone, bought by the United States from the Republic of Panama for $10,000,000, contains about 436 square miles. Of this area, at the time of the President's first order, the United States owned about 363 square miles, and 73 square miles were held in private ownership. The Zone begins at a point three marine miles from mean low-water mark in each ocean, and extends for five miles on each side of the centre line of the route of the canal. It includes the group of islands in the Bay of Panama named Perico, Naos Culebra, and Flamenco, and any lands and waters
outside of the prescribed limits which are necessary or convenient for canal purposes. About 95 square miles of the Canal Zone are beneath the waters of Gatun and Miraflores Lakes.

The cities of Panama and Colon are excluded from the Zone, but the United States has the right to enforce sanitary ordinances in those cities, and to maintain public order in them in case the Republic of Panama should not be able, in the judgment of the United States, to do so.

Under the treaty with Panama, the United States has the right to acquire by purchase or by the exercise of the right of eminent domain any lands, buildings, water rights, or other properties necessary and convenient for the construction, maintenance, operation, sanitation, and protection of the canal, and it can therefore at any time acquire the lands needed either within or without the Zone boundaries which are owned by private persons. The United States will also control the area to be covered by Gatun Lake, which extends beyond the lines of the Canal Zone.

The population of the Canal Zone in 1912, official census, was 62,810; of Panama City, 35,368; of Colon, 17,749.

Four joint commissions have been appointed for the purpose of adjudicating the prices that shall be paid to the owners of private lands needed for canal purposes. In accordance with the terms of the treaty with Panama, these commissions have been composed of four persons, two for each country, Panama and the United States; and, in case of disagreement, an umpire,
appointed jointly by the two governments, is provided whose decision shall be final.

The first commission, appointed in 1905, made awards aggregating $55,607.07. The second, appointed in 1907, adjudicated the half-interest of the Pacific Mail Steamship Company in the islands of Culebra, Flamenco, Naos, and Perico, in Panama Bay, awarding the company $20,000 for its improvements and $20,000 for the land. The Panama Railroad Company held the other half-interest. This commission also assessed the damage done by a conflagration in the Malambo district of the city of Panama in 1906, which, it was claimed, was started by fumigation directed by the Isthmian Canal Commission. The commission did not fix the responsibility on the United States, and the matter is still pending; a bill providing for $53,800 in payment for it has been introduced in several sessions of Congress, but has never been passed.

The third commission, appointed in 1908, agreed upon awards aggregating $123,980, and its chairman, chosen as umpire in cases upon which the commission had failed to agree, made additional awards aggregating $61,000.

The fourth commission, appointed by President Taft in January, 1913, was organized formally on the isthmus on March 6, 1913. It had before it a far greater task than had confronted any of its predecessors, for its prescribed duty was the "appraisement and settlement of damages to property in the Canal Zone" caused by making it a military reservation—that is, ridding it of all human habitation save that of the canal
civil and military forces. Previous commissions had been called upon to appraise and settle claims for particular tracts of land, but the duty of this body was to extinguish all claims for land or damages or improvements throughout the entire territory required for canal purposes. The various claims mounted into the thousands, and the hearing of them alone consumed many months. Before the commission began its work the entire area covered by the waters of Gatun Lake was cleared of human habitation below the eighty-seven-foot level. All buildings, commission and other, were removed. A large number of squatters were paid by the commission for their property, and many small claims were settled in that way through the legal counsel of the canal commission.

Decision to make the Canal Zone a military reservation was reached only after prolonged discussion in which considerable opposition was developed. It was thought at one time that the land in the Zone might be leased for agricultural purposes, and that many Americans in the employ of the canal commission who had become accustomed to life in the tropics might wish to remain and take up farming on the isthmus. Several ventures of this kind were made, but without success. All efforts to raise American vegetables on the isthmus have ended in failure. Only tropical products—bananas, mangoes, pineapples, papayas, and the like—can be grown to advantage, but for these there was very little suitable land remaining in the Zone after Gatun Lake was filled. In fact, virtually all the really productive land in the Zone was buried
under the lake, for it all lay in the valleys. It was made plain that very few, if any, Americans would become residents in the Zone if it were continued open to settlement, and no other nationality was wanted there, for settlements along the borders of the canal would be so many avenues of approach to it, and safety required that these should be under friendly control.

The area available for settlement was, at most, very small. No settlement of any kind could be allowed in the neighborhood of the earthworks about the locks or upon the lands over which an enemy would have to march to reach them. If settlement in the regions about Gatun Lake were permitted, roads would have to be kept open to them, a form of civil government, with schools, post-offices, and police protection, would have to be supplied, sanitation control and supervision exercised, and in case of settlements near canal works and structures fire protection would have to be given. All this would greatly increase the cost of governing the Zone, and the revenues would be inconsiderable.

With no settlements whatever along the borders of Gatun Lake, the dense jungle growth, unbroken by trails, will be the best possible protection, for it is virtually impassable for a hostile force. Fortifications at the entrances and about the locks are all that is necessary for canal protection, therefore, and with no one but Americans and their dependents in the Zone settlements the entrance of any persons with hostile intent will be instantly detected.

It has been asserted in many quarters that the locks might be destroyed by one or two men placing dyna-
mite or other high explosives in them. Colonel Goe-
thals was asked for his views on this point at the hear-
ing on fortification plans at Washington in January, 1913, and in his reply he said:

"In order to accomplish the destruction of the locks it would be necessary to place the charge very carefully in them. To do that would take time, and what would our men be doing in the meantime? One man could not carry a sufficient quantity to destroy the locks. You would have to locate the charge behind a gate and in a certain place behind the gate in order to dis-
able the canal, and you must destroy the gates to de-
stroy the canal. I cannot imagine what the people operating the canal and the men having charge of its defense would be doing in the meantime." The same thing is true of dynamite dropped from a flying-
machine. If it fell in the locks or on the lock walls, it could do no serious harm—it must get behind a lock gate to be effective for damage.
APPENDIXES
APPENDIX A

CANAL COMMISSIONS

FOR PRELIMINARY SURVEYS AND RECOMMENDATIONS

First Commission

Appointed by Proclamation by President Grant, March 13, 1872.

Brevet Major-General Andrew A. Humphreys, U. S. A.

*Professor Benjamin Pierce, of Massachusetts.

Captain Daniel Ammen, U. S. N.

Made final report, February, 1876, in favor of Nicaraguan route as possessing, both for the construction and maintenance of a canal, greater advantages and offering fewer difficulties, from engineering, commercial, and economical points of view, than any one of the other routes surveyed. Report sent to Congress in April, 1879, and printed.

Second Commission

DESIGNATED "NICARAGUAN CANAL COMMISSION"

Appointed by President McKinley, June 4, 1897.

Rear-Admiral John G. Walker, President.

Colonel Peter C. Hains, Corps of Engineers, U. S. A.

Lewis M. Haupt, C.E.

Made first report May 9, 1899.

Third Commission

DESIGNATED "ISTHMIAN CANAL COMMISSION"

Appointed by President McKinley on June 10, 1899.


Samuel Pasco.

*Resigned, December 1874; succeeded by Carlisle P. Patterson, Supt. U. S. Coast Survey.
George S. Morison, C.E.
Lieutenant-Colonel Oswald H. Ernst, Corps of Engineers, U. S. A.
Lewis M. Haupt, C.E.
Alfred Noble, C.E.
Colonel Peter C. Hains, Corps of Engineers, U. S. A.
William H. Burr, C.E.
Professor Emory R. Johnson.
Lieutenant-Commander Sidney A. Staunton, U. S. N., Secretary.

Reported on November 16, 1901, in favor of the Nicaraguan route; in a supplementary report on January 18, 1902, withdrew this finding and recommended the Panama route because the French Canal Company offered to sell its rights, privileges, etc., for $40,000,000, having previously asked $109,000,000.

FOR CANAL CONSTRUCTION

First Commission

Nominated by President Roosevelt, February 29, 1904.
Confirmed by the Senate, March 3, 1904.

John G. Walker, Rear-Admiral, U. S. N.
George W. Davis, Major-General (retired), U. S. A.
William Barclay Parsons, C.E., New York City.
William H. Burr, C.E., New York City.
Carl E. Grunsky, C.E., San Francisco, Cal.
Frank J. Hecker, Detroit, Mich.

Salary, $12,000 each.

On June 6, 1904, Dominick I. Murphy was elected secretary of the commission, holding the position till May 31, 1905, when he resigned.

Second Commission

Nominated by President Roosevelt, March 4, 1905.

Theodore P. Shonts, Chairman; salary, $30,000.

Charles E. Magoon, Member and Governor of the Canal Zone; salary, $10,000.
John F. Wallace, Member and Chief Engineer; salary, $25,000.
Brigadier-General Peter C. Hains, U. S. A. (retired); salary, $7,500.
Colonel Oswald H. Ernst, Corps of Engineers, U. S. A; salary, $7,500.
Benj. M. Harrod, C.E., salary, $7,500.

Nominated after adjournment of Congress and never confirmed in its original form. All nominations save that of Wallace, who resigned on June 28, 1905, and Ernst, who was transferred in 1906 to the Mississippi River Commission, were confirmed March, 1907.

On September 7, 1905, Joseph Bucklin Bishop was elected secretary of the commission.

*Third Commission*

Nominated by President Roosevelt, March, 1907.
Confirmed by the Senate, March, 1907.

Lieutenant-Colonel George W. Goethals, U. S. A., Chairman and Chief Engineer; salary, $15,000.
Major D. D. Gaillard, U. S. A.
Major William L. Sibert, U. S. A.
Civil Engineer H. H. Rousseau, U. S. N. salary $14,000.
Colonel W. C. Gorgas, U. S. A.
*J. C. S. Blackburn.
†Jackson Smith.
Joseph Bucklin Bishop, Secretary

*Succeeded by Maurice H. Thatcher, April 10, 1910, who was succeeded by Richard L. Metcalfe on August 8, 1913.
### APPENDIX B

**CANAL APPROPRIATIONS AND EXPENDITURES**

**Appropriations**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment to the new Panama Canal company</td>
<td>$40,000,000.00</td>
</tr>
<tr>
<td>Payment to Republic of Panama</td>
<td>10,000,000.00</td>
</tr>
<tr>
<td>Appropriation, June 28, 1902</td>
<td>10,000,000.00</td>
</tr>
<tr>
<td>Appropriation, December 21, 1905</td>
<td>11,000,000.00</td>
</tr>
<tr>
<td>Deficiency, February 27, 1906</td>
<td>5,990,786.00</td>
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<td>Appropriation, June 30, 1906</td>
<td>25,456,415.08</td>
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<tr>
<td>Appropriation, April 4, 1907</td>
<td>27,161,367.50</td>
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<tr>
<td>Deficiency, February 15, 1908</td>
<td>12,178,900.00</td>
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<td>Appropriation, May 27, 1908</td>
<td>29,187,000.00</td>
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<td>Deficiency, March 4, 1909</td>
<td>5,458,000.00</td>
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<td>Appropriation, March 4, 1909</td>
<td>33,638,000.00</td>
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<td>Deficiency, February 25, 1910</td>
<td>76,000.00</td>
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<tr>
<td>Appropriation, June 25, 1910</td>
<td>37,855,000.00</td>
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<td>Appropriation, March 4, 1911</td>
<td>45,560,000.00</td>
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<tr>
<td>Appropriation, August 24, 1912</td>
<td>28,980,000.00</td>
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<tr>
<td>Appropriation, June 23, 1913</td>
<td>16,265,393.00</td>
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<tr>
<td>Private Acts and Court Judgments</td>
<td>21,608.01</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$338,828,469.59</strong></td>
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<table>
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<th>Description</th>
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<tr>
<td>Appropriations for fortifications, March 4, 1911</td>
<td>3,000,000.00</td>
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<tr>
<td>Appropriation for fortifications, August 24, 1912</td>
<td>2,806,950.00</td>
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<tr>
<td>Appropriation for fortifications, June 23, 1913</td>
<td>4,870,000.00</td>
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**Classified Expenditures to March 1, 1913**

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<tr>
<td>Department of Construction and Engineering</td>
<td>$171,790,041.08</td>
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<tr>
<td>Department of Construction and Engineering Plant</td>
<td>2,396,127.35</td>
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</table>
### APPENDIX B

<table>
<thead>
<tr>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Department of Sanitation</td>
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<tr>
<td>Department of Civil Administration</td>
<td>6,197,073.40</td>
</tr>
<tr>
<td>Department of Law</td>
<td>37,360.43</td>
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<tr>
<td>Panama Railroad, second main track</td>
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<tr>
<td>Panama Railroad, relocated line</td>
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<tr>
<td>Purchase and repair of steamers</td>
<td>2,680,112.01</td>
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<tr>
<td>Zone water-works and sewers</td>
<td>5,289,485.06</td>
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<td>Zone roadways</td>
<td>1,599,153.86</td>
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<tr>
<td>Loans to Panama Railroad Company</td>
<td>3,247,332.11</td>
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<tr>
<td>Construction and repair of buildings</td>
<td>10,245,919.64</td>
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<tr>
<td>Purchase from new Panama Canal company</td>
<td>40,000,000.00</td>
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<tr>
<td>Payment to Republic of Panama</td>
<td>10,000,000.00</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>4,185,412.41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$283,572,837.62</strong></td>
</tr>
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Expenditures for fortifications to March 1, 1913.. 2,537,752.38

The balances carried in expenditure accounts, which are included in the last item above, for water-works, sewers, and pavements in the cities of Panama and Colon amounted altogether to $2,405,727.91. The unexpended balance in the appropriation for sanitation in the cities of Panama and Colon, available for expenditures on water-works, sewers, and pavements, was $77,131.29, including transfer of appropriations for quarter ended December 31, 1912.
APPENDIX C*

AN ACT

TO PROVIDE FOR THE OPENING, MAINTENANCE, PROTECTION, AND OPERATION OF THE PANAMA CANAL, AND THE SANITATION AND GOVERNMENT OF THE CANAL ZONE.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the zone of land and land under water of the width of ten miles extending to the distance of five miles on each side of the center line of the route of the canal now being constructed thereon, which zone begins in the Caribbean Sea three marine miles from mean low-water mark and extends to and across the Isthmus of Panama into the Pacific Ocean to the distance of three marine miles from mean low-water mark, excluding therefrom the cities of Panama and Colon and their adjacent harbors located within said zone, as excepted in the treaty with the Republic of Panama dated November eighteenth, nineteen hundred and three, but including all islands within said described zone, and in addition thereto the group of islands in the Bay of Panama named Perico, Naos, Culebra, and Flamenco, and any lands and waters outside of said limits above described which are necessary or convenient or from time to time may become necessary or convenient for the construction, maintenance, operation, sanitation, or protection of the said canal or of any auxiliary canals, lakes, or other works necessary or convenient for the construction, maintenance, operation, sanitation, or protection of said canal, the use, occupancy, or control whereof were granted to

* [Public—No. 337.] [H. R. 21969.]
the United States by the treaty between the United States and the Republic of Panama, the ratifications of which were exchanged on the twenty-sixth day of February, nineteen hundred and four, shall be known and designated as the Canal Zone, and the canal now being constructed thereon shall hereafter be known and designated as the Panama Canal. The President is authorized, by treaty with the Republic of Panama, to acquire any additional land or land under water not already granted, or which was excepted from the grant, that he may deem necessary for the operation, maintenance, sanitation, or protection of the Panama Canal, and to exchange any land or land under water not deemed necessary for such purposes for other land or land under water which may be deemed necessary for such purposes, which additional land or land under water so acquired shall become part of the Canal Zone.

Sec. 2. That all laws, orders, regulations, and ordinances adopted and promulgated in the Canal Zone by order of the President for the government and sanitation of the Canal Zone and the construction of the Panama Canal are hereby ratified and confirmed as valid and binding until Congress shall otherwise provide. The existing courts established in the Canal Zone by Executive order are recognized and confirmed to continue in operation until the courts provided for in this Act shall be established.

Sec. 3. That the President is authorized to declare by Executive order that all land and land under water within the limits of the Canal Zone is necessary for the construction, maintenance, operation, sanitation, or protection of the Panama Canal, and to extinguish, by agreement when advisable, all claims and titles of adverse claimants and occupants. Upon failure to secure by agreement title to any such parcel of land or land under water the adverse claim or occupancy shall be disposed of and title thereto secured in the United States and compensation therefor fixed and paid in the manner provided in the aforesaid treaty with the Republic of Panama, or such modification of such treaty as may hereafter be made.
Sec. 4. That when in the judgment of the President the construction of the Panama Canal shall be sufficiently advanced toward completion to render the further services of the Isthmian Canal Commission unnecessary the President is authorized by Executive order to discontinue the Isthmian Canal Commission, which, together with the present organization, shall then cease to exist; and the President is authorized thereafter to complete, govern, and operate the Panama Canal and govern the Canal Zone, or cause them to be completed, governed, and operated, through a governor of the Panama Canal and such other persons as he may deem competent to discharge the various duties connected with the completion, care, maintenance, sanitation, operation, government, and protection of the canal and Canal Zone. If any of the persons appointed or employed as aforesaid shall be persons in the military or naval service of the United States, the amount of the official salary paid to any such person shall be deducted from the amount of salary or compensation provided by or which shall be fixed under the terms of this Act. The governor of the Panama Canal shall be appointed by the President, by and with the advice and consent of the Senate, commissioned for a term of four years, and until his successor shall be appointed and qualified. He shall receive a salary of ten thousand dollars a year. All other persons necessary for the completion, care, management, maintenance, sanitation, government, operation, and protection of the Panama Canal and Canal Zone shall be appointed by the President, or by his authority, removable at his pleasure, and the compensation of such persons shall be fixed by the President, or by his authority, until such time as Congress may by law regulate the same, but salaries or compensation fixed hereunder by the President shall in no instance exceed by more than twenty-five per centum the salary or compensation paid for the same or similar services to persons employed by the Government in continental United States. That upon the completion of the Panama Canal the President shall cause the same to be officially and formally opened for use and operation.
Before the completion of the canal, the Commission of Arts may make report to the President of their recommendation regarding the artistic character of the structures of the canal, such report to be transmitted to Congress.

Sec. 5. That the President is hereby authorized to prescribe and from time to time change the tolls that shall be levied by the Government of the United States for the use of the Panama Canal: Provided, That no tolls, when prescribed as above, shall be changed, unless six months' notice thereof shall have been given by the President by proclamation. No tolls shall be levied upon vessels engaged in the coastwise trade of the United States. That section forty-one hundred and thirty-two of the Revised Statutes is hereby amended to read as follows:

"Sec. 4132. Vessels built within the United States and belonging wholly to citizens thereof; and vessels which may be captured in war by citizens of the United States and lawfully condemned as prize, or which may be adjudged to be forfeited for a breach of the laws of the United States; and seagoing vessels, whether steam or sail, which have been certified by the Steamboat-Inspection Service as safe to carry dry and perishable cargo, not more than five years old at the time they apply for registry, wherever built, which are to engage only in trade with foreign countries or with the Philippine Islands and the islands of Guam and Tutuila, being wholly owned by citizens of the United States or corporations organized and chartered under the laws of the United States or of any State thereof, the president and managing directors of which shall be citizens of the United States or corporations organized and chartered under the laws of the United States or of any State thereof, the president and managing directors of which shall be citizens of the United States, and no others, may be registered as directed in this title. Foreign-built vessels registered pursuant to this Act shall not engage in the coastwise trade: Provided, That a foreign-built yacht, pleasure boat, or vessel not used or intended to be used for trade admitted to American registry pursuant to this section shall not be exempt from the collection of ad va-
lorem duty provided in section thirty-seven of the Act approved August fifth, nineteen hundred and nine, entitled 'An Act to provide revenue, equalize duties, and encourage the industries of the United States, and for other purposes.' That all materials of foreign production which may be necessary for the construction or repair of vessels built in the United States and all such materials necessary for the building or repair of their machinery and all articles necessary for their outfit and equipment may be imported into the United States free of duty under such regulations as the Secretary of the Treasury may prescribe: Provided further, That such vessels so admitted under the provisions of this section may contract with the Postmaster General under the Act of March third, eighteen hundred and ninety-one, entitled 'An Act to provide for ocean mail service between the United States and foreign ports, and to promote commerce,' so long as such vessels shall in all respects comply with the provisions and requirements of said Act."

Tolls may be based upon gross or net registered tonnage, displacement tonnage, or otherwise, and may be based on one form of tonnage for warships and another for ships of commerce. The rate of tolls may be lower upon vessels in ballast than upon vessels carrying passengers or cargo. When based upon net registered tonnage for ships of commerce the tolls shall not exceed one dollar and twenty-five cents per net registered ton, nor be less, other than for vessels of the United States and its citizens, than the estimated proportionate cost of the actual maintenance and operation of the canal, subject, however, to the provisions of article nineteen of the convention between the United States and the Republic of Panama, entered into November eighteen, nineteen hundred and three. If the tolls shall not be based upon net registered tonnage, they shall not exceed the equivalent of one dollar and twenty-five cents per net registered ton as nearly as the same may be determined, nor be less than the equivalent of seventy-five cents per net registered ton. The toll for each passenger shall not be more than one dollar and fifty cents. The President is au-
authorized to make and from time to time amend regulations governing the operation of the Panama Canal, and the passage and control of vessels through the same or any part thereof, including the locks and approaches thereto, and all rules and regulations affecting pilots and pilotage in the canal or the approaches thereto through the adjacent waters.

Such regulations shall provide for prompt adjustment by agreement and immediate payment of claims for damages which may arise from injury to vessels, cargo, or passengers from the passing of vessels through the locks under the control of those operating them under such rules and regulations. In case of disagreement suit may be brought in the district court of the Canal Zone against the governor of the Panama Canal. The hearing and disposition of such cases shall be expedited and the judgment shall be immediately paid out of any moneys appropriated or allotted for canal operation.

The President shall provide a method for the determination and adjustment of all claims arising out of personal injuries to employees thereafter occurring while directly engaged in actual work in connection with the construction, maintenance, operation, or sanitation of the canal or of the Panama Railroad, or of any auxiliary canals, locks, or other works necessary and convenient for the construction, maintenance, operation, or sanitation of the canal, whether such injuries result in death or not, and prescribe a schedule of compensation therefor, and may revise and modify such method and schedule at any time; and such claims, to the extent they shall be allowed on such adjustment, if allowed at all, shall be paid out of the moneys hereafter appropriated for that purpose or out of the funds of the Panama Railroad Company, if said company was responsible for said injury, as the case may require. And after such method and schedule shall be provided by the President, the provisions of the Act entitled “An Act granting to certain employees of the United States the right to receive from it compensation for injuries sustained in the course of their employment,” approved May thirtieth, nineteen hundred and eight, and of the Act en-
titled "An Act relating to injured employees on the Isthmian Canal," approved February twenty-fourth, nineteen hundred and nine, shall not apply to personal injuries thereafter received and claims for which are subject to determination and adjustment as provided in this section.

Sec. 6. That the President is authorized to cause to be erected, maintained, and operated, subject to the International Convention and the Act of Congress to regulate radio-communication, at suitable places along the Panama Canal and the coast adjacent to its two terminals, in connection with the operation of said canal, such wireless telegraphic installations as he may deem necessary for the operation, maintenance, sanitation, and protection of said canal, and for other purposes. If it is found necessary to locate such installations upon territory of the Republic of Panama, the President is authorized to make such agreement with said Government as may be necessary, and also to provide for the acceptance and transmission, by said system, of all private and commercial messages, and those of the Government of Panama, on such terms and for such tolls as the President may prescribe: Provided, That the messages of the Government of the United States and the departments thereof, and the management of the Panama Canal, shall always be given precedence over all other messages. The President is also authorized, in his discretion, to enter into such operating agreements or leases with any private wireless company or companies as may best insure freedom from interference with the wireless telegraphic installations established by the United States. The President is also authorized to establish, maintain, and operate, through the Panama Railroad Company or otherwise, dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances for the purpose of providing coal and other materials, labor, repairs, and supplies for vessels of the Government of the United States and, incidentally, for supplying such at reasonable prices to passing vessels, in accordance with appropriations hereby authorized to be made from time to time by
Congress as a part of the maintenance and operation of the said canal. Moneys received from the conduct of said business may be expended and reinvested for such purposes without being covered into the Treasury of the United States; and such moneys are hereby appropriated for such purposes, but all deposits of such funds shall be subject to the provisions of existing law relating to the deposit of other public funds of the United States, and any net profits accruing from such business shall annually be covered into the Treasury of the United States. Monthly reports of such receipts and expenditures shall be made to the President by the persons in charge, and annual reports shall be made to the Congress.

Sec. 7. That the governor of the Panama Canal shall, in connection with the operation of such canal, have official control and jurisdiction over the Canal Zone and shall perform all duties in connection with the civil government of the Canal Zone, which is to be held, treated, and governed as an adjunct of such Panama Canal. Unless in this Act otherwise provided all existing laws of the Canal Zone referring to the civil governor or the civil administration of the Canal Zone shall be applicable to the governor of the Panama Canal, who shall perform all such executive and administrative duties required by existing law. The President is authorized to determine or cause to be determined what towns shall exist in the Canal Zone and subdivide and from time to time resubdivide said Canal Zone into subdivisions, to be designated by name or number, so that there shall be situated one town in each subdivision, and the boundaries of each subdivision shall be clearly defined. In each town there shall be a magistrate’s court with exclusive original jurisdiction coextensive with the subdivision in which it is situated of all civil cases in which the principal sum claimed does not exceed three hundred dollars, and all criminal cases wherein the punishment that may be imposed shall not exceed a fine of one hundred dollars, or imprisonment not exceeding thirty days, or both, and all violations of police regulations and ordinances and all actions involving possession or title to personal property
or the forcible entry and detainer of real estate. Such magistrates shall also hold preliminary investigations in charges of felony and offenses under section ten of this Act, and commit or bail in bailable cases to the district court. A sufficient number of magistrates and constables, who must be citizens of the United States, to conduct the business of such courts, shall be appointed by the governor of the Panama Canal for terms of four years and until their successors are appointed and qualified, and the compensation of such persons shall be fixed by the President, or by his authority, until such time as Congress may by law regulate the same. The rules governing said courts and prescribing the duties of said magistrates and constables, oaths and bonds, the times and places of holding such courts, the disposition of fines, costs, forfeitures, enforcements of judgments, providing for appeals therefrom to the district court, and the disposition, treatment, and pardon of convicts shall be established by order of the President. The governor of the Panama Canal shall appoint all notaries public, prescribe their powers and duties, their official seal, and the fees to be charged and collected by them.

Sec. 8. That there shall be in the Canal Zone one district court with two divisions, one including Balboa and the other including Cristobal; and one district judge of the said district, who shall hold his court in both divisions at such time as he may designate by order, at least once a month in each division. The rules of practice in such district court shall be prescribed or amended by order of the President. The said district court shall have original jurisdiction of all felony cases, of offenses arising under section ten of this Act, all causes in equity; admiralty and all cases at law involving principal sums exceeding three hundred dollars and all appeals from judgments rendered in magistrates' courts. The jurisdiction in admiralty herein conferred upon the district judge and the district court shall be the same that is exercised by the United States district judges and the United States district courts, and the procedure and practice shall also be the same. The district court or the
judge thereof shall also have jurisdiction of all other matters and proceedings not herein provided for which are now within the jurisdiction of the Supreme Court of the Canal Zone, of the Circuit Court of the Canal Zone, the District Court of the Canal Zone, or the judges thereof. Said judge shall provide for the selection, summoning, serving, and compensation of jurors from among the citizens of the United States, to be subject to jury duty in either division of such district, and a jury shall be had in any criminal case or civil case at law originating in said court on the demand of either party. There shall be a district attorney and a marshal for said district. It shall be the duty of the district attorney to conduct all business, civil and criminal, for the Government, and to advise the governor of the Panama Canal on all legal questions touching the operation of the canal and the administration of civil affairs. It shall be the duty of the marshal to execute all process of the court, preserve order therein, and do all things incident to the office of marshal. The district judge, the district attorney, and the marshal shall be appointed by the President, by and with the advice and consent of the Senate, for terms of four years each, and until their successors are appointed and qualified, and during their terms of office shall reside within the Canal Zone, and shall hold no other office nor serve on any official board or commission nor receive any emoluments except their salaries. The district judge shall receive the same salary paid the district judges of the United States, and shall appoint the clerk of said court, and may appoint one assistant when necessary, who shall receive salaries to be fixed by the President. The district judge shall be entitled to six weeks' leave of absence each year with pay. During his absence or during any period of disability or disqualification from sickness or otherwise to discharge his duties the same shall be temporarily performed by any circuit or district judge of the United States who may be designated by the President, and who, during such service, shall receive the additional mileage and per diem allowed by law to district judges of the United States when holding court away from their homes.
The district attorney and the marshal shall be paid each a salary of five thousand dollars per annum.

Sec. 9. That the records of the existing courts and all causes, proceedings, and criminal prosecutions pending therein as shown by the dockets thereof, except as herein otherwise provided, shall immediately upon the organization of the courts created by this Act be transferred to such new courts having jurisdiction of like cases, be entered upon the dockets thereof, and proceed as if they had originally been brought therein, whereupon all the existing courts, except the Supreme Court of the Canal Zone, shall cease to exist. The President may continue the Supreme Court of the Canal Zone and retain the judges thereof in office for such time as to him may seem necessary to determine finally any causes and proceedings which may be pending therein. All laws of the Canal Zone imposing duties upon the clerks or ministerial officers of existing courts shall apply and impose such duties upon the clerks and ministerial officers of the new courts created by this Act having jurisdiction of like cases, matters, and duties.

All existing laws in the Canal Zone governing practice and procedure in existing courts shall be applicable and adapted to the practice and procedure in the new courts.

The Circuit Court of Appeals of the Fifth Circuit of the United States shall have jurisdiction to review, revise, modify, reverse, or affirm the final judgments and decrees of the District Court of the Canal Zone and to render such judgments as in the opinion of the said appellate court should have been rendered by the trial court in all actions and proceedings in which the Constitution, or any statute, treaty, title, right, or privilege of the United States, is involved and a right thereunder denied, and in cases in which the value in controversy exceeds one thousand dollars, to be ascertained by the oath of either party, or by other competent evidence, and also in criminal causes wherein the offense charged is punishable as a felony. And such appellate jurisdiction, subject to the right of review by or appeal to the Supreme Court of the United States as in other
cases authorized by law, may be exercised by said circuit court
of appeals in the same manner, under the same regulations, and
by the same procedure as nearly as practicable as is done in
reviewing the final judgments and decrees of the district courts
of the United States.

Sec. 10. That after the Panama Canal shall have been com-
pleted and opened for operation the governor of the Panama
Canal shall have the right to make such rules and regulations,
subject to the approval of the President, touching the right of
any person to remain upon or pass over any part of the Canal
Zone as may be necessary. Any person violating any of such
rules or regulations shall be guilty of a misdemeanor, and on
conviction in the District Court of the Canal Zone shall be
punished by a fine not exceeding five hundred dollars or by
imprisonment not exceeding a year, or both, in the discretion
of the court. It shall be unlawful for any person, by any means
or in any way, to injure or obstruct, or attempt to injure or
obstruct, any part of the Panama Canal or the locks thereof or
the approaches thereto. Any person violating this provision
shall be guilty of a felony, and on conviction in the District
Court of the Canal Zone shall be punished by a fine not exceed-
ing ten thousand dollars or by imprisonment not exceeding
twenty years, or both, in the discretion of the court. If the
act shall cause the death of any person within a year and a day
thereafter, the person so convicted shall be guilty of murder
and shall be punished accordingly.

Sec. 11. That section five of the Act to regulate commerce,
approved February fourth, eighteen hundred and eighty-seven,
as heretofore amended, is hereby amended by adding thereto
a new paragraph at the end thereof, as follows:

"From and after the first day of July, nineteen hundred and
fourteen, it shall be unlawful for any railroad company or other
common carrier subject to the Act to regulate commerce to own,
lease, operate, control, or have any interest whatsoever (by
stock ownership or otherwise, either directly, indirectly, through
any holding company, or by stockholders or directors in com-
mon, or in any other manner) in any common carrier by water operated through the Panama Canal or elsewhere with which said railroad or other carrier aforesaid does or may compete for traffic or any vessel carrying freight or passengers upon said water route or elsewhere with which said railroad or other carrier aforesaid does or may compete for traffic; and in case of the violation of this provision each day in which such violation continues shall be deemed a separate offense.”

Jurisdiction is hereby conferred on the Interstate Commerce Commission to determine questions of fact as to the competition or possibility of competition, after full hearing, on the application of any railroad company or other carrier. Such application may be filed for the purpose of determining whether any existing service is in violation of this section and pray for an order permitting the continuance of any vessel or vessels already in operation, or for the purpose of asking an order to install new service not in conflict with the provisions of this paragraph. The commission may on its own motion or the application of any shipper institute proceedings to inquire into the operation of any vessel in use by any railroad or other carrier which has not applied to the commission and had the question of competition or the possibility of competition determined as herein provided. In all such cases the order of said commission shall be final.

If the Interstate Commerce Commission shall be of the opinion that any such existing specified service by water other than through the Panama Canal is being operated in the interest of the public and is of advantage to the convenience and commerce of the people, and that such extension will neither exclude, prevent, nor reduce competition on the route by water under consideration, the Interstate Commerce Commission may, by order, extend the time during which such service by water may continue to be operated beyond July first, nineteen hundred and fourteen. In every case of such extension the rates, schedules, and practices of such water carrier shall be filed with the Interstate Commerce Commission and shall be subject to the
act to regulate commerce and all amendments thereto in the same manner and to the same extent as is the railroad or other common carrier controlling such water carrier or interested in any manner in its operation: Provided, Any application for extension under the terms of this provision filed with the Interstate Commerce Commission prior to July first, nineteen hundred and fourteen, but for any reason not heard and disposed of before said date, may be considered and granted thereafter.

No vessel permitted to engage in the coastwise or foreign trade of the United States shall be permitted to enter or pass through said canal if such ship is owned, chartered, operated, or controlled by any person or company which is doing business in violation of the provisions of the Act of Congress approved July second, eighteen hundred and ninety, entitled "An Act to protect trade and commerce against unlawful restraints and monopolies," or the provisions of sections seventy-three to seventy-seven, both inclusive, of an Act approved August twenty-seventh, eighteen hundred and ninety-four, entitled "An Act to reduce taxation, to provide revenue for the Government, and for other purposes," or the provisions of any other Act of Congress amending or supplementing the said Act of July second, eighteen hundred and ninety, commonly known as the Sherman Antitrust Act, and amendments thereto, or said sections of the Act of August twenty-seventh, eighteen hundred and ninety-four. The question of fact may be determined by the judgment of any court of the United States of competent jurisdiction in any cause pending before it to which the owners or operators of such ship are parties. Suit may be brought by any shipper or by the Attorney General of the United States.

That section six of said Act to regulate commerce, as heretofore amended, is hereby amended by adding a new paragraph at the end thereof, as follows:

"When property may be or is transported from point to point in the United States by rail and water through the Panama Canal or otherwise, the transportation being by a common
carrier or carriers, and not entirely within the limits of a single State, the Interstate Commerce Commission shall have jurisdiction of such transportation and of the carriers, both by rail and by water, which may or do engage in the same, in the following particulars, in addition to the jurisdiction given by the Act to regulate commerce, as amended June eighteenth, nineteen hundred and ten:

“(a) To establish physical connection between the lines of the rail carrier and the dock of the water carrier by directing the rail carrier to make suitable connection between its line and a track or tracks which have been constructed from the dock to the limits of its right of way, or by directing either or both the rail and water carrier, individually or in connection with one another, to construct and connect with the lines of the rail carrier a spur track or tracks to the dock. This provision shall only apply where such connection is reasonably practicable, can be made with safety to the public, and where the amount of business to be handled is sufficient to justify the outlay.

“The commission shall have full authority to determine the terms and conditions upon which these connecting tracks, when constructed, shall be operated, and it may, either in the construction or the operation of such tracks, determine what sum shall be paid to or by either carrier. The provisions of this paragraph shall extend to cases where the dock is owned by other parties than the carrier involved.

“(b) To establish through routes and maximum joint rates between and over such rail and water lines, and to determine all the terms and conditions under which such lines shall be operated in the handling of the traffic embraced.

“(c) To establish maximum proportional rates by rail to and from the ports to which the traffic is brought, or from which it is taken by the water carrier, and to determine to what traffic and in connection with what vessels and upon what terms and conditions such rates shall apply. By proportional rates are meant those which differ from the corresponding local rates to and from the port and which apply only to traffic which has
been brought to the port or is carried from the port by a common carrier by water.

“(d) If any rail carrier subject to the Act to regulate commerce enters into arrangements with any water carrier operating from a port in the United States to a foreign country, through the Panama Canal or otherwise, for the handling of through business between interior points of the United States and such foreign country, the Interstate Commerce Commission may require such railway to enter into similar arrangements with any or all other lines of steamships operating from said port to the same foreign country.”

The orders of the Interstate Commerce Commission relating to this section shall only be made upon formal complaint or in proceedings instituted by the commission of its own motion and after full hearing. The orders provided for in the two amendments to the Act to regulate commerce enacted in this section shall be served in the same manner and enforced by the same penalties and proceedings as are the orders of the commission made under the provisions of section fifteen of the Act to regulate commerce, as amended June eighteenth, nineteen hundred and ten, and they may be conditioned for the payment of any sum or the giving of security for the payment of any sum or the discharge of any obligation which may be required by the terms of said order.

SEC. 12. That all laws and treaties relating to the extradition of persons accused of crime in force in the United States, to the extent that they may not be in conflict with or superseded by any special treaty entered into between the United States and the Republic of Panama with respect to the Canal Zone, and all laws relating to the rendition of fugitives from justice as between the several States and Territories of the United States, shall extend to and be considered in force in the Canal Zone, and for such purposes and such purposes only the Canal Zone shall be considered and treated as an organized Territory of the United States.

SEC. 13. That in time of war in which the United States shall
be engaged, or when, in the opinion of the President, war is imminent, such officer of the Army as the President may designate shall, upon the order of the President, assume and have exclusive authority and jurisdiction over the operation of the Panama Canal and all of its adjuncts, appendants, and appurtenances, including the entire control and government of the Canal Zone, and during a continuance of such condition the governor of the Panama Canal shall, in all respects and particulars as to the operation of such Panama Canal, and all duties, matters, and transactions affecting the Canal Zone, be subject to the order and direction of such officer of the Army.

Sec. 14. That this Act shall be known as, and referred to as, the Panama Canal Act, and the right to alter, amend, or repeal any or all of its provisions or to extend, modify, or annul any rule or regulation made under its authority is expressly reserved.

Approved, August 24, 1912.
### APPENDIX D

**EQUIPMENT AT PERIOD OF GREATEST ACTIVITY**

#### Canal Service

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam shovels:</td>
<td></td>
</tr>
<tr>
<td>105-ton, 5-cubic-yard dippers</td>
<td>15</td>
</tr>
<tr>
<td>95-ton, 4- and 5-cubic-yard dippers</td>
<td>30</td>
</tr>
<tr>
<td>70-ton, 2½- and 3-cubic-yard dippers</td>
<td>33</td>
</tr>
<tr>
<td>66-ton, 2½-cubic-yard dippers</td>
<td>10</td>
</tr>
<tr>
<td>45-ton, 1¾-cubic-yard dippers</td>
<td>11</td>
</tr>
<tr>
<td>26-ton</td>
<td>1</td>
</tr>
<tr>
<td>Trenching shovel, ¾-cubic-yard dipper</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>101</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Locomotives:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>American—</td>
<td></td>
</tr>
<tr>
<td>106 tons</td>
<td>100</td>
</tr>
<tr>
<td>105 tons</td>
<td>41</td>
</tr>
<tr>
<td>117 tons</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>161</strong></td>
</tr>
</tbody>
</table>

| French                      | 104      |
| Narrow gauge, American, 16 tons | 33       |
| Electric                    | 9        |
| **Total**                   | **307**  |

<table>
<thead>
<tr>
<th>Drills:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical churn, or well</td>
<td>196</td>
</tr>
<tr>
<td>Tripod</td>
<td>357</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>553</strong></td>
</tr>
<tr>
<td>Equipment Type</td>
<td>Quantity</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Cars:</td>
<td></td>
</tr>
<tr>
<td>Flat, used with unloading plows</td>
<td>1,760</td>
</tr>
<tr>
<td>Steel dumps, large</td>
<td>596</td>
</tr>
<tr>
<td>Steel dumps, small</td>
<td>1,207</td>
</tr>
<tr>
<td>Ballast dumps</td>
<td>24</td>
</tr>
<tr>
<td>Steel flats</td>
<td>487</td>
</tr>
<tr>
<td>Narrow gauge</td>
<td>209</td>
</tr>
<tr>
<td>Motor</td>
<td>6</td>
</tr>
<tr>
<td>Pay Car</td>
<td>1</td>
</tr>
<tr>
<td>Pay Certificate</td>
<td>1</td>
</tr>
<tr>
<td>Automatic, electric</td>
<td>45</td>
</tr>
<tr>
<td>Decauville</td>
<td>224</td>
</tr>
<tr>
<td>Special, shops</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,572</strong></td>
</tr>
<tr>
<td>Spreaders</td>
<td>26</td>
</tr>
<tr>
<td>Trackshifters</td>
<td>9</td>
</tr>
<tr>
<td>Unloaders</td>
<td>30</td>
</tr>
<tr>
<td>Pile-drivers</td>
<td>14</td>
</tr>
<tr>
<td>Dredges:</td>
<td></td>
</tr>
<tr>
<td>French ladder</td>
<td>7</td>
</tr>
<tr>
<td>Dipper</td>
<td>3</td>
</tr>
<tr>
<td>Pipe-line</td>
<td>7</td>
</tr>
<tr>
<td>Sea-going suction</td>
<td>2</td>
</tr>
<tr>
<td>Clam shell</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
<tr>
<td>Cranes</td>
<td>47</td>
</tr>
<tr>
<td>Rock-breaker</td>
<td>1</td>
</tr>
<tr>
<td>Tugs</td>
<td>11</td>
</tr>
<tr>
<td>Towboat</td>
<td>1</td>
</tr>
<tr>
<td>House-boats</td>
<td>3</td>
</tr>
<tr>
<td>Clapets</td>
<td>12</td>
</tr>
<tr>
<td>Pile-driver, floating</td>
<td>3</td>
</tr>
<tr>
<td>Crane-boat</td>
<td>1</td>
</tr>
</tbody>
</table>
**APPENDIX D**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barges, lighters and scows</td>
<td>72</td>
</tr>
<tr>
<td>Launches</td>
<td>29</td>
</tr>
<tr>
<td>Drill-boats</td>
<td>2</td>
</tr>
<tr>
<td>Floating derricks</td>
<td>2</td>
</tr>
</tbody>
</table>

**Panama Railroad**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locomotives:</td>
<td></td>
</tr>
<tr>
<td>Road (12 oil-burners)</td>
<td>36</td>
</tr>
<tr>
<td>Switch</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
</tr>
<tr>
<td>Cars:</td>
<td></td>
</tr>
<tr>
<td>Coaches</td>
<td>57</td>
</tr>
<tr>
<td>Freight</td>
<td>1,434</td>
</tr>
<tr>
<td>Total</td>
<td>1,491</td>
</tr>
<tr>
<td>Cranes:</td>
<td></td>
</tr>
<tr>
<td>Locomotive</td>
<td>2</td>
</tr>
<tr>
<td>Wrecking</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
<tr>
<td>Pile-drivers:</td>
<td></td>
</tr>
<tr>
<td>Track</td>
<td>1</td>
</tr>
<tr>
<td>Floating</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
</tr>
<tr>
<td>Tugboat</td>
<td>1</td>
</tr>
<tr>
<td>Lighters:</td>
<td></td>
</tr>
<tr>
<td>Coal, all steel</td>
<td>5</td>
</tr>
<tr>
<td>Cargo, steel and iron</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
</tr>
<tr>
<td>Motor-boats</td>
<td>2</td>
</tr>
<tr>
<td>Steam ditcher</td>
<td>1</td>
</tr>
</tbody>
</table>
APPENDIX E

DISTANCES IN NAUTICAL MILES

Saved from New York via the Panama Canal on Trade Routes

<table>
<thead>
<tr>
<th></th>
<th>San Francisco:</th>
<th>Honolulu:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Magellan</td>
<td>Magellan</td>
</tr>
<tr>
<td></td>
<td>13,135</td>
<td>13,312</td>
</tr>
<tr>
<td></td>
<td>Panama</td>
<td>Panama</td>
</tr>
<tr>
<td></td>
<td>5,262</td>
<td>6,700</td>
</tr>
<tr>
<td>Saved</td>
<td>7,873</td>
<td>Saved</td>
</tr>
<tr>
<td></td>
<td>Saved</td>
<td>6,612</td>
</tr>
</tbody>
</table>

|                      | Guayaquil:     | Manila:          |
|                      | Magellan       | Suez             |
|                      | 10,215         | 11,589           |
|                      | Panama         | *Panama          |
|                      | 2,810          | 11,548           |
| Saved                | 7,405          | Saved            |
|                      | Saved          | 41               |

|                      | Callao:        | Yokohama:        |
|                      | Magellan       | Suez             |
|                      | 9,613          | 13,079           |
|                      | Panama         | *Panama          |
|                      | 3,363          | 9,798            |
| Saved                | 6,250          | Saved            |
|                      | Saved          | 3,281            |

|                      | Iquique:       | Hongkong:        |
|                      | Magellan       | Suez             |
|                      | 9,143          | 11,628           |
|                      | Panama         | *Panama          |
|                      | 4,004          | 11,383           |
| Saved                | 5,139          | Saved            |
|                      | Saved          | 245              |

|                      | Valparaiso:    | Melbourne:       |
|                      | Magellan       | Magellan         |
|                      | 8,380          | 12,852           |
|                      | Panama         | Panama           |
|                      | 4,633          | 10,030           |
| Saved                | 3,747          | Saved            |
|                      | Saved          | 2,822            |

*Via San Francisco and the Great Circle.
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