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ANNUAL REPORT

OF THE

GOVERNOR OF THE PANAMA CANAL

FOR THE

FISCAL YEAR
ENDED JUNE 30

1918

WASHINGTON
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1918

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ANNUAL REPORT

OF THE

GOVERNOR OF THE PANAMA CANAL.

THE PANAMA CANAL,
OFFICE OF THE GOVERNOR,
Balboa Heights, Canal Zone, September 21, 1918.

SIR: I have the honor to submit the annual report covering the construction, operation, maintenance, and sanitation of The Panama Canal for the fiscal year ended June 30, 1918.

ORGANIZATION.

The war emergency has caused several changes in personnel. The following officers of the Army and Navy were relieved from duty with The Panama Canal on the dates indicated:

Commander H. I. Cone, marine superintendent, August 21, 1917.

Lieut. Col. J. J. Morrow, engineer of maintenance, August 31, 1917.

Lieut. Col. W. R. Grove, chief quartermaster, September 22, 1917.

Col. D. C. Howard, chief health officer, October 4, 1917, and his successor, Col. A. E. Truby, February 26, 1918.

Capt. F. H. Smith, assistant chief quartermaster, October 10, 1917.

Lieut. Col. T. H. Dillon, electrical engineer, February 6, 1918.

Lieut. Commander P. P. Bassett, captain of the port, Cristobal, August 14, 1917.

Lieut. Commander A. B. Reed, captain of the port, Balboa, August 14, 1917.

Capt. H. D. Mitchell, chief of police, July 8, 1917.

Lieut. Col. Earl I. Brown, chief of the Washington office, August 25, 1917, and his successor, Maj. Benedict Crowell, December 1, 1917.

The position of engineer of maintenance remained vacant throughout the remainder of the fiscal year. Mr. Walter J. Douglas, who was appointed to fill the position on May 13, 1918, assumed the duties on July 1, 1918. The position of marine superintendent was filled on January 23, 1918, by the appointment of Commander L. R. Sargent, United States Navy, who was detailed by the Navy Department for duty under the Governor of The Panama Canal and assignment to the position. The vacancy as chief quartermaster was filled by the appointment of Mr. R. K. Morris, who had been employed for a num-

ber of years in important capacities in that department. The position of chief health officer vacated by Col. Truby was filled by the appointment of Maj. A. T. McCormack, Medical Reserve Corps. Mr. A. L. Flint, chief clerk, was appointed chief of the Washington office as successor to Maj. Crowell, who resigned that position upon his appointment as Assistant Secretary of War. In addition to the officers mentioned, a total of 296 employees of The Panama Canal in various capacities resigned in order to enter the military or naval service, or to assume positions in the National Red Cross and other organizations immediately engaged on war work. During the existence of the vacancies in the positions of engineer of maintenance and marine superintendent, the duties of those positions were directly assumed by the Governor. During the absence of the Governor on duty in the United States, from December 13, 1917, to January 23, 1918, his duties on the Isthmus were assumed, by authority of the Secretary of War, by Judge Frank Feuille, as acting governor. Judge Feuille acted in the same capacity during the illness of the Governor from January 28, 1918, to February 25, 1918.

Except as above stated the heads of the departments and divisions reporting to the Governor remained as stated in last year's report.

To assist in the adminstration of the electrical division and the operation and maintenance of the locks in the absence of an engineer of maintenance, Lieut. Col. Dillon was given immediate supervision over the conduct of those branches of the work until his relief from duty with the canal, when he was succeeded in those duties by Mr. Hartley Rowe.

DEPARTMENT OF OPERATION AND MAINTENANCE.

On August 4, 1917, Mr. T. B. Monniche, engineer of docks, resigned, and his duties were transferred to the resident engineer of the building division on August 5, 1917. Thereafter the construction of the terminal structures in progress which had been conducted under the immediate supervision of the engineer of maintenance, was continued under the charge of Mr. Hartley Rowe, resident engineer, head of the building division.

Building Division.

Pier No. 6, Cristobal.—The construction of Pier No. 6 at Cristobal, authorized by the sundry civil act of July 1, 1916, was continued. At the beginning of the year the driving of the foundation cylinders was 70 per cent complete. The excavation of material from the cylinders was 73 per cent complete, and the filling of the cylinders with concrete was 50 per cent complete. The driving of the cylinders was completed September 7, 1917, with a total of 22,610 linear feet

in place. The excavation of material from the cylinders was completed September 19, 1917, with a total of 14,382 cubic yards removed. The filling of the cylinders with concrete was completed on October 19, 1917, with a total of 22,005 yards poured. The total cost of the completed cylinders, including excavation and concreting, was $550,894.20, and the total cost of the substructure, including trestle, false work, power and water lines, railway tracks, etc., was $687,677.04. Certain changes in the construction plant and in the design of the floor structure, in order to overcome so far as possible increased costs of materials, were described in the report for last year. As stated therein, when bids were received for the steel work the prices had advanced to such an extent as to make necessary the abandonment of the steel construction for the floor system and the substitution of reinforced concrete construction. On account of the heavy loads and of the large spans involved, and especially on account of the lack of rigidity against lateral movement of the long cylinders supporting the structure, considerable difficulty was experienced in determining a satisfactory design. The problem was successfully solved and the construction proceeded with a material saving in cost as compared with the original design, but in spite of the economies applied it became evident that on account of the abnormal increase in the prices of materials the completed structure could not be built for the original limit cost of $1,500,000 fixed by law. Upon representation to Congress an additional appropriation of $592,190 was obtained in the urgent deficiency bill which became a law on March 28, 1918.

The original plans for the superstructure contemplated a shed of structural steel of a design similar to that of Pier No. 7. Upon obtaining bids for the material involved in this superstructure it was found necessary to redesign the shed, abandoning the structural steel plans and adopting reinforced concrete, with an estimated saving of $177,000.

At the close of the year the state of completion was as follows: Floor, 35 per cent; cylinders, 100 per cent; pier as a whole, 60 per cent. The construction of the shed had not been started at the end of the year.

Boat landing and launch house between Piers Nos. 7 and 8, Cristobal.—At the beginning of the year work on this structure was in suspense awaiting material for the superstructure. The erection was resumed on October 6, 1917, upon arrival of the materials, and by October 25, 1917, the entire amount of 511,570 pounds of structural steel for the floor and shed had been erected. The pouring of the concrete for encasing the girders and for the floor slab was begun on October 31, 1917, and completed December 8, 1917. The concrete

work for the shed was started December 6, 1917, and completed January 12, 1918. The structure was entirely completed in March, 1918, and turned over to the marine division for use. The total cost of the completed structure was $109,939.07.

Miscellaneous buildings.—Other than the construction of the terminal facilities the operations of the building division included the continuation of the Ancon Hospital group of buildings, quarters for nurses at Colon Hospital, a dispensary at Gatun, the extension of the building housing the hydroelectric generating plant at Gatun, the garbage incinerator at Balboa, the local freight and baggage building for the Panama Railroad at Docks Nos. 9 and 10, Cristobal, cold storage building and industrial plant for the Panama Railroad at Mount Hope, an oil tank for the supply department at Mount Hope, buildings for the Mindi dairy farm, quarters for canal and Panama Railroad employees, and various quarters and other buildings for the Army and Navy provided for in appropriations of Congress and alloted to the Governor of The Panama Canal for expenditure.

The buildings completed and under construction in the Ancon Hospital group complete the project initiated in 1915. They include the following: Administrative and clinics building; kitchen and mess; section A, ward group; section B, ward group; section C, ward group; section D, ward group; isolation ward; dispensary; medical storehouse; laboratory and crematory; power house; superintendent's home; nurses' quarters; and garage. The plant provides a thoroughly equipped hospital of 690 beds, and is capable of expansion without undue crowding to 888 beds. The structures are all of permanent material and replace old French buildings. Several frame buildings occupied as quarters by the hospital staff and the old frame wards Nos. 17 to 23, inclusive, will remain within the hospital grounds and be utilized until their deterioration progresses sufficiently to justify their removal. Work was in progress during the year on the administration building, kitchen and mess, section C and section D ward groups, the isolation ward, the nurses' home, power house, and the garage, and covered passageways connecting different groups of buildings. By the end of the year there were completed and occupied the administration building with connecting covered ways; kitchen and mess, and the isolation ward. Section C ward group was 60 per cent complete, section D ward group 40 per cent complete, the nurses' home 98 per cent, the power house 95 per cent, and the garage 50 per cent complete. The total cost of the completed building project for the new Ancon Hospital will be $1,768,762, of which $1,292,835.04 was expended by the end of the year. The two large ward groups, C and D, are of uniform type and design of construction with the other ward groups heretofore completed.

The nurses' home, located in convenient proximity to the ward buildings, is three stories in height, 233 feet long, and 46 feet wide, and provides accommodation for 72 nurses and one chief nurse. The power house is a reinforced concrete structure with corrugated asbestos roof, and is one story high, 48 feet 6 inches by 62 feet 6 inches, with open sides and wide overhanging eaves. The building contains two 50-H. P. oil-burning boilers and supplies steam to all the hospital buildings and the shop for the hospital carpenter and plumber. The garage contains stalls for 8 hospital trucks and ambulances. It is a one-story structure 21 feet 3 inches by 80 feet 6 inches.

The nurses' home at Colon Hospital, begun in September, 1917, was completed during the year at a cost of $34,387.51. It is a two-story building, 45 feet by 70 feet, situated on the beach adjacent to Colon Hospital, and provides quarters for 13 nurses and 2 maids. The construction is of reinforced concrete columns, girders, and floor slabs, with walls and partitions of hollow concrete blocks; the roof is of red tile.

A dispensary was constructed at Gatun containing living apartments for the district physician, office of the district dentist, and the necessary office for the dispensing of medicines. The building is two stories high, 36 feet by 66 feet, of hollow block concrete construction, except the bearing columns and floor slabs, which are of reinforced concrete. The cost of the completed structure was $34,490.17.

The extension of the house inclosing the hydroelectric plant at Gatun, which was begun in November, 1916, was 99 per cent completed at the end of the year. The extension doubles the original size of the building and forms a continuation thereof. It is constructed with the same kinds of materials and of identical design.

The garbage incinerator plant for the consumption of garbage from the towns at the Pacific terminal of the canal and from the city of Panama, was completed. The structure is 42 feet by 66 feet 6 inches, of concrete construction, with a tile roof. Its location on a point of land formerly known as Gavilan Island was determined with reference to convenience of access from the different localities supplying the garbage, reducing as much as possible the passage of garbage wagons through streets of populated districts. The building was constructed of sufficient capacity to allow for an increase in the number of incinerating units as the increase of population might make necessary. The total cost of the plant, including building and equipment, is $116,055.92.

The report of the resident engineer, Appendix B, gives descriptions in detail of the buildings constructed and detailed items of cost.

Locks Operation.

There were 1,936 commercial and 335 noncommercial lockages at Gatun, and 2,096 commercial vessels were passed; at Pedro Miguel there were 2,041 commercial and 379 noncommercial lockages, and 2,083 commercial vessels were passed; at Miraflores there were 2,017 commercial and 326 noncommercial lockages, and 2,081 commercial vessels were passed. The number of ships passed exceeded the number of lockages on account of passing more than one ship through in one lockage under certain conditions. There were no delays to ships due to the failure of the operating machinery of the locks, and as heretofore the damage to vessels has been chiefly due to the breaking of chocks and bitts.

The maintenance work consisted of constant inspection of and attention to all of the lock operating machinery and such painting of gates and other steel parts as was required. The wall fenders originally installed have in some cases become unserviceable through decay and have been replaced by timbers of almendra, a native hardwood. Four new towing locomotives manufactured in the mechanical division shops were completed and placed in service during the year, two at Gatun locks and two at the Pacific locks. The installation of electric equipment on these locomotives was done by the lock forces. For purposes of inspection and maintenance work, lock chambers were unwatered at the different locks as follows: At Gatun, west chamber, middle and lower levels, from January 14 to February 23; east chamber, middle and lower levels, from March 1 to March 23; east chamber, upper level, April 9 to April 15. At Miraflores, east chamber, lower level, from August 29 to September 30.

Besides the necessity for painting portions of the gates, the chief indications of deterioration developing during these inspections were as heretofore the corrosion due to electrolytic action on valves and their fittings. Further inspection of the valves at Miraflores locks where greenheart lumber was used to replace metal valve seats and lignum-vitæ side seals in place of machinery steel, indicated the substitutions to be the best means thus far investigated for checking the trouble, and accordingly the same means were applied this year at Gatun. At Miraflores locks trouble has been experienced from the grounding of the control cables. As originally installed these cables were insulated with varnished cambric and were lead sheathed. On investigation it was found that the lead sheathing had become badly pitted, and in some places had entirely disappeared. A total of six control cables in the middle crossover were found to be defective to varying degrees. Every case was found to be in the side wall of the vertical shafts in a position where the lead was exposed to contact with water that had seeped through the concrete, and the corrosion

and destruction of the lead covering proved to be due to the chemical action of the seepage water which contained lime salts of sufficient strength to act upon the lead. The cables affected were withdrawn and new cables were installed in a different location, supported on hangers, where they would not be exposed to the seepage water, and no further trouble has developed since the change. The timber fenders at the end of the south approach wall at Pedro Miguel locks were renewed on account of the deterioration of the original fenders by the teredo. Repairs due to the same cause but to a less extent were made to the fender at the end of the north approach wall at Miraflores locks. In order to maintain the level of Miraflores Lake within the prescribed limits it was necessary to make 254 operations of the Miraflores spillway gates. To provide a settling basin and reduce maintenance of the channel in Miraflores Lake, an earthern dam was constructed before the completion of the canal across the Rio Grande River that discharges into Miraflores Lake on the west of the Pedro Miguel locks. On September 6, 1917, after a heavy rainfall, the discharge from this river exceeded the capacity of the spillway in the dam and the dam overflowed, carrying it out for about 80 feet and suddenly releasing 8 feet head of water. This caused a sudden and heavy discharge into Miraflores Lake and necessitated the opening of three gates in the Miraflores spillway for 40 minutes in order to prevent an excessive rise in Miraflores Lake.

The contract with the American Bitumastic Enamels Company under which the original painting of the interior of lock gates was done with a guarantee for a period of 5 years, expires in January, 1919. Under an arrangement agreed upon in January, 1918, the contractors withdrew their representative and men and turned the maintenance work under their contract over to the canal, the cost of the work to be billed to the contractors. Inspection of the interior of the gates and the application of the bitumastic wherever necessary is in progress so as to have everything in order at the expiration of the original guarantee.

Electrical Division.

Upon the relief from duty with the canal of Lieut. Col. T. H. Dillon, United States Army, on February 5, 1918, he was succeeded as electrical engineer by Mr. Walter L. Hersh. The operation and maintenance of the steam and hydroelectric power plants, substations, transmission lines and power distribution systems, street and house lighting systems, telephone and telegraph, fire alarm, railway block signal systems, and railway interlocking plants, all under the supervision of the electrical division, were satisfactorily conducted. New work was carried on in connection with the electrical installation for light, heat, and power at additions to the Army and Navy establish-

ments in the Canal Zone, as well as for the extensions of canal enterprises. The principal construction work in progress was the extension of the hydroelectric plant at Gatun spillway, as described in the report for last year. In this project three additional penstocks were installed at the Gatun spillway, providing for the No. 4 generating unit and for the two units, Nos. 5 and 6, that when installed will develop the plant to its maximum capacity. In the installation of these penstocks it was necessary to excavate 14,946 yards of material. The material was used in part in making a fill along the axis of the dam just west of its junction with Gatun locks, in order to restore to full dimensions a portion of the dam, that since its construction had settled below its original elevation. The head gate house, head gates, trash racks, and head gate operating machinery, including switchboard and wiring involved in the installation of the additional penstocks, were completed. The 4,500 K. W. generator unit and the 6,750 H. P. Pelton Francis turbine were received in May and erection was started on June 1. The 275 K. W. turbine exciter set was completed. The extension of this plant as now authorized will be completed by January 1, 1919, resulting in a capacity of 13,140 K. W., with provisions for future installations of two additional 4,500 K. W. units, making a total capacity of the plant of 22,140 K. W.

The changes and additions at the generating station at Gatun necessitated certain modifications at the Gatun substation to adapt it to the 6,600-volt instead of the 2,200-volt generation. The work involves the installation of one 8,400 K. V. A. 6,600–44,000 volt water-cooled transformer; the complete remodeling of concrete cells for oil circuit breakers and for instrument transformers; the installation of higher capacity circuit breakers; changes and additions to the existing switchboard; the installation of two 1,500 K. V. A. 6,600–2,200 volt water-cooled transformers; the reconnection of two 4,000 K. V. A. 2,200–44,000 transformers for 6,600–44,000 volt operation; and the removal of two 2,667 K. V. A. 2,200–44,000 volt transformers. These changes were in progress at the close of the fiscal year, and when complete the Gatun substation will be equipped with two 1,500 K. V. A. 6,600–2,200 volt transformers for local distribution, and two 4,000 K. V. A. and one 8,400 K. V. A. 6,600–44,000 volt transformers for distant transmission, with provisions for future installation of one 8,400 K. V. A. transformer. At the Miraflores substation certain changes were made, as described in detail in the report of the electrical engineer, for the purpose of releasing equipment for service at one of the naval establishments in the Canal Zone, thus affording temporary power facilities nine months in advance of the possible receipt from the manufacturers in the States of the permanent equipment required.

At the Balboa substation an additional 2,200-volt feeder equipment was installed for the operation of the air compressing plant in Balboa shops, and a similar unit for feeding auxiliary power to the Pacific forts. The principal items involved in extensions and improvements to the underground power distribution system included extensions to the townsite of New Cristobal, new cold storage plant at Cristobal, and to the naval reservation.

The net output of power generated averaged 4,419,192 K. W. H. per month, as compared with 4,190,020 K. W. H. per month last year. The increase in output has been generated principally at the hydroelectric station at Gatun, and the fuel oil consumption at the auxiliary steam plant at Miraflores was reduced from an average of 3,428 barrels per month to 2,906 barrels per month. The average cost of current generated and distributed for power purposes for the year was 0.7782 cent per K. W. H. The average cost of current per K. W. H. for lighting purposes, including cost of generation and transmission, maintenance of house lighting systems and lamp renewals, was 0.013179 cent. The Miraflores steam generating plant carries a load only at such times as the total load exceeds the capacity of the hydroelectric station at Gatun. During the year there was a total additional load on the generating plants of 1,900 K. W. for power and 270 K. W. for light.

There were 29 failures of the transmission line, as compared with 17 during the preceding year, due to insulation troubles.

There was a net increase of 369 telephone installations, and the average number of telephone calls per day of eight hours was 21,816.

Two additional fire-alarm boxes were installed at New Cristobal; four on the dock at La Boca, and a new fire alarm register at Ancon fire station.

For further details attention is invited to Appendix A.

Municipal Engineering Division.

The work of this division under the supervision of Mr. D. E. Wright, as municipal engineer, included the care and maintenance of water reservoirs, maintenance and operation of pumping stations and filtration plants, maintenance and repair of municipal improvements in the Canal Zone and the cities of Panama and Colon, the municipal construction work in the townsites of the Canal Zone and at the Army and Navy establishments. In the supply of water for all purposes the total number of gallons pumped during the year at the various stations was as follows: At Mount Hope, 1,442,275,000; at Agua Clara, 428,401,000; at Gamboa, 3,462,016,000; at Miraflores, 379,460,000; at Balboa, 2,383,659,575; and at Paraiso, 74,540,000. The average division cost per thousand gallons for water delivered to the various districts of the Canal Zone was as follows: Cristobal, $0.08; Gatun, $0.11;

Gamboa, $0.09; Paraiso, $0.06; Pedro Miguel, $0.06; Miraflores, $0.06; and Balboa-Ancon, $0.07. These figures include the charges for pumping and the operation and maintenance of the filtration plants. At Cristobal 1,420 ships were supplied with 44,875,000 gallons of water, and at Balboa 827 vessels were supplied with 24,067,600 gallons. The city of Panama consumed 858,402,000 gallons, and the city of Colon, including The Panama Canal and Panama Railroad reservations in Colon, consumed 591,209,125 gallons. The water revenue derived from private consumers in Panama totaled $152,-100.05, and in Colon $105,092.45. In the cities of Panama and Colon the municipal division expended $154,960.85 in the upkeep of streets and water and sewer systems. This expense is reimbursed, under the canal treaty, from the water revenues in the two cities. For new construction work by the municipal division in the towns and villages occupied by the Panama Canal employees, a total of $545,723.55 was spent. The items included the grading of grounds and extensions of roads, water and sewer systems for the new buildings in the hospital grounds at Ancon; the grading of grounds and installation of water and sewer systems in connection with the new schoolhouses at Ancon, Balboa, Pedro Miguel, Gatun, and Cristobal; resurfacing of the streets in old Cristobal and in Gatun, the Mount Hope-Colon road, Ancon-Corozal road, Corozal-Pedro Miguel road, East La Boca road, Sosa Hill road, and roads in the Balboa shop district; and the construction of new and extension of old sidewalks in the various towns occupied by canal employees. For the United States Army the municipal division performed work at a total expense of $258,416.59, including the completion of work under way the preceding year in the various posts; construction of concrete streets and sidewalks, extension of water and sewer systems, and the installation of water and sewer pumping station at Fort Sherman. There was also included the making of the necessary surveys and the preparation of plans and estimates for the proposed new Army posts at Gatun, Miraflores, Corozal, Diablo, and Corundu River. For the Panama Railroad this division performed work at a cost of $187,401.82, including the completion of the Corundu River storm sewer, the filling of and installation of water, sewers, and streets for the Folks River section of Colon extension; the installation of water, sewers, streets, and sidewalks for the chicken farm at New Culebra, renamed Summit; the installation of water lines and pumps for irrigating work on the various plantations; the construction of roads and sewers for the hog farm near Mindi; and the construction of roads and water and sewer systems for the Mindi dairy farm.

In the performance of work for various outsiders, including the construction of roads, sewers, and water lines for the area to be occupied by the cable company, concrete construction work for the

Panama Tramway Co., repairs to streets in Panama and Colon where gas connections were made, and making water and sewer connections for private parties in the cities of Colon and Panama, there was a total expense of $42,282.94, covered by deposits made by the interested parties.

For ratproofing of docks Nos. 13, 14, 15, and pier No. 18 a total of $56,896.93 was expended. On work requests from the building division for municipal work in connection with new buildings constructed, work was performed at a total cost of $91,419.28. In the construction of concrete ditches and drains, filling of swamp areas, preparation of estimates for proposed work, and maintenance of pumping station at Palo Seco leper colony, the sum of $37,325.83 was spent for the health department. Miscellaneous construction jobs at a total cost of $118,092.70 were done for the divisions of fortifications, clubs and playgrounds, locks, electrical, marine, dredging, mechanical, and supply.

During the year a total of 224,581 square yards of concrete streets and roads was constructed, and 12,268 square yards of roadway with Telford and macadam base, with a wearing surface of asphaltic concrete and Tarvia.

In the chemical laboratory at Miraflores water purification plant investigations were made of the concrete aggregates in general use on the canal in order to determine the necessity or otherwise of washing the aggregate before incorporating it in the concrete. From these investigations it has been determined that the extra expense in washing the aggregate is justified where uniformity of product and especially where the full strength of concrete is desired. This laboratory analyzed samples of paint, lime, alum, fertilizers, etc., and made special investigations of the cause of corrosion of the lead-sheathed cables at Miraflores locks. In addition the laboratory performed its normal duties in connection with the operation of the water purification plants. The filtered and treated water from the purification plants was maintained at a high standard of excellence.

For details of the operations of the municipal division, see report of the municipal engineer, Appendix A.

Meteorology and Hydrography.

The former head of this division, Mr. F. D. Willson, chief hydrographer, resigned, effective July 17, 1917, and was succeeded by Mr. R. Z. Kirkpatrick. Mr. Kirkpatrick resigned, effective April 13, 1918, to enter the military service, and Mr. H. G. Cornthwaite was appointed his successor. The existing observation stations were continued in operation and certain new stations were established, as follows: A station for the measurement of rainfall on Bohio Island, November 1, 1917, equipped with standard rain gauge; equip-

ment for the measurement of evaporation at Alhajuela, February 23, 1918; standard rain gauge on the Pedro Miguel River, June 25, 1918; standard rain gauge at Taboga, January 10, 1918, and a rainfall station at Darien on June 29, 1918.

The rainfall during the calendar year 1917 was above normal in the interior sections of the Canal Zone, and below normal along the Atlantic and Pacific coasts. The least rainfall for the calendar year was at Balboa, 64.11 inches, and the greatest rainfall was 145.96 inches at the Gatun River station. In the Pacific section the average for the year was 80.37 inches; in the Central section, 103.17; and in the Atlantic section 131.01 inches. The maximum 24-hour rainfall recorded was 8.58 inches at Gatun on April 28–29. During the first six months of the calendar year 1918 the rainfall averaged approximately normal at all stations.

The air temperature for the calendar year 1917 averaged from 1° to 2° F. below normal. The highest temperature recorded was in April and the lowest in February. At Balboa Heights the maximum temperature recorded was 94° F. on April 25, and the minimum recorded was 58° F. at Alhajuela on February 5. During the first six months of the calendar year 1918 the temperature has been generally below normal.

The wind movements over the Canal Zone have been normal. The maximum velocity recorded was at Colon on November 24, 42 miles an hour.

The evaporation from the surface of Gatun Lake, as measured at Gatun, was slightly below normal during the year. The usual prevalence of fogs occurred at the interior stations, and there were no fogs at either entrance of the canal. As the fogs are, as a general rule, dissipated by 8.45 a. m., no difficulties were experienced on their account in the navigation of the canal.

Thirty seismic disturbances were recorded at the Balboa Heights station during the fiscal year. They were all of low intensity, the maximum being that of August 31, 1917, which registered III on the Rossi-Forel scale. No damage resulted in the Canal Zone from any of these disturbances. The destructive earthquakes in Guatamala City and vicinity in December, 1917, and January, 1918, were recorded at the Balboa Heights instrument, but the intensity here was low.

No changes were made in the hydrographic stations and equipment. A water-stage register was established at Gatuncillo at the head of the Chagres River arm of Gatun Lake. There were four freshets in the Chagres River, the largest of which occurred on May 5, 1918, and gave a maximum momentary discharge of 61,200 cubic feet per second. This has been exceeded but three times in 20 years at Alhajuela, December, 1906, and November and December, 1909.

On January 1, 1918, Gatun Lake was at elevation plus 87.02. During the dry season it gradually fell to a minimum elevation of plus 84.52 on April 21. The consumption of water from Gatun Lake was due to causes with percentages stated as follows: Spillway discharge 67 per cent; hydroelectric station 16 per cent; evaporation 9 per cent; canal lockages and miscellaneous uses and losses 7 per cent. The spillway discharge represents the necessary waste during the wet season in order to maintain the surface of the lake at and below the prescribed maximum height. As discussed in last year's report, the annual water supply for Gatun Lake has proved to be sufficient for the use of the canal to its capacity. In dry seasons of exceptional length and intensity it will be necessary to conserve the water used at hydroelectric generating plant in order to maintain the lake level above the minimum of plus 80, when the number of lockages approaches the practicable limit of an average of 36 per day. At such time the deficiency in the electrical output of the generating station at Gatun may be supplemented by the operation of the steam generating plant at Miraflores.

For details see the report of the chief hydrographer, Appendix A.

Surveys.

Upon the resignation of Mr. O. E. Malsbury, assistant engineer, to accept a commission in the Army, the survey work was placed in charge of Mr. F. R. Fitch, assistant engineer, September 11, 1917. In Colon, corner and grade stakes were set on 46 lots and alley stakes on 35 lots. Sixteen block monuments were lowered to sidewalk level, and eight monuments were set in the section east of E Street. In Panama 19 block monuments, which had been destroyed by street improvements, were replaced; 28 block monuments were set in Guachapali section. Monthly observations were continued on settlement hubs at Gatun dam, which indicated normal settlement. Levels were run over the settlement hubs on Caño Saddle dam, indicating a settlement hardly appreciable. Surveys were completed of pastures of the supply department as follows: Caimito, Pedro Miguel, Miraflores, Arango, Monte Lirio, Summit, and Mandinga. The total area surveyed was about 24,000 acres. A topographical survey was made for the health department of the swamp area east of Margarita railroad for the purpose of estimating the cost of a hydraulic fill. A topographical survey was made for the municipal engineering division for use in its estimates for the construction of Army posts at Miraflores dump, and of a tract east of the old road between Panama and Pedro Miguel. Surveys of several estates were made and maps prepared for the use of the special attorney in the hearings before the Joint Commission in the settlement of land claims. The survey of the Panama-Ancon-Balboa district, begun

last year, was completed. Two new triangulations were established, "Corozal," near the old hotel at Corozal, and "Mole," on the outer end of the mole at Cristobal. A precise bench mark was established at Margarita. Fifty-one of the precise bench marks heretofore established in the transisthmian service were cleared, repaired, and painted. Three Canal Zone boundary monuments were reset on account of having been destroyed by street construction, and seven extra monuments were set on the boundary line between the Canal Zone and the city of Panama. The Colon Hospital, Quarantine, and Radio reservations were surveyed and monuments set on their boundaries.

For further details see Appendix A.

Office Engineer.

This office continued under the supervision of Mr. C. J. Embree, and performed the engineering, architectural, electrical, and miscellaneous designing work for all of the divisions of the canal except the mechanical division. A total of 964 working drawings were prepared. The blue-print room attached to this office turned out a total of 292,885 square feet of prints of all kinds, at an average cost of 0.0123 cent per square foot.

Marine Division.

Between August 21, 1917, the date of the relief from duty with the canal of Commander H. I. Cone, United States Navy, marine superintendent, and January 24, 1918, the date of the appointment of his successor, Commander L. R. Sargent, United States Navy, the supervision of this division was assumed by the Governor, the captains of the ports reporting directly to him. The operations of the division included, as heretofore, all matters pertaining to transactions with the canal by ships using its facilities, including the actual transit through the canal. To these normal duties there were added in April, 1918, the local administration, under the Governor, of Title II of the espionage act of June 15, 1917. As the local representative of the War Trade Board the Governor also charged the marine superintendent with the enforcement of bunker license regulations of the War Trade Board, and for the performance of this function the marine superintendent and the two port captains have been designated special agents of the Bureau of Transportation.

There was an increase in traffic as compared with former years. A total of 2,130 ships of all classes passed through, of which 921 were bound from the Atlantic to the Pacific, and 1,209 from the Pacific to the Atlantic. The cargo carried through the canal totaled 7,562,133 tons of 2,240 pounds. The average net tonnage of all ships was

3,126, and the average net tonnage of ships carrying cargo was 3,242. The actual weight of cargo transported per ship was 3,681 tons of 2,240 pounds. During the preceding year there was a total of 1,876 ships passing through the canal, of which 905 were from the Atlantic to the Pacific, and 971 from the Pacific to the Atlantic. The total cargo transported through the canal in the preceding fiscal year was 7,229,255 tons of 2,240 pounds. The tolls collected for the year ending June 30, 1918, amounted to $6,439,083.99. Attention has heretofore been called to the necessity for legislation revising the present law so as to make applicable to all vessels the Panama Canal rules of admeasurement. The legislation requested has been pending in Congress and the merits of the case have been fully set forth in special reports and in hearings before the appropriate committees of Congress. If the new law had been available during the past fiscal year, the tolls collected would have been $7,522,195.68, an increase in revenue for the canal of $1,083,111.69. This increase in revenue is not the only advantage that would have accrued, as the present law and regulations result in lack of uniformity in levying tolls on ships of different types of construction, and make it necessary to consider in each case two systems of measurement, one according to the canal rules and the other according to the United States rules of admeasurement.

In enforcing certain regulations made necessary on account of the war, the personnel and equipment of the marine division have cooperated with the military and naval branches of the Government.

For further details see the report of the marine superintendent, Appendix D.

Dredging Division.

The work of this division had so far diminished during the first six months of the year that on January 1, 1918, it was found advisible to place the dredging units on a single shift of eight hours per day, and on April 1, 1918, it was practicable to consolidate the two districts and to direct all the dredging operations from the division headquarters at Paraiso. The resident engineer, Mr. W. G. Comber, under whose direction the dredging operations throughout the canal had been conducted since May 1, 1913, and who had completed 13 years' service with the canal, resigned on June 14, 1918, effective at the expiration of his leave of absence. The position of resident engineer was abolished.

The work having practically reached a maintenance basis, the division was attached to the supervision of the engineer of maintenance immediately after the close of the fiscal year. As superintendent in charge of the dredging division, Mr. J. M. Pratt was appointed, effective July 1, 1918.

The following equipment was in operation as stated in each case: The seagoing suction dredge *Culebra*, from July 1 to 20, 1917, in Gaillard Cut; from July 21 to October 8, 1917, in the service of the supply department as a boat for the transportation of cattle from Colombia; from October 9 to 13, 1917, salvaging and wrecking operations for the rescue of the steamer *Somerset*, at Old Providence Island; from October 14, 1917, to April 3, 1918, maintaining and deepening the Pacific entrance channel and inner harbor at Balboa, and excavating and transporting sand from Chame Point; from April 4 to 10, 1918, salvaging and wrecking operations for the steamship *Grays Harbor*, grounded at Old Providence Island; and from April 11 to the end of the year in the service of the supply department as a cattle boat. The dipper dredge *Cascadas* was operated in the Pacific entrance channel and in the inner harbor at Balboa; excavating a basin for the naval establishment at Coco Solo; deepening the channel at the Fort De Lesseps wharf; and widening the Cristobal approach channel. The dipper dredge *Gamboa* was operated in Gaillard Cut, at the Cucuracha and Culebra slides, and in the work of widening the canal channel at Paraiso. The dipper dredge *Paraiso* was operated at the Culebra and Cucuracha slides and at the channel improvements at Paraiso. The seagoing ladder dredge *Corozal* was at work in Balboa Harbor widening and deepening the Pacific entrance channel. The 20-inch pipe line dredges *Nos. 82*, *83*, *84*, *85*, and *86* were engaged on various work at different times, including the digging of sand and gravel for construction purposes in the Chagres River above Gamboa; excavation at the naval establishment at Coco Solo; filling swamp areas; and maintaining the channel in Gaillard Cut. Dredge *No. 82* was permanently retired from canal service on May 26, 1918, and dredge *No. 85* on May 16, 1918, and both dredges were transferred to the construction bureau of the office of the Quartermaster General, United States Army. Of the 10 tugboats in the dredging service on July 1, 1917, 3 were transferred to the marine division, 1 to the War Department in the States, and 1 to the Navy Department. The tug *Reliance* was sunk off the west breakwater at Cristobal on December 27, 1916, and was floated and towed to Cristobal shops for overhaul; it was again placed in commission on August 19, 1917. Dredges operating in the canal prism at the Atlantic and Pacific terminals and in the sand and gravel service, removed a total of 6,765,031 cubic yards of material, at an average unit cost of 45.95 cents per yard, as against a total in 1917 of 15,445,885 cubic yards at an average unit cost of 27.78 cents. The increase in cost was chiefly due to the diminished output, and in the sea-level portions of the canal to restrictions in operations imposed by war conditions. In maintaining the canal there were removed from the canal prism quantities in the different sections as

follows: Atlantic entrance, 19,452 cubic yards; Gatun Lake, 0; Gaillard Cut, 2,285,273 cubic yards; Miraflores Lake, 0; Pacific entrance, 596,975 cubic yards. Original excavation in the canal prism chargeable to construction included 120,000 cubic yards in Gaillard Cut and 319,880 cubic yards at the Pacific entrance, making a total for the canal prism throughout the length of the canal of 439,880 cubic yards. At the end of the fiscal year there remained to be removed from the canal prism, chargeable to construction, quantities as follows: Atlantic entrance, 0; Gatun Lake, 50,000 cubic yards; Gaillard Cut, 25,000 cubic yards; Pacific entrance, 378,200 cubic yards; chargeable to maintenance: Atlantic entrance, 732,210; Gatun Lake, 165,000; Gaillard Cut, 933,400; Miraflores Lake, 175,000; and Pacific entrance, 1,712,830 cubic yards.

The slides at Culebra and at Cucuracha have reached a condition in which they require only intermittent dredging. At no time during the year was shipping delayed on account of slides, and a channel of practically full dimensions was maintained by the removal during the year of a total of 1,316,315 cubic yards. Excavation of an indeterminate but relatively small amount will be necessary in the future to maintain full dimensions in the canal prism as the slides move from time to time in their approach to permanent stability. Advantage was taken of the periods during which no dredging was necessary at the slides to effect improved conditions at two points in the canal. Immediately below the Miraflores locks on the west bank of the canal there was a projecting point of land which complicated the tidal currents and the currents resulting from the discharge of water from Miraflores Lake through the Miraflores locks in lock operations, and which interfered with the safe handling of ships. A project involving the excavation by dredging of 230,000 cubic yards of earth and 225,000 cubic yards of rock was approved, and of these quantities 68,400 cubic yards of earth and 14,600 cubic yards of rock had been removed on June 30, 1918. At the Paraiso point of intersection, one-half mile north of Pedro Miguel locks, and immediately south of the pontoon bridge at Paraiso, a high point of land obstructed the view at a place where north and south-bound ships frequently meet. An improvement at this point was authorized, consisting of a slight widening of the canal and the removal of the high bank, involving a total removal of 66,000 cubic yards of earth and 370,000 cubic yards of rock. Of these quantities, 21,100 cubic yards of earth and 81,000 cubic yards of rock had been excavated at the close of the year. Inspections of slide areas were made from time to time, with especial reference to the maintenance of drainage conditions. Periodical instrumental observations were taken on the points established in 1916 on Gold, Zion, Contractors, and Purple Hills, indicating no movement.

Miscellaneous dredging included the removal of 1,150,510 cubic yards of earth and 644,838 cubic yards of rock from the Atlantic terminal, and 1,160,693 cubic yards of earth and 152,975 cubic yards of rock from the Pacific terminal.

The rock and timber dikes at Mindi Beach, south of Limon Bay, were maintained, only minor repairs being necessary. No new dikes were constructed.

In the elimination of water hyacinths from the waters of the canal, 328,859 square yards of hyacinths were cleared by arsenic spraying, and 564,132 young plants were uprooted and destroyed.

For further details, reference is invited to the report of the superintendent in charge of dredging, Appendix C.

Mechanical Division.

The work of this division continued in charge of Commander R. D. Gatewood, naval constructor, and the mechanical plants remained as reported last year with the exception that the Paraiso shops were closed down on August 25, 1917, owing to the greatly diminished amount of repair work required for the dredging division in that vicinity. On October 1, 1917, the electrical forces of the mechanical division were transferred to the electrical division, except two electricians at Balboa shops and two at Cristobal shops for the maintenance of plant work. Owing to the congested condition of the shipyards and docks in the States, an abnormal amount of repairs to ships was conducted, including the thorough overhaul of two large ships for the Navy and the steamship *Ancon*, of the Panama Railroad Steamship Line. Minor repairs were made to various ships of the Navy as they passed through the canal. Construction work was performed for the local Army and Navy establishments. Canal equipment was placed in the dry docks for repairs at Cristobal and Balboa as follows: Dredges *Nos. 82*, *83*, *85*, *86*, *Chagres*, *Cascadas*, *Culebra*, *Corozal*, *Gamboa*, *Marmot*, and *Paraiso;* 26 barges and 5 scows; and tugs *Porto Bello*, *Chame*, *Engineer*, *Miraflores*, *De Lesseps*, *La Valley*, *Bohio*, *La Boca*, and *Mariner*. Repairs not requiring the use of the dry docks were made to the tug *Reliance*, which required extensive overhaul; tugs *La Boca*, *Miraflores*, and *Mariner*. There were overhauled and shipped for the Alaskan Engineering Commission and private firms 70 locomotives, 5 steam shovels, 400 flat cars, 30 Rodger ballast cars, and 30 dump cars. On account of the high cost and difficulty of transporting lumber from the States, this division has investigated the native lumber field, with the result that about 2,000,000 feet of lumber have been obtained. Changes and improvements in the Balboa shops included the construction of a steel paling fence around the inclosure; the removal of the old Panama Railroad shed covering Pier No. 15, making the space available

as repair wharves; the extension of the roof over the west end of the foundry; an extension at the north end of building No. 2; an extension to the car shop; the installation of a pipe-bending machine for the sheet-metal shop; bending rolls and plate planer in the boiler shop; and of a band-saw mill with capacity to handle hardwood logs 48 inches in diameter by 60 feet long.

At the Cristobal shops, repairs were made to the dry-dock gates, and new equipment has been installed as follows: Pipe threading and cutting machine, a power hack saw, 14-inch drill press, and an electric welding machine.

For further details see report of the superintendent, mechanical division, Appendix E.

SUPPLY DEPARTMENT.

Following the relief from duty with the canal of Lieut. Col. W. R. Grove as chief quartermaster, and Capt. F. H. Smith as assistant chief quartermaster, changes in the organization of the department were made. The position of assistant chief quartermaster was abolished, and the work of the department was subdivided into several branches, as follows:

(*a*) District quartermasters, hotels, restaurants, messes, and storehouses, under the direct supervision of a superintendent, reporting to the chief quartermaster.

(*b*) Commissary division, operated under a general manager, reporting to the chief quartermaster, and including commissary warehouses, cold storage plants, manufacturing plants, abattoir, laundries, and retail commissaries.

(*c*) Pastures, plantations, hog farms, chicken farms, and dairies, under the immediate supervision of a superintendent, cattle industry, who has also direct charge of the operation of the cattle boats, and who reports to the chief quartermaster.

(*d*) Purchase of live stock and cattle, in charge of a cattle buyer, who reports to the chief quartermaster.

(*e*) United States requisition bureau, under the chief of bureau, reporting to the chief quartermaster.

(*f*) Printing plant, designated as The Panama Canal Press, and operated under the charge of a printer, who reports to the chief quartermaster.

The commissaries, cattle industry, pastures, plantations, dairies, etc., and the Washington Hotel, are financed by the Panama Railroad, but the operations are conducted under the supervision of the chief quartermaster of The Panama Canal.

Labor.—There was a marked reduction in the number of employees on the silver roll accomplished gradually during the year. On June 30, 1918, the number employed was 16,157, as compared with 20,597

on June 30, 1917. The decrease resulted from the completion of construction work. The problem of caring for the unemployed, who were in general living in the cities of Panama and Colon, was somewhat simplified by the voluntary departure of a number to Cuba and the United States, and by the repatriation of others to the islands whence they came.

Quarters.—Applications by gold employees for family quarters were reduced from 257 on file June 30, 1917, to 226 on June 30, 1918. At the end of the fiscal years there were 1,721 applications on file by silver employees for married quarters, distributed as follows: Balboa, 602; Pedro Miguel, 114; Gatun, 30; and Cristobal, 975.

On account of the reduction in the volume of dredge work at Gaillard Cut, the village of Paraiso was abandoned as a residence for gold employees, and 30 family quarters vacated were converted into quarters for silver employees, providing a total of 80 apartments for occupation by silver employees of the dredging division, of the Pedro Miguel locks, and of other branches of canal work centered at Pedro Miguel.

The situation as to bachelor quarters for gold employees has improved so that 60 per cent of all bachelors are provided for at the rate of one man to a room. Additional bachelor quarters should ultimately be provided, but the matter is held in abeyance for the duration of the war.

Further experience with electric ranges in gold quarters, referred to in last year's report, indicates that they are slightly more expensive than coal-burning ranges, and no further installations are being made. The increased cost is due, not to the relative expense of electric current, but to the high cost of maintenance of the ranges.

Corrals.—The number of animals in the corrals was reduced from 52 horses and 289 mules on July 1, 1917, to 39 horses and 210 mules on June 30, 1918. The reduction of animals in the corrals was due to deaths, condemnation and sale, and transfers to plantation work. There was an increase from 115 to 176 in the number of motor vehicles of all descriptions, including trucks for handling supplies for the construction divisions and vehicles for commissary deliveries, mail deliveries, and garbage collection. Experience shows not only a saving in time, but a decreased cost of operation in the use of motor-driven as compared with animal-drawn vehicles.

Materials and supplies.—There was a considerable reduction in the number of requisitions prepared and forwarded to the general purchasing officer in Washington, and in the value of the materials received, compared with the preceding year. For the year covered by this report there was a total of 880 requisitions for supplies, of a total value of $8,700,356.62, as compared with 1,347 requisitions to the value of $10,817,106.51 for the preceding year. There was a

reduction in the value of local purchases, being $1,349,783.84, as compared with $1,516,914.79 for the preceding year.

The value of material in stock on June 30, 1918, was $6,747,688.26, showing an increase of $698,703.56 during the year. This increase is mainly due to the greater cost of material and the upward tendency of the market. A comparison of prices shows an average value increase of 131 per cent during the last four years, with a particularly marked increase during the last year, and although the amount of stores on hand shows an increase in money value, in total quantity it is smaller. Also owing to conditions resulting from the war, an increased stock had to be carried of certain commodities. Sales to Government departments and commercial steamships aggregated $1,630,827.60, an increase of $1,037,204.60 over the preceding year. The principal items sold were lumber, building material, general hardware, rope, cable, gasoline, kerosene, and lubricating oils. The consumption of cement for the year was 149,039 barrels, as compared with 270,053 barrels for the preceding year. The details of the collections and sales of obsolete material, equipment, and scrap are contained in the report of the chief quartermaster, Appendix E.

Fuel oil plants.—A contract with the Standard Oil Co. of California for the delivery at Balboa of 700,000 barrels, expires September 1, 1918. On June 30, 1918, a balance of 188,357 barrels remained to be delivered. A contract with the Atlantic Refining Co. for the delivery of 240,000 barrels of fuel oil at Cristobal expired June 30, 1918, with 75,000 barrels under order remaining to be delivered. The canal equipment for storing oil is to be increased by the construction of a 55,000-barrel capacity concrete fuel oil tank at Mount Hope, which was 75 per cent completed at the end of the year. A total of 2,517,217 barrels of fuel oil was handled by the Balboa and Mount Hope fuel oil plants, for a total of 438 vessels.

The Panama Canal Press.—Equipment was added to the printing plant at a cost of $3,072.21. The value of stock on hand on June 30, 1918, was $86,542.96, as compared with $81,767.72 for the preceding year. Unserviceable items were surveyed and disposed of to the value of $220.27.

Subsistence.—The net revenue from the restaurants and messes operated by the canal was $598,153.51, a decrease of $42,914.08 under the preceding year. The cost of operations was $594,395.99, a decrease of $39,754.34. The charges for building repairs, fuel, and light are not included in these figures. They are absorbed by canal appropriations, the reason being that these charges are not made to employees living in family quarters, and it would be unfair to include them in the cost of meals to the employees patronizing the restaurants and messes. The new lunch room at the Balboa shops was completed and occupied on September 7, 1917. There was a

considerable decrease in revenue at the hotels Tivoli and Washington. The operation of the Hotel Tivoli showed a net loss of $8,169.95, and the Hotel Washington showed a net loss of $15,465.92. The losses are due entirely to diminished patronage which results from lack of travel on account of war conditions. The hotels must be kept open as necessary utilities for the public having business with the canal. It is not practicable to prevent losses by increasing rates, and the cost of operation has been reduced to the minimum consistent with providing hotel facilities. There is no apparent reason why, on the resumption of normal conditions, the operation of these hotels should be a burden upon the canal appropriations or upon the funds of the Panama Railroad.

The efforts of the supply department to reduce the dependence of the Canal Zone population upon outside sources, especially the United States, for foodstuffs, referred to in report for last year, have been continued, and considerable progress has been made. The industries involved are financed by the Panama Railroad, but in this report it is appropriate to make a brief review of the results obtained. The production of native beef for consumption on the Isthmus and by the steamship trade utilizing the canal, has grown to such an extent that it was not necessary during the year to import beef from the United States. The hog industry has been developed so as to provide in sufficient quantities, ham, bacon, and sausage. The chicken farm has been developed to the extent of providing 23,914 dozen eggs during the past six months. At the Mindi dairy farm, which was placed in operation in January, 1918, there has been a monthly production of milk that has increased from 971 gallons in January to 5,373 gallons in June. The plantations have provided in significant quantities, various fruits and vegetables, including among the principal items, string beans, cucumbers, green corn, cocoanuts, onions, radishes, tomatoes, eggplant, sweet potatoes, oranges, okra, yams, plantain, bananas, alligator pears, papaya, and mangoes.

With the approval of the Secretary of War, Army commissaries were established under the administration of the quartermaster department of the Army, at the military posts of Fort Sherman, Fort Randolph, Las Cascadas, Empire, Culebra, and Corozal. The canal commissaries at those points were consequently abandoned, except that in order to provide for the Panama Canal employees working on the west bank of the canal a commissary at Empire was continued.

The regulations of the Food Administration at Washington have been applied on the Canal Zone wherever the commodities affected were imported from the United States.

For further details see the report of the chief quartermaster, Appendix F.

ACCOUNTING DEPARTMENT.

This department continued under the charge of Mr. H. A. A. Smith, auditor. It is subdivided into the division of auditing and accounting, under the direction of the auditor, assisted by Mr. Elwyn Green; division of collections, under the collector, Mr. T. L. Clear; and the division of disbursements, under the paymaster, Mr. J. H. McLean. Disbursements were made by the paymaster in the amount of $29,962,046.32, of which $11,273,280.32 were on account of the Panama Railroad. Employees on the gold rolls of the canal were paid $6,269,614.59, and on the silver roll $5,442,626.14. The sum of $6,976,425.27 was paid on miscellaneous vouchers. Collections on pay rolls totaled $3,897,644.15, of which $3,048,091.07 were collected for coupon books and meal tickets; $87,002.45 for rent; and the remainder for miscellaneous items. The Panama branch of the Commercial National Bank of Washington, D. C., was transferred on July 10, 1918, to the American Foreign Banking Corporation, the latter continuing as a Government depository and fiscal agent. Small deposits of United States Government and Panama Railroad funds are carried in this bank. The use of gold and of Panaman silver in making payments has been practically discontinued, and paper currency and American silver substituted therefor. The sum of $1,622,000 has been imported by the canal for use in making payments.

Collections repaid to appropriations totaled $8,625,298.20. Deposits by owners and agents of ships for payment of tolls and charges for supplies and services rendered by canal facilities totaled $13,859,467.05, of which $9,690,341.45 were deposited with the collector on the Isthmus, and the remainder, $4,169,125.60, with the Assistant Treasurer of the United States to the credit of the collector. Of the total deposited the sum of $691,044.36 was refunded on settlement of accounts. There were transferred to the Postmaster General of the United States, in payment of money orders drawn on the United States, funds to the amount of $1,655,000.

The tolls actually collected on vessels transiting the canal during the year amounted to $6,439,083.99. The sum of $2,321.25 was collected in addition for tolls on a vessel that passed through the canal during the preceding year. In further reference to the loss of revenue to the canal on account of the present legislation relating to rules of measurement of vessels, it may be stated here that, including the amounts refunded during the year, under authority of the act of Congress of June 12, 1917, the total loss of revenue since the opening of the canal has aggregated $2,797,260.26. The chief beneficiaries of the present rules of measurement have been vessels under foreign register.

The sum of $26,525.82 was paid in settlement of small claims for damage to vessels passing through the locks. These claims have thus far been adjusted and settled by mutual agreement without recourse to the courts, as authorized by the Panama Canal act.

Through an arrangement with the local banks, subscriptions to the First, Second, and Third Liberty Loans were settled for by pay-roll deductions in five equal monthly installments for each bond issued. In this manner collections were made of $218,618.47 for the First Liberty Loan; $339,960.35 for the Second Liberty Loan; and $260,870.49 for the Third Liberty Loan. Collections were also made by pay-roll deductions of $6,142.73 for War Savings Stamps, and $34,276.80 for Red Cross War Relief Fund.

To June 30, 1918, the total appropriated by Congress for the canal and fortifications was $441,375,781.44. For the construction of the canal and its immediate adjuncts the sum of $379,105,043.92 has been appropriated. Omitting from this sum amounts appropriated for colliers and coal barges; for the construction of Dock No. 6 at Cristobal; for reboilering and repairing the steamships *Ancon* and *Cristobal*, all of which were specifically exempted by law as charges against the authorized bond issue, the amount appropriated chargeable against the bond issue is $372,391,853.92, leaving a balance available for canal construction within the limit of the cost and the authorized bond issue of $2,831,302.08. The amount repaid on the cost of construction from miscellaneous receipts to June 30, 1918, was $6,879,278.03, which being deducted from the total sums appropriated chargeable against the bond issue leaves the sum of $365,512,575.89 as the total amount expended and on hand for expenditure for projects included within estimates upon which the cost of the canal was based. The amount shown as the cost of constructing the canal will be further reduced by receipts from the sale of construction material and equipment, and by collections to be made to cover the money expended for waterworks, sewers, and pavements in the cities of Panama and Colon. As a matter of bookkeeping, the canal is entitled also to credit for the value of buildings and other public works, equipment and plant, transferred to the Army, the Alaskan Engineering Commission, and the State Department without actual payment therefor. The estimated value of items so transferred is $1,973,011.17.

Under the agreement with the Republic of Panama, expenditures to June 30, 1918, of a total of $4,361,790.56 have been made on construction, operation and maintenance of waterworks, sewers, and pavements in the cities of Panama and Colon. These expenditures are to be reimbursed to the United States at the expiration of 50 years from July 1, 1907. There has been thus far reimbursed or is immediately due, the sum of $2,339,860.10. The amount immediately

due is $62,404.64, and the remaining total of $2,021,930.46 is payable in installments in the next 42 years.

The principal expenditures chargeable to capital cost paid from construction and maintenance and operation appropriations, are as follows: From Gatun to Pedro Miguel, 120,000 cubic yards of original rock excavation at a cost of $67,864.78; from Pedro Miguel to the Pacific Ocean 319,880 cubic yards of dredged material, of which 48 per cent was earth and 52 per cent rock, at a total cost of $292,558.52. For the power producing and transmitting systems a total of $618,886.72 was expended, which includes payments on the extension of the Gatun hydroelectric station, operating machinery for the same, transformer substations, duct lines, and distribution lines. In continuing the construction of the Atlantic terminal there was expended at the Cristobal coaling plant the sum of $26,127.55 and at Mount Hope fuel-oil plant $41,243.18. In the construction of concrete walls and piers at Cristobal, $611,142.44 were expended toward the construction of Pier No. 6 and boathouse between Piers Nos. 7 and 8. At the Pacific terminal there were expended for removal by dredging of the dry dock cofferdam, $47,792.85; dredging inner harbor, $379,573.88, involving the removal of 1,225,833 cubic yards of material and the pumping of 687,713 cubic yards of spoil in connection with the filling of swamp areas. At Balboa shops the sum of $204,508.97 was expended, of which the principal item was $146,-996.46, for additional equipment. Rat-proofing walls and piers, $58,307.67. Dredging out berth at the fuel-oil plant, $21,171.49. For permanent townsites there was a total of $174,281.57 expended, the principal items being, Balboa townsite, $65,423.03, and Colon Beach townsite, $78,581.33. For permanent buildings there were expended $1,284,935.04, of which the principal items were, storehouse, $12,-500.58; hotels and mess halls, $29,669.08; gold quarters, $46,464.13; silver quarters, $94,293.79; hospitals, $774,038.17, of which $35,235.01 was at the Colon Hospital and $738,803.16 at the Ancon Hospital; dispensaries, $46,254.74; schoolhouses, $56,188.48; incinerator at Balboa, $105,034.28. For road construction not included in townsites there were expended $150,707.79. In payment of awards of the Joint Commission and settlements by the land office there were expended $298,556.17.

Collection for licenses and taxes totaled $12,532.39; court fees and fines, $19,668.28; postal receipts, $107,165.85. These revenues derived by the Canal Zone Government have been deposited in the Treasury of the United States as miscellaneous receipts. Revenues derived from operation of the various clubhouses amounted to $365,-701.50, as compared with $233,544.22 received during the previous year.

During the year there were reported 3,413 accidental injuries, and 35 accidental deaths of employees, as compared with 4,068 accidental injuries and 39 accidental deaths reported during the prior year. Claims for compensation on account of these injuries and deaths were allowed in 1,495 cases of injuries and 3 cases of death. The sum of $42,396.54 was allowed on account of injuries to employees, including the canal and the railroad, and the sum of $3,848.77 on account of deaths, making a total of $46,254.31 allowed during the year under the act of September 2, 1916.

There were expended in the operation and maintenance of the canal, $5,903,719.69, as compared with $6,788,147.60 during the previous year. The reduction was due to the decreased expenditure for dredging in Gaillard Cut on account of the improvement in the slide conditions. The expenses for operation and maintenance of the locks increased from $737,430.39 during 1917 to $744,961.00 for 1918. The expenses of the marine division were reduced from $313,036.46 in 1917 to $293,546.28 in 1918. The direct charges for operation and maintenance totaled $3,077,068.37, as against $4,250,162.99 in 1917. The overhead expense charged to operation and maintenance in arriving at the total sum of $5,903,719.69 was $2,826,651.32, including charges for civil government, $678,232.88; hospitals, quarantine, and sanitation, $635,854.03; and for administration, $1,512,564.44, including the executive department, accounting department, Washington office, operation of and repairs to storehouses and quarters for employees, lighting of streets, operation and maintenance of waterworks, and maintenance of sewer systems and roads. Offsetting the total expense of $5,903,719.69 are amounts earned as tolls, $6,454,198.35; licenses and taxes, court fees and fines, $140,918.01; profits on business operations, $6,159.56, making a total of $6,601,275.92. These figures indicate revenues earned in excess of expenses amounting to $697,556.23, as against a loss of $979,648.90 for the previous year. Except for a few minor items the charges to operation and maintenance above given do not include charges for depreciation of plant or interest on the capital investment.

The total revenue derived from business operations carried on with Panama Canal funds, amounted to $10,324,071.91, as against a total of $7,579,588.44 during the previous year. The net profit resulting from these operations and covered into the treasury as miscellaneous receipts, was for the year $6,159.56. In reporting this fact it should be stated that shop work, work for the Panama Railroad and other departments of the Government, and all services rendered for employees are performed at cost, except that subsistence and hospital services to employees are rendered at less than cost. Fair profits are made on the sales of water, dry dockage at Balboa, and on the sale of fuel oil. The capital for carrying on the business operations of

the canal is supplied by the appropriation for maintenance and operation.

The appropriations for operation and maintenance have been limited to the amounts required for current expenses, and in order to provide a sufficient fund for carrying a stock of materials required in the conduct of the operations of the canal a special item for stock is necessary and will be estimated for.

For further details see the report of the auditor, Appendix G.

EXECUTIVE DEPARTMENT.

This department continued under the Governor with Mr. C. A. McIlvaine as executive secretary. In addition to the usual work, operations were expanded for the administration of laws and regulations of local application made and issued on account of war conditions. Of these the main items are the censorship of mails and the enforcement of regulations of the War Trade Board. For these purposes it was necessary to increase the number of employees of the division of civil affairs by 52 men. The division of schools employed 13 additional teachers to care for the increased enrollment of pupils. There was a reduction in the police and fire division of 21 employees, due primarily to the withdrawal of special police detailed at the locks, the guarding of these structures having been taken over by the Army.

With the outbreak of the war, admission to certain areas in the Canal Zone was limited to employees and others having business therein, and permits and means of identification were required. Arrangements are in progress for the establishment of a system of photo-metal checks, similar to those used by the munition plants and Navy yards in the United States, which will take the place of the permits and which provide a positive means of identification and minimize the possibilities of unauthorized or fraudulent use.

The bureau of statistics, created during the preceding fiscal year, has compiled much data of wages paid in the United States for work comparable with that on the Isthmus. This work has been abnormally large on account of the frequent changes of wages in Government establishments in the States, which changes are followed and put into effect on the canal. Investigations were made and statistics kept of living conditions of silver employees, whose rates of pay were twice advanced during the year to meet the increased cost of living.

Bureau of Clubs and Playgrounds.

Clubs for gold employees were maintained at Cristobal, Gatun, Paraiso, Pedro Miguel, Ancon, and Balboa, and for silver employees at Cristobal, Gatun, and La Boca. The clubhouses are social centers of the Canal Zone population and are indispensable to satisfactory

community life, in the necessary absence of any other facilities for a like purpose. The clubhouses were established in the early days of the construction period and the buildings are of frame construction and in general are old and inadequate in size, arrangements, and equipment. When normal conditions are restored after the war, the clubhouses should be rebuilt of permanent material, and with enlarged facilities and equipment. The entertainments provided have been practically limited to moving-picture exhibitions, except on a few occasions there have been entertainments by local amateurs or by professional entertainers who chanced to be in Panama en route to other places. The stadium on the athletic field at Balboa has been in frequent use for patriotic exercises on national holidays and for special entertainments provided for the Liberty Loan and Red Cross activities. It has also been regularly used during the baseball season. The encouragement of the popular and distinctly American game of baseball has been of benefit to a large class of employees.

Division of Civil Affairs.

Bureau of Posts.—The number of post offices remained at 16, of which 14 are money-order offices. The total revenues from the postal service, including box rents, payments from the Panama Railroad Company, from the Republic of Panama for transportation of its mail between Panama and Colon, and from the United States Post Office Department for handling United States transit mails, were $145,231.81, as compared with $110,741.41 for the preceding year. There was a total of 167,504 money orders, amounting to $3,372,973.55, issued, on which fees amounting to $11,918.35 were collected. On June 30, 1918, there was on deposit the sum of $1,097.15 as unpaid money orders drawn on Canal Zone post offices in favor of remitters. The deposit money orders totaled $1,244,335. Payments on deposit money orders aggregated $1,441,225. The balance on deposit on June 30, 1918, was $499,490. The deposits have been less during the year, on account of subscriptions by depositors to liberty bonds and war savings stamps. Interest on deposit money orders was paid to the amount of $8,441.71, as compared with $1,813.93 for the previous year. The registry business at the post offices was largely increased; 266,867 parcels and letters were handled, of which 130,894 were dispatched, and 135,973 were received. There were received in the mails from the United States 15,629 parcels containing articles imported by employees of the United States Government on the Canal Zone, as compared with 13,938 for the preceding year. The office of the director of posts issued 1,308 duplicates of lost or stolen money orders, investigated 136 cases of losses and nondelivery of registered mail, and under-

took investigations for the United States Post Office Department of mail in transit through the Canal Zone. Several arrests were made during the year for misuse of the mails, including the misuse of canceled postage stamps, false personation in attempts to cash money orders, fraudulent use of the mails in violation of section 1707, Postal Laws and Regulations. Six arrests were made and five convictions secured for rifling mail aboard United Fruit Co.'s steamers while in port at Cristobal. On account of the establishment of censorship of mail, the bureau of posts, in December, 1917, took charge of the handling of all mails entering and dispatched from the Canal Zone. Formerly certain countries in Central and South America maintained postal agents in the cities of Panama and Colon, who received and opened mail bags arriving from those countries and who dispatched mails originating in Panama, destined to those countries.

Bureau of Customs.—The total number of vessels entered was 4,447, and the total number cleared was 4,443, as compared with 3,718 entered and 3,721 cleared in the previous year. There arrived on the Isthmus 447 prohibited aliens—255 at Balboa and 192 at Cristobal. Of these, 223 were admitted to the Republic of Panama by authority of that Government, the remainder proceeded to their ultimate destination or were returned to the port of embarkation. This bureau is charged with the enforcement of the President's Executive order of February 6, 1917, relating to the exclusion of Chinese. There were seven arrests for attempted smuggling, resulting in six convictions and one acquittal. Under the arrangements with the Republic of Panama, by which employees of the United States Government are allowed free entry of goods imported for their own use, there were approved 1,381 requests for free entry, compared with 2,533 for the previous year. The inspection and certification of household goods packed for shipment to the United States has been unusually heavy on account of the frequent departures of canal employees and Army officers transferred to the States. Merchandise arriving at canal ports for delivery within the Republic of Panama is released to the Panama officials upon receipt of papers showing the payment of duty on such merchandise. There were 5,690 permits for such releases at Cristobal and 10 at Balboa.

The assistant chief of the division of civil affairs, as shipping commissioner, with the chief customs inspectors as deputies, has charge of signing on and discharging American seamen in Canal Zone ports and the settlement of disputes between the masters and members of such crews regarding wages, advance fines, and general treatment. There were 2,836 seamen shipped on American vessels and 2,549 discharged. Seamen's wages were received for deposit at the port of Balboa in the total sum of $5,293.31, of which all but

$320.91 were disbursed. At Cristobal $13,300.55 were received, and $1,009.23 remained not disbursed on June 30, 1918.

There were administered 199 estates of deceased and insane employees of The Panama Canal and the Panama Railroad Company, and 35 were in the course of settlement at the end of the year. Of the 199 estates settled, 112 were delivered to the consular or diplomatic representative in the Republic of Panama or the United States, of the countries of which the deceased or insane persons were citizens; 60 estates were settled directly with the heirs; 5 settled with administrators or guardians; 2 were repaid to persons who had recovered their sanity; and the net proceeds of 20 estates were applied to settle the claims against them. The total amount involved in the 199 estates was $13,562.07.

A total of 2,873 licenses were issued for motor vehicles, bicycles, hunting permits, and the keeping and carrying of firearms. The fees collected amounted to $7,359.15.

Police and Fire Division.

Upon the relief of Capt. H. D. Mitchell, United States Army, on July 8, 1917, Mr. Guy Johannes was appointed as his successor as chief of the police and fire division. Besides their normal duties, the police division of the canal performed considerable extra work incident to the war in connection with the protection of the canal and the general interests of the United States on the Isthmus. This work was performed in coöperation with the Army authorities. Fifty-two first-class policemen and 16 colored policemen were appointed; and 51 first-class policemen and 2 colored policemen left the service. There were 4,426 arrests made; 4,125 males and 301 females. The common-jail prisoners averaged 85.83 per month; and all those physically able were employed in road work. The total value of such labor amounted to $14,199.80, figured at the rates in effect for common labor. There were two arrests and prosecutions in the district court on charges of transporting or trafficking in opium in the Canal Zone. In one case the charge for violation of the opium act was dismissed, but the accused was found guilty of violation of customs regulations and fined $100. In the other case the accused was found guilty and sentenced to pay a fine of $50. The police division maintained a continuous patrol of the harbors at Balboa and Cristobal for the enforcement of the navigation laws and prevention of smuggling and irregular traffic, and to assist in the enforcement of military regulations. Launches were maintained at two points on Gatun Lake for the same purpose. A motorcycle patrol service was maintained for the enforcement of automobile and other vehicular regulations, and for special emergency police service. Twenty-five arrests were made for trespassing on Canal Zone lands, and 24 convictions were

secured. Eighty-four persons were deported from the Canal Zone, of whom 47 were convicts who had completed their term of imprisonment, and 37 were persons who had been convicted of misdemeanor charges and were deemed undesirable persons to be permitted to remain on the Zone. Seventy-two convicts were received at the penitentiary during the year. The terms of 52 convicts were completed and the convicts discharged. At the end of the year there were 54 convicts in custody at the penitentiary, as compared with 35 at the close of the preceding year. The cost of subsisting and guarding convicts was $20,113.77, of which $4,900.35 were expended for subsistence of convicts; $1,319.32 for subsistence of guards; $8,902.38 for salaries of officers and guards at the penitentiary; and $4,991.72 for salaries of officers and guards employed to guard convicts on road work. Four convicts were pardoned, and parts of sentences were remitted in seven cases. There were two escapes from the penitentiary on June 23, 1918. One was recaptured on the day of the escape, and one remained at large until his recapture on July 4, 1918. There were investigations by the coroner in 52 cases of death, of which 20 were due to accidental drowning and 21 to accidental traumatism.

For the fire division a new motor combination pumping engine and hose wagon was installed at Balboa on January 30, 1918. This equipment completes the substitution of motor-drawn for horse-drawn apparatus throughout the Canal Zone. Periodical inspections of Government buildings, docks, storehouses, yards, and other establishments were maintained to determine the condition of fire extinguishers, minor apparatus, and hose. There were 69 fires and 5 false alarms. The total fire loss amounted to $259,351.60, of which $230,000 represents loss due to a fire on the Panama Railroad steamship *Panama*, which arrived at Cristobal with a fire in her hold.

Division of Schools.

Regular sessions were resumed on October 8, 1917, in the new buildings at Ancon, Balboa, Pedro Miguel, Gatun, and Cristobal, there being a slight delay on account of the late arrival of furniture and equipment for these buildings. The remainder of the Canal Zone schools were opened on October 1, with the exception of the La Boca school, where an epidemic of measles and whooping cough delayed the opening until October 8. The average daily attendance for the school year was 1,963.2—1,322.9 in the white schools and 640.2 in the colored schools; compared with 1,709.2—1,212.2, and 495.6, respectively, for the previous year. The regular physical examination of pupils was made, resulting in the treatment of 679 pupils for defects discovered, consisting in the largest proportion of defective teeth. Courses of manual training and household arts were con-

ducted at Cristobal, for Cristobal and Gatun pupils, and at Balboa, for Balboa, Ancon, and Pedro Miguel pupils. The apprentice department has been in effective operation with 40 pupils. The classes are conducted in the office building of the shops at Balboa, and in a warehouse in close proximity to the Cristobal shops. The course of physical training and athletics was continued with satisfactory results. There were 28 pupils graduated from the high school, giving a total of 89 graduates since the establishment of the high school.

Courts.

In the district courts, 194 cases were pending at the beginning of the year; 930 cases were filed, and 900 cases settled during the year, leaving a total of 224 cases pending at the close of the year. There were 139 sessions. A total of 790 marriage licenses were issued, and 17 deeds were recorded. The collections of the courts totaled $6,248.20, consisting of civil costs, fines, forfeitures, and various fees. The magistrate's court at Balboa had seven cases pending at the beginning of the year, and during the year 1,863 were filed, of which 1,793 were criminal and 70 civil. Of the criminal cases tried, there were 1,330 convictions, 314 were committed to the district court, and 23 were dismissed. Total collections of fines, fees, and costs amounted to $8,086.15. The magistrate's court at Cristobal had two cases pending from last year; 1,938 cases were filed during the year, of which 1,913 were criminal and 25 civil. Of the criminal cases, there were 1,374 convictions, 263 acquittals, 26 suspensions, 39 dismissals, and 209 committed to the district court. Total collections for fines, fees, and costs amounted to $5,667.03.

The report of the district attorney is printed as appendix I.

The office of the marshal for the Canal Zone received 659 writs of process in civil cases, of which 602 were served. The marshal or his deputy attended 139 sessions of the district court at Balboa and Cristobal. Witnesses attending court were paid a total of $65.10. Collections for the service of court papers in civil cases amounted to $402.40.

Relations with Panama.

Negotiations by correspondence or personal conference between the executive secretary of The Panama Canal and the secretary of foreign relations of the Republic of Panama included the following subjects, in addition to routine matters:

Installation of buoys to mark the restricted area in the Bay of Panama for the guidance of navigators, etc.

Purchases at Canal Zone commissaries by unauthorized persons.

Exportation of coin and bar silver of the Republic of Panama.

New schedule of coach and automobile tariff in the districts of Panama and Colon and the Canal Zone.

Desirability of not advertising departure of vessels in newspapers in connection with the closing of mails.

Discontinuance of discharge of cargo at Balboa consigned to Panama by the South American Steamship Company.

Preservation of neutrality of the Canal Zone and the Republic of Panama and treatment of vessels in the service of the entente powers arriving and departing from Canal Zone ports and passing through the canal.

Extradition from the Republic of Panama to the Canal Zone of the former vice president of the Continental Banking and Trust Co.

Collection of customs duty on dutiable merchandise arriving at Canal Zone post offices.

Police protection at Colon Beach.

Delay in receiving money to the credit of a deceased employee in a bank in the city of Panama by the administrator of estates.

Permits for the construction of wooden houses on Colon Beach for the United Fruit Co.

Permission granted to Arraijan farmers to cross canal at Balboa without restrictions as to time.

Laying of underground cable from the Canal Zone to Santo Tomas Hospital, the American consulate, and the American legation in the city of Panama, for the purpose of furnishing them with electric current.

Preliminary survey for the extension of the Chiriqui Railroad in the Province of Chiriqui.

Handling of transit cargo at Cristobal without filing of bond to cover customs duty with the Panaman Government.

Construction of sanitoriums for tuberculosis patients in the Republic of Panama.

Construction of a slaughterhouse at Colon.

Exemption of payment of taxes for Panama Railroad Company's stables in cities of Panama and Colon.

The newly reclaimed area of land belonging to the Panama Railroad Company on the shore of Panama Bay adjoining the old American pier.

Furnishing of free medicine by the Santo Tomas Hospital to outpatients prescribed for by the Red Cross clinics.

Refund of fine imposed on chauffeur of the mail car of the Ancon post office for a collision for which he was not responsible by the police in the city of Panama.

Release of parcels post packages addressed to an interned alien without payment of customs duties.

Regulations to prevent the introduction of tuberculosis among domestic animals in the Canal Zone.

Indebtedness of the Republic of Panama to The Panama Canal.

Escape of prohibited aliens in transit through the Canal Zone.

Violations of the defensive area act by Panamans in entering the restricted area at the entrances of the canal.

Alleged sales of second-hand furniture by employees and officials of The Panama Canal and members of the military forces on the Isthmus to residents of the Republic of Panama on which no customs duty was collected at the time of importation.

Conservation of products native to Panama.

Refusal to allow settlement and cultivation of strip of land between the water level of Gatun Lake and the 100-foot contour line.

Construction of a telegraph line by the Republic of Panama between Colon and Porto Bello, which is to pass through the Canal Zone.

Anchorage of dynamite lighter in Panama Bay, and proposed construction of an explosive magazine for the Republic of Panama.

Advisability of permitting removal of sand from the beach between Punta Paitilla and the sea wall in the city of Panama.

Receiving and filing bills of health from the incoming vessels at the port of Bocas del Toro.

Outbreak of smallpox at Bocas del Toro and failure of Republic of Panama to provide necessary funds, etc., for subsisting and caring for quarantined persons.

Installation of fire-alarm system in the city of Colon.

Release and failure of Republic of Panama to prosecute certain persons arrested for gambling, and control of the gambling situation in the city of Colon.

Proposed sanitary improvements in Las Sabanas and Pueblo Nuevo districts.

Importation of fuel oil into the Canal Zone to be sold to sea-going vessels without the payment of consular fees to the Republic of Panama.

Clandestine landing of passengers from small vessels arriving at Panama from Colombia and Ecuador before reporting to the quarantine authorities for inspection and entry.

Censorship of mail.

Construction of highways in the Republic of Panama.

Counterfeiting in the city of Panama.

For further details see Appendix H.

Office of the Special Attorney.

Judge Frank Feuille continued as special attorney, and as such represented the Government's interests before the Joint Commission for adjusting land claims, prepared drafts for executive orders necessary to put into effect certain provisions of law, and in addition served as counsel for the Panama Railroad Company on the Isthmus,

There were 37 land claims, aggregating $80,113.90 that were settled by agreement without reference to the Joint Commission. Since the President's order of December 5, 1912, including the 37 claims just mentioned, a total of 4,418 claims, aggregating $1,072,137.20, have been thus directly made, including the settlements made prior to that order, and after August 6, 1908, authorizing the law department of the canal to make direct settlements where agreements could be reached. The total number of claims for damages for land and improvements claimed by private parties and taken over for canal and railroad purposes was 5,480, aggregating the sum of $1,321,040.50. During the year ending June 30, 1918, the Joint Commission disposed of 10 claims in 8 awards, aggregating $125,190. The umpire, appointed by the Government of the United States and the Government of Panama, under the provisions of article 15 of the Panama Canal treaty, disposed of 9 claims during the fiscal year, aggregating the sum of $118,061.38. The Joint Commission dismissed 29 claims during the year; 19 on account of previous adjustment by direct settlement between the Government and the claimants; 4 by default on account of the nonappearance of claimants; 1 for lack of sufficient evidence to support the claim; 1 because of lack of jurisdiction of the commission to try the claim; and 4 because the improvements claimed were situated on lands held under revocable leases. Two claims were certified to the umpire by the Joint Commission. The aggregate amount paid by the United States for lands and improvements to the end of the fiscal year was $2,716,382.52, covering 6,270 claims. There is a grand total of 890 claims brought before the Joint Commission and umpires, appointed under articles 11 and 15 of the Panama Canal treaty, and settled by them. The amounts paid under these awards totaled $1,395,242.02. Of these, 21 awards, aggregating the sum of $304,588, were made prior to the President's depopulation order of December 5, 1912. On June 30, 1918, 139 claims, involving $8,005,408.90, appeared on the Joint Commission dockets. Of these, 48, aggregating the sum of $226,790.55, are based on Panama Railroad leases and have been withdrawn from the jurisdiction of the Joint Commission by section 2 of the sundry civil appropriation act of July 1, 1916. In addition, 9 claims, aggregating $24,264.50, for improvements on lands admittedly owned by the United States and held under revocable lease from the Government, in accordance with previous rulings, will be dismissed for want of jurisdiction. There remained, therefore, on June 30, 1918, for adjudication and settlement by the Joint Commission, 82 claims, involving the sum of $7,754,353.85. Two vacancies occurred in the membership of the Joint Commission during the year; one due to the death of Mr. Nicholas Cornet, and the other due to the resigna-

tion of Mr. Clement L. Bouve. These vacancies were filled by the President of the United States by the appointment of Judge Burt New, of Indiana, and Judge George A. Connolly, of California, by Executive order of October 3, 1917. The new commissioners arrived on the Isthmus on November 26, 1917, and immediately assumed their duties.

There were in effect on June 30, 1918, 51 lot licenses issued by the land agent on behalf of The Panama Canal. Of this number, 7 were issued during the fiscal year. The licenses were granted to various parties to erect oil tanks, steamship office buildings, churches, lodge halls, and residences for the employees of steamship companies and oil companies. The rents collected on these leases for the fiscal year aggregated the sum of $15,042.02. No rental was charged on licenses to churches or other religious organizations.

The Canal Zone and The Panama Canal are included in several acts of Congress enacted during the fiscal year, but there has been no congressional legislation limited in its scope to the canal. An Executive order was issued on January 12, 1918, establishing maximum rates of fare and governing transportion of passengers for hire in the Canal Zone. This Executive order was issued by virtue of the act of August 21, 1916. On May 28, 1918, the President issued an Executive order relating to the anchorage and movement of vessels in Canal Zone waters, under authority granted to him by section I, Title II, of the act of June 15, 1917, commonly known as the espionage act. By the terms of the order the Governor of The Panama Canal is authorized to exercise, within the territorial waters of the Canal Zone, all the powers mentioned in said section of the said act, to the same extent as is conferred therein on the Secretary of the Treasury with regard to the territorial waters of the United States.

HEALTH DEPARTMENT.

Two changes in the head of this organization occurred during the year. On October 4, 1917, Col. D. C. Howard, Medical Corps, United States Army, was relieved from duty with The Panama Canal, and on February 26, 1918, his successor, Col. A. E. Truby, Medical Corps, United States Army, was also relieved. He was succeeded by Maj. A. T. McCormack, Medical Reserve Corps, on the date of his relief.

The health conditions of the employees and other residents of the Canal Zone have continued good. No cases of yellow fever or plague occurred on the Zone, in the cities of Panama and Colon, or in the vicinity of the Canal Zone in the Republic of Panama. The number of hospital admissions for malaria during the year was 622, distributed as follows: Employees residing in the city of Panama, 22; employees residing in the city of Colon, 64; employees residing in

Cristobal, 81; employees residing within other sanitated districts of the Canal Zone, 69; employees working outside of sanitated districts, 386. The malarial rate in the sanitated districts is 6.77 per 1,000, as compared with 128 per 1,000 in the insanitated districts.

The average civil population of the Canal Zone was 24,038, as compared with 31,048 for the preceding year. In this population the death rate from disease was 10.61 per 1,000, as compared with 8.95 for the preceding year.

City of Panama.—The average population was 61,369, compared with 60,778 for the preceding year. In this population the death rate from disease was 24.18, as compared with 27.93 for the preceding year.

City of Colon.—The average population was 26,078, as compared with 24,693 for the preceding year. In this population the death rate from disease was 24.96, as compared with 24.54 for the preceding year.

Division of Hospitals.

ANCON HOSPITAL.

In the progress of construction of the new hospital plant 10 of the the old frame buildings were evacuated and the buildings razed. The new permanent buildings occupied included the administration-clinics building in December, and the new kitchen and mess halls building in March. There was a total of 10,865 patients admitted to the hospital during the year. In the surgical clinic there were 1,525 major operations and 2,692 minor operations performed; 3,892 cases visited the out-patient department. In the medical clinic out-patient department 3,312 cases were treated. In the eye and ear clinic 6,099 cases were treated and 976 operations performed.

Corozal Hospital and Farm.—This institution for the care and treatment of insane patients continued under the supervision of the superintendent of Ancon Hospital, with a superintendent in local charge. At the close of the year there were 374 patients, as compared with 354 on June 30, 1917. There were 185 cases admitted, of whom 38 were assigned to the chronic ward. The increase in the number of patients has made it necessary to crowd to an undesirable extent the existing capacity of the wards, and makes necessary an additional ward building. The hospital provides for patients from the Republic of Panama, on a pay or charity basis, as circumstances require. As a part of the course of treatment for patients in condition to be benefited by it, the patients are engaged in some light occupation. The women do sewing, embroidering, rug and hat-making. The male patients are generally speaking fitted only for common labor and agricultural work, and under the supervision of male attendants are given plots of land to cultivate in the near vicinity of

the hospital. Amusements provided for the well being of the patients include moving pictures, phonograph concerts, band concerts, and walks in the vicinity of the hospital. Church services are also provided. An adjunct to this institution is the hospital farm and dairy, which provides employment for a number of cripples injured during their course of employment with the canal, and who are in practically destitute circumstances. At the dairy, besides the milk supplied for the hospitals, about 200 quarts of milk were available for daily sale to sick adults and children, on physicians' prescriptions.

COLON HOSPITAL.

The new nurses' home was completed during the year and was occupied on June 5, 1918. There were 526 major and 99 minor operations performed at this hospital during the year, and 2,313 patients were admitted for treatment.

PALO SECO LEPER ASYLUM.

No additional buildings were constructed at this asylum during the year. The average number of patients constantly cared for during the year was 68. There were 70 patients on June 30, 1918, as compared with 65 on the same date last year. Thirteen were admitted, 5 died, and 2 were discharged.

SANTO TOMAS HOSPITAL.

This hospital is located in the city of Panama and is owned by the Government of Panama, but is operated by agreement under the supervision of the health department of The Panama Canal. The average daily number of patients was 440.5, as compared with 440 for the previous year.

DISTRICT DISPENSARIES.

The dispensary at Paraiso was closed on May 14, 1918, and on account of the increased population at and near Gamboa the Paraiso dispensary will be transferred to that point. The new concrete dispensary at Gatun was completed and occupied on July 9, 1918. At the dispensaries throughout the Canal Zone a total of 552,864 persons, including employees and nonemployees, was treated. The district physicians treated 6,525 employees in quarters.

SANITATION.

The sanitary work within the Canal Zone was practically limited to the keeping down of malaria. The principal work was performed in the Colon-Cristobal district, which is more affected by swamp con-

ditions than the remainder of the Zone. The swamp to the northeast of the village of New Cristobal was drained during the year, and reclamation by clearing and ditching was conducted in the swampy area south of the coaling plant at Cristobal. South of Mount Hope, to the west of the Panama Railroad tracks, tidewater drains were constructed in large swamps, with marked reduction in the malaria incidence in the population living and working in the vicinity. In connection with drainage work there was a total of 92,112 linear yards of ditches dug, 5,152 linear yards of concrete ditches installed, and 17,114 cubic yards of fill deposited. In addition, 119,365 linear feet of ditches were maintained.

The sanitary work in Panama and Colon is carried on under the immediate supervision of the chief health officer of the canal by the health officers of the respective cities, who are employed by The Panama Canal. In the city of Panama, as a means of improving conditions concerning the incidence of tuberculosis, particular attention was paid to the elimination of dark and poorly ventilated rooms. In this work 534 buildings were altered and repaired, 4,000 windows were installed, and 30 rooms eliminated. The regulations for the inspection of foods, supervision of building construction, garbage collection, street cleaning, and preventive measures against disease in general, were enforced. In Colon similar work was done.

Quarantine Division.

A serious outbreak of cerebrospinal menegitis occurred on the Japanese steamer *Anyo Maru*, en route from Yokohama to Callao, Peru. Between Yokohama and San Francisco several cases of this disease occurred, and after leaving Balboa, a port of call, for Callao, there was a recrudescence of the disease, as a result of which the Peruvian authorities refused to receive the vessel. She returned to Balboa, and on her arrival, on May 28, 1918, 585 passengers and 16 of the crew were disembarked and placed in quarantine. The persons suffering from the disease, upon their arrival at Balboa, were successfully treated, and all such cases recovered without sequelæ. The ship was thoroughly disinfected and permitted to proceed on its voyage without the passengers. Active steps were taken to prevent spread of the disease among the noninfected persons removed from the ship and retained in quarantine, and no additional cases occurred. As the result of this incident, ships having cases of cerebrospinal meningitis will have their sick evacuated here, passengers and crew examined, and all carriers of the disease will be detained until they are no longer a source of danger to others.

In February, 1918, 3 cases of smallpox arrived at Bocas del Toro, Republic of Panama, from the islands of San Andres and Old Providence. Smallpox was reported at Bluefields, Nicaragua, and at

Cartagena, Colombia. In September, 1917, 2 cases of leprosy arrived at Cristobal, 1 from Colombia and 1 from Bocas del Toro. Bubonic plague was generally reported along the South American coast from Valparaiso, Chile, north. Yellow fever conditions remained unimproved in Guayaquil and vicinity. On the Atlantic side plague has been reported in the vicinity of Caracas, Venezuela. These conditions as to bubonic plague and yellow fever have made it necessary to continue quarantine restrictions to vessels arriving from ports in which the diseases are reported.

For further details, attention is invited to the report of the chief health officer, Appendix K.

WASHINGTON OFFICE.

On December 1, 1917, Mr. A. L. Flint was appointed general purchasing officer and chief of the Washington office, in succession to Maj. Benedict Crowell, United States Engineer Officers' Reserve Corps, who resigned on November 11, 1917, on his appointment as Assistant Secretary of War.

The abnormal labor conditions in the United States increased the difficulties heretofore experienced in filling requisitions from the Isthmus for skilled labor, especially in marine work. Tenders of employment were declined in 60 per cent of all classes. One thousand and ninety-four persons were tendered employment in the grades above that of laborer, of which number 432 accepted, covering 65 different positions. Additional work was entailed upon the correspondence and record division on account of correspondence with respect to matters that had to be referred, on account of war conditions, to the War Trade Board and its various bureaus, the Shipping Board, Fuel Administration, Alien Property Custodian, and other new Government establishments. In the office of the assistant auditor of the canal, stationed in the Washington office, 15,999 claims were passed for payment, leaving on hand on June 30, 1918, 382 claims. There was a decrease of 2,190 claims received during the year, as compared with the preceding year, and a decrease of 2,322 claims passed for payment. During the year, 13,474 vouchers for payment, amounting to $9,643,732.81; 232 collection vouchers, amounting to $335,040.15; and 3,075 settlements by transfers of appropriation, aggregating $1,893,490.47, were given administrative examination. There was a decrease of $1,209,549.87 in disbursements as compared with the previous year. One hundred and four contracts were prepared, amounting to $3,521,474.53, a decrease of 65 in number and $1,575,514.93 in amount, as compared with the previous year. The assistant auditor, as the legal officer in the United States of The Panama Canal, has continued to render assistance to the Department of Justice in the preparation for trial, and at the trial, in the courts,

of all cases in connection with contracts made with The Panama Canal.

The usual routine methods of procuring and shipping materials have been materially interfered with on account of war conditions. This is especially true of materials in which a shortage exists or is imminent in the States. All such cases must be reported to the War Industries Board, in compliance with the instructions of the President to the War Industries Board, contained in his letter of March 4, 1918, with the exceptions as prescribed by executive order signed by the Secretary of War, dated May 18, 1918, with especial reference to The Panama Canal. The chief of the Washington office has been designated as representative of The Panama Canal on the Clearance Committee and the Requirements Division of the War Industries Board. The new conditions referred to inevitably entailed increased work upon the Washington office.

The principal purchases in filling requisitions from the Isthmus have been made by the Washington office, although branch offices have been continued in charge of assistant purchasing officers at New York, New Orleans, and San Francisco. Preliminary inspection has been made in the States of materials purchased by a corps of inspectors under the supervision of the inspecting engineer of the Washington office. The work of inspection has been facilitated, as heretofore, by assistance rendered by the district officers of the Corps of Engineers, United States Army, by the Bureau of Standards, the Bureau of Mines, Bureau of Chemistry, and the Medical Department, Ordnance Department, Signal Corps, and the Quartermaster Corps of the United States Army.

The number of orders for materials and supplies during the year was 6,608, a decrease of 2,300 as compared with the previous year. The total value of the materials on the orders placed was $8,019,608.90 for the year, as compared with $10,405,157.27 for the previous year. The grand total of purchases made for the canal through the Washington office since the year 1904 is $136,582,840.43.

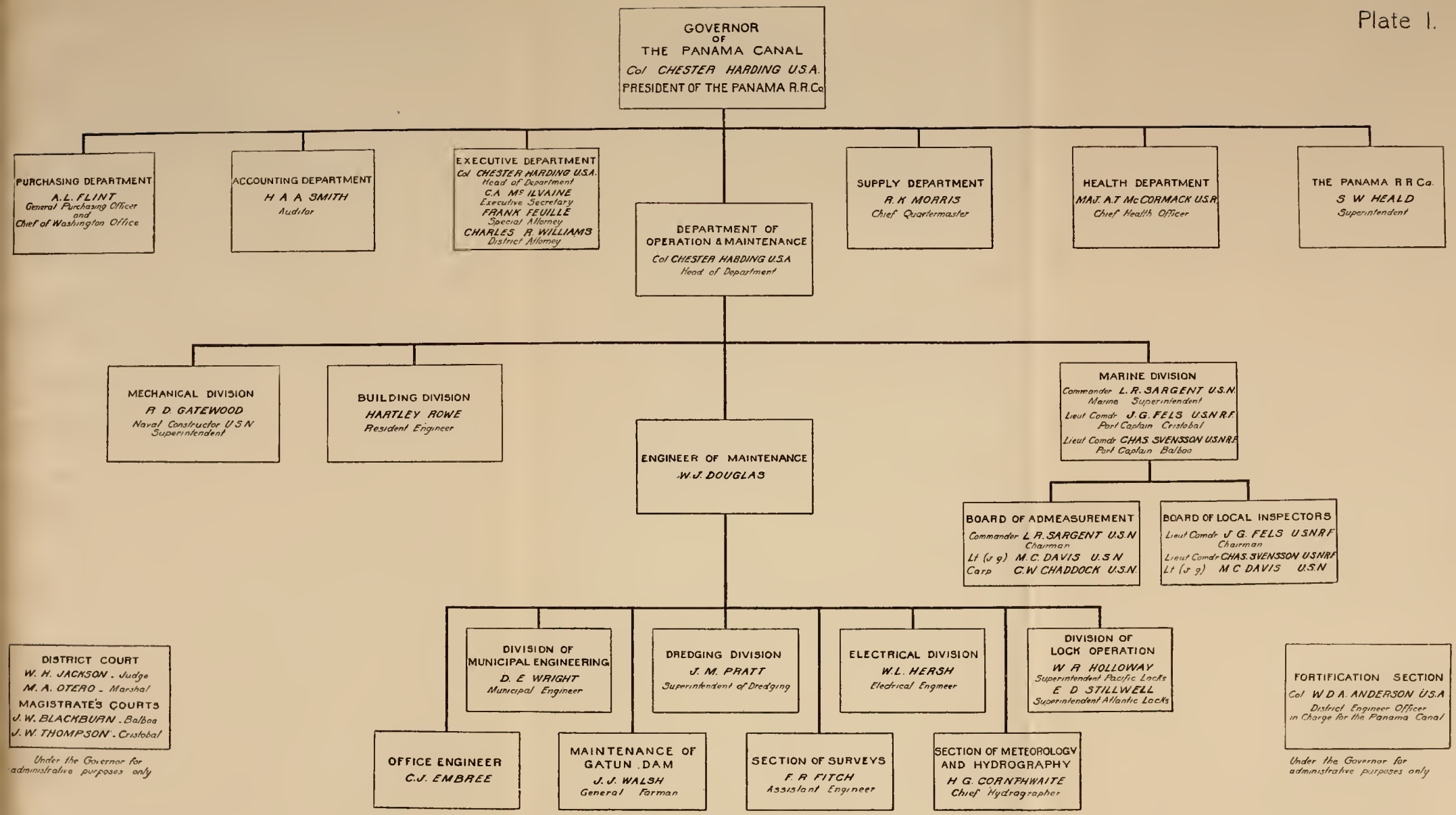
For further details attention is invited to Appendix L.

Respectfully submitted.

CHESTER HARDING,
Governor, The Panama Canal.

HON. NEWTON D. BAKER,
Secretary of War, Washington, D. C.

Plate I.



ORGANIZATION OF THE PANAMA CANAL JULY 1. 1918

APPENDIX A.

REPORT OF THE ENGINEER OF MAINTENANCE.

The Panama Canal,
Office of the Engineer of Maintenance,
Balboa Heights, Canal Zone, July 20, 1918.

Sir: The following report of work done under the jurisdiction of this office during the fiscal year ended June 30, 1918, is submitted:

Organization.

The duties of the engineer of maintenance were not changed during the year. The office continued under your charge throughout the year. Lieut. Col. Jay J. Morrow was ordered to duty in the United States and resigned as engineer of maintenance on August 30, 1917. On this date the division of lock operation, the section of office engineer, the section of meteorology and hydrography, and the section of surveys were transferred to supervision of the electrical engineer, Lieut. Col. T. H. Dillon.

The heads of the remaining divisions reporting to the engineer of maintenance were ordered to report direct to you on this date. Lieut. Col. T. H. Dillon was ordered to duty in the United States and resigned as electrical engineer on February 6, 1918. On this date the electrical division, the division of lock operation, the section of office engineer, and the section of meteorology and hydrography were transferred to the supervision of resident engineer, building division, and continued under his supervision until the end of the fiscal year. The remaining divisions and sections of this office reported direct to you.

The various divisions and sections have been in charge of the following personnel:

Electrical division.—Lieut. Col. T. H. Dillon continued as electrical engineer until his relief from duty with The Panama Canal on February 6, 1918, when Mr. Walter L. Hersh was appointed electrical engineer.

Building division.—Mr. Hartley Rowe, resident engineer, continued in charge of the building division.

Locks division.—Mr. E. D. Stillwell continued in charge of the Atlantic locks and Mr. W. R. Holloway continued in charge of the Pacific locks.

Municipal division.—Mr. D. E. Wright, municipal engineer, continued in charge of this division.

Terminal construction.—Mr. T. B. Monniche, engineer of docks, resigned August 4, 1917, when this work was transferred to the resident engineer, building division.

Mr. A. R. Brown, assistant engineer, resigned October 18, 1917, and the uncompleted part of this work was transferred to the resident engineer, building division.

Section of meteorology and hydrography.—Mr. F. D. Willson resigned July 17, 1917, and was succeeded by Mr. R. Z. Kirkpatrick on August 15, 1917. Mr. Kirkpatrick resigned April 13, 1918, to accept a commission in the Engineer Officers' Reserve Corps, and was succeeded by Mr. H. G. Cornthwaite, appointed April 14, 1918.

Section of office engineer.—Mr. C. J. Embree, office engineer, continued in charge of this section.

Section of surveys.—Mr. O. E. Malsbury, assistant engineer, resigned from this office September 10, 1917, to accept a commission in the Engineer Officers' Reserve Corps, and was succeeded by Mr. F. R. Fitch on September 11, 1917.

Locks Division.

LOCKAGES.

The following table gives the total commercial and noncommercial lockages of the year:

Date.	All lockages.	Commercial lockages.	Commercial vessels.	Noncommercial lockages.
Gatun—				
To July 1, 1917	4,155	3,520	3,889	635
During fiscal year	2,271	1,936	2,096	335
To July 1, 1918	6,426	5,456	5,985	960
Pedro Miguel—				
To July 1, 1917	4,385	3,622	3,863	763
During fiscal year	2,420	2,041	2,083	379
To July 1, 1918	6,805	5,663	5,946	1,142
Miraflores—				
To July 1, 1917	4,302	3,634	3,856	668
During fiscal year	2,343	2,017	2,081	326
To July 1, 1918	6,645	5,651	5,937	994

The average number of lockages made at all locks for each month of the fiscal year was 195.39 or about 6.5 through lockages per day. The greatest number of lockages made in any month of the year occurred in May when the Atlantic locks made 229 lockages and the Pacific locks 225 lockages.

WATER CONSUMPTION—GATUN LAKE.

Complete data regarding the hydrography of Gatun Lake for the calendar year are given hereinafter, but the following data have been compiled for the fiscal year, July 1, 1917, to June 30, 1918:

Average quantity per month.	Millions of cubic feet of water.	Per cent lost or used.	Per cent of total.
Water lost:			
By evaporation	2,028.98	11.511	8.964
By wastage over Gatun spillway	15,534.18	88.132	68.624
By leakage, Gatun spillway	10.21	.058	.045
By transfer to Miraflores Lake	23.95	.136	.106
By leakage at all locks	28.69	.163	.127
Total water lost	17,626.01	100.000	.....
Water used:			
For pumping	68.46	1.366	.302
For lockages, Atlantic	812.47	16.215	3.589
For lockages, Pacific	695.93	13.888	3.074
For hydroelectric station	3,317.37	66.203	14.655
Gain in storage, Gatun Lake	116.66	2.328	.515
Total water used	5,010.89	100.000	100.000
Total water, lost and used	22,636.90	.....	.....

Useful water $= \frac{5010.89}{22636.90} = 22.135$ per cent.

Water used for lockages $= 6.66$ per cent.

It is always endeavored to have Gatun Lake level at or near its maximum allowable elevation, plus 87 feet, at the beginning of the dry season, so that there is a maximum amount of water in storage for the dry months of the year. Gatun Lake was at elevation plus 87.06 on January 1 and 2, and remained at approximately this elevation until February 1, when storage in the lake was drawn on, due to lack of rainfall. The lake level lowered gradually until it reached its minimum elevation of the year on April 21 at plus 84.52.

It will be noted by the above table that the hydroelectric station uses most of the water drawn from storage, and as lockages increase in number the use of water during the dry season by the hydroelectric station will have to be limited by the necessities of the locks. If no water had been used by the hydroelectric station during the dry season months—February, March, and April—the net loss in storage due to all other causes would have carried the lake level from plus 87 on February 1 to plus 86.83 on the last day of April. In other words, the lake elevation would have remained practically stationary during the dry season if no water had been used by the hydroelectric station, and this condition would have existed in spite of the fact that the average number of lockages during these months was 196.66 per month, or 6.5 through lockages per day.

A material saving in water can be accomplished at the locks by cross filling and operating tandem lockages. Precautions of this nature have not been necessary to date owing to the plentiful supply of water for all purposes, although tandem lockages are used whenever possible without causing a delay to shipping.

GATUN DAM.

Monthly surveys of Gatun dam indicate a gradual consolidation similar to former years and no fills were necessary to replace settlement this year. During the year that portion of the dam over the new penstock at the hydroelectric station was backfilled. The usual maintenance work on the dam, tracks, and borrow pits was performed.

TOWING LOCOMOTIVES.

The four new towing locomotives constructed upon the Isthmus were completed, and all machines of this type are continuing to render excellent service.

SPARE PARTS.

The warehouse at Corozal was transferred during the year from the quartermaster to the locks division, and in addition to the spare parts which were in the building all of the lock-gate spares (except the gate girders) which were formerly at Paraiso have been added. All lock-gate spares at Corozal are being repainted and put into first-class condition.

At the beginning of the past fiscal year there were 15 United States requisitions in the process of manufacture. These have been completed. Twenty-six United States requisitions were issued during the year, 20 of them have been filled to date, the material on the balance being in process of manufacture.

APPROACH WALL FENDER CRIBS.

At the end of each approach wall there are installed fender cribs constructed of piling and heavy timbers, to prevent serious damage to any vessel that may approach the locks out of control.

In October, 1917, it was noted that the fender cribbing at lower Pedro Miguel appeared to be very insecure and upon withdrawing one of the piles it was found to be practically honeycombed by the teredo. The fender was reconstructed with the use of creosoted piling and timbers and the work was completed in December, 1917.

The above cribbing was in Miraflores Lake, 54 feet above sea level which lake is fed entirely by fresh water from Gatun Lake and the watershed in the vicinity. The fact that the cribbing was attacked by the teredo is a peculiar confirmation of the fact that Miraflores Lake is gradually becoming saline through the back feeding of sea water through Miraflores locks.

On March 16, 1918, when the steamship *Capto* approached Pedro Miguel locks from the north, she rammed the fender cribbing at the end of the north approach wall and made it necessary to install new piling and cribbing on the east side.

PAINTING LOCK GATES.

During the year all of the gates and machines at the Atlantic locks were examined and the enamel removed and replaced where it was found to be in bad condition. A complete report on this subject

will be found in the report of the superintendent which follows hereinafter.

It has been impossible to find an oil paint that will stand up under the severe conditions found at the locks. Arrangements have been made to apply bituminous enamel to certain of the exposed portions of the gate leaves as well as the submerged portions. It is hoped that this experiment will prove successful, in this way decreasing the maintenance work on the gates.

LOCK POWER AND CONTROL CABLES.

The installation of all power and control cables at the locks was practically completed by August, 1913. During the four years which elapsed between that time and the beginning of the present fiscal year, practically no serious trouble has been experienced with the lead sheathed control cables.

It has been found, however, that the rubber insulated double braided wires were being attacked by the "termite" or white ant and it became necessary to open up all closed wall chases carrying this type of wire to the lighting outlets. It was also found that the rubber insulated telephone conductors to the lamp standard outlets were becoming grounded due to the dampness in the chases and it became necessary to replace these with lead sheathed cables. These faults were to be expected, however, and it is believed that the present method of running all wires in exposed chases on the walls of the tunnels will keep them dried out and as the "termite" cannot live and work in the light no further harm should come to the exposed wires other than gradual deterioration which occurs in any climate.

It had been expected that our lead sheathed cables would last for a number of years before showing signs of deterioration. However, a series of breakdowns at Miraflores locks beginning September, 1916, were experienced, and by June, 1917, about seven lead sheathed control cables had broken down and were replaced temporarily by other cables until the maintenance work on the lock gates and valves could be completed, after which the trouble was investigated thoroughly.

As all control cable are run with two, three, and four cables to the duct, it was difficult to remove one without removing the others, therefore the investigation was begun in the crossover tunnel where the cables run under the lock chamber in very damp ducts. Several ducts were broken open and tests were made between the lead sheaths and the water in the sump at the base of the shaft with the following results:

Readings taken in West Crossover—No tunnel lining—Walls very wet.

	Volts.
From cable lying on top of ducts very wet to iron ground	0.18
Same cable to copper float in water of sump	.32
Same cable to galvanized-iron wire in water of sump	.16

Readings taken in East Crossover Tunnel—Steel lining is in place—Tunnel walls dry.

	Volts.
From cables to top of ducts to ground	0.05
From cables to top of ducts to copper float in sump	.14
From cables to top of ducts to concrete floor	.02

The above readings were taken with the telephone cables connected in their battery supply. It was thought advisable to remove all possibility of direct current from an external source and repeat the readings. The direct-current supply to the telephone cables was cut and the readings again repeated with results practically identical to those quoted above.

While working in the tunnel one of the men complained of the fact that the seepage water from the ducts appeared caustic in its effect on his hands. Furthermore, in opening some of the ducts, water and a peculiar sediment came out. Some of the material discharged was black and some almost clear white. Samples of each were sent to the laboratory for analysis with the result that the black sediment was found to be a lead salt. Furthermore, the seepage water was found to carry a large amount of lead in solution.

Two pieces of sheet lead 5 inches by 2 inches were placed at the base of the shaft, one of them in seepage water and grounded and the other in a position where seepage water would drip over its surface. The grounded sample did not appear to be materially affected by electrolytic action. The other sample exposed to seepage water weighed 182½ grams at the beginning of the test, and in two weeks it had lost 3½ grams, or about 1.92 per cent of its weight, and this in spite of the fact that the seepage water had been flowing over about 70 feet of cable and must have had considerable lead in solution before striking the test sample.

All the defective cables were then removed and found to be in the condition shown on plate No. 2.

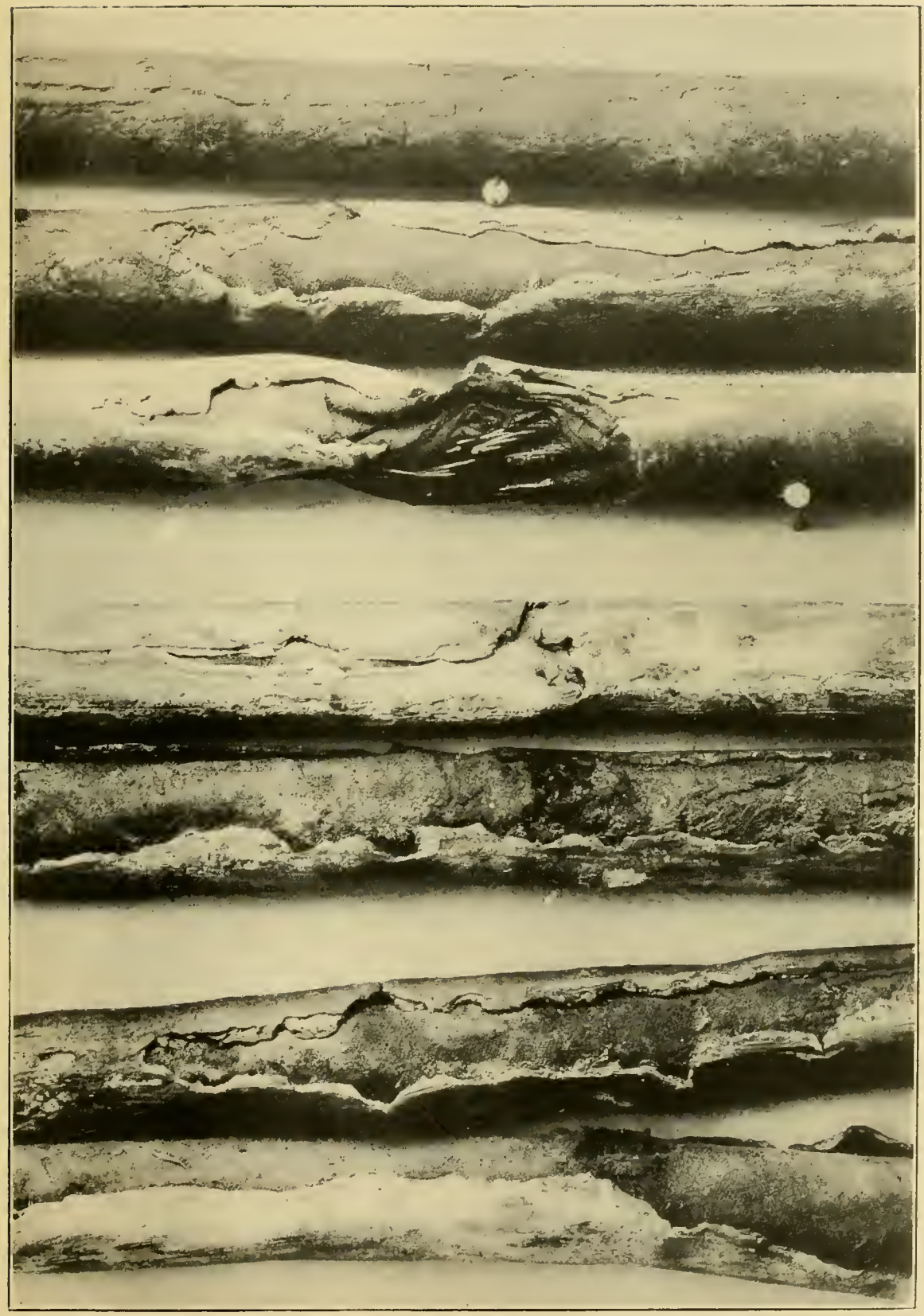
All control cables used have either five or eight conductors of No. 10 B. & S. gauge, each insulated with 1/16-inch varnished cambric with 1/32-inch varnished cambric over all, and a lead sheath 1/16 inch thick. The five conductor cables are about 7/8 inch in diameter and the eight conductor cables are about 1–1/8 inch in diameter. This information may be of assistance in studying plate No. 2.

As a result of this condition found in the center crossover tunnel at Miraflores, all similar installations at all locks were examined but no further indications of trouble were found. To guard against further damage from seepage water, arrangements will be made to install all replace cables in ducts away from the wall of the tunnel shaft, in this way using the outside or wall ducts as drains for the seepage water. Replace cables at Miraflores were hung on porcelain hangers, and if necessity should arise and should further precaution be advisable arrangements will be made to place all cables on porcelain hangers and coat them with an insulating material such as bituminous compound.

The following report has been submitted by the chemist of the municipal engineering division who investigated the cause of the chemical action above referred to:

Corrosion of the Lead Sheaths of Cables at Miraflores Locks.

The corrosion of the sheaths of some of the cables at Miraflores locks was first called to the chemists' attention in August, 1917. An inspection was made of the cables exposed at the west end of the middle crossover tunnel. There were irregular shaped deposits of a white scale on the cables over which water was dripping. A bottle was placed so as to catch some of the drippings on August 9, and the drippings were sent to this laboratory on August 11 for analysis.



FIVE AND EIGHT CONDUCTOR, LEAD SHEATHED CONTROL CABLES REMOVED FROM THE MIDDLE CROSS-OVER TUNNEL AT MIRAFLORES LOCKS.

Previous to the inspection several samples of materials collected in the locks were submitted for analysis. Qualitative analyses of these samples were made, the results obtained are as follows:

1. A brownish red material collected from the duct lines in the lower crossover. The sample contained large amount of iron, and small amounts of calcium and silica.

2. White material collected from the duct line on the west end of the middle crossover tunnel. The sample contained large amounts of calcium carbonate and hydroxide and a small amount of lead. The claim of the helper that when collecting this sample "something ate through the skin on his hand" must have been due to the lime.

3. Black substance collected from the same location as sample No. 2 contained large amounts of lead, calcium, and small amount of iron and the following acid radicles of sulphide, sulphate, and carbonate. The sulphide must have formed by the decomposition of vegetable matter.

The first sample of water collected was characterized by a total alkalinity to crysthrosine of 1,740 parts per million of which 1,680 parts were caustic or hydroxide alkalinity. The chlorine content was 1,325 parts per million. The water contained 50 parts per million of lead.

On August 12 and 20 two more samples of drippings from the middle crossover at Miraflores locks were collected and the mineral analysis of the samples were as follows, in parts per million:

	Sample No. 2.[1]	Sample No. 3.[2]
Hydroxide alkalinity as $CaCO_3$	1,850	1,800
Carbonate alkalinity as calcium carbonate ($CaCO_3$)	180	320
Silica (SiO_2)	8	7
Iron and aluminum (Fe and Al)	2	2
Calcium (Ca)	215.1	184
Magnesium (Mg)	26.4	13
Lead (Pb)	60	72.4
Sodium (Na)	2,033	2,396
Potassium (K)	284.7	.....
Chlorine (Cl)	2,320	2,266
Carbonate (CO_3)	108	192
Sulphate (SO_4)	115.7	99.1

[1] Date of collection, Aug. 12, 1917. [2] Date of collection, Aug. 20, 1917.

Portland cement contains 60 to 65 per cent of calcium oxide.

According to various authorities when the cement sets among other compounds large amounts crystallized calcium hydroxide, and some calcium aluminate form. Calcium hydroxide is quite soluble in water, so when water comes in contact with concrete, calcium hydroxide goes into solution. Calcium aluminate is decomposed by water forming calcium hydroxide and gelatinous aluminum hydroxide.

From the above mineral analyses it could be seen that the caustic alkalinity and calcium contents of the dripping water is quite high as compared with the mineral analyses of water obtained on August 23, 1917, from the lock chambers at Miraflores, which was as follows in parts per million:

Hydroxide alkalinity as ($CaCO_3$)	0
Carbonate alkalinity as ($CaCO_3$)	0
Bicarbonate alkalinity as ($CaCO_3$)	110
Silica (SiO_2)	23
Iron (Fe)	Trace.
Aluminum (Al)	0
Calcium (Ca)	35
Magnesium (Mg)	42
Sodium and potassium (Na and K)	425
Chlorine (Cl)	904
Bicarbonate (HCO_3)	134
Dissolved oxygen	6.8
Temperature degrees centigrade	27
Per cent saturation	85

The corrosion of the lead sheaths of cables can be due to two reasons, (1) alternating current electrolysis, and (2) to the chemical action of the dripping water saturated with lime salts from concrete. We thought the corrosion was due mainly to the second reason above stated. In order to substantiate this theory we carried out the following experiments in the laboratory:

The lead sheath of an unattached cable was cut open, and strips of lead were cut measuring 6 to 7 centimeters long, 2.5 to 2.8 centimeters wide, and 0.2 centimeters thick. These strips of lead were numbered and weighed accurately to the forth place. Some water was obtained from the lock chambers and placed in bottles holding one liter. The bottles were also numbered, and different amounts of calcium hydroxide solution were added to each to get the desired alkalinity. The alkalinity of the contents of each bottle was determined by titration. When the bottles were ready the strips of lead bearing corresponding numbers to the bottles were placed in them. The strips were taken out from time to time, dried very quickly, and weighed to find out the weight dissolved. Two series of these experiments were carried on and the following tables show the results obtained:

TABLE No. 1.—*Résumé of the experiment to determine the rate of solution of lead in the lock water after the addition of different amounts of calcium hydroxide solution to change the concentration of the hydroxide ion.*

No. of sample.	OH alkalinity of the water as $CaCO_3$ in p.p.m.	CO_3 alkalinity of the water as $CaCO_3$ in p.p.m.	Weight of the strips in grams.	Length of strip in cm.	Width of strip in cm.	Thickness of strip in cm.	Number of milligrams of lead dissolved per 100 grams of lead having the same thickness as the strips, after immersing in the different samples of water for the periods of time in hours as indicated below.																	
							½	5	26	46	73	96	117	140	163	205	249	278	325	415	463	654	846	1,013
1.....	0	HCO_3 110	24.8194	4.15	2.25	0.25	6.4	9.6	9.6	14.4	16.8	22.1	22.1	26.9	26.9	27.7	28.6	31	32.6	33.8	34.6	34.6	35.8	37
2.....	0	0	24.9041	3.90	2.50	.22	.....	11.2	11.2	14.8	16.0	21.6	21.6	28.5	28.5	32.5	35.3	38.9	41.7	43.8	46.2	45.3	52.6	56.6
3.....	1,160	280	30.0434	4.2	2.7	.25	13.3	57.5	173.4	252.8	328.5	391.4	441.1	491.6	538.6	586.2	654.8	717.3	780	846	911	964	1,034	1,097
4.....	1,360	360	30.2692	4.1	2.75	.25	12.2	54.8	170.2	246.6	320.4	375	426.2	459.8	499.7	551.7	607.1	692.8	727	818	864	912	953	1,054
5.....	1,440	300	29.4319	4.2	2.7	.25	9.5	51.6	173.3	265.9	339.8	399	451.5	493.8	533.2	581.5	642.4	720.8	783	835	892	935	1,013	1,067
6.....	1,540	240	31.0934	4.25	2.80	.25	11.2	50.4	162.4	236.1	331.2	379	426.7	468.9	513.5	560.2	628.1	689	763	824	873	924	994	1,070
7.....	1,610	400	31.5250	4.20	2.85	.25	13.9	55.1	163.6	241.1	317.1	369.3	411.8	448.2	483.5	521.2	576.4	665.8	720	786	836	894	967	1,051
8.....	1,670	520	31.1185	4.10	2.75	.25	8.3	45.2	153.5	231.3	302.5	354	369.4	433.1	469.1	504.3	543.6	612.7	666	722	760	803	861	926
9.....	1,810	380	28.6460	4.20	2.60	.25	8.0	48.5	160.9	240.3	314.5	374.2	413.4	450.4	488.4	530.6	591.1	674.8	735	792	831	870	942	1,003

NOTE.—Sample No. 1 is the original lock-chamber water and sample No. 2 is pure distilled water. The strips had a hole with a diameter of 0.4 centimeter.

Throughout this report by expression of "the rate of solution of lead" we do not mean that all the lead goes into solution as lead hydroxide. Lead hydroxide is somewhat soluble in water; after the solubility product of the lead hydroxide is reached lead hydroxide precipitates.

TABLE No. 2.—*Résumé of the experiment to determine the rate of solution of lead in the lock water after the addition of different amounts of calcium hydroxide solution to change the concentration of the hydroxide ion.*

No. of sample.	OH alkalinity of the water as $CaCO_3$ in p. p. m.	CO_3 alkalinity of the water as $CaCO_3$ in p. p. m.	Alkalinity of the samples after immersing the strips for 740 hours.			Weight of the strips in grams.	Length of strip in cm.	Width of strip in cm.	Thickness of strip in cm.	Number of milligrams of lead dissolved per 100 grams of lead having the same thickness as the strips, after immersing in the different samples of water for periods of time in hours as indicated below.							
			OH alkalinity as $CaCO_3$ in p. p. m.	CO_3 alkalinity as $CaCO_3$ in p. p. m.	HCO_3 alkalinity as $CaCO_3$ in p. p. m.					47	95	143	215	311	406	549	740
10	20	180	0	0	80	45.1182	7	2.5	0.25	9.3	11.9	13.9	19.5	22.1	23.9	25.7	31
11	85	190	0	40	60	45.0486	7	2.5	.25	9.1	13.6	14.6	21	30.6	34.8	38.4	44.8
12	120	220	0	160	32	45.6827	7	2.5	.25	17.2	22.3	25.6	30.4	34.5	39.8	48.1	56.9
13	270	220	80	224	0	45.4382	7	2.5	.25	12.7	20.6	26.1	36.7	48.8	58.9	96.1	167.8
14	450	240	190	268	0	45.8475	7	2.5	.25	115.5	152.8	173	195	215	240	276	305
15	580	220	486	328	0	45.1844	7	2.5	.25	151.4	200	247	320	428	529	653	745
16	700	200	588	328	0	45.2499	7	2.5	.25	163	220	261	344	396	508	642	805
17	820	200	588	388	0	45.0240	7	2.5	.25	179	233	280	347	401	488	573	675
18	840	320	802	388	0	46.0327	7	2.5	.25	187	243	291	368	450	518	648	792
19	0	170 HCO_3	0	0	162	46.0518	7	2.5	.25	4.3	7.6	10.6	22.8	24.5	29.5	33	55.8
20	170	320	0	0	346	45.1608	7	2.5	.25	79.1	113.6	132.2	149.2	158	160.7	163.8	169

NOTE.—Sample No. 19 is undiluted sea water and sample No. 20 is undiluted sea water plus calcium hydroxide. The strips had a hole with a diameter of 0.55 centimeter.

If milligrams of lead dissolved are plotted in the above experiments, per hundred grams of lead of 0.25 centimeter thickness against the time in hours, curves showing their interrelation will be obtained.

The curves clearly indicate that the rate of solution of lead is directly proportional to the concentration of OH ion; that is, the higher the concentration of OH ion, the more lead goes into solution. This fact was already known before the experiment was started. This gradation of the lead going into solution is more clearly seen, especially toward the beginning of the experiment rather than at the end, because the stronger solution becomes weaker sooner by absorbing CO_2 from the atmosphere than a weaker solution. Therefore, the difference in the amount of lead dissolved between the weak and strong solutions is not so much toward the end of the experiment. It is also interesting to see that sample No. 1 on page 51 and sample No. 19 on page 52, which are original lock chamber and sea waters, did not attack the lead even as much as sample No. 2 on page 51, distilled pure water. This is due to the fact that, in the latter case, under the joint action of water and dissolved oxygen, lead hydroxide is produced, which is slightly soluble in water, and therefore does not protect the lead. In impure water, such as samples Nos. 1 and 19, which contain sulphate and carbonate radicles, the corresponding lead salts are formed which have extremely small solubility, and form firmly an adhering layer on the lead.

The conditions in the above experiments are not similar to those in the duct lines, because the strips of lead were continually immersed in the same water except when they were taken out to be weighed, while in the duct lines saturated lime solution drips continually to the same spot or around it, and it is natural that, the reaction between fresh drip and the lead goes on much faster.

In order to measure quantitively how fast the lead was corroded by the dripping water in the duct lines, the following experiment was performed: A strip of sheet lead measuring 17.1 centimeters long, 5.8 centimeters wide, 0.12 centimeters thick and weighing 182.8 grams was tied with a strip of lead to one of the lead cables at west end of the middle crossover at Miraflores locks. Wires of volt motor attached to ends of piece of lead cable gave no reading. Water dripped from cable to this piece of lead. The strip was removed after 12 days and weighed. Weight of the strip plus the scale, was 184.55 grams. The weight of the strip after the removal of the scale was 179.6 grams. The loss of the strip was 3.2 grams. The corrosive action of the dripping water was plainly visible on the sheet lead and the composition of the white scale was found to be lead hydroxide and carbonate. At this rate the whole sheet of lead would corrode in 685.5 days. But the corrosion was only around where the water was dripping; if the water had dripped all over the surface at one time the sheet lead would corrode in a good deal less than 685.5 days.

Similar experiments were tried with another sheet of lead measuring 16.8 centimeters long, 5.6 centimeters wide, 0.12 centimeters thick and weighing 182.5 grams. The piece of lead was tied to a different lead cable at west end of middle crossover by copper wire. One end of the wire was fastened to lead cable and the other end to a copper float. Reading between end of copper wire attached to lead cable and end attached to copper float gave 0.06 volts. Water dropped from cable to the piece of lead. The strip of lead was removed after 12 days, the weight of the strip plus scale was 182.35 grams; the weight of the same strip after the removal of the scale was 181.7 grams. The loss of the lead was 0.8 grams. In this case the loss was not as much as in the first case; probably the dripping was not as strong.

While the above experiment was going on in the locks a similar experiment was started in the laboratory. A 15-gallon carboy was filled with lock chamber water and saturated with calcium hydroxide. The alkalinity of the water was as follows: Hydroxide alkalinity as calcium carbonate, 1,640 p. p. m.; carbonate alkalinity as calcium carbonate, 460 p. p. m.

The carboy was placed on a platform and a burrette was lowered into it to draw off the water. Two inches below the tip of the burrette a lead cable of 12 feet long was hung on a support, and the burrette was turned over it so that 2.2 c. c. of the water dripped on the cable per minute. The drippings were caught in another vessel below on the floor. The dripping water was analyzed and hydroxide alkalinity as calcium carbonate was 1,400 p. p. m., carbonate alkalinity as calcium carbonate 240 p. p. m., and the water contained 288 p. p. m. lead. When the carboy was emptied it was refilled and the dripping was continued. At the end of three weeks the corrosion on the surface of the

cable was plainly visible, which was brought about by the action of the dripping water. There was no chance for alternating current electrolysis in this experiment, as there was no current of any sort near the support where the cable was hung.

CONCLUSIONS.

The following conclusions can be drawn from the above experiments:

1. The rate of going into solution of lead, immersed in waters having different concentrations of hydroxide ion, is directly proportional to the hydroxide ion.
2. Lock chamber and sea water do not attack the lead as much as distilled pure water.
3. The corrosion of the lead sheaths of cables at Miraflores locks is due exclusively to the chemical action of the dripping water saturated with lime salts from the concrete and not to the alternating current electrolysis. The third conclusion is substantiated by the experiment described in the last paragraph of page 53, and also by the fact that the corrosion in the cables is noticed in certain localities of the duct lines where water is dripping and no action is noticed where the cables are free from drippings. According to Mr. J. C. Myrick's report of September 19, 1917, to Mr. H. R. Holloway: "In the horizontal runs of all the crossovers the duct lines have much more water than the vertical runs and an equally good condition for electrolytic action. In no case have we found any sign of action in the horizontal runs."

This fact could be explained very easily for the reason that, by the time the water reaches the horizontal runs of the crossover all the hydroxide contents of the water would be used up and therefore no action is seen in the horizontal runs.

Following are extracts from reports of the lock superintendents, covering details of operation and maintenance of the locks.

GATUN LOCKS.

ORGANIZATION AND PERSONNEL.

Mr. E. D. Stillwell and Mr. H. M. Thomas continued as superintendent and assistant superintendent, respectively, throughout the year. On July 1, 1917, Mr. F. M. Easter was appointed to fill the position of mechanical supervisor which had been vacant since June 12, 1917. Mr. C. W. Roberts, electrical supervisor, was transferred to the electrical division on September 24, 1917, and on October 3, 1917, Mr. P. R. Kiger was appointed to fill the vacancy. Mr. Kiger resigned on April 24, 1918, in order to enter the military service, Mr. A. E. Wood being appointed electrical supervisor on that date.

The positions of recorder and property clerk were combined and the work is now done by one man.

The personnel of the organization has changed considerably during the year, due to resignations and transfers. A total of four men resigned to enter the military service, three of whom received commissions.

OPERATION.

The same system of operation continued in effect as in the past year. The operation was carried on by two shifts covering the period from 7 a. m. to 8.30 p. m. It has been necessary, frequently, to extend this period to as late as midnight in order to clear the north bound ships the same day they entered the canal on account of the unusual conditions due to the war.

Delays due to failure of the operating machinery and accidents to vessels during the passage through the locks have been few and of negligible magnitude. The damage to vessels has been chiefly the breaking of chocks and bitts due to not being adapted for towing purposes.

The most serious damage occurred on February 2, 1918, to the steamship *Republic*, southbound, which hit the northeast wing wall and damaged the plates on the port bow above the water line. The accident occurred before the ship entered the lock and was under control of the locomotives.

The longest ship, although not the greatest tonnage, locked through to date was the steamship *Ceramic*, northbound, on December 12, 1917. The *Ceramic* is 655 feet long and 69.2 feet beam. Actual time of lockage was 60 minutes.

The water consumption at Gatun locks was as follows:

	Cubic feet.
Leakage	186, 985, 000
Lockage	9, 952, 110, 000
Total	10, 139, 095, 000

The average amount of water taken from Gatun Lake per lockage was 4,299,916 cubic feet.

The emergency dams were operated each month, except during the overhauling period. No emergency operations were necessary.

No emergency tests of the chain fenders were made during the year.

MAINTENANCE.

Maintenance work was carried on during the year as was necessary to keep the machinery and equipment in good operating condition. A number of changes were made in order to facilitate inspection, repairs, or operation of the machines. Equipment which was found to be unnecessary was removed and placed in stock for reissue to other departments.

Locomotives and tracks.—Two new locomotives made by the mechanical division shops at Balboa were received and placed in service during the year. The installation of the electrical equipment was done by the lock forces.

Several accidents have happened to the locomotives on all the locks due to not having a positive brake which could be applied under all conditions. Experiments were made, but not completed, on a type of wedge brake which has for its braking power the friction between the surface of the concrete and a steel wedge which takes part of the weight of the locomotive.

Emergency dams.—The electrical interlocks on the gate contactors were removed and replaced by a positive mechanical interlock on both dams.

All the meters on the control panels of the dams were removed and turned in to the Balboa storehouse, as the equipment was unnecessary and was deteriorating.

Miter gates.—Antirebounding devices were installed on the contactors of all the gate machines.

On all the intermediate gates the handrail motors, gear boxes, and limit switches with the wiring were removed and placed in store. The cost of maintaining this equipment was high and it was considered not essential to the operation.

Work was practically completed on fitting hinged covers and a removable section over the handrail equipment on the gates in order to allow ready access for inspection and repairs to the equipment.

Rising stem valves.—All intermediate rising stem valves with the roller trains and rods, valve stem, and the guide bearings have been placed in good condition and when necessary to use the short lengths of lock will be reinstalled. They have also served to replace other valves during the period of overhauling.

Chain fenders.—Wooden blocks with springs have been installed in the pits of all chain-fender machines. The springs take up the shock of the intermediate cylinder at the end of the upstroke.

Caisson and pump barge.—The lock caisson was used from January 14 to April 15, 1918, in unwatering the lock chambers. At the completion of the work all the paint on the interior was touched up and the machines and equipment put in good condition.

The spillway caisson was placed on the west lock wall for painting; repairs were made to the wooden seals and decking and some angle irons and U bolts were straightened.

Pump barge *No. 169* was dry-docked in the upper chamber and the interior and exterior of the hull painted.

Miscellaneous.—The covers on approximately 14,000 linear feet of the chases for the lighting and telephone wires in the operating tunnels were removed. This was made necessary due to the trouble on these circuits caused by water and mud filling the chases.

Water level indicator board and switches were installed at the top of the shafts at all crossunder sump-pump motors. The switches operating the sump pumps are now thrown manually when the indicator shows the sumps are full.

An indicating device has been installed on the lock control board to show the position of the arrow on the south approach wall which can not be seen

by the control-board operator. The device is operated by a transmitter and receiver similar to those on the control board.

Approximately 3,600 feet of lead-covered telephone cable have been pulled in from the lamp-posts to the chases in the operating tunnel to replace the jute-covered cable which was unserviceable.

New wall fenders of alemendra, a native hardwood, are being used to replace the old timber fenders as fast as they are broken and have to be renewed.

CONSTRUCTION AND NEW EQUIPMENT.

One new rowboat was constructed. A power-driven hack saw has been added to the equipment for the machine shop. A motor-operated jointer machine was made by the lock forces for the carpenter shop and a secondhand band saw is also being installed. Concrete scrap bins and an oil house have been placed on the platform in rear of the storeroom building. A new frame building was erected by the building division on the middle level, east wall, for use as a paint shop and storeroom. A rope shelter with concrete roof and posts has been erected on all wing and approach walls.

GENERAL OVERHAULING.

From January 14 to April 15, 1918, the lock chambers were unwatered in order to paint the gates and make necessary repairs to the valves and submerged parts.

The following dates of placing and removing the caisson show the completion of the work in the various chambers:

West chamber, middle and lower levels: Caisson placed on January 14, and raised on February 23.

East chamber, middle and lower levels: Caisson placed on March 1, and raised on March 23.

East chamber, upper level: Caisson placed on April 9, and raised on April 15.

The work on the rising stem valves in addition to touching up the bitumastic enamel, covered the renewal of all parts worn due to corrosion and electrolytic action, replacing broken bronze spring strips on the side seals and grinding off the bottom seats of the valves, which were badly pitted. A number of floor plates were found missing and these were replaced.

The machinery steel removable side strips on the box castings were replaced with lignum-vitæ strips on all valves in the middle and lower levels. The Babbitt seat was replaced with greenheart on all valves, except the intermediate, in the middle and lower levels.

The work on the cylindrical valves consisted of the replacing of the worn leather seals and nuts. Only the valves in the middle and lower levels were overhauled.

The channel irons and rollers in the roller trains, the roller train tracks on both the wall and the valve, and the front wearing pad on the rising stem valves all showed marked wear and corrosion. Extensive repairs and renewal of parts will be necessary at the next overhauling of these valves.

From July to November, 1915, the exterior surfaces of the lock gates on both sides from the bottom to the freeing ports, except on gates Nos. 1, 2, 3, 4, 37, 38, 39, 40, on which to the full height on both sides, and on gates Nos. 33, 34, 35, 36 to the full height, only on the upstream side, were painted by the American Bitumastic Enamels Co. with bitumastic solution and enamel under a five-year guarantee. A contract has been entered into by which The Panama Canal is to do the necessary work to repair the paint on these gates, the cost of same to be billed against the American Bitumastic Enamels Co.

During the period the locks were unwatered; the lock forces painted these gates where necessary. In the lower level the bitumastic enamel had failed to such an extent that practically all the exterior surfaces of the gates in the lower level had to be cleaned and were repainted with hermastic solution and poison enamel furnished by the contractor. The interior of the water chambers of the gates, which are under water, were also painted at this time.

At the end of this fiscal year, the work of touching up the paint under the contract on the exterior of the gates and on the interior of the gates in both the air and water compartments was about 90 per cent complete and will be entirely completed in about one more month.

The five-year guarantee for the interior of the gates in the water and air compartments expires in January, 1919.

Hermastic solution and enamel is being used to paint the lock gates on the exterior surfaces which were not covered by the contractor. At the end of the fiscal year 19 sides of gates were completed, and the work will be carried on as fast as the oil paint fails and the surfaces need repainting.

In the last annual report mention was made of applying a zinc coating by the Schoop process to one rising stem valve and portable parts and section of two of the lock gates below sea level. These parts were unwatered one year after the zinc had been applied, and it was found that practically all the zinc coating had gone and all parts were rusting, showing that this process can not be used for a protective coating on gates and valves.

Pacific Locks.

ORGANIZATION AND PERSONNEL.

Mr. William R. Holloway as superintendent continued throughout the entire fiscal year, making his headquarters at Pedro Miguel locks, Mr. Jesse C. Myrick as assistant superintendent, being located at Miraflores locks, Mr. Robert S. Mills as electrical supervisor and Mr. George L. Viberg as mechanical supervisor, divided their time between the two locks. The personnel of the organization was slightly changed, eight employees resigning their positions to enter into the United States Army and United States Navy service, making it necessary to fill their positions by promotion.

OPERATION.

The lock force has continued working on the two-shift basis, as outlined in the previous annual report, covering a period from 7 a. m. to 8 p. m. This plan has been made suitable to meet all requirements of the increased traffic.

At Pedro Miguel locks 2,420 lockages were made or an average of 6.63 per day, and at Miraflores locks 2,343 lockages were made or an average of 6.40 per day.

The traffic for the month of May broke all previous records as to number of lockages, commercial vessels and tonnage passing through the canal. The commercial vessels numbered 212, which is 17 more than any previous month. The total number of lockages made at Pedro Miguel locks was 229, exceeding the previous high record by 9.

The steamship *Ceramic* locked through on December 12 northbound, is the longest ship that has been handled in the locks to date—length, 655 feet; beam, 69.2; draft, 29.2 feet in fresh water—was towed by eight locomotives, being under perfect control at all times.

Each emergency dam was operated once a month through the year for drill and inspection. All gold employees on the operating shift on duty respond to the signal whistle. The towing locomotive operators are all qualified to operate the gate and girder hoisting machines and the general operators to swing the dams.

The spillway at Miraflores locks was operated as necessary to keep the elevation of Miraflores Lake within the prescribed limits.

There was a total of 254 spillway operations made during the year.

The greatest discharge through the spillway to date occurred on September 6, 1917, when three gates were raised 5.2 feet for 40 minutes. This was due to the failure of the dam for the settling basin on the west side of Pedro Miguel locks, during an unusually heavy rain. The water overflowed the dam, tearing it out for about 80 feet and releasing 8 feet head of water. As a result of this heavy discharge through the spillway, some damage was sustained by the railroad trestle bridge south of Miraflores locks and some dredging was required in the canal channel opposite this bridge.

MAINTENANCE.

Cables.—Two or three cases of trouble developed in the control cables. On inspection it was found that one 5 and one 8 conductor, varnished cambric insulated, lead sheathed cables in the middle crossover at Miraflores locks were grounded. These two cables were located in a closed duct, back of the other cables, next to the lock walls. Upon removal the lead sheathing was found to be badly pitted and entirely gone in places, due to seepage of water through the concrete, which entered these ducts near top of shaft, causing the chemical

action, which was explained in report on cables to Col. Dillon dated September 24, 1917.

A total of six control cables in the middle crossover were found to be affected to varying degrees and the affected cables were replaced with new ones.

Every case of cable failure was found to be in the side wall of the vertical shafts in the outside row of ducts, on the upstream side of duct lines at Miraflores locks. To obviate this the new cables were installed in a different location supported on hangers, keeping them 2 or 3 inches from the surface of the concrete. Since this change has been made no further trouble has developed and all cables are in good condition.

Chain fender machines.—To facilitate testing and setting of Ross valves, the top cylinders of all machines are drilled, tapped and nipples and valves applied for a three-fourths-inch pipe connection, allowing direct connection to the high-pressure testing pump. The air-operated high-pressure pump used for above testing was overhauled and rebuilt to increase its capacity.

Every three months all chain fender machines are tested with high-pressure pumps, the Ross valves reset and adjusted to release at 300 and 400 pounds of pressure, then sealed with lead car seals to prevent being tampered with. All overflow tanks are washed out and refilled with fresh water at the same time.

Control houses.—The control house, control boards, and all accessories have been completely overhauled and kept in perfect operating conditions at both locks.

Emergency dams.—Mechanical interlocks have been installed on contacts at panels for all gate and girder hoists, replacing the electrical interlocks.

Having been found to be unnecessary, all ammeters and wattmeters, with their current transformers and Y-box resistances, have been removed from all dams and returned to stock at Balboa storehouse.

Fenders.—The fender timbers on all approach and wing walls at both locks have been maintained. It has been necessary to replace many of these timbers during the year, some from decay or rot, and others being damaged by ships striking them.

The crib fenders at the end of south approach wall at Pedro Miguel locks were practically destroyed by teredos, making it necessary to install a complete new crib fender. One hundred and twenty new creosoted piling were driven and new fender frame installed around same.

The crib fender at the north end of Pedro Miguel locks was damaged, caused by a collision of the steamship *Capto* on March 16. This necessitated replacing 60 of the piling and an entirely new fender frame.

New chains for holding the low-tide fender timbers in place during high-tide water on south approach wall at Miraflores locks were installed to replace cables used originally, which had rusted away.

Crib fender at end of north approach wall at Miraflores locks was also repaired. Eighteen new piles were driven in connection with this work.

Miter gate machines.—All machines were thoroughly overhauled, motors tested and inspected. The bullwheel openings at the upper guard gates at both locks were protected by one-half-inch mesh steel guards to prevent access from the outside.

Miter lock gates.—Soundings were taken in all air-tight compartments weekly which were pumped out where necessary.

All sump pumps were operated for test weekly and given a thorough inspection each month.

Rising stem valves.—Steel footwalks and handrails were installed over all pits at all machines at both locks, to facilitate maintenance and promote safety for employees.

To insure the bevel gears remaining in proper mesh, a Babbitt collar has been cast on vertical shaft under the gear and a split iron collar placed on the vertical shaft between the gear and the bearing; this work has been completed on all machines at both locks.

In September, 1917, the east chamber was unwatered for the inspection of the miter gates and other submerged parts by the contractor. At this time the lock forces made a thorough inspection of the rising stem valves at the lower end of the east and center walls. The valves and fixed irons had been coated with bitumastic the previous years, at which time the steel side seal strips and the Babbitt bottom seals had been replaced with lignum-vitæ and greenheart wood, respectively. The bitumastic enamel was found to be in good condition and required very little touching up. The new wood seals have been found very satisfactory and showed very little wear and no evidence as yet of teredos.

Spillway.—Galvanized-iron pans were made and installed under the worms of each of the gate-operating machines, to catch the oil drippings which formerly went to waste; this oil is now being filtered and used again.

Telephone and lighting system.—Considerable trouble has been experienced with the telephone system during the past year. On inspection, it was found that the jute-covered wire originally installed was the cause of the trouble; this jute-insulated wire has all been replaced with lead-covered cable. Rubber-insulated wire originally installed in the exterior lamp-posts for lighting, has also been replaced with lead-covered cable at both locks, which has practically eliminated all trouble on these circuits.

The installing of lead-covered cable, replacing jute-covered wire, in the chases in all tunnels was completed, the chases being left open for inspection and ventilation. These chases were originally closed up with cement blocks; on removing these blocks, the chases were found to be very damp and wet and the wires covered with mold; leaving the chase open has prevented any further trouble.

Terminal boards have been installed under the control boards in control houses, on telephone cables, to facilitate testing and locating trouble.

Distribution terminal boards were also installed in all crossover rooms in operating tunnels to facilitate testing and locating trouble on telephone system.

Towing locomotives.—The two new locomotives manufactured at the Balboa shops were received at Miraflores locks in June, 1917. The cars as received had no electrical work done on them. Panel boards have since been installed, together with other electrical accessories, and the cars wired complete; they are giving satisfactory service.

Several changes were made in the design of these locomotives, i. e., the cab was increased 6 inches in height, and is a decided improvement. Electrically operated brakes were installed on the slow coiling motors, to prevent them from overhauling, a feature previously installed on one locomotive for experimental purposes, which proved very satisfactory and a valuable improvement. It is the intention to install same style brakes on all towing locomotives, using the brakes from the discarded miter forcing machines for this purpose. Openings were cut and sliding panels made and installed in the back of each cab on all locomotives to give access to the wiring on the rear of the switchboard panels. Pipe fenders were installed on all locomotives to prevent cables from rubbing the sides.

All locomotives have been maintained both electrically and mechanically and kept in practically perfect operating condition.

Towing track system.—On account of faulty construction, many of the rail joints of towing tracks and the sections over the miter gate recesses were found to be loose, necessitating removing the concrete and also removing the removable sections, correcting the base plate, by placing steel shims under the rails, to level them, after which the concrete was put back in place, making these tracks mechanically perfect at the present time. The vibration of these loose joints caused many of the copper bonds connecting the rails together to break loose, which had to be renewed.

Transformer rooms.—Ventilators were designed, cast out of concrete and installed in the decking covers, 20 in all, one at each transformer room at both locks.

The oil in all transformer and oil switch cases at both locks was tested and filtered, or renewed where necessary.

"Resuscitation" instructions and one-line diagrams of high-tension distributing system were provided with frames and hung on the walls in every transformer room for the benefit of employees.

Caisson.—The floating caisson previous to being sent to Gatun locks, was pumped out to reduce the draft to 33½ feet, and left Pedro Miguel locks on October 29, 1917.

Deck lights.—Broken glasses were removed and new glasses placed where necessary at both locks. Approximately 8,000 new glasses were installed.

Backfills and dams.—The backfills and dams at both sets of locks have been maintained throughout the year.

All railroad tracks at both locks were maintained and resurfaced.

The grass on all backfills and dams has been kept cut during the rainy season; during the dry season part of this force was used in caring for and clearing up backfills, grading, ditching, and draining same.

Four locomotive repair pits have been installed, one on the upper level and one on the lower level on each side at Miraflores locks. Spurs connecting these

pits with the return tracks on the lock walls and with the main railroad tracks have been installed, requiring a large amount of grading on the west side.

The west dam at Miraflores locks was riprapped from launch landing to lock wall, a distance of about 300 feet.

A 5-foot concrete walk was made from west lock wall to bachelor quarters and a 5-foot oil and gravel walk connecting this with the launch landing at Miraflores locks.

Launches and boats.—Launch *Mary S* was taken out of water, completely overhauled, and put back into service.

The assembling of the new launch (knocked down) ordered from the States has been started and is well under way.

Five flat-bottom and three round-bottom rowboats were built and put into service.

Locomotive cranes.—All locomotive cranes were kept in serviceable condition, ready for instant use.

Lock machine shops.—The machine shops have been able to turn out nearly all parts necessary for the maintenance of the lock equipment, with the exception of a very few very heavy pieces of work, which were sent to the Balboa shops.

A retaining wall was built for the platform in front of the machine shop at Miraflores. The platform was finished off with gravel and screenings. This wall was mainly built out of concrete slabs left over from the construction of the locks.

MISCELLANEOUS WORK.

Scaffolds.—Twelve scaffolds were made for painter, for use in painting miter gates.

Cocoli shed.—All machinery and material stored at Cocoli shed was cleaned up and painted with tar paint.

One carload of piping 2½ to 6 inches, four carloads of scrap iron, and two cars of scrap rail were sent to storehouse for credit.

A run around railroad track with two switches, was laid around Cocoli shed.

Trees obstructing the view from the control house were cut off Cocoli shed, south of Miraflores locks.

BITUMASTIC WORK AND PAINTING OF LOCK GATES AND SUBMERGED PARTS.

The floating caisson was sunk at the lower end of the east chamber at Miraflores locks on August 29, for the purpose of making an inspection and touching up of the miter gates, valves, and other submerged parts. All painting work was completed and the chamber again flooded on September 20, 1917.

The water was lowered in the west chamber on September 29, for an inspection of the miter gates, which were found to be in very good condition.

The contractor who had coated the portion of the gates under water with bitumastic enamel performed the necessary touching up of this work.

His work had not stood up as well as anticipated and necessitated quite a lot of touching up. He was unable to procure the same kind of material originally used, so was allowed to substitute a practically new material, which is manufactured under the name of "Hermastic enamel." This seems to have formed a perfect bond and has proved satisfactory so far.

Under date of January 11, 1918, a new contract was entered into by the American Bitumastic Enamels Co. with The Panama Canal, to do the necessary repair work to the enamel on these gates, to complete their five-year guarantee. They withdrew their representative from the Isthmus; since this time the lock forces have taken care of this work in a more satisfactory manner than it was done heretofore, the cost of same being billed against the contractors.

The interior of the gates is now being inspected and the necessary touching up is being done, as the five-year guarantee on the interior of all gates expires during 1918. The work will be done as near the expiration of the contract as possible.

Gates Nos. 100–101, 102–103 at Miraflores and gates Nos. 50–51, 52–53, 70–71, and 72–73 at Pedro Miguel have been completed. Those at Pedro Miguel locks were in fair condition, while those at Miraflores locks require about one-third of the surface to be reenameled. The material has held up well where it was applied, but inspection proved that in some places no enamel had been applied.

The upper portion of the gates, which had been coated with graphite and lead paint, was gone over by the lock force at the same time, with the exception of four gates, Nos. 112–113, 116–117. Two of these gates (Nos. 116–117) were treated with hermastic enamel and solution furnished by the manufacturer, the other two gates (Nos. 112–113) being treated with enamel over Navy solution formula No. 58, for the purpose of determining which was the better. Preliminary results have proven that the latter treatment forms a more perfect bond.

The exterior surface of all miter gates at Pedro Miguel locks which were coated with Navy bitumen enamel and solution, formula No. 58–59–60, during the last fiscal year, and reported as having been done by the lock forces in the last annual report, has been inspected and found very satisfactory up to the present time.

PAINTING.

In addition to caring for the bitumastic work and the painting of the spare parts at Corozal storehouse, the following painting has been done:

Chain fenders.—Fourteen machines at Miraflores and two at Pedro Miguel locks have been painted completely and the walls of the pits whitewashed during the year. All of the chains have been painted with an especially prepared tar paint, which has proved very successful for this purpose.

Rising stem valves.—The rising stem valves in the east and center wall culverts at Miraflores locks were inspected. These had been coated with bitumastic the year previous by the contractors. They were found in very good condition and the very small amount of touching up necessary was done by the contractor.

Towing locomotives.—All locomotives have been painted during the year, receiving two coats of gray paint and two coats of spar varnish. The gray color is more lasting, absorbs the heat less, and is easier to keep clean than the original black.

Emergency dams.—Emergency dams at both sets of locks were due to be painted January, 1918, as they are supposed to be painted every two years, but upon inspection, they being found in fairly good condition, it was decided to do some necessary touching up and leave a general coating go until next year.

Spillway.—The upstream side of the spillway gates was touched up with bitumastic and the downstream side and bridge structure painted.

Rowboats.—Flat and round bottom rowboats used around the locks to handle lines and to put the pilots aboard ships were severely attacked by teredos, more damage being done at Miraflores locks than has been reported at any other place on the Isthmus. To obviate this these boats were coated with a special copper paint, which has been used since last November with good results.

Concrete-floor paint.—After considerable study, to get a suitable paint to hold on the concrete floors of the operating tunnels and machine rooms, a small order was secured from the "Trus Con" laboratories which seems to be more satisfactory than that heretofore used.

Conductor-slot covers.—All conductor-slot covers have been coated with tar paint.

Test plates.—A series of about 30 test plates have been made up and several different paints of various manufacturers and some paints locally manufactured by the lock forces are being tested to determine just what will make the best coating for the protection of the steel structure both under and above water. This was done on account of the climatic conditions found here. It is hoped that some very valuable information will be obtained from these test plates for future use.

Paint mixing and grinding machines.—Due to the large quantities of paints required for maintenance at the locks, it was considered advisable to have a paint machine. Accordingly, a 30-inch single water-cooled Kaestner & Hecht paint machine was installed in the paint shop at Pedro Miguel locks. This mill has proved to be a valuable addition to our equipment, as a better paint is obtained and at a lower cost by buying the raw materials and doing our own mixing and grinding. A considerable saving is also effected by regrinding old paint that has dried and hardened. This machine is belt driven by a 7-horsepower induction motor secured from the stock of miter-forcing machine motors, which were considered unnecessary and were removed.

Miscellaneous.—The necessary painting of all operating machinery has been kept up during the year.

Electrical Division.

The details of the operations of the electrical division during the fiscal year are covered in the report of the electrical engineer, which follows:

ELECTRICAL DIVISION.

W. L. Hersh, Electrical Engineer.

CHARACTER AND EXTENT OF THE WORK.

The duties of the electrical division, during the fiscal year just closed, comprised the necessary work of design, construction, operation, and maintenance of the steam and hydroelectiric power plants, substations, transmission lines and power distribution systems; municipal, street, shops, dock, building, and house lighting systems; telephone, telegraph, fire-alarm and railway block-signal systems, and the railway interlocking plants; the electric storage battery cargo handling trucks at the terminal docks and storehouses; and the installation and repair of all classes of electrical apparatus for The Panama Canal, Panama Railroad Company, United States Army and Navy, and of all departments and divisions therein, and of commercial and United States Navy steamships.

ORGANIZATION AND PERSONNEL.

Col. T. H. Dillon, United States Army, continued as electrical engineer until he was ordered to Washington on February 5, 1918, when Mr. Walter L. Hersh was appointed electrical engineer. This change made the position of superintendent of power open, to which Mr. Baxter R. Grier was appointed. On April 24, 1918, Mr. W. L. Fey, superintendent of maintenance and construction, resigned to accept a commission in the United States Engineer Reserve Corps, and his position was filled by Mr. Albert C. Garlington. Mr. Carl W. Markham, in charge of the office and requisitions, resigned on August 11, 1917, to accept a commission in the United States Engineer Reserve Corps, and his position was filled by Mr. M. P. Benninger. The five divisions into which the work was divided remains unchanged except as above, and is as follows:

Office and requisitions, M. P. Benninger.
Power and transmission system, B. R. Grier, superintendent.
Construction and maintenance, A. C. Garlington, superintendent.
Telephone and telegraph, C. L. Bleakley, superintendent.
Railway signal system, E. C. McDonald, supervisor.

On June 30, 1918, there were 208 gold and 393 silver employees in this division. The average monthly pay roll for the division was $46,000; average monthly expenditures were about $127,000, of which 80 per cent was for work done for other departments and divisions.

OFFICE AND DESIGN.

The usual miscellaneous office work was done throughout the year, including correspondence, reports, work orders, estimates and the preparation of 19 material requisitions, including specifications for 2,045 items totaling in value $783,903.

The general plans of last year were developed in complete detail for the extension to the hydroelectric generating station and the transformer substation at Gatun. Plans were developed, specifications prepared, and requisitions placed for the complete electrical installations for light, heat, and power at the Navy submarine base and the Army and Navy aero stations.

Plans were prepared for the lighting and application of electric power in all buildings erected as new or remodeled by The Panama Canal, and in a few buildings for other interests located on the Canal Zone.

Plans were prepared for the necessary extensions to the underground conduit and cable distribution system for light, power, telephone and telegraph, and fire-alarm service in the permanent towns of the canal, including the Army and Navy reservations.

A complete revision of forms and method of handling work orders has been made and the new system is going into operation July 1, 1918.

POWER-PLANT EXTENSIONS.

The project of extending the hydroelectric development at Gatun spillway, including the installation of one additional generator unit of 4,500 kilowatt capacity, was carried on throughout the year. Considerable delay was experienced in this work due to the difficulty of obtaining equipment and materials from the States. Most of this delay was caused by war conditions, the congested factories of the contractors supplying this equipment, and the difficulty of railroad and ocean transportation.

By the end of the year the building extension proper was practically completed, including concrete cells for oil circuit breakers, and concrete shelving for duplicate set of 6,600 volt buses. The penstocks for the proposed No. 4 unit and for the future units Nos. 5 and 6 were completed, including backfill and inside coat of bitumastic enamel. The head-gate house, the head gates, the trash racks, and the head-gate operating machinery, including switchboard and wiring, were completed.

The erection of the 275 kilowatt horizontal turbine exciter set has been completed, but no final test has as yet been made. The 6,750 horsepower Pelton Francis vertical turbine, and the 4,500 kilowatt generator unit were received in May, and the erection was started by June 1. The oil pumps and pipe for the oil system were received and their erection was started during June. The switchboard and switchboard meters were the last material to be received, and were delivered on the Isthmus during the last week in June. Copper was installed for the extension of bus No. 1, and the work on bus No. 2 was started. The work of placing switch gear in the compartments for the oil circuit breakers was started. This work was delayed to some extent when the men were taken from this work for more urgent work in line with national defense.

After the installation of the No. 4 unit, the hydroelectric plant will have a capacity of three 2,880 kilowatts and one 4,500 kilowatt units, totaling 13,140 kilowatts, with provisions for the future installation of two 4,500 kilowatt units, making a total ultimate capacity of 22,140 kilowatts.

WATER CONSUMPTION—HYDROELECTRIC STATION.

A study has been made of the possible quantity of water to be consumed for the generation of electric power at the hydroelectric station at Gatun spillway. After this plant has been developed to its ultimate capacity, the equipment driven by turbines will consist of three 2,880 kilowatt and three 4,500 kilowatt generating units, and one 275 kilowatt exciter unit. Actual figures covering a six months' period develop the fact that the existing three 2,880 kilowatt units were operating at an average load of 75 per cent of their capacity. Under average load of 75 per cent of their capacity, it was computed that these three units will each consume water at a rate of 410 cubic feet per second. Under maximum capacity load, it has been computed that these three units will consume 528 cubic feet per second. In these computations, the efficiency of the generators has been based on the manufacturer's factory tests and the turbine efficiency on the test made at the time of the acceptance of the larger capacity turbine wheels mentioned in last year's report.

In estimating the water to be consumed by the 4,500 kilowatt units, Nos. 4, 5, and 6, no actual test data are available. This computation was based on the turbine and generator efficiencies as proposed by the manufacturers. From these proposed values, it has been computed that water will be consumed by each of these units, when loaded on the average to 75 per cent of their capacity, at a rate of 657 cubic feet per second, and when loaded to full capacity this rate will be 852 cubic feet per second. The water consumption of the new 275 kilowatt exciter set, when based on generator and turbine efficiencies as proposed by the manufacturers, is computed to be 58.3 cubic feet per second.

The total water consumption at the hydroelectric stations, when the ultimate six unit capacity of 22,140 kilowatts is operated under average load of 75 per cent, is summed up as follows:

	Cubic feet per second.
For three 2,880-kilowatt generator units	1,230
For three 4,500-kilowatt generator units	1,971
For one 275 kilowatt exciter unit	58.3
Total	3,259.3

The total water consumption at this plant, when developed to its ultimate capacity of 22,140 kilowatts and fully loaded, is summed up as follows:

	Cubic feet per second.
For three 2,880-kilowatt generator units	1,584
For three 4,500-kilowatt generator units	2,556
For one 275-kilowatt exciter unit	58.3
Total	4,198.3

The estimate of 3,259 cubic feet per second is a very conservative figure for the rate of water consumption for the average loading of this station when developed to the ultimate capacity.

The value 4,198 cubic feet per second would represent the rate of water consumption in case the minimum or valley output exceeded the plant's ultimate capacity requiring the generation of loads in excess of 22,140 kilowatts at Miraflores steam or other plants. But while such conditions are not impossible, there is at this time no indication of their probability for some indefinite time in the future.

SUBSTATION AND TRANSMISSION LINE IMPROVEMENTS.

At Gatun substation, preparations were made to adapt this station to the conditions obtaining after the conversion of the hydro station from 2,200 volt to 6,600 volt generation. This work includes the installation of one 8,400-kilovolt-ampere 6,600–44,000-volt water-cooled transformer; the complete remodeling of concrete cells for oil circuit breakers and for instrument transformers; the installation of higher capacity circuit breakers; the remodeling of a greater part of and additions to existing switchboard; the remodeling of bus layout, including both 2,200 volt and 6,600 volt secondary buses; the installation of two 1,500-kilovolt-ampere 6,600–2,200-volt water-cooled transformers; the installation of a cooling water system to supply raw lake water to cool new transformers; the reconnection of two 4,000-kilovolt-ampere 2,200–44,000-volt radiator-type transformers for 6,600–44,000-volt operation; and the removing of two 2,667-kilovolt-ampere 2,200–44,000-volt radiator-type transformers.

This work has been under way for some time, but has been delayed to some extent due to causes incident to the war conditions, such as the congestion of the factories of the contractors supplying new equipment, to the difficulty of railroad and ocean transportation, and to the need of calling men from this work in favor of work in the line of national defense.

When these changes now in progress have been completed, the Gatun substation will be equipped with two 1,500-kilovolt-ampere 6,600–2,200-volt transformers for local distribution, and with two 4,000-kilovolt-amperes, and one 8,400-kilovolt-ampere 6,600–44,000-volt transformers for distant transmission, with provisions for the future installation of one 8,400-kilovolt-ampere water-cooled transformer.

At the Cristobal substation one of the two 2,667-kilovolt-ampere 44,000–2,200 transformers has been rebuilt and rerated to 2,500-kilovolt-ampere 44,000–11,000 volts. There has been installed an 11,000-volt bus with complete switch gear and the necessary switchboard improvements for accommodating two transformers rebuilt as above; two outgoing 11,000-volt feeders to refrigerating plant and submarine base, with provisions to accommodate the two future outgoing 11,000 feeders. A second 2,667-kilovolt-ampere transformer is to be rebuilt and rerated to 2,500-kilovolt-amperes upon removal from Gatun substation. When this last-mentioned item is completed, this station will be equipped with two 2,667-kilovolt-ampere transformers for 2,200-volt local distribution, and two 2,500-kilovolt-ampere transformers for distant 11,000-volt distribution. At this Cristobal substation, one 2,200 feeder equipment has been installed for supplying current to the townsite at New Cristobal.

At the Miraflores substation one 2,667-kilovolt-ampere 44,000–2,200 volt transformer has been rebuilt and rerated 2,500-kilovolt-ampere 44,000–11,000 volts. This transformer was removed from Gatun substation, rebuilt and located at Miraflores in order that three 500-kilovolt-ampere transformers can be released for service at the Coco Solo submarine base. A small temporary 1,000-kilovolt-ampere 11,000-volt substation was built at Gold Hill from second-hand transformers and materials, and energized from Miraflores. By this expedient there were released three 500-kilovolt-ampere transformers for use at the Coco Solo

submarine base. After these changes of rebuilding and rerating transformer equipment the Miraflores substation is now equipped with three 2,667-kilovolt-ampere 44,000–2,200-volt transformers, and one 2,500-kilovolt-ampere 44,000–11,000-volt transformer.

Through the releasing of a total of six 500-kilovolt-ampere transformers, sufficient transformer equipment was secured to arrange for temporary power facilities at the Navy submarine base and aero stations practically nine months in advance of the proposed receipt of permanent equipment from manufacturers in the States.

At the Balboa substation two 2,200 volt feeder equipments were installed; one additional feeder to the air-compressing plant in building No. 29, and the second for feeding auxiliary power to the Pacific forts. Requisition has been placed for equipping this station with 400 kilovolt amperes transformer capacity, and necessary details to supply auxiliary power to the Pacific forts at a potential of 6,600 volts. The main power installation of this station, consisting of three 2,667 kilovolt amperes, 44,000–2,200 volt transformers, remains practically unchanged.

Transmission line improvements consisted of the insertion of line-section switches at Gamboa. At this point four 3-pole sets of an improved type of disconnecting switch, arranged for steel tower mounting with facilities for operating from the ground, were installed. This installation proved so convenient and time saving in times of line faults, that all the original type of line section switches, which required the operator to climb part way up the tower, were replaced by this improved type of switch. The total installation of this type now consists of four 3-pole switches at Miraflores, four 3-pole switches at Gamboa, and four 3-pole switches at Gatun.

DISTRIBUTION LINES.

Extensions and improvements to the underground power distribution system included the laying of approximately 75,240 duct feet of vitrified tile duct; 25,000 duct feet of fiber duct, and the installation of 382,720 feet of lead-covered cable of all sizes and voltages.

The principal items of work included in these figures are the distribution system extensions to the townsite of New Cristobal, the new cold-storage plant, Cristobal, to the submarine base at Coco Solo, and the aero station at Manzanillo. In these figures there are also included the installations of complete underground distribution systems at Balboa radio station, at Corozal ordnance depot, at Fort Sherman, and the local distribution systems within the reservations at the submarine base and aero stations.

Miscellaneous other items of distribution improvements include the building of a small pole line to serve Mindi dairy farm; the placing of the greater part of the overhead secondary distribution at Ancon and Balboa underground; extensive changes to range and beacon circuits whereby these circuits, previously energized from Pedro Miguel locks, are now energized from Gamboa; and an underground circuit in the city of Panama to supply light and power to Panama Canal and other Government interests in that city.

The principal additions to the street-lighting systems were those at New Cristobal and Fort Grant, and several improvements were made to the existing installations requiring a total addition of 70 standard type lighting posts and approximately 14,300 feet of lead-covered cable.

OPERATION OF POWER SYSTEM.

The power system was operated throughout the year with an average net generated output of 4,419,192 kilowatt hours per month, as compared with 4,199,020 kilowatt hours per month last year. The increase in output has been largely generated at the hydroelectric station, and the fuel-oil consumption at the Miraflores steam plant for stand-by service has been reduced from an average of 3,428 barrels per month last year to 2,906 barrels per month this year. The average cost of distributed power for the year was 0.7782 cent per kilowatt hour, as compared with 0.7301 cent per kilowatt hour last year. This increase in cost of power has been caused largely by the increased cost of labor for operation and maintenance.

Plate No. 3 shows the typical curves of Sunday and week-day loads carried at the hydroelectric station. The Miraflores steam station is operated on a

reserve basis carrying load only at such times as the total-system load exceeds the present three-unit capacity of the hydro station. The power used to motor the two or more generators at Miraflores operated as synchronous condensers for power-factory correction exceeds the power generated at this plant. This accounts for the negative output for this plant as tabulated in the following abstract showing the monthly output generated at both plants:

Table showing monthly outputs in kilowatt hours.

Month.	Net output in kilowatt hours.		Total net generated power.	System losses includes transmission, transformation, and distribution losses.
	Gatun hydro station.	Miraflores steam station.		
1917.				*Per cent.*
July	4,516,700	−144,620	4,421,930	14.7
August	4,730,300	− 86,120	4,644,180	14.5
September	4,570,000	− 82,960	4,487,040	15.2
October	4,502,790	−161,940	4,340,850	14.9
November	4,525,868	−128,110	4,397,758	14.4
December	4,392,277	−153,710	4,238,567	14.2
1918.				
January	4,815,719	−140,010	4,675,709	14.4
February	4,261,000	−106,850	4,154,150	13.8
March	4,681,100	−103,260	4,577,840	14.8
April	4,431,704	−105,350	4,326,354	15.4
May	4,488,674	20,140	4,508,814	16.2
June	4,318,936	− 61,770	4,257,116	15.0
Average	4,519,589	−104,549	4,419,192	14.7
Average last year	4,132,620	.....	4,199,020	14.6

The following table shows the cost of power in its various states of distribution. Cost figures are based on delivery to consumer and not on the net amount actually generated.

	Total, fiscal year, 1917–18.	Average per month.	Average cost per kilowatt hour.	
			This year.	Last year.
Net consumption ..... kilowatt hours	45,215,117	3,767,926	.....	.....
Cost of operation and maintenance, hydro station	$38,575.52	$3,214.63	$0.000853	$0.000629
Cost of operation and maintenance, Miraflores steam plant	78,321.18	6,526.77	.001732	.001655
Cost of operation and maintenance of substations	64,059.99	5,338.33	.001416	.001203
Cost of maintenance, transmission lines	28,343.90	2,353.66	.000624	.000456
Cost of maintenance, distribution lines	46,753.01	3,896.08	.001034	.001163
Depreciation, transmission system	96,000.00	8,000.00	.002123	.002195
Total cost of current for power distribution	348,454.94	29,037.91	.007782	.007301
Net consumption, lighting current ..... kilowatt hours	10,345,826	862,152	.....	.....
Cost of maintenance, house lighting system, including lamp renewals	$55,842.48	$4,653.54	$0.005397	$0.006079
Cost of lighting current per kilowatt hour	.....	.....	.013179	.013380

The principal loads in kilowatts added during the past year are tabulated as follows:

	Power.	Light.		Power.	Light.
Submarine charging station (temporary)	1,000	.....	Series street lighting	.....	10
Storage battery charging station, Cristobal	150	.....	Municipal pumping station, Empire	120	.....
Army quarters and buildings	20	30	Municipal pumping station, Paraiso	50	.....
New Hospital, Ancon	100	100	Buildings at Red Tank	.....	20
New hospital, Cristobal	.....	20	Buildings at New Cristobal	.....	90
Mindi dairy farm	10	.....	Total	1,900	270
Balboa shops, additional machinery and miscellaneous	250	.....			
Air compressor, building 29, 1,000 cubic feet	200	.....			

The principal loads to be added in the future are tabulated as follows:

	Power.	Light.		Power.	Light.
Submarine base	2,000	100	New Ancon hospital	40	60
Navy aero station	30	50	New hotel, Pedro Miguel	10	5
Army aero station	30	50	Municipal pumping station, Rio Grande	150	.....
Cold storage plant, Cristobal	1,800	40	Ancon laundry, new machinery	20	.....
Pacific forts	215	150			
New piers, No. 6	200	300			
Series street lighting	.....	50	Total	4,545	805
Industrial school	20	.....			

Considerable trouble was experienced in maintaining the hardened steel roller type thrust bearings in units 1, 2, and 3 at the hydroelectric station at Gatun. This trouble became so serious that some change was necessary and other bearings of an improved spring-supported segmental type were placed on requisition. Three of these new bearings were received, but by June 30 only one had been installed, with indications that the change will prove satisfactory.

Some trouble has been experienced with the governors of these same three units, and governors of a different type were placed on requisition. The new material was received but was not erected by the end of June.

The substation apparatus caused three interruptions in high-tension service due to the failure of porcelain bushings of high-tension oil-circuit breakers.

Due to the failure in service of porcelain insulators on the high-tension transmission line, this service was interrupted a total of 29 times as compared with 17 times last year. It has been proposed to reduce this trouble by the use of insulator strings of four units instead of three as at present. Materials to accomplish this were placed on requisition but were not received during the time covered by this report. These transmission line troubles are briefly tabulated in plate No. 4.

There were a total of 104 insulators on the transmission lines renewed during the year. Of this total number 34 failed in service; 34 failed under line tests; and 36, classed as miscellaneous, include those considered in a suspicious condition or found broken by the patrolmen and those broken from external violence.

TELEPHONES AND TELEGRAPH.

During the fiscal year 820 telephones were installed and 451 removed, leaving 2,523 in service June 30, 1918, an increase of 369 for the year. The average number of telephone calls per day of eight hours, obtained by peg count, was 21,816, or 2,724 per hour. The average number of telephone trouble cases was 9.5 per day, in comparison with 8 per day last year.

Seventy-four thousand eight hundred and forty-three feet of lead-covered paper telephone cable, of all sizes, ranging from 5 to 200 pair, were installed and 19,367 feet removed, leaving 592,239 feet in service. On this entire cable installation there were 14 cases of cable trouble during the year. The prin-

cipal items of cable installation included in these figures are a trunk cable to submarine base and necessary extensions to the underground system at Balboa Heights, Cristobal, and Pedro Miguel.

The Transisthmian duct line was broken by a slide near Mile Post 17, on November 18, 1917, making necessary the rebuilding of 150 feet of 4-way duct and the transfer of cables. Also a 600-foot section of this duct line was rebuilt at Mile Post 38, new cable installed, and the overhead cable removed at this point.

The principal items of work performed by the telephone department include the installation of a new cable in the Transisthmian duct line for the Central & South American Cable Co.; the installation of one private branch exchange at Quarry Heights, and a second at the submarine base; and the installation of a complete 14 station interphone system at the Balboa radio station.

Central office improvements included the installation of additional switchboard sections, consisting of two operating positions at Cristobal exchange, two positions at Pedro Miguel exchange, and one position at Balboa Heights exchange.

The question of new telephone equipment for the Cristobal exchange is being investigated to determine the best type of apparatus to install. Those under consideration are the improved type of manual with automatic listing and ringing, semiautomatic, and full automatic.

FIRE-ALARM SYSTEM.

The work of inspecting and maintaining the fire-alarm system has been combined with the telephone department. New installations consisted of two additional fire-alarm boxes at New Cristobal, four auxiliary fire-alarm boxes on dock at La Boca, and a new fire-alarm register at the Ancon fire station.

One case of trouble was reported during the year; this was a defective alarm box at Cristobal. The complete system has been inspected and worked over, and worn parts have been renewed where necessary to keep the system in good state of repair and in positive operating condition.

RAILWAY SIGNAL SYSTEM.

There were a few changes made on the railway signal system during the year on account of track changes; at Gamboa a new spur track was connected to main line; Gamboa passing track was extended 50 feet south, making it necessary to move one train-order signal and two automatic signals; minor track changes at Monte Lirio required some changes in signal system; the power-operated train-order signals at Frijoles were taken out of service on account of discontinuing this as an operating station; railway switch at Rio Grande was removel and switch signals removed.

The overhead signal cable at slide near Mile Post 38 was taken down and cable installed in rebuilt duct line around this slide. Also new piece of cable cut in at north end of Bohio siding on account of threatened slide, new duct line having been built. Two highway-crossing bells were installed at Cristobal street crossings. All signals were thoroughly adjusted for kick off, and trouble from this cause has been practically eliminated. Derails were installed at several places on hand-thrown switches.

There were 2,404,176 registered arm movements with 131 responsible signal interruptions, compared with 2,474,210 arm movements and 115 signal interruptions of the previous year. This gave an average of 18,352 arm movements per signal failure for 1918 and 21,515 arm movements per failure for year of 1917. There were 556 train-minutes delay in 1918, compared with 431 train-minutes delay for 1917. There was an average of 4.2 minutes for each delayed train on account of flagging. There was one reported false clear aspect on the 120 automatic, 16 semiautomatic, 14 power operated, 12 mechanical, and 11 train-order signals for the 2,404,176 arm movements. This lone failure occurred in November, 1917, and was caused by broken-down installation in cable splice.

In the following are tabulated the responsible signal failures, arm movements, train-minutes delay for each month during the year:

Date.	Total signal failures.		Total arm movements.	Total train-minutes delay.
	Responsible.	Nonresponsible.		
July, 1917	15	0	218,414	86
August, 1917	18	4	211,032	33
September, 1917	14	1	205,874	97
October, 1917	5	2	251,427	28
November, 1917	9	0	224,859	50
December, 1917	16	0	201,592	50
January, 1918	6	0	192,398	18
February, 1918	7	2	177,141	20
March, 1918	3	1	180,563	20
April, 1918	16	3	184,096	42
May, 1918	10	0	182,512	60
June, 1918	12	4	173,268	50
Total	131	18	2,404,176	556

There was an average of 46 train minutes' delay and 10.9 responsible signal failures per month.

There were three derailments at the interlocking plants as compared with nine for the preceding year—one in February, at the pontoon bridge, caused by lift rail not being properly seated; second in March, at Balboa Heights, caused by error in operation by leverman in cabin; third in April, at Balboa Heights, cause remains unknown. There was but one derailment at switches equipped with hand-throw derails; this was caused by colored brakeman throwing derail under moving car. There was one failure of power-operated train-order signal, apparently caused by poor contact adjustment.

There were 60 reported signal failures at interlocking plants for the year. This includes both mechanical and electrical signals. This was an increase over the preceding year. The greater part of these failures occurred at the pontoon bridge, mainly from causes foreign to the signal department. Rapid filling of Pedro Miguel locks lowers the water level at this bridge about 6 or 7 inches in a few minutes. This, and the action of a large dipper dredge which has been working very close to the bridge for several months, causes a lateral movement of the pontoon which results in opening of electrical contacts and loosening of mechanical joints.

Responsible signal interruptions for fiscal year ending June 30, 1918.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Track circuits:						
Switch box out of adjustment; shunting track	2					
Poor or defective track battery, dirty zincs, poor connection	3	3	4			
Leakage due to low resistance, crossties, roadbed, drainage			2			
Track rails not bonded						2
Bad relay contact						
Bad track wire connections; boot leg						
Broken bond wire	1					
Relay out of adjustment		1	2			
Open track battery terminal			1			1
Broken split cotter key on switchbox pin					1	
Discharged or exhausted storage battery; careless maintenance	2		1			
Signal light out				1		
Signal light out on account of bad kerosene oil		9				
Unknown	4	4	4	1	8	8
Open coil on control relay				1		
Open coil on signal slot arm						
Open wire from signal to main cable, in cable connection						3
Pole changer; loose connection						
Commutator sticking on signal meter, account dirty brushes; rough commutation; sanded				1		
Broken slot arm spring	1			1		
Reversed polarity in primary battery	2					
Circuit breaker on signal not properly adjusted		1				
Loose connection on meter battery						2
High resistance in magnet coils, account chemical action on wire						
Open switch						
Total	15	18	14	5	9	16

Responsible signal interruptions for fiscal year ending June 30, 1918—Continued.

	Jan.	Feb.	Mar.	Apr.	May.	June.	Total.	Percentage for year.
Track circuits:								
Switch box out of adjustment; shunting track							2	1.53
Poor or defective track battery, dirty zincs, poor connection							10	7.84
Leakage due to low resistance, crossties, roadbed, drainage							2	1.53
Track rails not bonded							2	1.53
Bad relay contact				1			1	.77
Bad track wire connection; boot leg		1					1	.77
Broken bond wire	4						5	3.81
Relay out of adjustment	2					1	6	4.57
Open track battery terminal							2	1.53
Broken split cotter key of switchbox pin							1	.77
Discharged or exhausted storage battery; careless maintenance			2				5	3.81
Signal light out				5			6	4.57
Signal light out on account of bad kerosene oil							9	6.87
Unknown		2		2	2	10	45	34.55
Open coil on control relay							1	.77
Open coil on signal slot arm				3	1		4	3.05
Open wire from signal to main cable, in cable connection		1	1	1			6	4.57
Pole changer; loose connection		2					2	1.53
Commutator sticking on signal meter, account dirty brushes; rough commutation; sanded					6	1	8	6.10
Broken slot arm spring							2	1.53
Reversed polarity in primary battery							2	1.53
Circuit breaker on signal not properly adjusted							1	.77
Loose connection on meter battery							2	1.53
High resistance in magnet coils, account chemical action on wire		1		4			5	3.81
Open switch					1		1	.77
Total	6	7	3	16	10	12	131	100

MISCELLANEOUS ELECTRICAL WORK.

The principal items of electrical work not otherwise classified or mentioned include: The installation of two 500 kilowatt rotary converters for the Navy for use in charging the batteries of submarines; the temporary installation of two 11,000–2,200-volt box-car portable substations, one at Coco Solo submarine base, and one at Manzanillo aero station; the installation of motor-driven pumps for the municipal division at Paraiso and Empire; the installation of lighting system in 72 buildings for the Army, 12 for the Navy, 62 buildings for The Panama Canal, and 12 others, making a total of 158 buildings illuminated.

The work at the electric repair shop, exclusive of work done in the field or which required the men to leave the shop, is briefly summarized and include the following:

Armatures rewound, motors and generators 1 to 700 horsepower	160
Transformers, compensators, etc., repaired and rewound	58
Magneto and fans repaired and rewound	71
Miscellaneous electric appliances repaired	47
Switchboard panels manufactured	34

The work at the marine electric shop included miscellaneous classes of repair work, new installations, and additions or repairs to existing installations on 189 commercial vessels, and 77 vessels of the United States Navy.

The work included the installations of complete wireless outfit on the steamship *Carribean* and a 10-kilowatt steam-turbine generator set on the U. S. S. *Perry*, and the complete renewal of the lighting circuits on the dredge *Corozal*.

The major items of marine electric work included the complete renewal of lighting and annunciator systems on the steamship *Ancon* and the complete remodeling of and making additions to the electrical installations on the U. S. S. *Von Steuben* and the U. S. S. *Koningin der Nederlanden* as required to convert these vessels for transport service.

Some items of miscellaneous electrical material and supplies consumed in the work done by the electrical division during the year are briefly expressed in the following tabulation:

Wire, rubber-covered twin, total all sizes	feet	339,000
Wire, rubber-covered single, total all sizes	do	503,200
Wire, base copper, total all sizes	do	38,600
Lamp cord	do	29,000
Heater cord	do	25,000
Cable, lead-covered, total sizes and types	do	383,000
Conduit, rigid steel, all sizes	do	349,100
Condulet fittings	units	17,650
Outlet boxes	do	6,025
Electric lamps, all sizes	do	199,700
Sockets and receptacles, all types	do	35,500
Fuses, all sizes	do	35,600
Lighting fixtures, house	do	5,250
Lighting fixtures, marine	do	1,050
Distribution transformers, total 229 all sizes	kilowatts	1,140
Electric division motor vehicles traveled	miles	43,950

Municipal Engineering Division.

The details of the operations of the municipal engineering division during the fiscal year are covered in the report of the municipal engineer which follows:

Division of Municipal Engineering.

The construction and general maintenance of the division of municipal engineering was divided into two districts, the Southern, under the supervision of Mr. W. J. Spalding, extending from Darien to Flamenco Island; and the Northern, under the supervision of Mr. E. H. Chandler, extending from Frijoles to Magarita.

The Southern district includes Darien, Gamboa, Las Cascadas, Empire, Culebra, Paraiso, Pedro Miguel, Red Tank, Corozal, Ancon, Balboa, La Boca and the city of Panama, Republic of Panama. The total population of this district, exclusive of United States Military and Naval forces, is approximately 80,600.

The Northern district includes Frijoles, Monte Lirio, Gatun, Mount Hope, Cristobal, New Cristobal, Toro Point, Magarita, and the city of Colon, Republic of Panama. The population of this district, exclusive of the United States Military and Naval forces is approximately 40,400.

The operation of the water purification plants, the care of the sources of water supply, the laboratory control work on concrete, sheet asphalt, concrete asphalt, tarvia, investigation and experimental work on paints, analysis of soils, by-products from slaughterhouses, etc., were under the supervision of Mr. George C. Bunker, physiologist. The staff of the physiologist was composed of the following members:

H. W. Nightingale, biologist.

H. T. Campion, superintendent of the Mount Hope filter plant up to March 6, 1918, succeeded by H. Gunning.

H. F. Schmidt, superintendent of Agua Clara filter plant up to July 7, 1917, succeeded by W. C. Dunn.

H. W. Green, engineer of tests.

A. H. Khachadoorian, chief chemist.

H. Schuber, assistant chemist.

C. W. Saxe, assistant chemist.

J. Congo, filter operator.

R. G. Shell, filter operator.

G. C. Chevalier, filter operator.

E. J. Tucker, chief assistant, resigned September 22, 1917, to enter the Sanitary Corps of the United States National Army.

The following is a list of the more important items of material used on construction and maintenance work by the municipal division during the fiscal year:

70,480 barrels of cement.
5,603 cubic yards of sand.
5,247 cuubic yards of crushed rock.
2,362 cubic yards of screenings.
52,459 cubic yards of run-of-bank gravel.
634,552 feet b. m. of lumber.
673,506 pounds of reinforcing steel.
31,900 linear feet of vitrified sewer pipe.
67,829 linear feet of galvanized-iron water pipe.
6,371 linear feet of 20-inch and 24-inch concrete pipe.
32,110 linear feet of cast-iron water pipe.
51 three-way fire hydrants.
2,237 barrels of crude oil.
395 water meters.
8,165 pounds of leadite.
61,566 pounds of lead.
2,100 pounds of jute.
19,765 paving bricks.
1,191,361 pounds of asphalt.
52,831 gallons of tarvia.
2,246 tons of coal.
$2,418 worth of meter repair parts.

Equipment purchases consisted of two 4,000 gallons per minute sewer pumps for New Cristobal; two self-propelling 11 cubic feet concrete mixers; pumping equipment for the water and sewer pumping stations at Toro Point and Coco Solo; 1 Iroquois portable asphalt mixing plant; gasoline driven centrifugal pumps for the pumping stations at Frijoles and Monte Lirio; miscellaneous equipment for road repair work.

A large portion of the above listed material was used for maintenance and upkeep of water plants, roads, streets, sidewalks, and water and sewer systems in the Canal Zone, on which a total of $558,941.59 was spent.

The following statement shows the quantity of water pumped at each of the pump stations during the year and the average quantity per month with the average cost per thousand gallons for pumping:

Pumping station.	Total gallons pumped during year.	Average number gallons per month.	Average cost per M gallons for pumping.
Mount Hope	1,442,275,000	120,189,583	+$0.01605
Agua Clara	428,401,000	35,700,083	+ .0311
Frijoles	8,408,250	700,687	+ .2400
Monte Lirio	3,089,250	257,437	+ .4973
Gamboa U. S. No. 1	3,462,016,000	288,501,333	.0105
Miraflores U. S. No. 2	379,460,000	31,621,666	.0215
Balboa U. S. No. 3	2,383,659,575	198,638,297	.0105
Paraiso	74,540,000	6,211,666	.0620
Cucuracha (Mount Zion)	121,070,000	10,089,166	.....
Camacho (tanks)	97,476,200	8,230,016	.....
Camacho (into mains)	116,159,100	9,679,925	.....

The following statement shows the division cost of water delivered in the various districts of the Canal Zone:

Districts.	Cost.[1]	Districts.	Cost.[1]
Cristobal	$0.08	Pedro Miguel	$0.06
Gatun	.11	Miraflores	.06
Gamboa	.09	Balboa—Ancon	.07
Paraiso	.06		

[1]Division cost for water delivered period ending June 30, 1918 (per thousand gallons).

The municipal division received credit for the cost value of water furnished other departments and divisions of The Panama Canal, the Panama Railroad, the Panaman Government, other departments of the United States Government, and individuals and companies, amounting in all to $170,992.25 during the year.

The sale of water to vessels at the docks at Cristobal and at Balboa was handled by the municipal division. The rate charged for water was 50 cents per thousand gallons, with a minimum charge of $3. The following table shows the total quantity of water sold at each of the two ports in the Canal Zone, with the number of vessels taking water during the year:

Port.	Vessels supplied with water.	Gallons water sold.
	Number.	*Number.*
Cristobal	1,420	44,875,000
Balboa	827	24,067,600

In the cities of Panama and Colon, the sum of $154,960.85 was spent for the upkeep of streets and water and sewer systems. All expense in connection with this work is repaid by water rentals, which are collected by the municipal division. The following table shows the quantity of water used in each of the two cities during the fiscal year, by quarters, together with the amount of water rentals:

PANAMA WATER OFFICE.

Consumption per quarter.

Quarter ended—	Paying connections.	Private.	Public hydrants and taps.	Total.	Daily average consumption
		Gallons.	*Gallons.*	*Gallons.*	*Gallons.*
Sept. 30, 1917	2,428	148,983,000	56,239,000	205,222,000	2,280,000
Dec. 31, 1917	2,425	141,032,000	67,752,000	208,784,000	2,320,000
Mar. 31, 1918	2,426	152,558,000	71,786,000	224,344,000	2,492,000
June 30, 1918	2,445	152,030,000	68,022,000	220,052,000	2,445,000
Total for year	.....	594,603,000	263,800,000	858,402,000	2,384,250

Collections.

Quarter ended—	Amount collected from private consumers.[1]	Average consumption per private connection per quarter.	Average private quarterly bill.
		Gallons.	
Sept. 30, 1917	$38,179.85	61,000	$15.72
Dec. 31, 1917	36,116.55	58,000	14.89
Mar. 31, 1918	39,059.90	62,000	16.10
June 30, 1918	[2] 38,743.75	62,000	15.85
Total for year	152,100.05	243,000	62.56

[1] Includes all bills rendered against Panaman Government for water consumed in public buildings in Panama City.
[2] Net amount of bills.

REPORT OF WATER COLLECTIONS OFFICE—COLON.

Consumption of water.

Quarter ended—	Number of paying connections.	Consumption per quarter.				Total consumption.	Average daily consumption.
		Private connections.	Panama R. R. reservation.	Panama Canal hospital and quarantine.	Public fire hydrants and taps.		
		Gallons.	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*
Sept 30	941	63,043,000	4,755,750	6,588,750	70,065,525	144,453,025	1,605,033
Dec. 31	956	65,442,500	4,967,000	6,627,000	76,157,675	153,194,175	1,702,157
Mar. 31	962	63,986,250	5,472,750	6,150,750	72,896,750	148,506,500	1,650,072
June 30	971	67,415,750	5,228,750	5,717,250	66,693,675	145,055,425	1,611,727
Total for year	.....	.....	.....	.....	.....	591,209,125	1,642,247

REPORT OF WATER COLLECTIONS OFFICE—COLON—Continued.

Water rental collections.

Quarter ended—	Amount collected from private consumers.	Amount collected from Panama R. R.	Amount collected from Panama Canal.	Amount paid or to be paid by Panaman Government.	Total revenue per quarter.	Average consumption per private connection per quarter.	Average private quarterly bill.	Average cost per hydrant.
						Gallons.		
Sept. 30	$25,645.40	$1,427.10	$1,981.50	$1,644.38	$30,698.38	66,996	$27.25	$14.17
Dec. 31	26,453.70	1,493.10	1,988.70	3,615.80	33,551.30	68,454	27.67	31.17
Mar. 31	25,816.00	1,643.70	1,845.30	3,034.56	32,339.56	66,514	26.83	26.16
June 30	27,177.35	1,569.00	1,715.70	.....	30,462.05	69,429	27.90	.....
Total for year	105,092.45	6,132.90	7,531.20	.....	.....	.....	109.74	.....

The following statement shows the status of the capital cost account for the municipal improvements in the cities of Panama and Colon at the close of the fiscal year. This statement also shows the status of the account on July 1, 1910, with detail of the debits and credits each year since that date according to the agreement of September 30, 1910, with the Republic of Panama, under authority of which quarterly statements of the account are made:

Status of capital cost account for municipal improvements in Panama and Colon.

Items.	Panama.	Colon.
Cost of original water and sewer system within city prior to July 1, 1910	$504,911.57	$314,760.99
Cost of original pavements within city prior to July 1, 1910	447,966.60	221,070.29
Cost of extensions to water and sewer systems within city prior to July 1, 1910	122,165.92	169,581.52
Cost of extensions to pavements prior to July 1, 1910	92,193.08	88,967.20
Interest on capital cost water and sewer systems and pavements prior to July 1, 1910	77,742.27	48,314.47
Proportion interest on capital cost reservoirs, pumping stations, and pipe lines prior to July 1, 1910	6,216.66	6,125.16
Cost of maintenance water and sewer systems and pavements and proportion cost of maintenance reservoirs, pumping stations, and pipe lines prior to July 1, 1910	99,617.17	145,025.27
Water rental collections prior to July 1, 1910	212,375.20	200,410.74
Capital cost water and sewer system and pavements July 1, 1918	[1] 995,569.49	[1] 1,036,360.97
Capital cost reservoirs, pipe lines, pump stations, and filter plants in Zone July 1, 1918	[1] 1,765,222.58	[1] 585,642.89

[1] Panaman Government pays a proportion of interest on these sums at 2 per cent based on relation of total quantity of water used in Panama and Colon to total quantity of water produced by system.

PANAMA.

Fiscal year ending—	New construction in city.	Maintenance work.	Interest.	Applied in authorization of capital cost.	Water rentals, including deficiencies.
June 30, 1911	$54,609.74	$30,121.03	$25,759.26	$26,611.99	$78,467.71
June 30, 1912	38,745.05	35,563.86	26,532.29	31,651.54	97,772.26
June 30, 1913	[1] 1,815.77	38,470.70	27,468.14	48,937.71	114,876.55
June 30, 1914	1,505.37	104,469.25	29,086.29	32,648.88	166,204.42
June 30, 1915	5,034.13	88,414.68	24,505.45	25,247.78	138,167.91
June 30, 1916	.....	84,543.88	32,094.21	25,283.10	141,921.19
June 30, 1917	.....	97,744.09	30,404.15	25,283.07	153,431.31
June 30, 1918	.....	94,966.25	29,632.23	25,283.04	149,881.52
Total	98,078.52	574,293.74	225,482.02	240,947.11	1,040,722.87

[1] Indicates credit by adjustment.

Status of capital cost account for municipal improvements in Panama and Colon—Continued.

COLON.

June 30, 1911	$188,114.24	$43,111.09	$19,041.25	$18,019.80	$78,870.28
June 30, 1912	84,528.41	54,470.85	21,774.37	20,994.40	98,541.48
June 30, 1913	88,071.07	51,161.60	24,101.66	23,553.23	98,816.49
June 30, 1914	14,302.97	61,542.71	26,292.38	24,388.65	112,223.74
June 30, 1915	1,413.33	64,125.55	26,611.47	24,513.22	115,250.24
June 30, 1916	1,908.82	85,171.60	26,256.02	24,569.28	135,996.90
June 30, 1917	54,876.54	69,774.81	25,062.22	24,868.25	119,705.28
June 30, 1918	4,799.90	75,490.70	25,463.52	15,992.66	126,946.88
Total	438,015.28	504,848.91	194,602.89	176,899.49	886,351.29

Under the head of new construction by the municipal division in the towns and villages occupied by Panama Canal employees in the Canal Zone, a total of $545,723.55 was spent. The principal items of construction under this heading were the grading of grounds and the extension of roads, water and sewer systems for the new buildings erected in the hospital grounds at Ancon; the grading of grounds, installation of water and sewer systems around the new school houses erected at Ancon, Balboa, Pedro Miguel, Gatun, and Cristobal; the resurfacing with concrete of the streets in old Cristobal, the Mount Hope-Colon Road, Main Street, Gatun, the Ancon-Corozal Road, the Corozal-Pedro Miguel Road, the East La Boca Road, Sosa Hill Road, and roads in the Balboa shop district; the construction of new and extension of old sidewalks in the various towns occupied by canal employees and various extensions to the existing water and sewer lines.

Under the head of work for other divisions, the following sums were expended and the more important items of work under this heading were as listed below:

United States Army.—Total expenditure $258,416.59. The principal work under this heading was the completion of construction under way in the various posts at the end of the fiscal year 1917, and such maintenance and repair work as was requested, consisting mainly of grading and planting of grass, construction of concrete streets and sidewalks, extension of water and sewer systems at Forts Amador, Sherman, and de Lesseps, and the installation of water and sewer pumping station at Fort Sherman. There was also performed under this heading the making of surveys and the preparation of plans and estimates for the proposed new Army posts at Gatun, Miraflores, Corozal, Diablo, and Corundu River, and general maintenance and repair work in Army camps.

The Panama Railroad.—The sum of $187,401.82 was expended. The principal items of construction under this heading were the completion of the Corundu River storm sewer, the filling of and installation of water, sewers, and streets for the Folks River section of Colon extension; the installation of water, sewers, streets, and sidewalks for the Summit chicken farm; the installation of water lines and pumps for irrigating work on the various plantations; the construction of roads and sewers for the hog farm; the grading for and construction of roads and the necessary water and sewer systems at the Mindi dairy farm. In addition, numerous miscellaneous jobs were performed.

Outsiders.—The total expenditure was $42,282.94. The work done consisted principally of that for which deposits were made and included the construction of roads, sewers, and water lines for the area to be occupied by the South and Central American Cable Co., concrete construction work for the Panama Tramway Co., repairs to streets where gas connections were made; making water and sewer connections for private parties in the cities of Colon and Panama.

Terminals.—A total of $56,896.93 was expended, consisting in the main of ratproofing under docks Nos. 13, 14, 15, and pier No. 18, a total of 12,200 square yards of reinforced concrete being placed; and the extension of roads in the shops district.

Building division.—A total of $91,419.28 was spent. The work consisted of the installation of water and sewer connections for new buildings constructed; the erection of clotheslines for new quarters; the preparation of building sites; the installation of water lines; circulating water system from Mindi diversion and construction of roads for the cold storage plant; the grading

for the building site of Mindi dairy farm; numerous miscellaneous jobs of work.

Health department.—The sum of $37,325.83 was spent on such engineering and general construction work as was requested by the health department; the construction of concrete ditches and drains; filling of swamp areas; preparation of estimates for proposed work; maintenance of pumping station at the Palo Seco leper colony.

Miscellaneous.—For the divisions of fortifications, clubs and playgrounds, locks, electrical, marine, dredging, mechanical, quartermaster and supply there was a total of $118,092.70 spent. This work consisted of miscellaneous construction jobs.

During the year a total of 224,581 square yards of concrete streets and roads were constructed, 30,800 square yards of which were covered with a wearing surface of sheet asphalt; 12,268 square yards of roadway were constructed with Telford and macadam base, with a wearing surface of asphaltic concrete and hot tarvia mixed. The total number of square yards of road constructed during the year was 236,849.

Trouble experienced on the Canal Zone with concrete aggregates due to their containing excessive amounts of clay, loam, and silt resulted in instituting a laboratory at Miraflores water purification plant. During the past year the work has been of a practical nature, very little research work having been undertaken. The first problem has been to furnish convincing evidence that the concrete as laid varies greatly in compressive strength due to lack of uniformity of this aggregate, and that sufficient care has not been taken in mixing, placing, and curing the concrete.

The inspection of various construction jobs was made with the aid of (1) the compression cylinders made as shown in the following tables, (2) the analysis of the aggregates, (3) the time studies on the mixers, (4) the determination of the amount of water used, and (5) the methods employed by the various foremen.

Cylinders made and broken during the fiscal year, from January to June 30, 1918.

[6 inches in diameter, 12 inches high.]

Location.	Runs sampled.	Cylinders.		Age of concrete, in days.			
		Made.	Broken.	7	28	60	120
Pacific roads	43	560	370	.....	217	10	143
Pacific sidewalks	2	24	.....	.....	.....	.....	.....
Atlantic roads	16	128	47	.....	31	.....	16
Ancon Hospital	22	342	108	.....	97	11	.....
Cold-storage plant	15	120	44	.....	44	.....	.....
Pier No. 6, Cristobal	21	.....	91	.....	91	.....	.....
Larvacide factory	1	26	8	4	4	.....	.....
Oil tanks	2	48	24	4	20	.....	.....
Total	122	1,248	692	8	504	21	159

In making reports of the specimens tested the following form was used:

COMPRESSIVE STRENGTH OF CONCRETE.

[6 by 12 inch cylinders.]

Specimens were taken: January 19, 1918, by H. W. Green.
Specimens were broken: May 18, 1918, by H. W. Green.
Location: Corozal-Miraflores Road, at 172 + 75.
Foreman: Albert Lewis.[1]
Number of specimens taken: 16.
Mixer: Batch, mounted platform.
Mix: 1 : 6, measured.
Consistency: Quaking-mushy.
Time of mix: 48 seconds.
Period of mix: 1 minute, 40 seconds.
Aggregate: Course, Chagres River run of bank of good quality.

[1] Inspected by H. W. Green.

Ultimate compressive strength in pounds per square inch after 120 days.

Type of treatment	A		C	
	2568	−358	2302	−283
	2826	−100	2451	−134
	2888	− 38	2714	129
	3034	108	2871	286
	3315	389	----	-----
Average strength	2926	-----	2585	-----
Maximum deviation	----	389	----	286
Average deviation	7%	200	8%	210

Type of treatment: A. The forms are removed after being buried two days in moist sand and the specimens then buried in moist sand. C. The forms are removed after being buried two days in moist sand and the specimens receive treatment similar to that of the road—i. e., covered with about 2 inches of clay and wet down frequently.

Remarks: Specimens having rough ends were capped with plaster of Paris. Distribution of load by blotting paper. Spherical head was used.

Speed: Slow-slow.

The table of the values of the compressive strength has been omitted from this year's report because it was desired that the cylinders be permitted to age for 28, 60, and 120 days before being broken. Inasmuch as many of the 120-day tests have not matured, the 28 and 60 day results also have been omitted.

The following is an average of the various samples taken of Chagres River run of bank, from which all material is derived for concrete construction at present on the Canal Zone:

Size of seive.	Average.[1]	Size of sieve.	Average.[1]	Size of sieve.	Average.[1]
	Per ct.		*Per ct.*		*Per ct.*
2 inches	99.4	½ inch	58.7	No. 40	13.5
1¾ inches	96.5	¼ inch	43.1	No. 50	8.8
1½ inches	92.1	No. 10	29.2	No. 74	4.9
1¼ inches	87.2	No. 16	25.6	No. 100	2.8
1 inch	80.3	No. 20	23.8	No. 150	1.4
¾ inch	71.4	No. 30	18.0	No. 200	.8

[1] Average run of bank, Chagres River, passing each sieve.

Summary of the determinations made in connection with the work on concrete aggregates.

60 mechanical analyses of the aggregate available.
40 trial mixes and curves to determine the most dense mix with different combinations of the aggregates.
1,200 briquettes made of neat cement or 1 : 3 mortar.
70 cylinders, 2 inches in diameter and 4 inches high made of neat cement or 1 : 3 mortar.

In addition to this, determinations of silt and organic matter were made. Some work is being done with Abram's sodium hydroxide method. Both the laboratory and the field methods are being used.

Special care was taken to furnish all foremen performing construction work with data showing results of the tests made on their respective jobs with various conditions under which their work was performed.

The main difficulty encountered with most of the construction men was that of convincing them of the necessity of giving sufficient time to the mix, holding the amount of water to a minimum and taking the necessary precautions to pond the concrete where possible and where not possible to cover with a sufficient layer of clay, that by being kept wet, would protect the slab from the direct rays of the intense tropical sun.

It is possible to demonstrate beyond question, as is the case on all concrete work where laboratory control is used, that by observing the cardinal principles of mixing a sufficient time, using a minimum amount of water, a proper classification of the aggregate and the necessary care in curing, the same results are obtained in compressive strength with a very appreciable decrease in the amount of cement used.

While this laboratory control, as stated, has only been started during the present fiscal year, very appreciable benefits have been obtained. It is believed that by continuing the practice of laboratory control a more uniform class of work will be done at an appreciable saving.

It has been found that one of the most important causes of trouble with run-of-bank gravel from the Chagres River is the lack of bond, to a greater or less extent, between the cement paste and the aggregate. The particles upon close examination show that they are coated by a film of impurities which may be removed by treatment with acid or alkali, and to a large extent by careful washing.

Silt and organic matter in Chagres River sand.

[Average of 10 determinations of different samples.]

1. Per cent of silt	5.1
2. Per cent of organic matter	.51
3. Per cent of organic matter in the silt	10
4. Per cent of loss on ignition	2.2
5. Rated in accordance with Abram's sodium hydroxide index	300

The only practical method found which will appreciably remove this film is by thoroughly washing the aggregate before using. Due to the expense involved in the present method of washing it has been possible to use the washed material only upon work where an extra strong concrete is necessary. It is intended to erect a suitable washing plant to take care, more economically, of future requirements.

It was found that by washing Chagres River sand the tensile strength could be increased on an average over 40 per cent, and by grading and washing the Chagres River run of bank a stronger and more uniform concrete is obtained with a considerable saving of cement.

The laboratory control was also used on our bituminous road construction.

Daily laboratory control of the asphalt plant has been instituted, and samples have been taken both at the plant and from the laid pavement.

Summary of the work performed during the past fiscal year:

119 mechanical analyses and determinations of the per cents of bitumen, voids, specific gravities, and other data required to complete a report.
83 additional determinations of the per cent of bitumen.
30 mechanical analyses of aggregates available for asphalt work.
83 mechanical analyses of the aggregate mixtures for asphaltic wearing surface taken at the plant.
19 mechanical analyses of the aggregate mixtures for asphaltic binder course taken at the plant.
32 different combinations employed, of the available aggregates, with weight per cubic foot, void determinations, and mechanical analyses of the resulting mixtures to determine the most dense mix and the mix best suited for binder and wearing surfaces.

The wearing surface determined upon from the experiments was made up as follows:

Materials.	Weight of pavement.	Weight of aggregate.
	Per cent.	*Per cent.*
Bitumen	10	.....
Chagres River sand	72	80
Sand from hydraulic fill	9	10
Cement	9	10

The method of laying the sheet asphalt wearing surface on a concrete foundation was as follows: The surface of the concrete was thoroughly swept, and by means of a squeegee one-quarter of a gallon of Tarvia "B" was applied to each square yard, as a seal coat. It was found by comparing surfaces laid with and without the squeegee coat of Tarvia that a much more perfect bond was obtained between the concrete and the wearing surface where the squeegee coat was used than where the asphalt was laid directly on the concrete.

Following is the form of reporting the operation of the plant in order that the cost may be computed daily.

Daily cost report—asphalt plant.

Material.	Amount.	Unit cost.	Total cost.
Bitumen, pounds	*		
Chagres River sand, cubic yards	*		
Cement, sacks	*		
LABOR.			
Labor, mixing			
Labor, placing			
Transportation charges			
Total cost			
WEARING SURFACE.			
Mixed, cubic yards	*	**	
Laid, square yards	*	**	
Laid, linear feet of road	*	**	

Date, ...
Location, ...
Foreman, ...

NOTE.—* To be filled in by foreman. ** Data desired.

Special sections of road were laid for experimental purposes using different quantities by weight of aggregate and bitumen. These sections are carefully recorded as to location and make it possible to show by practical illustration the comparative values of different mixes.

The diagram on which we prepare our curves was patterned after that in use in the engineer's office of the city of Berkeley, Cal. This card appeared in the issue of Engineering and Contracting for March 7, 1917, Vol. XLVII, No. 10.

Record of screen test No. 2.

Lab. No. P. 33. (Date) March 13, 1918.
Analysis of wearing surface.
Road or street, Ancon-Miraflores Road.
Laid Mar. 9, 1918.
Dug out Mar. 11, 1918.

Weight of sample	291.0
Weight of sample in air after soaking in water for 24 hours	295.5
Weight of sample in water after soaking in water for 24 hours	164.0
Per cent of water absorbed	1.55
Apparent specific gravity of sample	2.213

Composition of the sample.	Per cent units of the aggregate.	Per cent weights.
Soluble in CS_2 (total bitumen)		7.0
Passing 200-mesh sieve	9.9	9.2
Passing 150 retained on 200 mesh	2.4	2.2
Passing 100 retained on 150 mesh	4.6	4.3
Passing 74 retained on 100 mesh	5.4	5.0
Passing 50 retained on 74 mesh	6.7	6.2
Passing 40 retained on 50 mesh	7.8	7.2
Passing 30 retained on 40 mesh	7.8	7.2
Passing 20 retained on 30 mesh	9.2	8.6
Passing 16 retained on 20 mesh	3.5	3.3
Passing 10 retained on 16 mesh	8.9	8.3
Passing ¼ inch retained on 10 mesh	23.3	21.7
Retained on ¼ inch mesh	10.5	9.8
Passing 1 inch on ½ inch mesh		
Passing 1¼ inch retained on 1 inch mesh		
Passing 1½ inch retained on 1¼ inch mesh		
Retained on 1½ inch mesh		
Specific gravity of original bitumen at 78°/78° F		1.035
Apparent specific gravity of aggregates retained on ¼ inch		
Specific gravity of aggregate retained on 10 mesh		2.677
Specific gravity of fine aggregate retained on 16–100 mesh		2.680
Specific gravity of fine material retained on 150–200 mesh, and passing 200 mesh		2.780
Maximum possible density		2.423
Bitumen, rational per cent		16.39
Aggregate, rational per cent		83.61
Per cent of voids in mineral aggregate		25.05
Per cent of voids in original sample		2.66

Remarks: The thickness of the samples was 2 inches.

GEO. C. BUNKER,
In charge of testing laboratories.

The following plates accompany this report:

Plate No. 5. Concrete road between Corozal and Miraflores.

Plate No. 6. Typical section of 18-inch concrete roadbed, with sheet asphalt wearing surface.

Following is report of work performed by chemical section of the testing laboratories at Miraflores during the year:

	Number of samples analyzed.
Asphalt	10
Tarvia	1
Asphalt wearing surface	35
Asphalt wearing surface mixtures	103
Bituminous concrete pavement	16
Miscellaneous work, including samples of paints, painting materials, saud, cement, lime, alum, fertilizers, coal, minerals, rocks, seeds, etc	122

Investigations were made on the following subjects:

1. Corrosion of the lead sheaths of cables at Miraflores locks.
2. Waterproofing concrete tanks to store crude carbolic acid.
3. Substitute for embossing compound used at the Mount Hope printing plant.

The total cost of work performed by the municipal division during the fiscal year, including labor and material and charges from other divisions and departments of The Panama Canal, was $2,051,462.08.

The following is a summary of the report of the work performed in connection with the operation of the water purification plants during the year:

	Agua Clara.	Mount Hope.	Miraflores.
Placed in service	Dec. 29, 1911	Feb. 23, 1914	Mar. 14, 1915.
District supplied	Gatun, Toro Point.	Colon, Mount Hope, Margarita Point.	Pedro Miguel, Corozal, Ancon, Balboa, Panama.
Source of supply	Agua Clara Reservoir.	Brazos Brook Reservoir.	Chagres River.
Rated capacity, gallons per day	2,500,000	8,000,000	15,000,000.
Method of purification	Aeration, sedimentation, rapid sand filtration.	Aeration, sedimentation, rapid sand filtration.	Aeration, sedimentation, rapid sand filtration.
Aeration basin:			
Size, feet	4 by 8[1]	60 by 66	86 by 130
Number of nozzles		85	105
Sedimentation basin:			
Size, feet	70.5 by 71	171 by 171	300 by 125
Depth, feet	10.5	12.25	16.5
Capacity, gallons	350,000	2,500,000	4,500,000
Period of sedimentation, hours	10	14	12
Rapid sand filters:			
Number of units	4	6	14
Total sand area, square feet	1,156	3,078	5,950
Depth of filtering materials—			
Sand, inches	30	30	30
Gravel, inches	24	22	24
Size of filtering materials:			
Sand, effective size	0.44	0.41	0.41
Sand, uniformity coefficient	1.81	1.70	1.70
Gravel, size, inches	$\frac{3}{16}$ to $1\frac{3}{4}$	$\frac{1}{8}$ to $1\frac{1}{2}$	$\frac{3}{16}$ to $1\frac{3}{4}$
Per cent of sand area covered by horizontal area of troughs.	22.3	32.0	32.8
Washing of filters:			
Vertical rise per minute, inches	19	20	24
Gallons per square feet of sand surface	12	12.5	15
Filter bottom, type	Harrisburg, Pa.	Harrisburg, Pa.	Concrete false bottom.
Loss of head:			
Average initial, feet	0.5	1.3	1.0.
Average final, feet	7.5	12.5	11.5
Length of filter runs, hours, yearly average.	94.22	27.2	37.2
Volumes of water, average gallons per day:			
Raw	1,199,000	4,102,000	8,899,000
Filtered	1,171,000	3,951,000	8,799,000
Delivered to mains	1,162,000	3,834,000	8,613,000
Wash water	9,000	116,000	186,400
Per cent of filtered water	0.76	2.95	2.11
Chemicals, yearly averages:			
Alum, pounds per million gallons	212	238	180
Lime, pounds per million gallons	56		
Liquid chlorine, parts per million, available chlorine.		0.268	0.40

	Agua Clara.	Mount Hope.	Miraflores.
Physical and chemical characteristics of filtered water, parts per million:			
Color	7	7	0
Turbidity	0	0	0
Free carbonic acid (CO_2)	0	2.9	4.1
Carbon dioxide as carbonate (CO_2)	2.05	0	0
Alkalinity, orythrosine ($CaCO_3$)	17.10	24.7	42.2
Hardness, soap ($CaCO_3$)	23.05	33.8	46.8
Oxygen consumed	2.46	1.57	0.54
Chlorine (Cl)	6.5	6.5	7.1
Iron (Fe)	0.12	0.14	0.9
Solids, total	79	87	109
Nitrogen as—			
Nitrites (NO_2)	0.0003	0.0000	0.0024
Nitrates (NO_3)	0.003	Trace	0.17
Colonies of bacteria per c. c. in water from distribution system:			
Nutrient agar at 37.5° C., 24 hours	182	31	24.1
B. coli index, number per liter	91.4	45.3	23.0

[1] Aerator box.

Section of Meteorology and Hydrography.

The section of meteorology and hydrography continued to keep the permanent records of weather conditions on the Canal Zone, the hydrology of Gatun Lake watershed, and the hydrographic conditions at the Atlantic and Pacific ports of the canal. Special investigations were carried to conclusion and report as indicated in the report of the chief hydrographer, which follows:

Section of Meteorology and Hydrography.

H. G. Cornthwaite, chief hydrographer.

PERSONNEL.

The following changes in the personnel of the section were made during the year:

Mr. F. D. Willson, chief hydrographer, resigned, effective July 17, 1917, and was succeeded by Mr. R. Z. Kirkpatrick.

Mr. R. L. Mitchell, hydrographer, resigned, effective October 9, 1917, to enter the military service.

Mr. H. G. Cornthwaite was appointed assistant chief hydrographer, effective December 28, 1917.

Mr. R. Z. Kirkpatrick, chief hydrographer, resigned, effective April 13, 1918, to enter the military service, and Mr. H. G. Cornthwaite was promoted to the position of chief hydrographer.

Mr. George Johnson was made assistant chief hydrographer, effective May 1, 1918.

Mr. George Reichenbach was appointed computer, effective April 27, 1918, vice J. E. Hughes promoted to hydrographer.

Mr. George E. Matthew, meteorologist, resigned, effective June 10, 1918, to enter the military service.

METEOROLOGY.

General.—Few changes were made during the year in the meteorological stations operated under the direction of the chief hydrographer. All stations enumerated in the 1917 annual report were continued in operation, and the following new stations were established:

A rainfall station was established on Bohio Island, November 1, 1917. The station is equipped with standard rain gauge, and rainfall measurements are made twice a month.

Equipment for recording soil temperature automatically was installed at Balboa Heights on February 1, 1918; the thermograph bulb is buried at a depth of approximately 4 inches.

The necessary equipment was installed and evaporation records were begun at Alhajuela on February 23, 1918.

A standard rain gauge was installed on the Pedro Miguel River on June 25, 1918. Records from this station are used in estimating the average rainfall over the Miraflores Lake watershed.

A rainfall station, equipped with standard gauge, was established at Taboga on January 10, 1918.

A rainfall station was established at Darien radio station on June 29, 1918. This station is equipped with standard rain gauge; the records are kept by the officer commanding the radio station.

Precipitation.—Rainfall for the calendar year 1917 was above normal everywhere in the Canal Zone and vicinity, except on the Pacific and Atlantic coasts, and at Monte Lirio, Quipo, and Cano. The annual totals ranged from 64.11 inches at Balboa to 145.96 inches at the Gatun River station. The average precipitation in the Pacific section was 80.37 inches; in the Central section, 103.17 inches; and in the Atlantic section, 131.01 inches.

The 1917 dry season rainfall averaged approximately 50 per cent below normal, and amounted to but 3 per cent of the annual total in the Pacific and Central sections, and 6 per cent of the yearly total in the Atlantic section.

November was the month of heaviest rainfall at all stations, and February was in general the month of least rainfall. The maximum 24-hour rainfall recorded during the year was 8.58 inches at Gatun on April 28–29. Daily quantities of 4 inches or more, were recorded as follows:

Station.	Date.	Rainfall.	Station.	Date.	Rainfall.
		Inches.			*Inches.*
Colon	Sept. 6	4.15	Empire	Sept. 6	4.32
Do	Nov. 19	4.08	Camacho	Sept. 7	4.02
Brazos Brook	Apr. 28	5.15	Do	Nov. 20	4.00
Gatun	...do....	6.63	Culebra	Sept. 7	4.79
Do	July 22	4.48	Rio Grande	Sept. 6	4.29
Do	Nov. 18	4.28	Do	Nov. 20	7.23
Trinidad	Nov. 16	6.00	Pedro Miguel	Sept. 6	4.00
Frijoles	Nov. 18	6.05	Do	Nov. 20	4.73
Gamboa	Nov. 23	4.01	Miraflores	Sept. 6	4.75
Do	Dec. 6–7	6.20			

The rainfall during the first six months of 1918 has averaged approximately normal.

Monthly records for 1917, 1918, and the station averages are presented in Table No. 1; and the maximum rainfall of record for periods of 5 minutes, 1 hour, and 24 hours at stations equipped with automatic registers is shown in Table No. 2. The 1917 rainfall at selected stations, compared with monthly averages, is shown graphically on plate No. 7, while the annual distribution of rainfall in the Canal Zone is shown on plate No. 8.

Air temperature.—The air temperature for the year 1917 averaged from 1 to 2° F. below normal at the various stations. The highest temperatures during the year occurred in April and the lowest temperatures in February.

The means and extremes in air temperature for the year 1917 at the various stations are presented in the following table:

Station.	Maximum.		Minimum.		Annual mean, °F.
	° F.	Date.	° F.	Date.	
Balboa Heights	94	Apr. 25	66	Feb. 5	78.9
Gamboa	93	Apr. 14	63	...do.....	78.4
Alhajuela	93	Apr. 15[1]	58	Feb. 5–6[1]	76.5
Gatun	92	May 6	68	Feb. 6	79.4
Colon	90	Apr. 14	68	June 19	78.8

[1] Other dates also.

The absolute maximum and minimum temperatures of record at the various stations are given below (records revised to June 30, 1918):

Station.	Maximum.		Minimum.		Annual average °F.	Years record.
	°F.	Date.	°F.	Date.		
Balboa Heights	97	Apr. 7, 1912	63	Jan. 27, 1910	80.1	12
Gamboa	94	Apr. 28, 1918	63	Feb. 5, 1917	78.4	1
Alhajuela	96	Apr. 18, 1912[1]	58	Feb. 5, 1917[1]	78.6	7
Gatun	92	May 30, 1915[1]	66	Aug. 7, 1912	80.4	7
Colon	92	June 3, 1909	66	Dec. 3, 1909	79.7	10

[1] Other dates also.

NOTE.—The minimum temperature record of 58° F. recorded at Alhajuela on February 5 and 6 and March 25, 1917, is the lowest temperature of record on the Isthmus. The maximum temperature record of 97° F., recorded at Aneon (now Balboa Heights) on April 7, 1912, was equaled at the Naos Island station on February 13, 1906.

The temperature during the first six months of 1918 has been generally below normal.

Monthly temperature records and other meteorological data at the two first-class stations are presented in Tables Nos. 3 and 4.

Wind.—The wind movement over the Canal Zone for the year 1917 was approximately normal. March was the windiest month at all stations, except Balboa Heights, where the greatest wind movement occurred in February. July was generally the month of least wind movement. Northwest, north, or northeast winds prevailed at all stations, although there was a large percentage of southeast and variable winds during the rainy-season months.

The average hourly-wind movement, prevailing direction, and maximum velocities at the various stations for the year 1917 are presented in the following table:

Station.	Average wind movement, miles per hour.		Year 1917.			
	1917	Annual average.	Prevailing direction.	Maximum velocity.		
				Miles.	Direction.	Date.
Balboa Heights	7.4	7.4	Northwest	36	North	Aug. 13.
Pedro Miguel	5.1	5.5	do	28	Southeast	Sept. 19.
Gamboa	5.0	4.8	Northeast	28	Northeast	Jan. 1.[1]
Gatun	5.8	7.4	North	30	Southwest	July 24.
Colon	10.5	10.3	Northwest	42	Northwest	Nov. 24.

[1] Also other dates.

The following table, revised to June 30, 1918, gives the maximum wind velocities of record at stations in the Canal Zone:

Stations.	Maximum velocity.		
	Miles per hour.	Direction.	Date.
Balboa Heights	59	South	July 10, 1909
Pedro Miguel	30	Northeast	Sept. 23, 1912
Gamboa	39	do	June 6, 1918
Gatun	49	East	Aug. 7, 1912
Colon	46	North	Apr. 4, 1915

The wind movement has been approximately normal during the first six months of 1918, and the prevailing direction has been from the north of northwest.

Atmospheric pressure.—The mean atmospheric pressure for the year 1917 was slightly above normal on both coasts. February was the month of highest pressure, and October the month of lowest pressure.

Relative humidity.—The mean relative humidity of the atmosphere for the year was slightly above normal on the Pacific coast, and slightly below normal on the Atlantic. November was the month of highest average humidity, and February and March were the months of lowest humidity.

Cloudiness.—The average daytime cloudiness for the year 1917 was slightly below normal on the Pacific side, and slightly above on the Atlantic. January was the month of least cloudiness on both coasts, while June was the month of heaviest cloudiness on the Pacific side, and August on the Atlantic coast.

Evaporation.—Evaporation from the lake surface at Gatun was slightly below normal during the year 1917, but the evaporation at both coast stations was above the annual average.

During the first six months of 1918 the evaporation has averaged close to normal.

The records at the various stations are shown in Table No. 5.

Fogs.—No fogs were observed during the year at the Atlantic entrance, and but few on the Pacific coast. Numerous fogs occurred at the interior stations, but practically all fogs observed lifted or were dissipated by 8.45 a. m.

Sea temperature.—The surface temperature of the sea water was slightly below normal on both coasts. Records for the year 1917 are given in the following table:

Station.	Temperature of sea water.				1917 mean.	Annual average.
	Maximum.		Minimum.			
	° F.	Date.	° F.	Date.		
Balboa	85	Oct. 7[1]	61	Feb. 15[1]	77.8	79.7
Colon	86	Nov. 9	77	Feb. 8[1]	81.4	82.1

[1] Other dates also.

Seismology.—Thirty seismic disturbances were recorded at the Balboa Heights seismological station during the fiscal year ended June 30, 1918. Most of these shocks were slight tremors and no damage resulted from them in the Canal Zone. Two shocks were recorded on August 30 and 31, which are thought to have originated in Colombia, where considerable damage was reported. The tremors recorded at Balboa Heights on August 30 were very slight, but the shock of August 31 had an intensity of III on the Rossi-Forel scale, the maximum amplitude of the record being 62 m. m.

Destructive earthquake shocks occurred in Guatemala City and vicinity in December, 1917, and January, 1918. Four of these shocks were recorded at Balboa Heights, on December 26 and 29, 1917, and January 4 and 25, 1918. The shocks recorded here were very slight, considering the destructive character of the Guatemala earthquake and the relatively short distance of the Canal Zone from the center of seismic activity. The probable cause of this slight registration on the Balboa Heights instruments is to be found in the extremely local character of the destructive shocks in Guatemala. It is probable also that a fault zone located somewhere between the Canal Zone and Guatemala may have acted as a damper to the seismic waves.

A complete list of the seismic disturbances recorded at Balboa Heights during the year 1917–18 is given in Table No. 6.

Special investigations.—A series of observations was made at Balboa Heights between April 19 and 27, 1918, to determine the maximum heating of steel exposed to the sun's rays in this climate. Blocks of steel 2 by 2 by 12 inches were exposed to the sun's rays in a manner favorable for maximum heating, and protected from the wind to reduce to a minimum the loss of heat by conduction and convection. Half-inch holes drilled into the center of each steel block were filled with mercury, and temperature readings were obtained at 15-minute intervals by immersing the thermometer bulb into the mercury well. The maximum steel temperature observed was 133° F. at 3.30 p. m., April 26. Since these observations were made during the season of maximum

solar radiation in the Canal Zone, it is thought that under the most favorable natural conditions possible the maximum temperature of steel exposed to the sun in this climate is not likely to exceed 140° F.

The following plates and tables accompany the meteorological section of this report:

Plate No. 7. Monthly rainfall year 1917 and station averages.

Plate No. 8. Distribution of rainfall in Canal Zone, maximum, minimum, current, and average years.

Table No. 1. Monthly rainfall on the Isthmus of Panama and station averages.

Table No. 2. Maximum rainfall in Canal Zone and vicinity.

Table No. 3. Monthly meteorological data, Balboa Heights, year 1917.

Table No. 4. Monthly meteorological data, Colon, year 1917.

Table No. 5. Monthly evaporation, Canal Zone, year 1917–18, and average.

Table No. 6. Seismograph records, Balboa Heights, fiscal year 1917–18.

TABLE No. 1.—*Monthly rainfall on Isthmus of Panama, 1917–18, and station averages.*

[Values in inches.]

Stations.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Balboa:													
1917	0.31	0.19	T.	2.03	4.98	8.14	9.17	6.27	9.41	5.79	13.33	4.49	64.11
1918	1.02	.00	1.32	4.33	6.45	4.57	.....	.....	.....	.....	.....	.....	.....
Average, 19 years	1.07	.67	.63	3.78	8.28	7.43	8.24	7.83	6.93	9.36	9.35	5.72	69.29
Balboa Heights:													
1917	.13	.19	.02	2.24	5.75	7.35	10.17	7.42	11.53	6.14	13.77	4.09	68.80
1918	1.78	T.	1.25	4.52	6.75	5.20	.....	.....	.....	.....	.....	.....	.....
Average, 20 years	.99	.89	.65	2.84	8.72	7.61	7.95	8.00	7.79	10.30	10.37	4.45	70.56
Miraflores:													
1917	.37	.28	.48	1.10	6.84	11.23	12.23	9.45	14.25	7.56	14.65	6.13	84.57
1918	3.37	.00	.20	10.89	8.36	5.70	.....	.....	.....	.....	.....	.....	.....
Average, 9 years	1.72	1.24	.48	3.43	10.17	8.97	8.47	8.89	9.47	12.25	11.37	7.02	83.48
Pedro Miguel:													
1917	.30	T.	.91	1.25	7.38	11.34	14.78	9.51	11.78	6.01	19.38	7.00	89.64
1918	3.08	.02	.03	11.01	9.36	6.55	.....	.....	.....	.....	.....	.....	.....
Average, 10 years	1.04	.81	.38	3.56	11.03	9.73	9.21	8.72	8.98	11.96	11.67	6.08	83.17
Rio Grande:													
1917	.00	.04	.17	1.85	6.98	11.45	14.44	10.28	11.39	5.92	24.79	7.41	94.72
1918	1.48	.12	.00	7.77	13.68	7.33	.....	.....	.....	.....	.....	.....	.....
Average, 13 years	1.17	.77	.32	3.13	10.61	9.29	10.20	9.70	10.56	12.21	11.89	5.69	85.54
Culebra:													
1917	.00	.09	.03	1.91	7.17	9.89	13.59	9.97	13.05	5.56	21.62	5.84	88.72
1918	1.75	.10	.02	6.91	16.20	8.07	.....	.....	.....	.....	.....	.....	.....
Average, 27 years	1.59	.69	.60	3.57	10.95	8.87	9.47	10.25	10.76	11.24	12.59	7.13	87.71
Camacho:													
1917	.00	.22	.00	1.57	6.59	12.33	12.70	9.95	9.95	6.76	25.37	8.70	94.14
1918	1.04	.02	.16	6.69	15.30	10.92	.....	.....	.....	.....	.....	.....	.....
Average, 11 years	1.02	.97	.45	3.11	11.24	9.66	9.89	9.72	10.41	12.91	13.80	6.03	89.21
Empire:													
1917	.01	.08	.01	2.40	8.07	12.24	11.96	8.76	11.44	6.38	23.79	7.71	92.85
1918	1.50	.02	.20	6.91	13.56	9.31	.....	.....	.....	.....	.....	.....	.....
Average, 13 years	.74	.83	.36	3.18	9.86	8.65	8.96	9.44	8.74	12.75	12.24	5.30	81.05
Gamboa:													
1917	.09	.30	.26	3.96	8.14	7.82	17.75	12.62	9.93	11.21	22.05	8.31	102.44
1918	3.07	.07	.54	3.16	11.45	10.12	.....	.....	.....	.....	.....	.....	.....
Average, 35 years	1.73	.89	.75	3.61	10.81	9.77	10.31	11.99	10.49	12.66	12.28	6.78	92.07
Juan Mina:													
1917	.04	.08	.21	2.31	12.34	9.45	11.66	15.30	11.51	11.75	22.23	7.06	103.94
1918	1.35	.96	.00	3.80	10.29	13.56	.....	.....	.....	.....	.....	.....	.....
Average, 7 years	.60	1.38	.28	3.30	11.01	10.78	10.08	12.00	11.90	14.59	13.73	5.26	94.91
Alhajuela:													
1917	.11	.04	.17	1.09	17.17	8.70	12.90	13.32	9.92	13.73	19.83	6.41	103.39
1918	.93	.14	.02	6.80	11.34	15.76	.....	.....	.....	.....	.....	.....	.....
Average, 18 years	1.04	.81	.52	3.34	12.30	12.33	12.64	12.69	11.72	14.12	14.74	6.24	102.49
Vigia:													
1917	.13	.17	.02	.67	15.09	9.66	13.71	15.71	10.67	16.88	20.89	4.21	107.81
1918	1.37	.30	.17	4.91	11.46	15.58	.....	.....	.....	.....	.....	.....	.....
Average, 9 years	.74	1.81	.46	3.01	12.07	13.26	12.22	12.94	13.11	16.46	15.54	5.02	106.64
Frijoles:													
1917	.17	.15	.27	4.14	7.37	10.04	14.71	9.71	13.78	9.20	28.10	10.18	107.82
1918	3.03	.24	.31	5.27	11.29	8.06	.....	.....	.....	.....	.....	.....	.....
Average, 6 years	1.74	2.78	.63	4.30	12.04	10.60	10.42	10.50	10.73	15.33	17.05	6.33	102.45
Trinidad:													
1917	.58	.45	.47	4.18	11.64	9.45	11.59	16.35	8.44	10.03	28.84	9.14	111.16
1918	3.96	.37	.39	4.75	15.10	5.39	.....	.....	.....	.....	.....	.....	.....
Average, 10 years	2.67	2.94	2.20	5.01	13.40	10.62	9.68	10.98	11.45	14.37	18.91	8.65	110.88

TABLE No. 1.—*Monthly rainfall on Isthmus of Panama, 1917–18, and station averages*—Continued.

Stations.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Monte Lirio:													
1917	.68	.55	.75	3.81	11.24	14.50	13.93	12.83	14.10	10.04	27.04	9.97	119.44
1918	3.92	.76	1.34	4.20	14.51	9.43	.....	.....	.....	.....	.....	.....	.....
Average, 10 years.	2.64	3.55	2.48	5.31	13.02	13.00	12.22	11.88	12.89	16.12	22.14	9.58	124.83
Gatun:													
1917	1.11	.62	.52	9.84	15.15	12.41	17.80	17.81	12.20	10.05	30.94	11.59	140.03
1918	4.03	.53	.55	6.66	11.64	8.29	.....	.....	.....	.....	.....	.....	.....
Average, 13 years.	3.14	3.01	2.30	5.50	14.61	12.96	12.25	14.06	10.39	16.02	21.23	10.98	126.45
Brazos Brook:													
1917	1.28	1.11	.61	6.23	15.86	12.33	17.54	19.71	13.31	10.50	24.86	11.93	135.27
1918	4.72	1.00	.92	5.50	16.99	10.11	.....	.....	.....	.....	.....	.....	.....
Average, 11 years.	3.04	3.45	2.33	4.99	13.41	15.03	15.85	14.34	12.26	16.12	23.01	11.89	135.72
Colon:													
1917	1.10	.45	.76	1.87	12.11	14.37	13.58	15.79	17.67	7.87	20.49	11.66	117.72
1918	3.28	.67	.41	5.34	19.26	8.56	.....	.....	.....	.....	.....	.....	.....
Average, 47 years.	3.86	1.69	1.64	4.18	12.57	13.48	16.14	14.92	12.62	14.94	21.49	11.90	129.43

NOTE.—Station averages do not include 1918 records.

TABLE No. 2.—*Maximum rainfall in Canal Zone Oct. 1, 1905, to June 30, 1918.*

[Values in inches.]

Stations.	Maximum rainfall.					
	5 minutes.		1 hour.		24 hours.[1]	
	Inches.	Date.	Inches.	Date.	Inches.	Date.
Balboa (June 10, 1906)	0.90	May 12, 1912	5.86	June 2, 1906	7.57	Nov. 16–17, 1906.
Balboa Heights (Oct. 1, 1905).[2]	.64	Aug. 7, 1908	3.98	Oct. 9, 1911	7.23	May 12–13, 1912.
Miraflores (June 19, 1914)	.50	Sept. 6, 1917	4.09	Sept. 6, 1917	4.75	Sept. 6, 1917.
Pedro Miguel (Jan. 1, 1908)	.60	Nov. 11, 1908	3.46	.....do.....	5.45	Nov. 19–20, 1917.
Rio Grande (Dec. 29, 1905)	.75	July 24, 1908	4.14	Nov. 20, 1917	8.24	Do.
Empire (July 18, 1906)	.60	July 25, 1906	3.63	Oct. 1, 1909	6.15	Dec. 3, 1906.[3]
Gamboa (Nov. 18, 1915)	.59	July 27, 1908	3.32	May 11, 1911	6.56	Dec. 2–3, 1906.
Alhajuela (Mar. 31, 1907)	.60	July 20, 1909	4.19	July 8, 1915	8.19	Do.[3]
Frijoles (June 26, 1913)	.54	July 23, 1915	2.81	July 21, 1915	6.73	Apr. 3–4, 1915.
Gatun (Oct. 1, 1905)	.62	Aug. 3, 1912 Aug. 12, 1914	4.72	Aug. 12, 1914	10.48	Dec. 3, 1906.[3]
Bohio (Oct. 1, 1905) [4]	.67	June 16, 1909	4.51	Aug. 7, 1908	8.85	Aug. 7–8, 1908.
Colon (Oct. 1, 1905)	.64	Aug. 25, 1909	4.90	Oct. 8, 1909	8.53	Dec. 2–3, 1906.
Porto Bello (May 1, 1908) [5]	[6] 2.45	Nov. 29, 1911	4.53	Nov. 29, 1911	10.86	Dec. 28–29, 1909.

[1] Maximum fall in 24 consecutive hours.
[2] Formerly Ancon Station moved to Balboa Heights, Oct. 1, 1914.
[3] No automatic record on this date, total for 24 hours ending at noon.
[4] Station closed January, 1912.
[5] Station closed Aug. 31, 1914.
[6] Approximate; automatic record indistinct, due to unusually excessive rate of fall.

NOTE.—Dates in parentheses opposite station names refer to installation of automatic register.

TABLE No. 3.—*Monthly meteorological data, year 1917, Balboa Heights, Canal Zone.*[1]

Month.	Atmospheric pressure (inches).		Air temperature (° F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station.[2]	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January	29.776	29.902	78.3	89	24	86.6	66	12	70.0	21	71	69	86
February	29.825	29.950	78.2	89	16	86.9	66	5	69.4	21	70	68	82
March	29.748	29.869	80.0	90	3	87.8	67	25	72.1	23	72	70	79
April	29.742	29.864	80.3	94	25	88.4	69	25	72.2	25	73	71	81
May	29.762	29.883	79.3	90	7	85.2	70	20	73.4	17	75	74	88
June	29.751	29.873	79.0	90	9	84.8	70	1	73.2	17	75	74	91
July	29.740	29.862	79.1	89	5	85.1	71	25	73.1	17	75	74	92
August	29.760	29.882	79.4	89	16	85.5	71	31	73.4	16	75	74	92
September	29.744	29.865	79.0	89	22	84.9	71	10	73.0	17	75	74	91
October	29.734	29.856	78.2	88	10	83.5	70	18	72.9	14	74	74	92
November	29.749	29.870	78.0	90	27	83.6	71	6	72.3	17	74	73	93
December	29.758	29.880	78.4	89	11	85.6	68	29	71.3	18	73	72	90
Year	29.757	29.880	78.9	94	[3] 25	85.7	66	[4] 5	72.2	25	73.4	72.2	88.1

Month.	Precipitation (inches).			Wind.					Number of days.				Average cloudiness.[6]
	Monthly total.	Normal.[5]	Rainy days.	Total movement (miles).	Prevailing direction.	Maximum velocity.			Clear.	Partly cloudy.	Cloudy.	Thunderstorms.	
						Miles per hour.	Direction.	Date.					
January	0.13	0.99	3	7,021	N.	30	N.	22	15	15	1	0	3.8
February	.19	.89	2	7,230	N.	32	NE.	30	11	17	0	0	4.0
March	.02	.65	2	9,292	N.	33	N.	19	6	25	0	0	4.5
April	2.24	2.84	6	6,221	N.	26	N.	27	1	28	1	3	5.9
May	5.75	8.72	18	5,021	N.	26	N.	13	0	13	18	8	7.6
June	7.35	7.61	20	3,753	NW.	32	E.	28	0	6	24	6	8.1
July	10.17	7.95	23	3,887	NW.	28	NW.	8	0	8	23	14	8.0
August	7.42	8.00	23	4,277	NW.	36	N.	13	0	10	21	11	8.0
September	11.53	7.79	25	4,515	NW.	36	S.	19	0	7	23	10	7.9
October	6.14	10.30	20	4,258	NW.	23	S.	5	0	16	15	5	7.0
November	13.77	10.37	24	4,627	NW.	28	N.	24	0	13	17	2	7.3
December	4.09	4.45	12	5,760	NW.	25	N.	30	2	24	5	1	5.5
Year	68.80	70.56	178	65,862	NW.	36	N.	[7] 13	35	182	148	60	6.5

[1] Station formerly Ancon—moved to Balboa Heights Oct. 1, 1914.
[2] Elevation of barometer 118 feet above sea level.
[3] April.
[4] February.
[5] Average for 20 years' record.
[6] Tenths of sky.
[7] August.

TABLE No. 4.—*Monthly meteorological data, year 1917, Colon (Cristobal).*

Month.	Atmospheric pressure (inches).		Air temperature (° F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station.[1]	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January	29.882	29.918	78.8	85	7	82.5	70	11	75.1	12	74	72	82
February	29.928	29.965	79.3	84	28	83.1	73	3	75.5	10	73	71	79
March	29.855	29.892	78.8	84	4	81.5	73	5	76.0	11	74	71	79
April	29.839	29.876	79.2	90	14	82.2	72	27	76.2	15	75	73	80
May	29.842	29.879	79.0	89	13	83.3	72	29	74.7	14	75	74	86
June	29.830	29.868	78.7	88	6	83.1	68	19	74.3	14	75	74	88
July	29.825	29.862	79.0	87	21	83.4	71	22	74.5	13	76	75	89
August	29.842	29.880	78.8	86	8	82.9	72	7	74.8	11	76	75	90
September	29.821	29.858	79.8	90	12	85.1	72	3	74.4	15	75	74	87
October	29.808	29.845	79.1	88	6	83.7	72	25	74.5	14	75	74	88
November	29.836	29.872	77.5	85	9	81.1	72	25	73.9	11	75	74	89
December	29.844	29.882	77.6	84	12	81.4	69	30	73.8	12	74	73	85
Year	29.846	29.883	78.8	90	[2] 14	82.8	68	[3] 19	74.8	15	74.7	73.3	85.2

Month.	Precipitation (inches).			Wind.					Number of days.				Average cloudiness.[5]
	Monthly total.	Normal.[4]	Rainy days.	Total movement (miles).	Prevailing direction.	Maximum velocity.			Clear.	Partly cloudy.	Cloudy.	Thunderstorms.	
						Miles per hour.	Direction.	Date.					
January	1.10	3.86	12	12,551	NW.	34	NW.	8	14	16	1	0	4.0
February	.45	1.69	9	11,357	NW.	39	NW.	22	12	14	2	0	4.2
March	.76	1.64	10	12,923	N.	32	NE.	19	8	9	14	0	5.5
April	1.87	4.18	11	8,269	N.	27	NW.	28	5	16	9	1	5.8
May	12.11	12.57	21	5,461	SE.	30	NW.	18	4	12	15	7	7.2
June	14.37	13.48	19	4,458	SE.	30	N.	13	1	9	20	11	7.7
July	13.58	16.14	23	4,435	S.	29	NW.	8	0	8	23	13	8.2
August	15.79	14.92	29	5,302	NW.	24	N.	16	0	5	26	17	8.6
September	17.67	12.62	22	5,464	SE.	33	E.	25	3	11	16	11	7.4
October	7.87	14.94	24	4,498	SE.	28	NE.	6	0	13	18	10	8.0
November	20.49	21.49	24	7,651	NW.	42	NW.	24	2	8	20	5	7.9
December	11.66	11.90	22	9,190	N.	35	N.	30	2	19	10	0	6.5
Year	117.72	129.43	226	91,559	NW.	42	NW.	[6] 24	51	140	174	75	6.8

[1] Elevation of barometer 36 feet above sea level.
[2] April.
[3] June.
[4] Average for 47 years of record.
[5] Tenths of sky.
[6] November.

TABLE No. 5.—*Monthly evaporation, Canal Zone, years 1917 and 1918.*

[Values in inches.]

Month.	Balboa Heights.[1]			Gatun.			Colon.		
	1917	1918	Average (10 years).	1917	1918	Average (7 years).	1917	1918	Average (9½ years).
January	7.188	5.495	5.860	6.194	5.548	5.983	7.387	4.858	6.113
February	6.934	7.732	6.128	6.229	7.231	6.301	7.345	7.871	6.406
March	9.283	8.242	7.377	7.246	8.475	7.514	6.878	8.960	7.225
April	6.725	5.201	5.467	6.514	6.502	6.658	5.508	6.960	5.892
May	4.159	3.513	3.518	4.903	4.901	5.094	3.769	3.949	3.851
June	2.994	3.234	2.964	4.110	4.859	4.183	3.040	3.450	3.200
July	2.930	.....	3.172	3.903	.....	4.448	2.932	.....	3.081
August	2.971	.....	3.137	4.008	.....	4.447	2.876	.....	3.111
September	2.929	.....	3.173	4.851	.....	4.443	3.364	.....	3.200
October	3.157	.....	3.326	4.750	.....	4.207	3.001	.....	3.274
November	2.845	.....	2.941	3.617	.....	3.536	2.909	.....	2.929
December	5.325	.....	4.386	4.899	.....	4.854	4.506	.....	4.306
Year	57.440	.....	51.449	61.224	.....	.....	53.515	.....	52.588

[1] Formerly Ancon station. Moved to Balboa Heights Oct. 1, 1914.

NOTE.—Evaporation records are obtained from insulated tanks 10 inches in diameter at Balboa Heights and Colon. Water surface protected from action of sun and rain. Exposed pan 4 feet in diameter and 10 inches deep floating in water at Gatun. For monthly evaporation during past years see previous annual reports.

TABLE No. 6.—*Seismograph records, Balboa Heights, Canal Zone, year ended June 30, 1918.*

[Lat. 8° 58′ N.; Long. 79° 33′ W.]

[100 K Bosch-Omori seismographs. Greenwich mean time; midnight to midnight.]

Date.	Component.	Time of beginning.		Time of—		Maximum amplitude, millimeters.	Approximate distance of epicenter.	
		Preliminary tremors.	Long waves.	Maximum.	End.		Miles.	Probable direction.
1917.								
July 1	N.-S.	(?)	(?)	0 25 18	(?)	T.	(?)	(?)
	E.-W.	(?)	(?)	0 24 17	(?)	T.	(?)	(?)
July 11	N.-S.	(?)	(?)	7 26 16	(?)	0.2	(?)	(?)
	E.-W.	(?)	(?)	7 26 16	(?)	0.1	(?)	(?)
July 27	N.-S.	1 04 48	1 09 16	1 07 56	2 06 00	10.0	1,135	N.
	E.-W.	1 04 50	1 09 24	1 05 06	2 02 00	9.0	1,135	N.
July 27	N.-S.	2 59 36	3 05 31	3 05 54	4 01 00	1.5	1,215	N.
	E.-W.	2 59 42	3 05 36	3 09 42	3 57 00	0.5	1,215	N.
Aug. 30	N.-S.	3 26 10	3 28 10	3 28 54	3 51 00	3.0	590	S.
	E.-W.	3 26 08	3 28 20	3 28 42	3 47 00	1.5	590	S.
Aug. 31	N.-S.	11 38 12	11 40 12	11 40 49	12 36 00	62.0	565	S.
	E.-W.	11 38 08	11 40 10	11 41 52	12 34 00	46.0	565	S.
Sept. 11	N.-S.	4 11 15	4 11 39	4 11 47	4 15 00	1.0	130	(?)
	E.-W.	4 11 15	4 11 37	4 12 00	4 14 25	0.5	130	(?)
Oct. 22	N.-S.	7 21 10	7 22 46	7 23 06	7 48 00	2.0	460	(?)
	E.-W.	7 20 44	7 22 20	7 23 10	7 45 00	3.0	460	(?)
Oct. 28	N.-S.	13 24 48	13 26 10	13 26 14	13 55 08	7.0	390	(?)
	E.-W.	13 24 48	13 26 18	13 26 34	13 53 12	7.0	390	(?)
Nov. 13	N.-S.	8 59 02	8 59 48	9 00 06	9 06 00	1.0	185	N.
	E.-W.	8 59 02	8 59 43	9 00 01	9 06 00	0.5	185	N.
Nov. 16	N.-S.	(?)	4 05 09	4 17 09	4 35 09	0.5	(1)	(?)
	E.-W.	Timer failed to record.				1.5	(1)	(?)
Dec. 26	N.-S.	(?)	(?)	1 25 52	(?)	0.5	(?)	NW.
	E.-W.	(?)	(?)	1 25 48	(?)	0.3	(?)	NW.
Dec. 29	N.-S.	22 54 40	22 58 14	22 55 01	23 49 00	1.5	730	NW.
	E.-W.	22 54 40	22 58 12	22 55 00	23 48 40	5.6	730	NW.

[1] Very distant.

TABLE No. 6.—*Seismograph records, Balboa Heights, Canal Zone, year ended June 30, 1918*—Continued.

Date.	Component.	Time of beginning.		Time of—		Maximum amplitude, millimeters.	Approximate distance of epicenter.	
		Preliminary tremors.	Long waves.	Maximum.	End.		Miles.	Probable direction.
1918.								
Jan. 4	N. S.	4 35 44	4 39 04	4 40 22	4 58 50	0.5	700	NW.
	E.-W.	4 35 36	4 38 58	4 35 40	4 59 30	1.5	700	NW.
Jan. 8	N-S.	(?)	(?)	9 14 00	(?)	0.2	(?)	NW.
	E.-W.	(?)	(?)	9 13 48	(?)	0.1	(?)	NW.
Jan. 25	N.-S.	1 24 00	1 27 48	1 24 04	1 55 00	0.1	780	NW.
	E.-W.	1 23 56	1 27 44	1 24 01	1 57 00	4.0	780	NW.
Jan. 26	N.-S.	(?)	18 01 25	18 01 28	(?)	1.2	(?	NW.
	E.-W.	(?)	18 01 20	18 01 30	(?)	2.2	(?)	NW.
Jan. 29	N.-S.	(?)	(?)	0 04 20	(?)	0.1	(?)	NW.
	E.-W.	(?)	(?)	0 04 20	(?)	0.1	(?)	NW.
Feb. 20	N.-S.	6 35 52	6 37 16	6 38 46	6 53 00	2.0	400	(?)
	E.-W.	6 35 48	6 37 20	6 37 24	6 51 30	2.0	400	(?)
Mar. 11	N.-S.	16 25 44	16 26 32	16 26 44	16 46 00	18.0	240	(?)
	E.-W.	16 25 44	16 25 32	16 25 40	16 45 00	22.0	240	(?)
Apr. 21	N.-S.	Slight tremors between 22 40 and 23 20.				.....	(?)	(?)
	E.-W.	Slight tremors between 22 40 and 23 20;				.....	(?)	(?)
Apr. 25	N.-S.	Slight tremors 3 15 00.				.....	(?)	(?)
	E.-W.	Slight tremors 3 15 00				.....	(?)	(?)
Apr. 25	N.-S.	21 47 51	21 48 25	21 48 33	21 59 00	2.0	175	(?)
	E.-W.	21 47 48	21 48 22	21 48 32	21 57 00	3.0	175	(?)
May 20	N.-S.	14 43 48	14 53 52	14 54 04	15 29 00	4.5	2,000	(?)
	E.-W.	14 43 48	14 54 04	14 54 12	15 30 00	2.5	2,000	(?)
May 20	N.-S.	18 02 10	18 12 08	18 04 12	18 26 00	1.0	2,000	(?)
	E.-W.	18 02 04	18 12 04	18 12 12	18 26 00	1.5	2,000	(?)
May 25	N.-S.	19 36 35	19 42 46	19 43 06	20 26 00	2.0	1,250	(?)
	E.-W.	19 36 33	19 45 45	19 46 07	20 22 00	1.5	1,250	(?)
June 16	N.-S.	12 29 51	12 31 15	12 31 19	12 43 26	1.8	390	NW.
	E.-W.	12 29 34	12 30 58	12 31 05	12 43 16	2.0	390	NW.
June 20	N.-S.	Faint trace.				.....	(?)	(?)
	E.-W.	Faint tremors from 5 24 00 to 5 36 00.				.....	(?)	(?)
June 22	N.-S.	22 06 5,	22 07 26	22 08 28	22 24 14	11.4	185	(?)
	E.-W.	22 06 44	22 07 52	22 08 44	22 26 28	8.0	185	(?)
June 28	N.-S.	8 01 42	8 02 30	8 02 34	8 10 14	0.5	240	(?)
	E.-W.	8 01 41	8 02 33	8 02 36	8 10 30	0.5	240	(?)

NOTE.—Period of pendulum, 20 seconds; magnification, 35; damping medium. The amplitude indicates the maximum displacement of the pen. Laska's formula is used in computing distances of remote earthquakes (620 miles or more) and Omori's formula for earthquakes less than 620 miles distant.

HYDROGRAPHY.

Few changes were made during the year in hydrographic stations and equipment.

The lake station at Bohio was discontinued on March 16, 1918. This station was established to determine the amount of "heaping up" of the water at Bohio Narrows due to wind effects and flood discharge. The records obtained at Bohio prove conclusively that while such a tendency exists, it is too slight to affect navigation or other canal interests adversely.

A water-stage register station was established at Gatuncillo at the head of the Chagres River arm of Gatun Lake and put in operation on April 13, 1918. The records from this station are used in connection with the prediction of flood heights on the plantations located on the Chagres River arm of the lake.

TIDAL CONDITIONS.

Automatic tide registers were continued in operation at Balboa and Colon. The tidal extremes of record at these stations are given in the following table, revised to June 30, 1918; length of record, 10 years:

Station.	Maximum elevation.	High-water date.	Extreme elevation.	Low-water date.	Maximum feet.	Daily range date.[1]	Minimum feet.	Daily range date.[1]
Balboa	11.2	Oct. 2, 1909	−11.0	Feb. 13, 1918 Mar. 14, 1918	21.1	Feb. 14, 1918 Mar. 14, 1918	4.9	Feb. 24, 1915
Colon	1.68	Feb. 11, 1915	− 1.01	June 9, 1910	2.17	Feb. 28, 1911	(2)	.....

[1] For consecutive tides.
[2] One tidal fluctuation is often absent at Colon. Elevations are referred to zero of gauge rods approximately mean sea level.

From the above table it will be seen that the extreme low water of record at Balboa and also the maximum tidal range of record occurred in February and March, 1918.

Monthly tide data at Balboa and Colon for the year 1917 are presented in Table No. 14.

The tide station established at Taboga (Morro Island) in June, 1917, was continued in operation. Table No. 15 gives a comparison of the tide records at Taboga and Balboa for the fiscal year 1917–18.

Total yield, Gatun Lake watershed.—Gatun Lake watershed total yield for the year 1917 was 26 per cent above the seven-year average, or 7,992 cubic feet per second, against a normal of 6,361 cubic feet per second. The total yield of the watershed amounted to 252.04 billion cubic feet, accounted for as follows:

	Per cent.	Billion cubic feet.
Land area yield	83	208.42
Direct rainfall on lake surface	17	43.62
Total yield	100	252.04

The uses and disposition of this water supply are given below:

	Per cent.	Billion cubic feet.
Evaporation from lake surface	9	23.33
Canal lockages and miscellaneous uses and losses	7	18.61
Hydroelectric station	16	40.50
Increase in lake storage	1	1.62
Spillway discharge	67	167.98
Total yield	100	252.04

The Gatun Lake total yield for the dry season of 1918 (January to April) was 5 per cent above the eight-year average yield, or 2,200 cubic feet per second, against an average of 2,085 cubic feet per second. Slightly more than half of the 1918 dry season total yield was contributed by the Chagres River at Alhajuela.

Storage depletion.—Gatun Lake fell from elevation +87.02 feet on January 1 to minimum elevation +84.52 feet on April 21, and stood at elevation +84.78 feet at midnight April 30. The 21.80 billion cubic feet of water remaining in lake storage above elevation +80 feet on April 30, 1918, would have provided additional water for canal uses equivalent to a steady draft of 2,103 cubic feet per second throughout the four dry season months. Water wasted over the spillway at Gatun in January was equivalent to a steady flow of 1,132 cubic feet per second. Assuming that with heavy canal traffic approximately half of this water would have been saved for canal uses, we have a total additional water supply available for canal uses amounting to 2,250 cubic feet per second. *It would have been possible to have increased the water consumption at the hydroelectric station from 1,245 cubic feet per second to 2,800 cubic feet per second, and to have provided for 15 complete canal lockages daily instead of 6, without lowering the lake below elevation +80 feet by the end of the 1918 dry season.* In this estimate, water consumption per canal lockage is based on 1918 uses.

Freshets.—There were nine freshets in the Chagres River during the year 1917, with a rise of 5 feet or more at Alhajuela, occurring during the months May, June, September, October, and November. The largest freshet of the year occurred on November 23, with a crest elevation of 107.95 feet and a rise of 12.33 feet, giving a maximum momentary discharge of 51,300 cubic feet per second. Data on the principal freshets for the year 1917 and January to June, 1918, are given in Table No. 13.

The freshet of May 5, 1918, reached a crest elevation of 110 feet at Alhajuela. This is the largest rise on record since the creation of Gatun Lake.

The maximum momentary discharge was 61,200 cubic feet per second, and has been exceeded but three times at Alhajuela in the past 20 years, in December, 1906, and in November and December, 1909.

Flood-warning stations.—Vigia and Alhajuela were continued as flood-warning stations, and as previously mentioned, a new flood station was established at Gatuncillo in April, 1918.

The rise in the river at Alhajuela averages about 70 per cent of the Vigia rise, and the rise at Gatuncello is approximately 40 per cent of the Vigia rise, while the rise at Juan Mina for large freshets is approximately 10 per cent of the Vigia rise.

Current meter gaugings.—Sixty-eight gaugings were made at the Calle Larga gauging station (Chagres River) during the year, covering a range from elevation 116.60 feet to 95.97 feet. Sixteen current meter gaugings were made in 1917 at Dos Bocas (the forks of the Chagres) measuring the discharge of La Puente, the Pequeni, and the Chagres Rivers.

SPECIAL INVESTIGATIONS.

Tide currents—Balboa Harbor.—A tide current survey was made of Balboa Harbor and vicinity. Current direction and velocity measurements were made at 10, 20, 30, and 40 foot depths. Most of these observations were made in February and March, 1918, during the spring tide periods when tidal currents are strongest.

Current velocity.—Tide currents were found to be strongest in the canal channel, along the reloader wharf, and in the vicinity of the oil pier. The maximum surface current velocity observed was approximately 1.4 knots per hour at a point in the canal channel opposite the Panama Railroad dock with a falling tide. The maximum current velocity observed below the surface was 1.3 knots per hour at a depth of 30 feet at a point opposite the oil pier with a rising tide. Tide currents are strongest near the mean sea level stage of the tide and are reduced to zero during high and low tide slack-water periods. The tidal currents around docks Nos. 14 to 19 and in the inner harbor basin were found to be very sluggish.

Effects of winds on tide currents.—Steady moderate to fresh northerly winds prevail at the Pacific entrance to the canal during the dry season, and light northerly or variable winds during the rainy season. These northerly winds tend to accelerate the surface currents of outgoing tides and to retard the surface currents of incoming tides. A fresh northerly wind was observed to *reverse* the surface current of an incoming tide at a point just off the inner end of the reloader wharf.

Current directions.—Current directions were recorded by a Ritchie-Haskell current-direction meter. This instrument records accurately the direction of currents having a velocity of 0.2 knot per hour or higher. In general, the stronger tide currents in Balboa Harbor flow in directions approximately parallel to the course of the canal. Notable exceptions to this rule are found in the steady set of outgoing tide currents toward the inner end of the reloader wharf, and the tendency of the tide currents near the oil pier to cross the canal channel forming an acute angle following the channel of the old French canal. The direction of the slower currents at several locations around the docks and in the inner harbor basin was found to be variable.

Troublesome currents.—Strong tidal currents are encountered in the canal channel, but they follow the general direction of the canal and do not affect navigation except by retarding or accelerating the speed of passing ships.

Tidal currents in the vicinity of the Balboa reloader wharf are troublesome, especially during a falling tide, as the steady set of the current toward the inner end of this wharf makes it difficult to handle ships approaching or leaving the coal wharves by drifting the vessels toward the wharf. Northwest winds increase this drifting tendency.

Currents in the vicinity of the oil pier are troublesome also. These currents cross the canal channel diagonally. With a falling tide they tend to drift approaching ships against the pier, while the currents are reversed with a rising tide and tend to drift approaching ships away from the pier.

WATER SUPPLY STUDIES.

A study was made of the water supply available for canal uses, based on revised estimates of future requirements for power development and canal lockages. An abundant supply of water is available for all canal uses during

the rainy season months. It is only in the dry season that a possible shortage may exist.

The conclusion was reached that during an *average year* it will be possible to operate the hydro station at full projected capacity, using 3,260 cubic feet per second, and take care of about 21 complete canal lockages daily throughout the dry season without utilizing additional storage. Any increase in canal lockages above this figure will have to be made at the expense of a corresponding decrease in the water used for power development.

With 36 canal lockages daily during the *dryest year* of record, it will be necessary to cut the water used for power development to about 900 cubic feet per second throughout the dry-season months, which is sufficient to operate the hydro station at about 25 per cent of its full projected capacity.

From the above it will be seen that with capacity canal traffic about 75 per cent of the generating load at the power stations will have to be carried by the auxiliary steam plant during the *dryest dry season* if no additional storage reserve is provided.

The water supply available for canal uses during an average year and the dryest year is shown on plates Nos. 15 and 16.

BRANCH HYDROGRAPHIC OFFICE, CRISTOBAL.

The branch hydrographic office at Cristobal is operated in connection with the Cristobal meteorological station. The charts, pilots, almanacs, and other publications for navigators sold or issued for official use during the fiscal year 1917–18 amounted to a total value of $2,223.10. Sales have shown a steady increase throughout the year.

The following plates and tables accompany the report of the hydrographical section of this report:

Plate No. 9. Operating uses of Gatun Lake water supply.

Plate No. 10. Gatun Lake massed curved, yield and losses.

Plate No. 11. Gatun Lake total yield, year 1917, dry season 1918, and average.

Plate No. 12. Gatun Lake total yield massed, maximum, minimum, average, and current years.

Plate No. 13. Alhajuela mean monthly discharge, year 1917, dry season 1918, and average.

Plate No. 14. Alhajuela discharge, massed curves, year 1917 and average.

Plate No. 15. Water supply available for canal uses, average year.

Plate No. 16. Water supply available for canal uses, dryest year.

Table No. 7. Hydrology of Gatun Lake watershed, year 1917.

Table No. 8. Hydrology of Miraflores Lake watershed, year 1917.

Table No. 9. Monthly hydrology Gatun Lake, year 1917.

Table No. 10. Maximum, minimum, and mean elevations, Gatun and Miraflores Lakes and Chagres River stations.

Table No. 11. Hydrology of the Chagres, year 1917.

Table No. 12. Monthly discharge, Chagres River at Alhajuela, year 1917.

Table No. 13. Principal freshets in Chagres River, year 1917, also to June, 1918.

Table No. 14. Tidal conditions, year 1917, Balboa and Cristobal.

Table No. 15. Comparison table, Balboa and Morro Island tides, July, 1917, to June, 1918, inclusive.

TABLE No. 7.—*Hydrology of Gatun Lake watershed, year 1917.*

[Drainage area, 1,320 square miles.]

Gatun Lake.	Elevation.	Date.
Yearly mean	85.19	
Maximum	87.02	Dec. 31.
Minimum	83.14	Apr. 27.

TABLE No. 7.—*Hydrology of Gatun Lake watershed, year 1917*—Continued.

	Quantities in—	
	Million cubic feet.	Second-feet.
Gatun spillway, waste	167,984	5,326.7
Gatun spillway, leakage	122	3.9
Gatun locks, lockages and tests	9,085	288.1
Gatun locks, leakage	186	5.9
Gatun hydroelectric plant	40,500	1,284.2
Pedro Miguel locks, lockages and tests[1]	7,636	242.1
Pedro Miguel locks, leakage[1]	158	5.0
Maintaining Miraflores Lake through Pedro Miguel locks[1]	564	17.9
Pumping at Gaillard Cut[1]	172	5.5
Brazos Brook Reservior	262	8.3
Pumping at Gamboa	432	13.7
(*a*) Total outflow	227,101	7,201.3
(*b*) Storage (+ increase; − decrease)	+1,620	+51.4
(*c*) Net yield ($a \pm b$)	228,721	7,252.7
(*d*) Evaporation (61.224 inches)	23,327	739.7
(*e*) Total yield ($c+d$)	252,048	7,992.4
(*f*) Rainfall on lake (114.50 inches)	43,625	1,383.3
(*g*) Yield from land area ($e-f$)	208,423	6,609.1
Transferred into Miraflores Lake[1]	8,529	270.5

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage (run-off).
Lake surface	164	114.50	114.50	100
Land area	1,156	115.48	77.65	67
Total watershed	1,320	115.36	82.12	71

[1] Transferred into Miraflores Lake.

Gatun lockages, 2,108; Pedro Miguel lockages, 2,274.

TABLE No. 8.—*Hydrology of Miraflores Lake watershed, year 1917.*

[Drainage area, 38.5 square miles.]

Miraflores Lake.	Elevation.	Date.
Yearly mean	53.65	
Maximum	54.77	Sept. 6
Minimum	50.10	Oct. 25

	Quantities in—	
	Million cubic feet.	Second-feet.
Miraflores spillway, waste	3,667	116.3
Miraflores spillway, leakage	32	1.0
Miraflores locks, lockages and tests	7,084	224.6
Miraflores locks, leakage	167	5.3
Miraflores power plant cooling water	788	25.0
Miraflores locks, lake regulation	24	.8
(*a*) Total outflow	11,762	373.0
(*b*) Total inflow from Gatun Lake[1]	8,537	270.8
(*c*) Storage (+ increase; − decrease)	−10	−.3
(*d*) Net yield ($a-b\pm c$)	3,215	101.9
(*e*) Evaporation on lake (54.216 inches)	202	6.5
(*f*) Total yield ($d+e$)	3,417	108.4
(*g*) Rainfall on lake (87.17 inches)	324	10.3
(*h*) Yield from land area ($f-g$)	3,093	98.1
Includes filtration plant wash water[1]	8	.3

[1] Includes filtration plant wash water.

TABLE No. 8.—*Hydrology of Miraflores Lake watershed, year 1917*—Continued.

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage (run-off).
Lake surface	1.6	87.17	87.17	100
Land area	36.9	87.65	36.11	41
Total watershed	38.5	87.63	38.28	44

Miraflores lockages, 2,215.

TABLE No. 9.—*Monthly hydrology, Gatun Lake, 1917.*

[Drainage area, 1,320 square miles.]

1 Month.	2 Mean elevation above mean sea level.	3 Operative and useful losses.	4 Spillway discharge.	5 Storage (+increase, −decrease).	6 Evaporation from lake surface.	7 Net yield (3+4±5).	8 Total yield (6+7).
	Feet.	*Sec. feet.*	*Sec. feet.*	*Sec. feet.*	*Sec. feet.*	*Sec. feet.*	*Sec. feet.*
January	86.51	1,767	28	− 683	892	1,112	2,004
February	85.83	1,834	8	−1,703	993	139	1,132
March	84.78	1,767	0	−1,949	1,024	−182	842
April	83.67	1,817	0	−1,370	946	447	1,393
May	83.93	1,823	1,852	+ 960	689	4,635	5,324
June	84.04	1,913	3,428	+1,254	597	6,595	7,192
July	85.00	1,908	6,612	+ 635	552	9,155	9,707
August	85.04	1,873	9,273	− 56	567	11,090	11,657
September	85.06	2,093	9,202	− 58	709	11,237	11,946
October	85.50	1,881	5,670	+1,792	680	9,343	10,023
November	86.22	1,949	21,322	+ 679	538	23,950	24,488
December	86.68	1,877	6,419	+ 955	705	9,251	9,956
Year	85.19	1,874	5,327	+ 51	740	7,253	7,992

TABLE No. 10.—*Monthly maximum, minimum, and mean elevations for Gatun Lake, Miraflores Lake, and Chagres River, 1917.*

1917	Gatun Lake.								
	Gatun.			Trinidad.			Monte Lirio.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	86.70	86.22	86.51	86.73	86.20	86.51	86.72	86.26	86.55
February	86.26	85.34	85.83	86.21	85.31	85.82	86.28	85.39	85.87
March	85.36	84.19	84.78	85.34	84.33	84.84	85.39	84.22	84.83
April	84.20	83.14	83.67	84.33	83.14	83.71	84.22	83.19	83.72
May	84.41	83.42	83.93	84.28	83.35	83.87	84.37	83.45	83.96
June	84.70	83.83	84.04	84.65	83.77	83.95	84.74	83.91	84.09
July	85.17	84.70	85.00	85.09	84.64	84.94	85.25	84.74	85.06
August	85.23	84.87	85.04	85.16	84.76	84.97	85.26	84.91	85.09
September	85.39	84.90	85.06	85.28	84.76	84.97	85.39	84.91	85.11
October	86.12	84.95	85.50	86.04	84.82	85.41	86.14	84.94	85.53
November	86.79	85.94	86.22	86.72	85.91	86.19	86.88	86.00	86.29
December	87.02	86.36	86.68	87.08	86.30	86.70	87.08	86.41	86.74
Year	87.02	83.14	85.19	87.08	83.14	85.15	87.08	83.19	85.24

TABLE No. 10.—*Monthly maximum, minimum, and mean elevations for Gatun Lake, Miraflores Lake, and Chagres River, 1917*—Continued.

1917	Gatun Lake.								
	Bohio.			Frijoles.			San Pablo.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	86.75	86.32	86.59	86.72	86.26	86.56	86.75	86.31	86.57
February	86.32	85.44	85.91	86.30	85.40	85.85	86.31	85.42	85.89
March	85.44	84.29	84.88	85.42	84.29	84.85	85.41	84.26	84.87
April	84.29	83.26	83.77	84.30	83.22	83.76	84.26	83.25	83.75
May	84.40	83.48	84.00	84.33	83.40	83.93	84.34	83.45	83.95
June	84.77	83.88	84.13	84.70	83.86	84.06	84.72	83.88	84.07
July	85.23	84.77	85.09	85.19	84.70	85.02	85.22	84.72	85.03
August	85.33	84.97	85.14	85.26	84.90	85.07	85.25	84.90	85.08
September	85.44	84.92	85.14	85.40	84.81	85.06	85.41	84.86	85.07
October	86.17	84.95	85.53	86.11	84.89	85.50	86.15	84.91	85.51
November	86.79	85.99	86.27	86.77	85.94	86.23	86.85	85.98	86.27
December	87.09	86.41	86.75	87.06	86.35	86.70	87.11	86.38	86.74
Year	87.09	83.26	85.27	87.06	83.22	85.22	87.11	83.25	85.23

1917	Gatun Lake.								
	Gamboa.			Pedro Miguel.			Juan Mina.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	86.79	86.15	86.52	87.70	85.36	86.52	86.76	86.25	86.57
February	86.33	85.25	85.85	87.01	84.63	85.84	86.32	85.39	85.90
March	85.43	84.20	84.84	86.37	83.43	84.82	85.43	84.25	84.88
April	84.39	83.12	83.72	85.06	82.37	83.69	84.32	83.20	83.78
May	84.32	83.35	83.90	85.00	82.60	83.87	84.52	83.50	84.03
June	84.72	83.68	84.03	85.68	82.82	83.99	84.91	83.86	84.17
July	85.32	84.62	84.99	86.17	83.65	84.97	85.53	84.79	85.11
August	85.34	84.75	85.04	86.15	83.65	85.01	85.53	84.91	85.18
September	85.52	84.18	85.02	86.65	83.40	84.97	86.10	84.79	85.07
October	86.17	84.70	85.45	87.00	83.69	85.42	86.22	84.81	85.49
November	87.04	85.75	86.23	87.76	84.80	86.20	88.32	85.88	86.33
December	87.20	86.24	86.70	88.07	85.21	86.67	87.16	86.27	86.73
Year	87.20	83.12	85.19	88.07	82.37	85.17	88.32	83.20	85.27

1917	Chagres River.						Miraflores Lake, southern end Pedro Miguel lock.		
	Alhajuela.			Vigia.					
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	92.40	91.71	91.97	126.10	125.45	125.69	54.30	51.30	53.38
February	91.74	91.20	91.43	125.55	125.05	125.25	54.02	53.39	53.70
March	91.86	91.02	91.26	125.80	124.85	125.12	54.30	53.20	53.82
April	93.90	90.72	91.05	128.10	124.70	124.99	54.08	53.05	53.60
May	103.40	91.60	92.66	142.00	125.25	126.49	54.20	53.20	53.71
June	99.50	92.18	93.40	135.60	125.75	127.22	54.51	53.58	53.98
July	97.60	92.66	93.58	133.40	126.15	127.32	54.40	53.43	53.98
August	100.20	93.20	94.35	136.35	127.00	128.37	54.46	53.37	53.87
September	104.15	93.10	94.30	141.55	126.60	128.10	54.77	50.49	53.25
October	100.25	93.06	94.08	136.80	127.40	128.88	54.33	50.10	53.14
November	107.95	93.45	95.83	149.75	128.60	131.34	54.50	51.20	53.40
December	96.95	92.60	93.47	131.90	126.95	128.11	54.50	53.50	54.00
Year	107.95	90.72	93.11	149.75	124.70	127.24	54.77	50.10	53.65

TABLE No. 11.—*Hydrology of the Chagres River at Alhajuela, year 1917, and dry season, 1918.*

Alhajuela, 38.5 miles from Gatun. Drainage area, 427 square miles.

	Year 1917.	Dry season. 1918.
Mean:		
Elevation (feet)	93.12	91.91
Discharge (second-feet)	3,026	1,117
Maximum:		
Date	Nov. 25	Apr. 22
Elevation	107.95	97.47
Discharge (second feet)	51,300	11,967
Minimum:		
Date	Apr. 26–27	Apr. 7–10
Elevation	90.72	91.13
Discharge (second feet)	268	466
Percentage of yield at Gatun	[1] 42	[1] 96
	[2] 38	[2] 51
Length of record (years)	16	17
Compared with annual and dry season averages (per cent)	[3] 5	[4] 16

[1] Compared with net yield.
[2] Compared with total yield.
[3] Above.
[4] Below.

NOTE.—All elevations are in feet above mean sea level.

TABLE No. 12.—*Monthly discharge, Chagres River at Alhajuela, year 1917.*

[Drainage area, 427 square miles.]

Month.	Discharge in second-feet.			Date.	Mean.	Inches on watershed.	
	Maximum.	Date.	Minimum.			Rainfall.	Run-off.
January	1,510	1	862	27, 28–31	1,073	0.49	2.894
February	884	1	502	27, 28	663	.24	1.614
March	969	19, 20	410	28	555	.33	1.499
April	3,830	30	268	26, 27	453	1.16	1.183
May	33,284	25	784	20	1,996	15.05	5.384
June	18,250	22	1,268	11	3,065	11.43	8.011
July	12,345	18	1,850	4	3,313	15.02	8.946
August	20,650	15	2,664	1	4,724	15.82	12.751
September	36,735	6	2,502	29	4,732	12.94	12.362
October	20,825	24	2,437	6–9	4,207	14.66	11.356
November	51,300	25	3,069	3	8,307	22.33	21.701
December	10,546	13	1,764	30	3,143	7.12	8.485
Year	51,300	[1] 25	268	[2] 26, 27	3,026	116.59	96.186

[1] November. [2] April.

NOTE.—Annual run-off equaled 83 per cent of rainfall.

TABLE No. 13.—*Principal freshets in the Chagres River for the year 1917 and January to June, inclusive, 1918.*

Date.	Vigia.		Alhajuela.				Juan Mina.				
	Elevation of crest.	Rise.	Elevation of crest.	Rise.	After Vigia.	Maximum discharge.	Elevation of crest.	Rise.	After Vigia.	Vigia rise.	Alajuela rise.
1917.		*Feet.*		*Feet.*	*Hours.*	*C.f.s.*		*Feet.*	*Hours.*	*P.ct.*	*P.ct.*
May 25	142.00	16.05	103.40	11.20	1¼	32,625	84.52	0.57	2	4	5
June 22	135.60	8.10	99.50	5.90	1⅓	18,250	84.41	.36	2¼	4	6
Sept. 6	141.55	14.00	104.15	10.37	1⅓	35,500	86.10	1.03	5	7	10
Oct. 12	135.45	7.50	98.40	5.02	1⅓	14,765	85.30	.28	2	4	6
Oct. 24	136.80	8.65	100.25	6.91	1	20,825	86.22	.22	1¼	3	3
Nov. 4	139.10	10.15	101.90	8.21	1¼	26,910	86.94	.79	2¾	8	10
Nov. 16	145.80	16.30	105.60	11.05	1½	41,300	87.42	1.18	3	7	11
Nov. 20	138.80	8.35	101.50	6.40	1	25,350	87.22	.62	1¾	7	10
Nov. 23	149.75	18.82	107.95	12.33	1	51,300	88.25	1.55	2½	8	13
1918.											
Apr. 22	133.40	6.40	97.47	5.17	1½	11,967	84.80	[1] .20	4	3	4
May 5	152.80	25.30	110.00	17.15	1¼	61,200	87.35	2.45	2½	10	14
May 15	140.40	11.90	101.90	8.95	1¼	26,910	85.42	.37	2½	3	4
June 5	135.90	8.70	99.20	6.70	1¼	17,290	85.42	.32	1¾	4	5
June 9	144.25	16.35	104.90	11.90	1	38,500	85.90	.85	3	5	7

[1] No crest at Juan Mina. Rise is increase in lake level due to additional storage.

TABLE No. 14.—*Tidal conditions, year 1917.*

[Elevations in feet, referred to zero of rod approximate mean sea level.]

PACIFIC COAST—BALBOA, CANAL ZONE.

Month.	Maximum high water.	Date.	Extreme low water.	Date.	Maximum range.[1]	Date.	Minimum range.[1]	Date.	Monthly mean tide level.
January	9.8	25, 26	−10.8	26	20.6	26	7.3	18	+0.143
February	10.0	23	−10.9	23	20.9	23	7.4	17	− .242
March	10.2	24	−10.2	24	20.4	24	6.5	3	+ .302
April	8.9	21, 22	− 9.5	22	18.4	22	6.5	1	+ .299
May	8.7	8	− 8.0	20, 21	16.3	21	7.0	1-30	+ .876
June	8.7	8	− 8.2	7	16.7	9	6.3	30	+1.027
July	9.6	8	− 8.6	6	18.2	8	7.1	29	+ .818
August	10.8	6	− 9.2	5	20.0	6	7.3	28	+ .811
September	11.0	3	− 9.5	2, 4	20.5	3	7.0	11	+1.072
October	10.5	2	−10.1	3	20.5	3	7.1	10	+ .706
November	9.7	1	− 9.3	1	19.0	1	6.8	8	+ .632
December	8.3	17, 18, 19	− 8.5	1-16	16.7	17	6.8	8	+ .433
Year	11.0	Sept. 3	−10.9	Feb. 23	20.9	Feb. 23	6.3	June 30	+ .573

ATLANTIC COAST—CRISTOBAL, CANAL ZONE.

January	1.15	23	−0.07	7	1.68	21	0.20	23	−0.090
February	.91	18	− .83	2	1.43	2	.21	3	− .054
March	1.06	18	− .80	29	1.39	18	.20	15	+ .081
April	.67	10	− .89	23	1.50	24	.21	25	− .086
May	.92	19	− .86	9	1.62	10	.20	30	+ .032
June	1.11	15	− .78	7	1.61	6	.20	28	+ .101
July	1.12	6	− .61	31	1.61	3	.20	6-21	+ .134
August	1.01	10-29	− .56	1	1.53	1	.22	20	+ .103
September	1.03	25	− .56	24	1.47	26	.20	17	+ .108
October	1.16	29	− .56	5	1.60	31	.21	22	+ .218
November	1.42	27	− .67	30	1.84	30	.17	27	+ .384
December	1.26	25	− .82	17	1.65	15	.21	3-26	+ .139
Year	1.42	Nov. 27	− .87	Jan. 7	1.84	Nov. 30	.17	Nov. 27	+ .089

[1] For consecutive tides.
Mean average tidal range for year: Balboa, 12.56 feet; Cristobal, 0.87 foot.
NOTE.—One tidal fluctuation is often absent at Cristobal.

TABLE No. 15.—*Comparison table—Balboa and Morro Island (Taboga) tides, Pacific coast, July, 1917, to June, 1918, inclusive.*

[Elevations in feet referred to zero of rod approximate mean sea level.]

[Morro Island data reduced to plane of Balboa gauge.]

Month.	Maximum high water.		Extreme low water.		Maximum amplitude.[1]		Minimum amplitude.[1]		Monthly mean tide level.	
	Balboa.	Morro Island.	Balboa.	Morro Island.	Balboa.	Morro Island.	Balboa.	Morro Island.	Balboa.	Morro Island.
1917.										
July	9.6	9.0	— 8.6	— 9.1	18.2	17.7	7.1	6.8	+0.82	+0.83
August	10.8	10.0	— 9.2	— 9.3	20.0	19.2	7.3	7.0	+0.81	+0.69
September	11.0	10.5	— 9.5	— 9.5	20.5	19.8	7.0	6.8	+1.07	+0.75
October	10.5	10.2	—10.1	— 9.7	20.5	19.9	7.1	6.9	+0.71	+0.80
November	9.7	9.3	— 9.3	— 9.0	19.0	18.3	6.8	6.7	+0.63	+0.75
December	8.3	8.2	— 8.5	— 8.3	16.7	16.1	6.8	6.5	+0.43	+0.52
1918.										
January	9.1	9.1	— 9.9	— 9.6	19.0	18.4	6.6	6.2	+0.33	+0.41
February	10.2	10.2	—11.0	—10.6	21.1	20.8	6.2	6.0	+0.02	+0.10
March	10.1	10.0	—11.0	—10.5	21.1	20.5	6.7	6.5	+0.13	+0.15
April	10.3	9.7	—10.5	—10.4	20.8	20.1	7.6	7.4	+0.74	+0.60
May	9.9	9.4	— 9.1	— 9.0	19.0	18.3	7.4	7.3	+1.16	+1.07
June	9.0	8.8	— 8.3	— 7.9	17.3	16.7	7.0	6.8	+1.17	+1.30
Year	11.0	10.5	—11.0	10.6	21.1	20.8	6.2	6.0	+ .668	+.664

[1] For consecutive tides.

SECTION OF SURVEYS.

The section of surveys has continued to attend to all Panama Railroad land and lot surveys and has maintained the established Canal Zone monuments, triangulation stations, and bench marks; this section has also made surveys and prepared maps for other divisions and for the Joint Land Commission. Attention has been given to various features of the canal requiring precise observation.

The report of the assistant engineer gives the detail of the work accomplished:

SECTION OF SURVEYS.

B. B. Alexander, Acting Assistant Engineer.

BUILDING LOTS.

Colon.—Corner and grade stakes were set on 46 lots and alley stakes on 35 lots. Sixteen block monuments were lowered to level of sidewalk. A survey was made for the purpose of monumenting block No. 65. In the section east of E Street eight block monuments were set. Corner and grade stakes were set on one lot in Cristobal. A survey was made of a lot on Colon Beach and map made to accompany lease.

Panama.—Nineteen block monuments in Las Esplanadas section, which had been destroyed by street improvements, were replaced. The houses on lots Nos. 20 and 21, block No. 6, Guachapli section, were located and map made to accompany new lease. Twenty-eight block monuments were set in Guachapli section.

Balboa.—Lot No. 1, in the block leased to oil companies, was staked.

GATUN DAM.

Settlement hubs.—Readings were taken on the settlement hubs once a month throughout the year, showing normal settlement. A survey was made and plan drawn up showing locations of all settlement hubs and bench marks.

Bench marks.—The bench marks in the East Valley were checked by a precise level circuit.

South approach wall.—Bimonthly readings were taken over the settlement points on the south approach wall and showed an average settlement of 0.14 foot. This is about 0.04 foot less than the average reported last year.

A precise level circuit was run from P. B. M. 7, through P. B. M. "G" to P. B. M. 7A, then from P. B. M. "G" to the reference B. M. used in the settlement readings on the approach wall. This reference B. M. is located on the center wall about 250 feet north of the break in the approach wall. The precise levels showed no change in elevation of the reference B. M. since August, 1915.

Cano Saddle.—Levels were run over the settlement hubs on Cano Saddle three times during the year, showing normal settlement. The settlement of this saddle is hardly appreciable.

SUPPLY DEPARTMENT.

Pastures.—Surveys of the following pastures were completed during the year: Caimito, Pedro Miguel, Miraflores, Arango, Monte Lirio, Summit, and Mandinga. The work comprised the running of the perimeter of each pasture and all inside fence lines, the pastures having from 6 to 20 divisions. Areas were obtained, sketch maps made, and blue prints furnished the superintendent of cattle industry. The total area surveyed was, in round numbers, 24,000 acres.

All the clearing on these pastures was done by contract and sublet to individuals. All the different areas thus involved were measured up by this section.

Plantations.—All the contract clearing work was measured up and areas obtained on the following-named plantations: Limon, Las Guacas, Juan Mina, Flatrock, and Rio Palenque. Drainage ditches were staked and the yardage of all ditching computed. Reports and blue prints of above were furnished to the superintendent of plantations. These plantations are located on the Chagres River, about 8 miles above Gamboa. A survey and map were made of the chicken farm at Summit. A survey was made and map prepared for the study of a proposed irrigation project on La Pita farm, situated just north of Summit.

HEALTH DEPARTMENT.

Work was started on a topographical survey of the swamp area east of Margarita Railroad, between Rio Majagual and Rio Coco Solo for the purpose of estimating the cost of a hydraulic fill. This survey is about 60 per cent completed.

MUNICIPAL DIVISION.

A topographical survey was made for the municipal engineering division, covering the Miraflores dump and a tract east of the old road between Panama and Pedro Miguel.

JOINT LAND COMMISSION.

Surveys of the following estates were made: Cuatro Calles, Santa Cruz, San Antonio, Charco Barnco, Otro Lado, El Pihiva, and La Pihivia. These estates are situated on the Rio Chagres north from Gamboa to the Canal Zone boundary line. Maps of these estates were prepared and furnished the special attorney for use in hearings before the Joint Commission.

Mandinga and Pihisba estates.—A survey of the Mandinga and Pihisba estates was completed and maps furnished the special attorney. These estates are situated on the Mandinga River, and west of the town of Empire.

Palo Differente estate.—The accuracy of a map of the Palo Differente estate, presented by the claimants, was investigated on the ground and findings reported to the special attorney.

Macia and Verner.—The boundary lines of the Macia claim near the mouth of the Chagres were run out and those of the Verner claim investigated.

SURVEY—PANAMA, ANCON, BALBOA.

A survey of the district was about 75 per cent complete last year and is now complete. As to method, the district was divided into 7 sections over which

were established 14 stations by precise triangulation, which, together with those already established, made a total of 18 stations. Starting from these stations the district was covered with a network of closed traverses by transit and steel tape. There were over 500 of these control traverse points put in whose geodetic coordinates and elevations have been determined. The map, as its close control would indicate, is a very comprehensive one and is used extensively by the various divisions and departments of the canal. The scale is 1:2000, and the territory covered is about 5 square miles.

TRIANGULATION.

Two new triangulation stations were established, Corozal and Mole. Corozal is located near the old hotel at Corozal, and Mole on the outer end of the mole at Cristobal.

Stations Espinosa, Luisa, Cocoli, Semaphore, Mare, and Gatun were repaired.

Stations New Culebra and Cocoa Grove were replaced.

The angles in the "slide" triangulation system were observed twice during the year and found to be the same as previous observations, indicating that there had been no movement on either side of the canal at these points. These stations are situated on Gold Hill, Mount Zion, and Contractor's Hill.

BENCH MARKS.

A precise B. M. was established at Margarita. Fifty-one P. B. Ms. were cleared, repaired, and painted. The number and elevation were stenciled on each. Four P. B. Ms. were reset on account of having been destroyed or disturbed.

CANAL ZONE BOUNDARY MONUMENTS.

Three Canal Zone boundary monuments were reset on account of having been destroyed by street construction.

The boundary line was cleared from Monument F to Monument 84, and each monument on the line cleared and marked with its number.

Seven extra monuments were set on the boundary line between the Canal Zone and the city of Panama. This was done at the request of the Canal Zone police department.

CRISTOBAL COALING PLANT.

Three times during the year readings were taken on the east and west walls of the coal pocket, over established monumented lines, to determine the spread of the reclaiming bridge tracks which are laid in these concrete walls.

No movement has been found in the west wall since construction. The east wall seems to have a slight continuous spread, as, for example, in June, 1917, the average total spread since October, 1916, had been 0.029 foot; in June, 1918, it had been 0.040 foot; in June, 1918, the east wall had a maximum total spread since October, 1916, of 0.081 foot; in February, 1918, the maximum was also 0.081 foot, but at a different place in the wall.

The point where the maximum of 0.081 foot occurred in February, 1918, showed a spread of only 0.068 foot in June, 1918. This would seem to indicate that the maximum movement varies with the positions of the bridge and the high coal piles, and that there is a spring in the wall.

From information obtained from those in charge at the plant, no difficulty has been experienced in the movement of the bridges recently.

MISCELLANEOUS.

Colon Hospital and Quarantine Reservation, and radio reservations.—These reservations have one boundary which is common to both. Fourteen monuments were set on the boundaries, a traverse run over them, and a description written up by metes and bounds. A map was made on a scale of 1:1200, thus completing the work on these reservations.

Isolated 100 foot contour boundary monuments.—The 100-foot contour around Gatun Lake area is marked by iron pipe monuments. Eighty-five of these monuments were cleared, repainted, and pointed out to the police patrol,

Instruments.—All surveying instruments which were turned into the instrument-repair shop were tested for estimated cost of repairs or for recommendations as to whether they should be sold or scrapped.

Stadia intervals were determined for several transits and stadia boards were laid out and made for same.

Sufficient surveying instruments which are in first-class condition have been kept on hand for issue to other divisions as their requirements demanded.

Examination.—An examination for the grade of junior engineer was given on March 3, 1918. There were 12 applicants, 5 of whom received a passing grade.

Section of meteorology and hydrography.—The water stage register gauge staffs at Pedro Miguel, Gamboa, Frijoles, Monte Lirio, and Gatun, were checked with Y-level elevations.

The tide gauges at Balboa and Cristobal were checked for elevations.

Miles of line.—Transit, 58; Y level, 236; precise level, 28; stadia traverse, 299; side shots, 587; trail and trocha, 24. Total miles of line, 1,232.

Section of Office Engineer.

The details of the work accomplished by this section are given in the report of the office engineer, which follows:

Section of Office Engineer.

C. J. Embree, Office Engineer.

This section has continued to handle the engineering, architectural, electrical, and miscellaneous design work required by all divisions of the canal except the mechanical division. The most important work handled has been that required by the building and electrical divisions, both of which have carried through large programs of construction. The designers and draftsmen working on Pier No. 6 were consolidated with the force of this office when the construction work was placed under the direction of the resident engineer, building division.

On account of the gradual completion of the authorized construction program for the year, the drafting force has been gradually reduced from a maximum of 30 men to the present force of 14 electrical, architectural, engineering, and general draftsmen.

The average force consisted of 27 men, who have produced a total of 964 working drawings, or an average of 1 complete drawing for every 49 man-hours.

The detail description of the work covered by the designing forces will be found in the reports of the heads of divisions concerned.

The blue-print room maintained in connection with the drafting room has continued to issue the necessary white, blue, and brown prints required, the total being as follows:

	Square feet.
Blue prints	265,580
White prints	24,000
Brown-print negatives	4,305
Total	293,885

The average cost of producing the above prints, including labor and material, has been 1.23 cents per square foot.

This office has continued to write the specifications and requisitions, as well as keep a record of all spare parts and supplies required by the division of locks.

Respectfully,

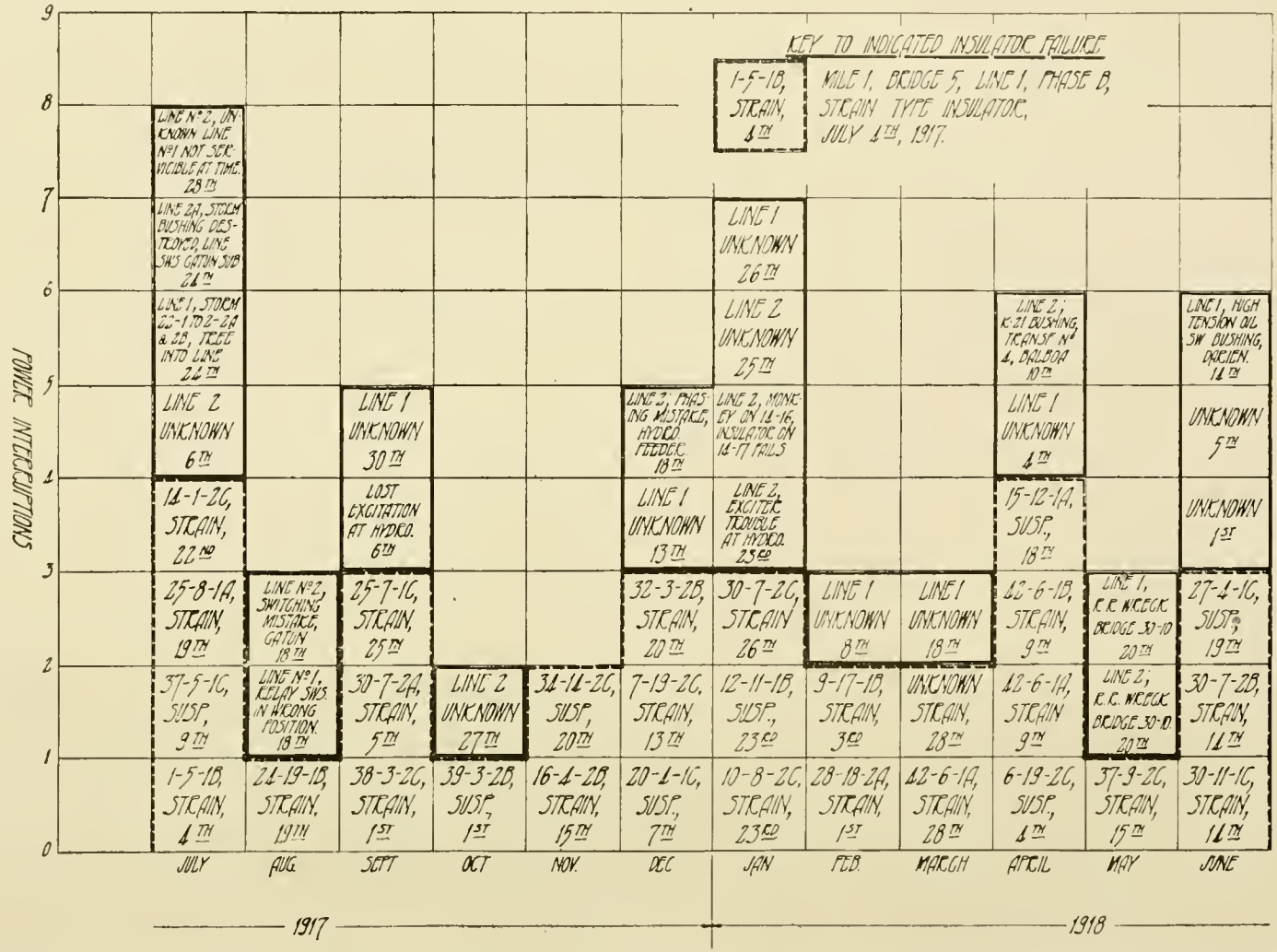
H. Rowe,
Resident Engineer.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

Plate 3.

TRANSMISSION SYSTEM;
GATUN HYDRO-ELECTRIC STATION—TYPICAL DAILY LOAD CURVES,
① —WEEK DAY LOAD,
② —SUNDAY LOAD.

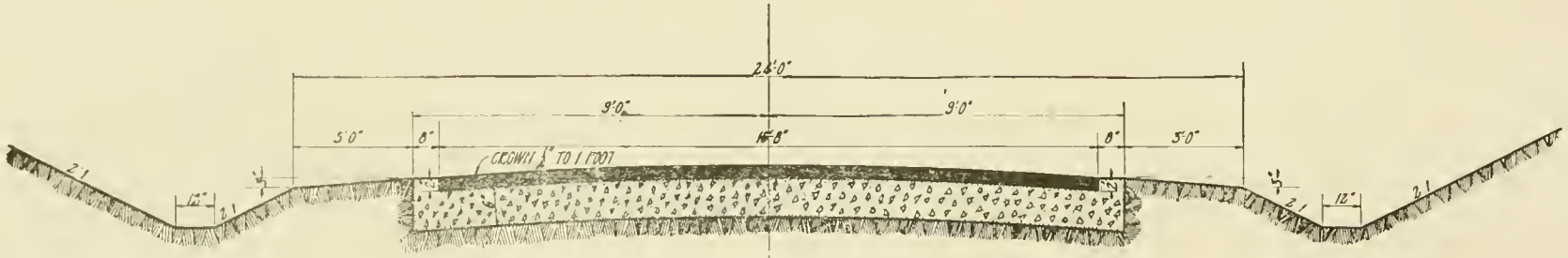
Plate 4.



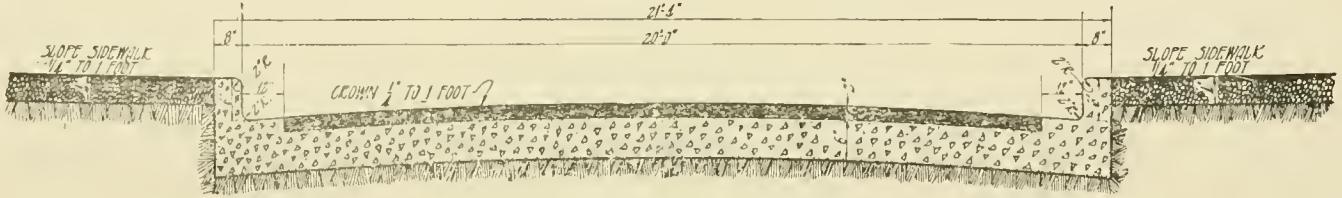
TRANSMISSION SYSTEM,
CAUSES AND DATES OF POWER INTERCUPTIONS,
INTERCUPTIONS DUE TO INSULATOR FAILURES SHOWN IN AREA UNDER DOTTED LINES,
INTERCUPTIONS DUE TO ALL OTHER CAUSES SHOWN IN AREA BETWEEN SOLID AND DOTTED LINES.

CONCRETE ROAD BETWEEN COROZAL AND MIRAFLORES.

Plate 6.



TYPICAL SECTION OF 18 FT. CONCRETE ROADBED WITH SHEET ASPHALT WEARING SURFACE,
HORIZONTAL SCALE – ½" = 1 FOOT,
VERTICAL SCALE – 1" = 1 FOOT.



TYPICAL SECTION OF 20 FT. CONCRETE BASE WITH CURB & GUTTER
FORMED AS PART OF SLAB FOR SHEET ASPHALT WEARING SURFACE,
HORIZONTAL SCALE – ½" = 1 FOOT,
VERTICAL SCALE – 1" = 1 FOOT.

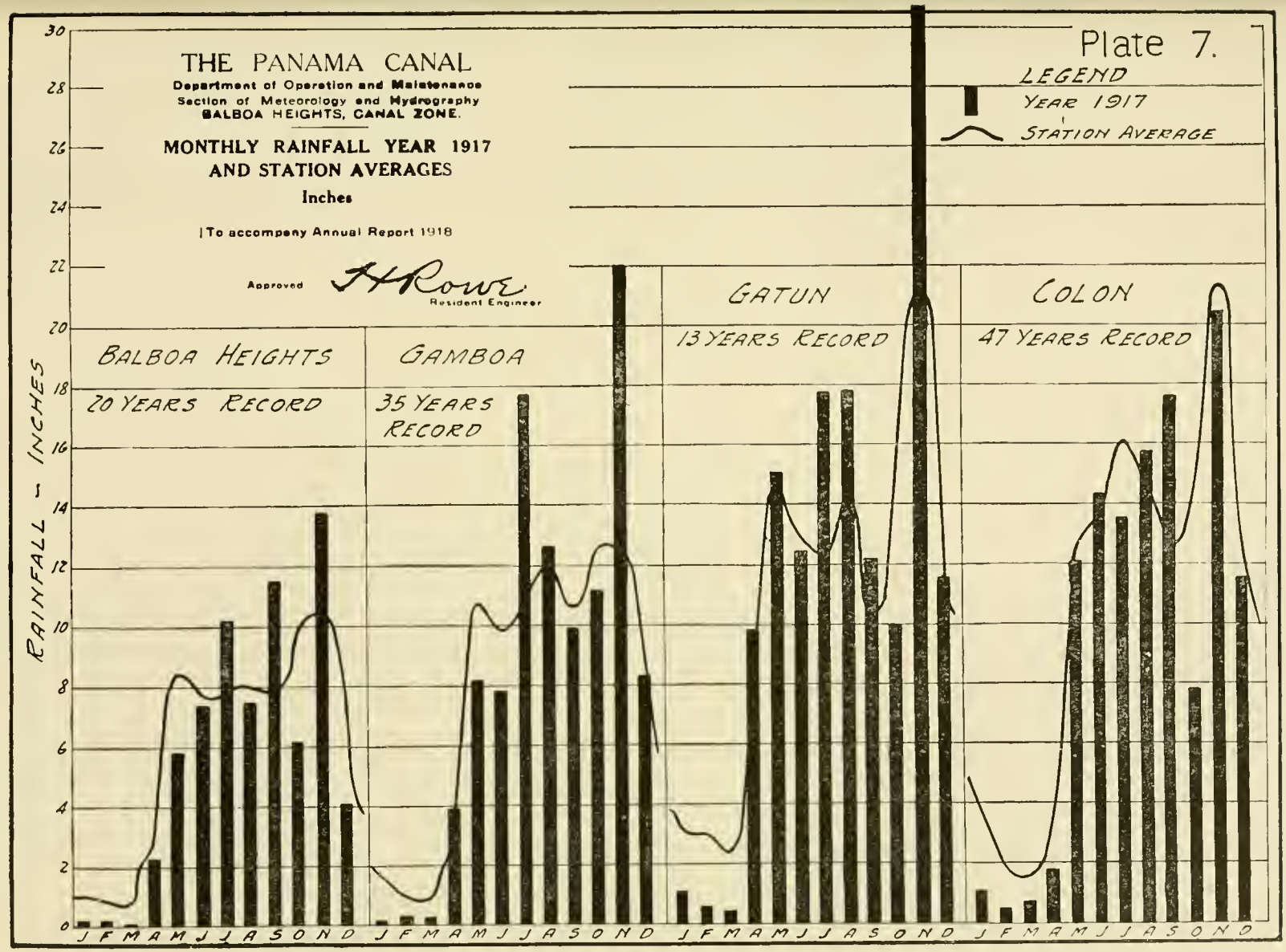


Plate 7.
THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
MONTHLY RAINFALL YEAR 1917
AND STATION AVERAGES
Inches
(To accompany Annual Report 1918
Approved
Resident Engineer
LEGEND
YEAR 1917
STATION AVERAGE
BALBOA HEIGHTS
20 YEARS RECORD
GAMBOA
35 YEARS RECORD
GATUN
13 YEARS RECORD
COLON
47 YEARS RECORD
RAINFALL - INCHES
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
J F M A M J J A S O N D

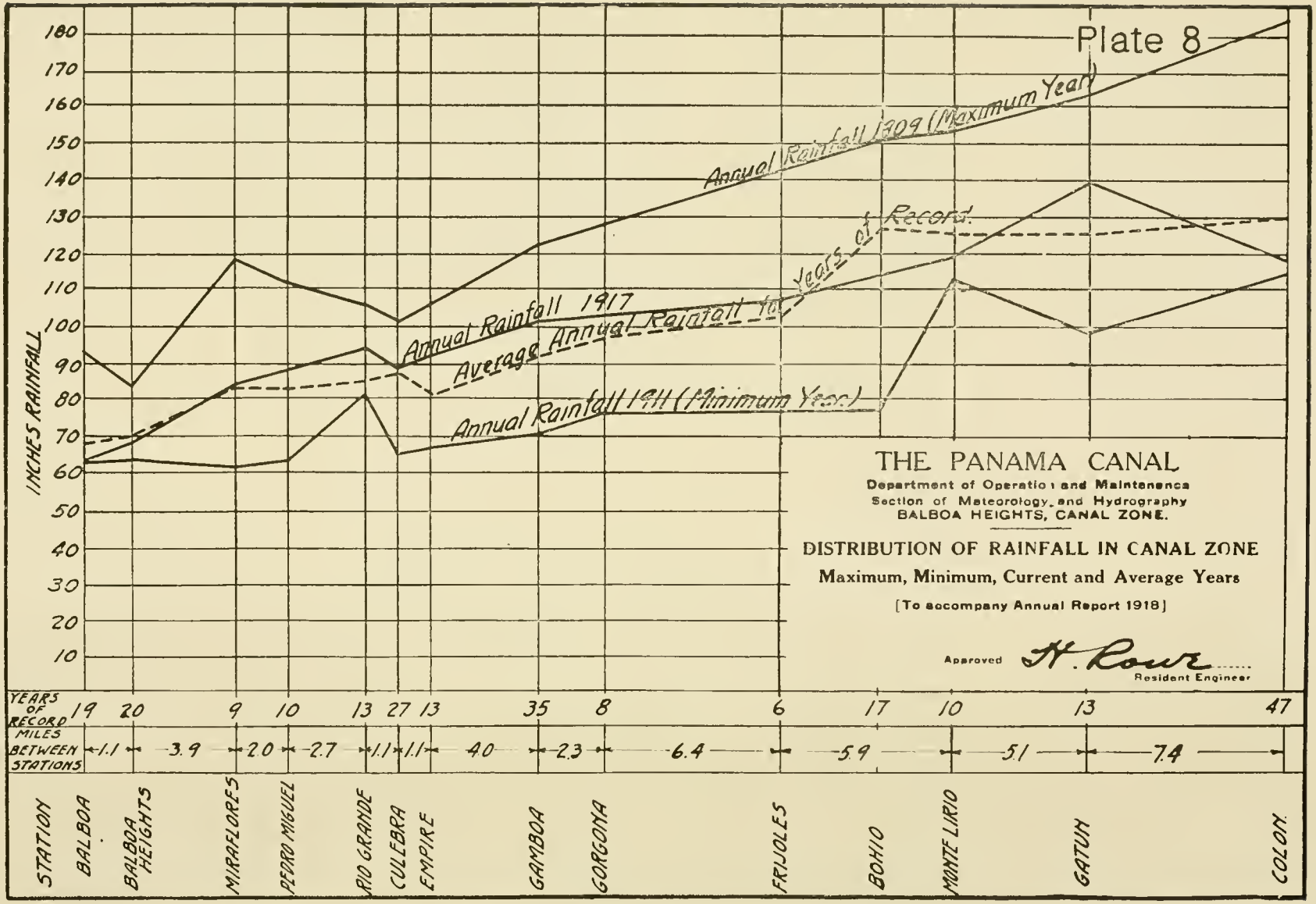


Plate 8
INCHES RAINFALL
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
Annual Rainfall 1909 (Maximum Year)
Years of Record.
Annual Rainfall 1917
Average Annual Rainfall for
Annual Rainfall 1911 (Minimum Year)
THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
DISTRIBUTION OF RAINFALL IN CANAL ZONE
Maximum, Minimum, Current and Average Years
[To accompany Annual Report 1918]
Approved H. Rowe
Resident Engineer
YEARS OF RECORD
19 20 9 10 13 27 13 35 8 6 17 10 13 47
MILES BETWEEN STATIONS
1.1 3.9 2.0 2.7 1.1 1.1 4.0 2.3 6.4 5.9 5.1 7.4
STATION
BALBOA
BALBOA HEIGHTS
MIRAFLORES
PEDRO MIGUEL
RIO GRANDE
CULEBRA
EMPIRE
GAMBOA
GORGONA
FRIJOLES
BOHIO
MONTE LIRIO
GATUN
COLON.

Plate 9.

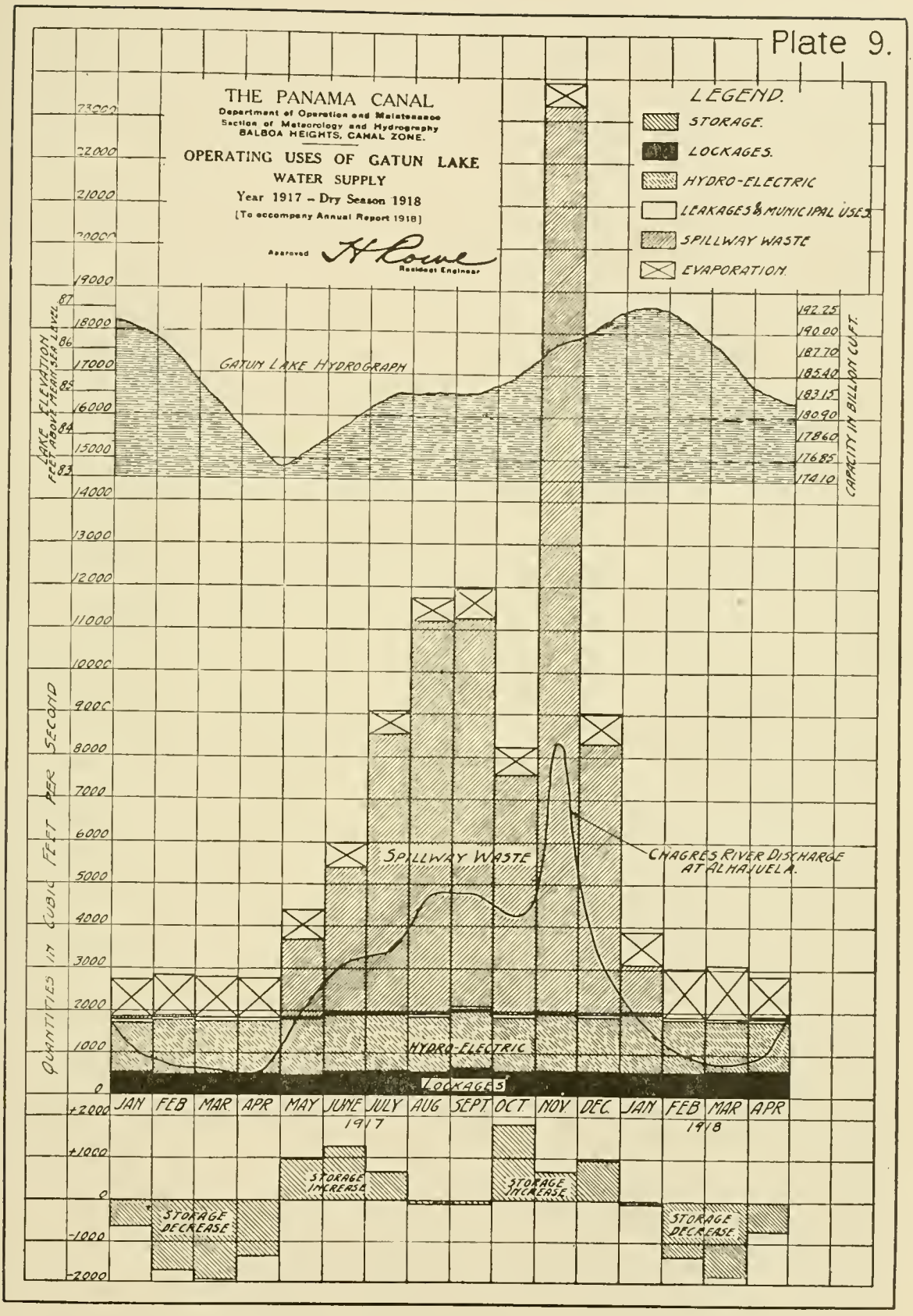

THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
OPERATING USES OF GATUN LAKE
WATER SUPPLY
Year 1917 – Dry Season 1918
(To accompany Annual Report 1918)
Approved H. Rowe
Resident Engineer
LEGEND.
STORAGE.
LOCKAGES.
HYDRO-ELECTRIC
LEAKAGES & MUNICIPAL USES
SPILLWAY WASTE
EVAPORATION.
GATUN LAKE HYDROGRAPH
LAKE ELEVATION FEET ABOVE MEAN SEA LEVEL
CAPACITY IN BILLION CU. FT.
QUANTITIES IN CUBIC FEET PER SECOND
SPILLWAY WASTE
CHAGRES RIVER DISCHARGE AT ALHAJUELA.
HYDRO-ELECTRIC
LOCKAGES
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB MAR APR
1917
1918
STORAGE INCREASE
STORAGE DECREASE
STORAGE INCREASE
STORAGE DECREASE

Plate 10.

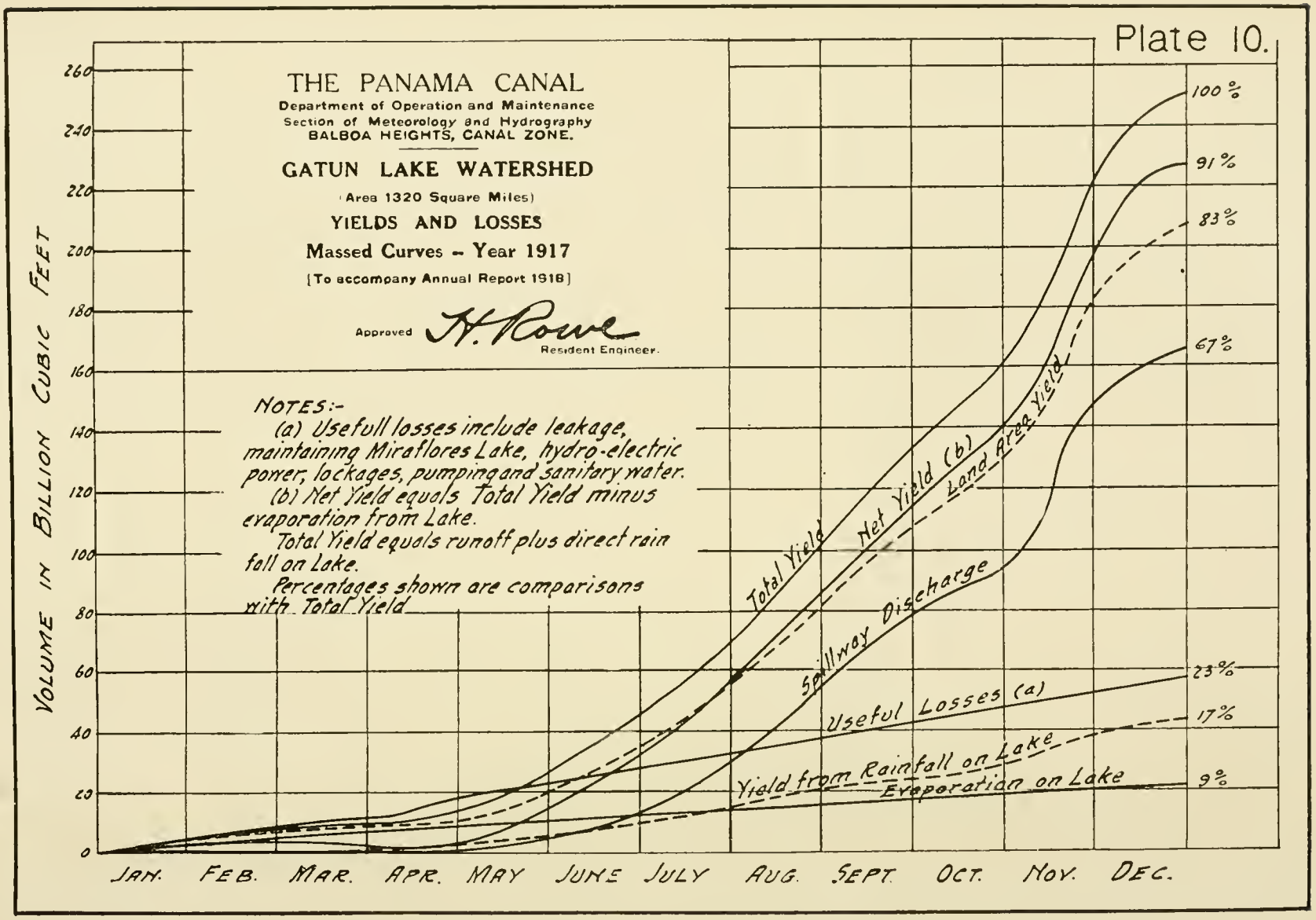

THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
GATUN LAKE WATERSHED
(Area 1320 Square Miles)
YIELDS AND LOSSES
Massed Curves – Year 1917
[To accompany Annual Report 1918]
Approved H. Rowe
Resident Engineer.
NOTES:-
(a) Usefull losses include leakage, maintaining Miraflores Lake, hydro-electric power, lockages, pumping and sanitary water.
(b) Net Yield equals Total Yield minus evaporation from Lake.
Total Yield equals runoff plus direct rain fall on Lake.
Percentages shown are comparisons with Total Yield
VOLUME IN BILLION CUBIC FEET
0
20
40
60
80
100
120
140
160
180
200
220
240
260
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
Total Yield
Net Yield (b)
Land Area Yield
Spillway Discharge
Useful Losses (a)
Yield from Rainfall on Lake
Evaporation on Lake
100 %
91 %
83 %
67 %
23 %
17 %
9 %

Plate II.

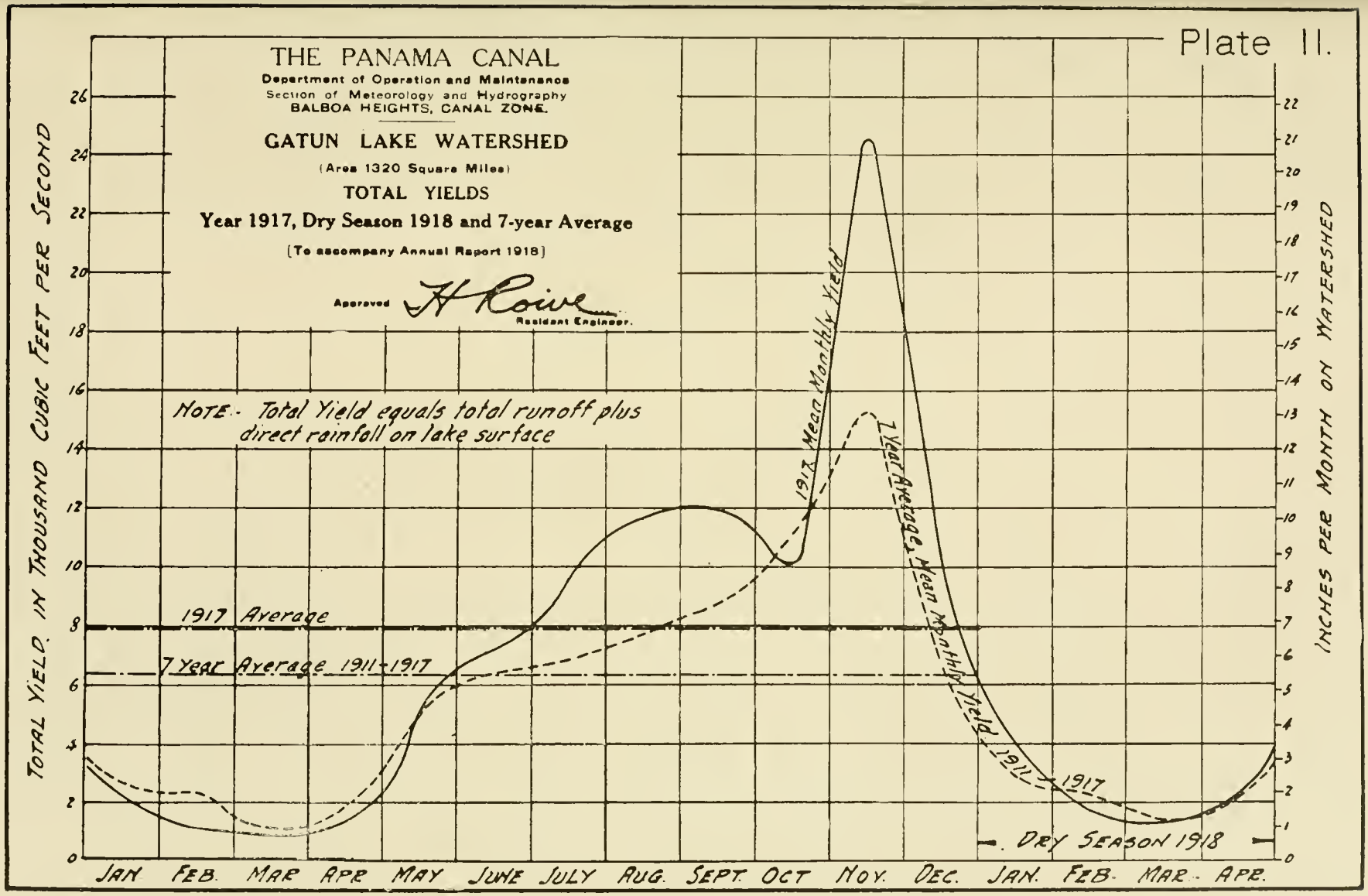
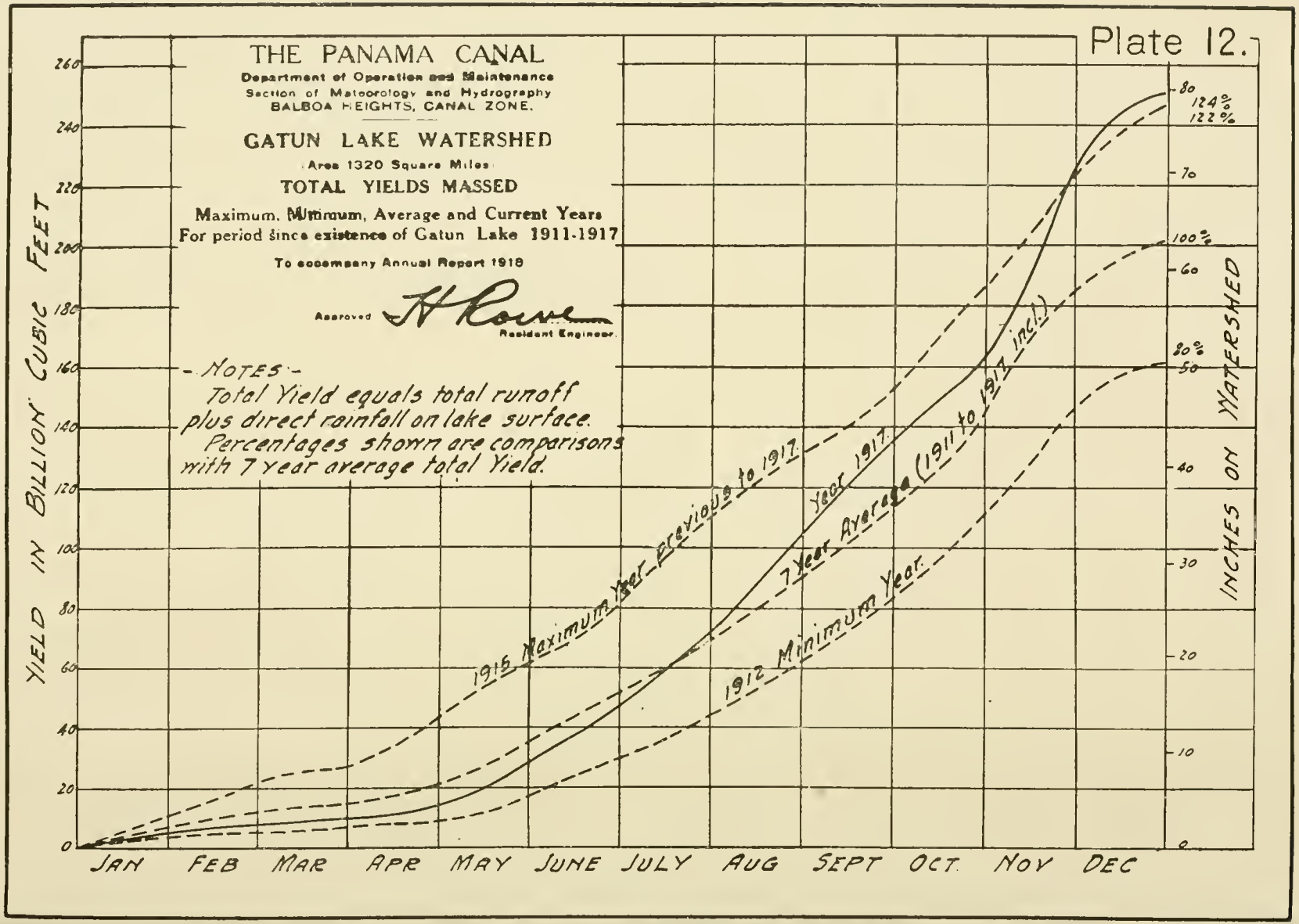

THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
GATUN LAKE WATERSHED
(Area 1320 Square Miles)
TOTAL YIELDS
Year 1917, Dry Season 1918 and 7-year Average
(To accompany Annual Report 1918)
Approved H Rowe
Resident Engineer.
NOTE.- Total Yield equals total runoff plus direct rainfall on lake surface
1917 Average
7 Year Average 1911-1917
1917 Mean Monthly Yield
7 Year Average Mean Monthly Yield 1911-1917
DRY SEASON 1918
TOTAL YIELD IN THOUSAND CUBIC FEET PER SECOND
INCHES PER MONTH ON WATERSHED
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

Plate 12.


THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
GATUN LAKE WATERSHED
Area 1320 Square Miles
TOTAL YIELDS MASSED
Maximum, Minimum, Average and Current Years
For period since existence of Gatun Lake 1911-1917
To accompany Annual Report 1918
Approved
Resident Engineer.
- NOTES -
Total Yield equals total runoff plus direct rainfall on lake surface.
Percentages shown are comparisons with 7 year average total Yield.
YIELD IN BILLION CUBIC FEET
INCHES ON WATERSHED
1915 Maximum Year previous to 1917.
Year 1917.
7 Year Average (1911 to 1917 incl.)
1912 Minimum Year.
124%
122%
100%
80%
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT. NOV DEC

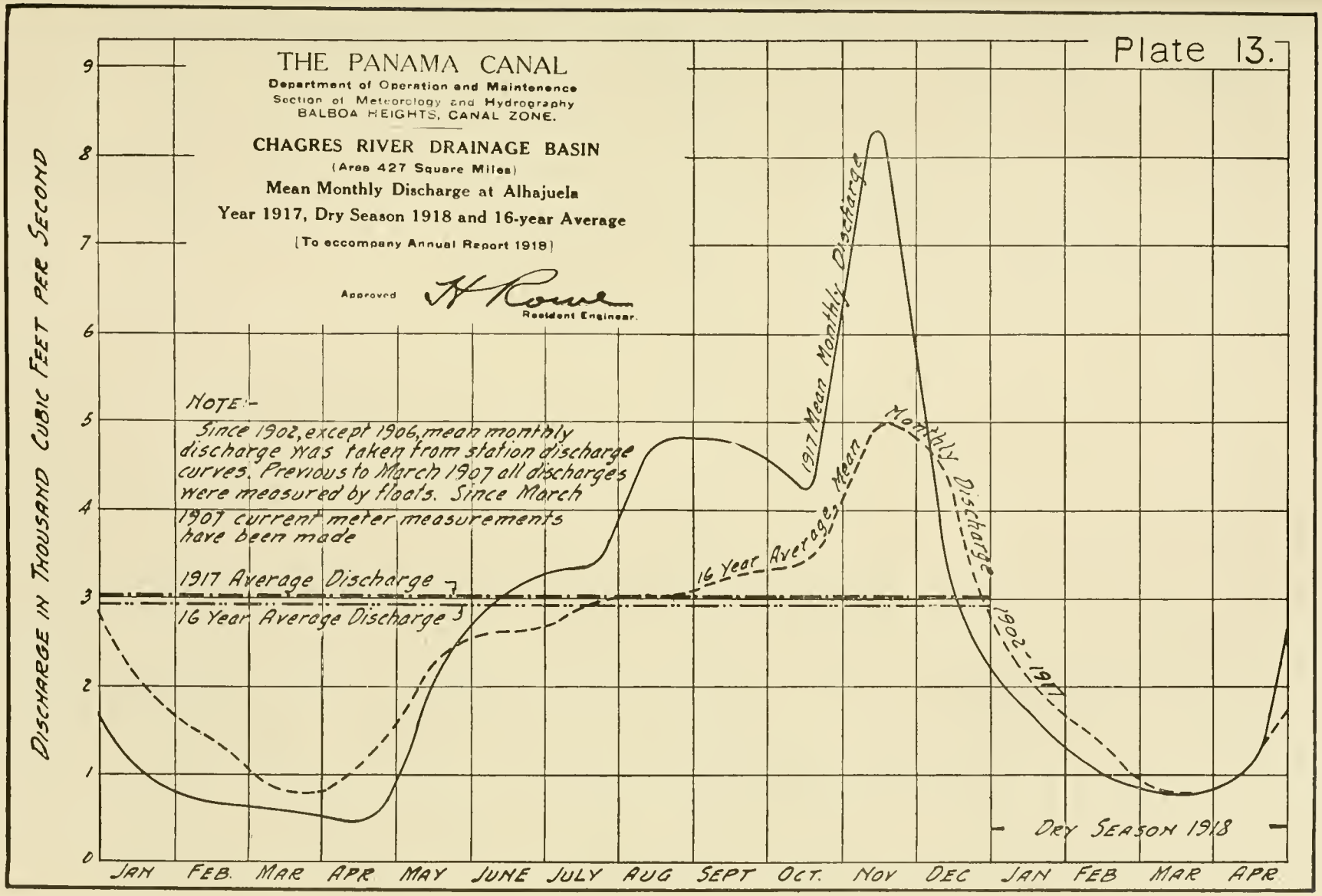


Plate 13.
THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
CHAGRES RIVER DRAINAGE BASIN
(Area 427 Square Miles)
Mean Monthly Discharge at Alhajuela
Year 1917, Dry Season 1918 and 16-year Average
(To accompany Annual Report 1918)
Approved
Resident Engineer.
NOTE:-
Since 1902, except 1906, mean monthly discharge was taken from station discharge curves. Previous to March 1907 all discharges were measured by floats. Since March 1907 current meter measurements have been made
1917 Average Discharge
16 Year Average Discharge
1917 Mean Monthly Discharge
16 Year Average Mean Monthly Discharge
1902-1917
Dry Season 1918
Discharge in Thousand Cubic Feet per Second
0
1
2
3
4
5
6
7
8
9
Jan
Feb.
Mar
Apr
May
June
July
Aug
Sept
Oct.
Nov
Dec
Jan
Feb
Mar
Apr

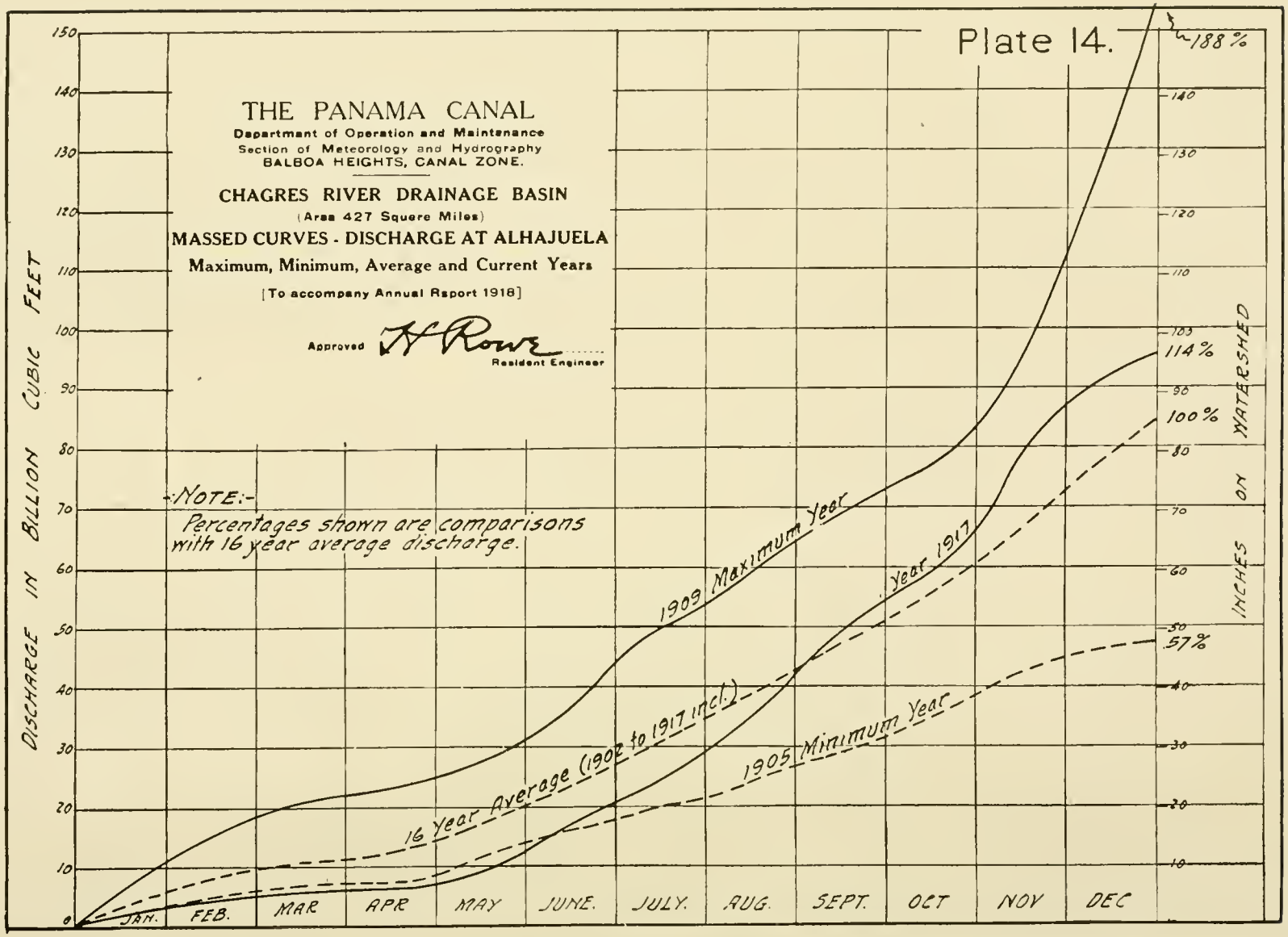
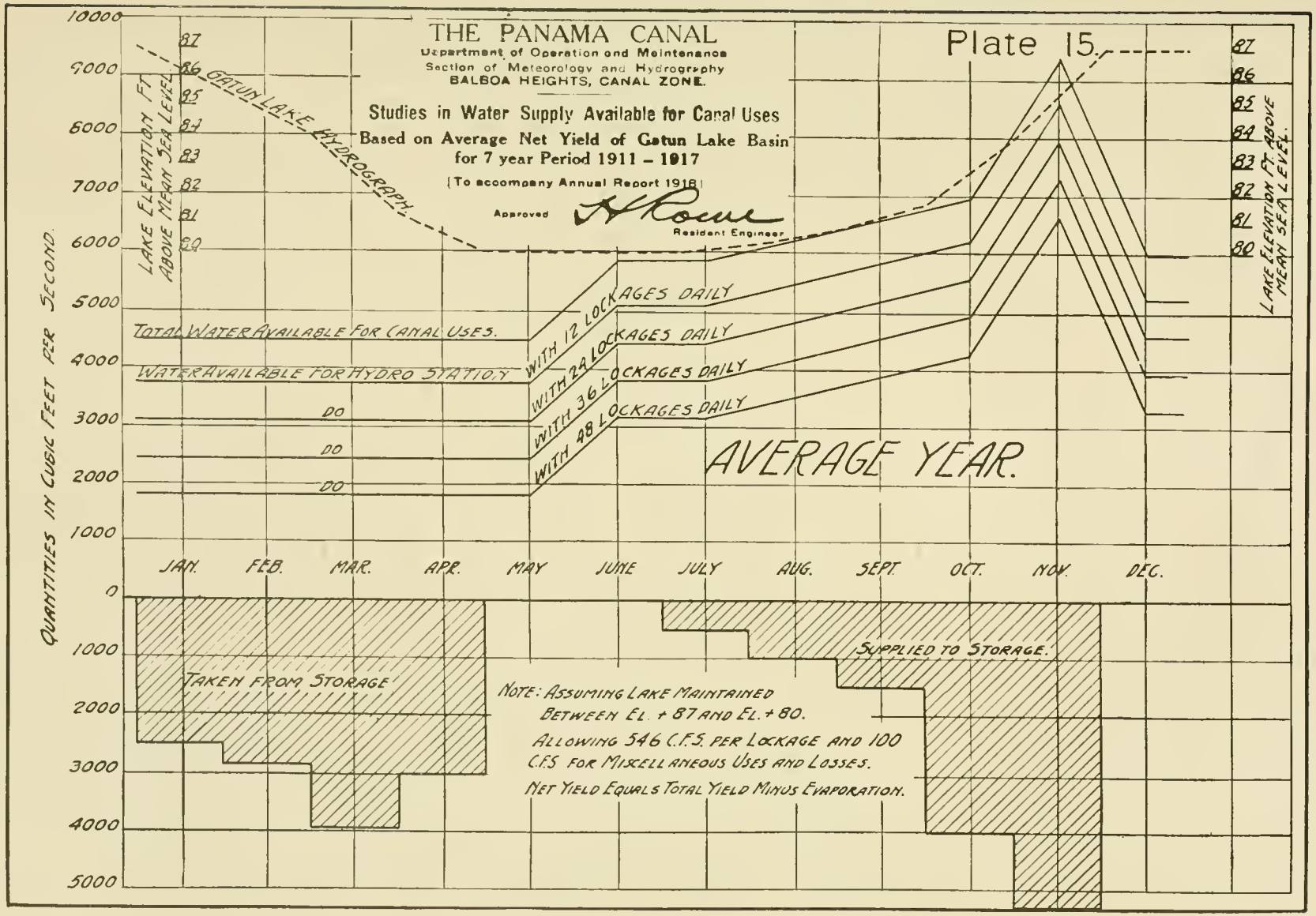
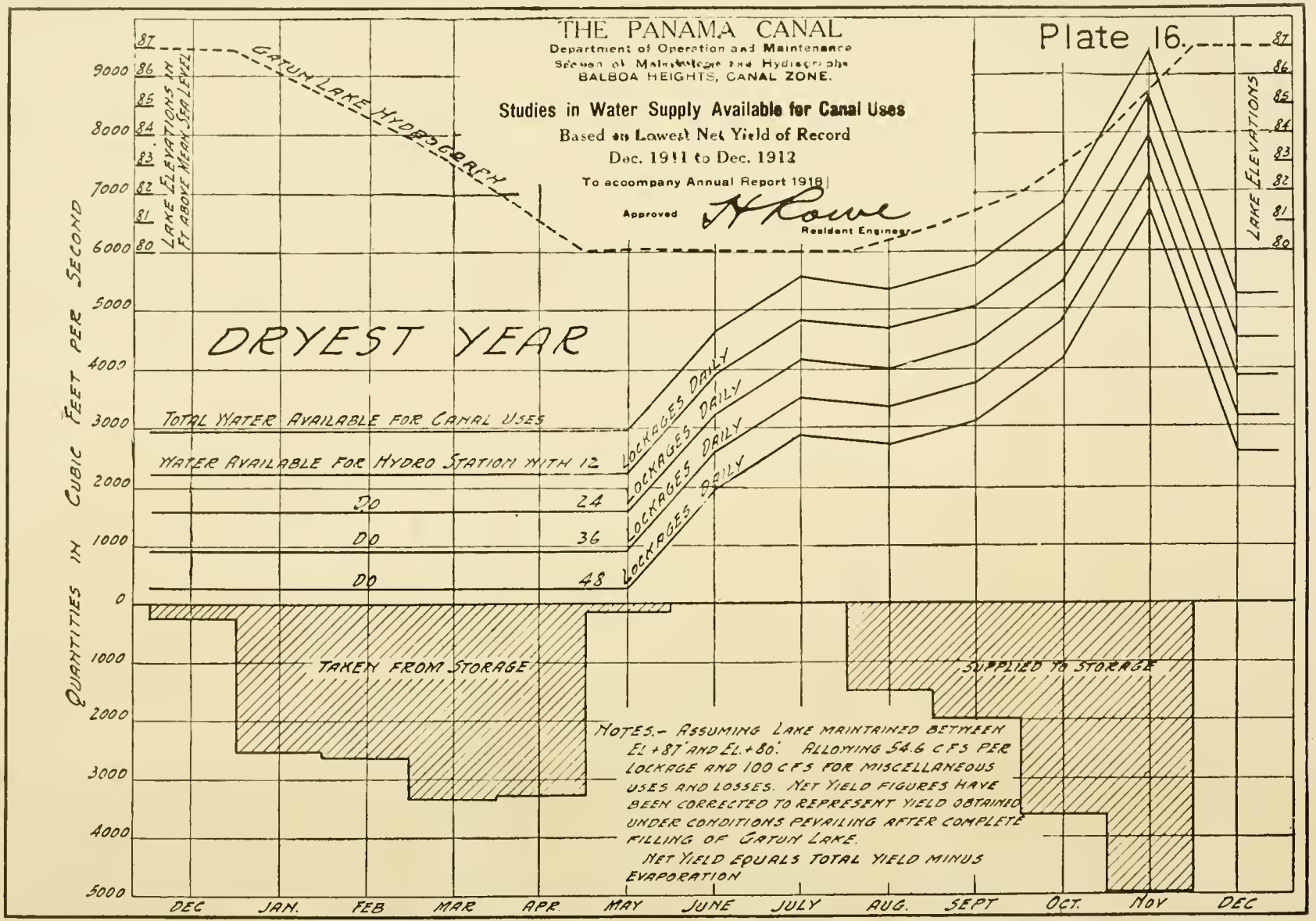


Plate 14.
THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
CHAGRES RIVER DRAINAGE BASIN
(Area 427 Square Miles)
MASSED CURVES - DISCHARGE AT ALHAJUELA
Maximum, Minimum, Average and Current Years
[To accompany Annual Report 1918]
Approved
Resident Engineer
NOTE:-
Percentages shown are comparisons with 16 year average discharge.
DISCHARGE IN BILLION CUBIC FEET
INCHES ON WATERSHED
1909 Maximum Year
Year 1917
16 Year Average (1902 to 1917 incl.)
1905 Minimum Year
188%
114%
100%
57%
JAN.
FEB.
MAR
APR
MAY
JUNE.
JULY.
AUG.
SEPT.
OCT
NOV
DEC


THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.
Studies in Water Supply Available for Canal Uses
Based on Average Net Yield of Gatun Lake Basin
for 7 year Period 1911 – 1917
(To accompany Annual Report 1918)
Approved
Resident Engineer
Plate 15.
GATUN LAKE HYDROGRAPH
LAKE ELEVATION FT ABOVE MEAN SEA LEVEL
QUANTITIES IN CUBIC FEET PER SECOND.
TOTAL WATER AVAILABLE FOR CANAL USES.
WATER AVAILABLE FOR HYDRO STATION
DO
DO
DO
WITH 12 LOCKAGES DAILY
WITH 24 LOCKAGES DAILY
WITH 36 LOCKAGES DAILY
WITH 48 LOCKAGES DAILY
AVERAGE YEAR.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
TAKEN FROM STORAGE
SUPPLIED TO STORAGE.
NOTE: ASSUMING LAKE MAINTAINED BETWEEN EL. + 87 AND EL. + 80.
ALLOWING 546 C.F.S. PER LOCKAGE AND 100 C.F.S. FOR MISCELLANEOUS USES AND LOSSES.
NET YIELD EQUALS TOTAL YIELD MINUS EVAPORATION.


THE PANAMA CANAL
Department of Operation and Maintenance
Section of Meteorology and Hydrographs
BALBOA HEIGHTS, CANAL ZONE.
Studies in Water Supply Available for Canal Uses
Based on Lowest Net Yield of Record
Dec. 1911 to Dec. 1912
To accompany Annual Report 1918
Approved
Resident Engineer
Plate 16.
DRYEST YEAR
GATUN LAKE HYDROGRAPH
LAKE ELEVATIONS IN FT ABOVE MEAN SEA LEVEL
LAKE ELEVATIONS
QUANTITIES IN CUBIC FEET PER SECOND
TOTAL WATER AVAILABLE FOR CANAL USES
WATER AVAILABLE FOR HYDRO STATION WITH 12 LOCKAGES DAILY
DO 24 LOCKAGES DAILY
DO 36 LOCKAGES DAILY
DO 48 LOCKAGES DAILY
TAKEN FROM STORAGE
SUPPLIED TO STORAGE
NOTES.- ASSUMING LAKE MAINTAINED BETWEEN EL +87' AND EL. +80'. ALLOWING 54.6 CFS PER LOCKAGE AND 100 CFS FOR MISCELLANEOUS USES AND LOSSES. NET YIELD FIGURES HAVE BEEN CORRECTED TO REPRESENT YIELD OBTAINED UNDER CONDITIONS PREVAILING AFTER COMPLETE FILLING OF GATUN LAKE.
NET YIELD EQUALS TOTAL YIELD MINUS EVAPORATION
DEC
JAN.
FEB
MAR
APR.
MAY
JUNE
JULY
AUG.
SEPT
OCT.
NOV
DEC

APPENDIX B.

REPORT OF THE RESIDENT ENGINEER, BUILDING DIVISION.

BALBOA HEIGHTS, CANAL ZONE, *July 20, 1918.*

SIR: I have the honor to submit the following report of operations of this division for the fiscal year ended June 30, 1918:

ORGANIZATION.

The organization of the division is the same as outlined in the report for the fiscal year of 1917, with the following additions:

The terminal construction work (construction of docks) was transferred to this division August 5, 1917.

The terminal construction work (dry dock and coal plant completion) was transferred to this division August 30, 1917.

On August 4, 1917, Mr. T. B. Monniche, engineer of docks, resigned and his duties were transferred to the resident engineer of the building division by Circular 660–34, effective August 5, 1917.

Mr. T. C. Morris continued as assistant to resident engineer. Mr. S. M. Hitt continued as architect.

Mr. C. A. Nelson was transferred to the division on August 5, 1917, as superintendent of construction, Pier No. 6.

Mr. J. B. Fields continued as superintendent of construction, Southern district.

Mr. J. Cosgrove resigned as superintendent of construction, Northern district, on May 5, 1918, and was succeeded by Mr. R. C. Hardman.

Mr. C. C. Snedeker continued as superintendent of submarine base construction.

BUILDING OPERATIONS.

Construction work on new Pier No. 6, Ancon Hospital, ice and cold-storage plant, concrete and frame quarters, and other projects for the canal were carried on during the year.

The construction work authorized in 1917 for the Army barracks and quarters was completed, and the aviation base authorized for Manzanillo Bay was designed and carried to 90 per cent of completion.

For the Navy, the construction of an aviation and a submarine base was carried to 95 per cent of completion.

The report on the status of work on Pier No. 6 is as follows:

At the close of the fiscal year 1916–17, the condition of the substructure of Pier No. 6 was as follows: The driving of caissons was

70 per cent complete, with a total of 15,855 linear feet in place; the excavation from cylinders was 73 per cent complete, with a total of 10,503 cubic yards of material removed; and the concreting of the caissons was 50 per cent complete, with a total of 10,987 cubic yards poured. The driving of caissons was completed on September 7, 1917, with a total of 22,610 linear feet in place. The excavation of material from the caissons prior to concreting was completed on September 19, 1917, with a total of 14,382 cubic yards removed. The concreting of the caissons was completed on October 19, 1917, with a total of 22,005 cubic yards poured.

The cylinders were 6 feet in diameter and were rolled from ⅜-inch and ½-inch flat plates furnished by the Riter Conley Company at $0.0357 per pound. The rolling of the caissons was performed by the mechanical division at the Cristobal shops, at a cost of $4.20 per linear foot, and the cylinders in place cost a total of $15.25 per linear foot. The excavation of material from the cylinders cost $6.01 per cubic yard, and the concreting of the caissons cost $5.51 per cubic yard. The total cost of the completed cylinders, including excavation and concreting, was $550,894.20, corresponding to $24.36 per linear foot; while the cost of the substructure as a whole, including the cost of trestles and falsework, power and water lines, tracks, overhead charges, etc., was $687,677.04, or $172,629.47 in excess of the corresponding cost for Pier No. 7. This increased cost was due to the increased cost of material, especially steel and piling. The steel on Pier No. 6 cost $0.0357 per pound, against $0.01447 per pound on Pier No. 7, while the piling used in the trestlework on Pier No. 6 cost $0.46 per linear foot, against $0.19 per linear foot on Pier No. 7. A considerable economy was effected by the use of only one trestle on Pier No. 6 in connection with floating equipment. In case four trestles had been used on Pier No. 6, as was the case on Pier No. 7, the cost of same would have been approximately $194,000, against the actual cost of $47,993, showing a gross saving of $146,000 on this item. The cost of operating the derrick barges was approximately $32,000, so that an actual saving of approximately $114,000 was effected by this change in the method of construction. As shown above, however, this saving was not sufficient to offset the increased cost of material.

FLOOR FOR PIER NO. 6.

As mentioned in the annual report for the fiscal year 1916–17, the floor for Pier No. 6 was originally designed and the cylinders spaced for a structural-steel floor system. The bids received for the steel work, however, showed that the lowest price for which this material could be secured was $0.058 per pound, including erection, and $0.052 per pound, not including erection. This would have brought the cost of steel in place up to approximately $650,000, not including overhead charges, or $381,000 more than the corresponding cost for Pier No. 7.

In view of this large increase in the cost of structural-steel floor system, studies were made to determine the advisability of substituting a reinforced-concrete floor system for the structural steel. The caissons, a large number of which were already in place, were spaced 45 feet apart in the longitudinal direction and 26 feet 6 inches apart in

the transverse direction, a spacing which proved highly economical on Pier No. 7 with reference to the total cost of the pier. The span of 45 feet, however, offered serious difficulties to a reinforced-concrete construction, and the use of continuous arch-shaped girders with steel tie-rods in alternate bays, designed to take either compression or tension, was at first determined upon. Later it was found advisable to use arches in the same bays as the struts, but elsewhere to use ordinary haunched girders. This design was eventually approved for the 45-foot longitudinal spans, while in the transverse direction tee beams were used to transmit the loads to the girders and arches. Due to the continuity of the arches and girders and to the movable abutments resulting from the flexibility of the cylinders and the extensibility of the tie-rods, the stresses were indeterminate to a high degree, but the analysis was successfully carried out by the aid of the elastic theory.

After the development of the design in the floor system, the next problem encountered was to find a means of supporting the concrete forms plus the weight of the fresh concrete, amounting to a total of approximately 350,000 pounds for the girders and 250,000 pounds for the arches. After an investigation of various methods of carrying this excessive load, it was finally decided to use long secondhand steel bridge girders to support the forms for the concrete girders, while smaller girders supported at the ends of the bridge girders were used to carry the forms for the arches. The bridge girders were supported by H-beams running between cylinders at right angles to the direction of the bridge girders. The general appearance of the arches and girders is shown by plate No. 22.

The concrete being used on Pier No. 6 consists of one part cement to four parts run-of-bank gravel, and the design assumed that the concrete would stand 2,000 pounds per square inch compression when 28 days old. Compression tests made with sample cylinders indicated, however, that the concrete was not as strong as assumed. Various experiments were accordingly made with a view to strengthening the concrete, and it was found that by washing the gravel and removing a certain amount of the very fine sand the strength of the concrete was increased nearly 100 per cent. Accordingly all gravel is now being washed over one-sixteenth-inch mesh screens placed at 45° to the horizontal, so that the required amount of fine sand is removed in the same operation.

During September and October, 1917, the first drawings for the arches and girders were completed, and the pouring of concrete was started in October. During the remainder of the fiscal year a total of 10,115 cubic yards were poured or 35 per cent of the required total of 28,820 cubic yards to be used in the floor system. It is estimated that this concrete can be put in place for approximately $20 per cubic yard, including the cost of the forms and reinforcing.

Toward the close of the fiscal year 1916–17 it became evident that Pier No. 6 could not be constructed for the appropriation of $1,500,000 provided by Congress. This was due entirely to the large increase in the costs of materials which followed the preparation of the estimates upon which the appropriation was based. The prices of steel and piling, for instance, each advanced to more than two and one-half times the cost of these items used on Pier No. 7. As pointed

out above, floating derricks were used to save trestle work on the foundation, and a reinforced concrete floor system was decided upon to save steel in an effort to offset these abnormal increases in cost. Other changes in design effecting economy without impairing the usefulness of the pier were also made. These included the elimination of paving bricks, except between the rails, a considerable reduction in the size of door openings which will result in a large saving in the cost of the doors, and a redesign of the fender systems, bringing the creosoted timber required down to a minimum. A further saving will be effected by the use of a reinforced concrete shed in place of a structural steel shed. In spite of these changes, however, it was necessary to request an additional appropriation of $593,190 from Congress, which was provided by the passage of the urgent deficiency bill, on March 28, 1918.

Bids were opened in Washington on April 30, 1918, covering the cost of furnishing approximately 4,400,000 pounds of structural steel for the shed of Pier No. 6. The most favorable bid for the material was $4.99 per hundredweight delivered at New York, indicating that the structural steel in place would cost approximately $302,000, or about 150 per cent more than the corresponding cost on Pier No. 7. The cost of the roof, doors, electrical work, concrete, and miscellaneous items would bring the total cost of the shed up to $515,000, and in view of the unusually high cost all bids were rejected after careful estimates of cost, and preliminary plans were prepared for a reinforced concrete shed. The design requires 66,000 cubic yards of concrete, which is estimated to cost not more than $200,000. Adding to this figure the cost of the doors, electrical work, louvers, and miscellaneous items, it is estimated that the total cost of the shed will be $338,000, representing a saving by the adoption of this type of construction of approximately $177,000. The design involves the use of reinforced concrete roof trusses, which will be cast on the floor of the pier and erected into place by locomotive cranes. Plans for these trusses are well under way and working drawings will be finished at an early date. The condition of Pier No. 6 at the close of the fiscal year is shown by Plate No. 21, "General View of Pier 6, July 1, 1918."

BOAT LANDING AND LAUNCH HOUSE BETWEEN PIERS NOS. 7 AND 8, CRISTOBAL.

At the close of the fiscal year ending June 30, 1917, the 2,107 linear feet of 3-foot and 4-foot diameter caissons required for the foundations for the boat landing and launch house had been put in place, excavated, and concreted, completing all work on the substructure. The cost of the caissons in place amounted to $5.98 per linear foot. A total of 536 cubic yards of excavation was performed at a cost of $5.45 per cubic yard, while the concrete, of which 750 cubic yards were used, was poured at a cost of $7.10 per cubic yard. The total cost of the foundations, including preliminary work and overhead charges, was $23,174.72.

No work on the floor of the boat landing was performed until October 6, 1917, due to delays in the delivery of the floor steel, the erection of which was started on that date. By October 25, the entire amount of 511,570 pounds of structural steel for the floor and shed

had been erected, including 297,887 pounds for the floor and 213,683 pounds for the shed. The floor steel was furnished by the J. B. Kendal Company at $0.0491 per pound, and the shed steel was furnished by the Belmont Iron Works at $0.06 per pound.

The pouring of concrete for the girder encasement and floor slab was started on October 31, 1917, and completed December 8, 1917, a total of 481 cubic yards having been used.

The concrete work for the shed was started on December 6, 1917, and completed on January 12, 1918, a total of 280 cubic yards having been used.

All work on the boat landing and launch house was completed in March, 1918, and the structure turned over to the marine division. The total cost of the completed structure was $109,939.07.

The following is a description of the principal structures constructed or in course of construction during the past year:

INDUSTRIAL PLANT—PANAMA RAILROAD.

Construction was begun this past fiscal year on a group of industrial buildings at Mount Hope that it is proposed will ultimately consist of a cold-storage building, an ice plant, an abattoir, a meat-canning factory, a bone-meal, fertilizer, and soap-making plant; a laundry, bakery, and grocery warehouse; and all the necessary buildings necessary to the most economical operation of such an establishment—namely incinerator, boiler house, machine, pipe fitting, blacksmith and carpenter shops, and garage.

The buildings under construction are the ice and cold-storage plant and the abattoir, which will be completed and equipped for operation conjointly with the power plant. These buildings are of the reinforced concrete column, beam and floor slab and filled-in block-wall type of construction, and are to have flat slab roofs, waterproofed with cement and temperature steel.

Cold-storage building.—This building is 105 feet 8 inches by 341 feet 3 inches in over-all dimensions above the first story, and three stories high. The first story has an additional width of 10 feet. The building has three electric elevators in shafts, 9 by 10 feet, and two automatic meat drops. Floors, walls, and ceiling are lined with 4-inch, 6-inch, or 9-inch thickness of cork where low temperatures are required, and the building is equipped with modern machinery for the industries described below:

On the first floor is an ice-cream manufacturing plant, comprising freezing and hardening rooms, brick cutting and finished product, vestibule, storage, and wash room. All these rooms and those of the dairy products storage are floored with red ceramic tile.

On the third floor are rooms equipped for corning beef, and for hamburger and sausage making and pickling.

The remainder of the building is planned for the packing and shipping of meat, vegetables, and dairy products and for cold storage of the following capacities:

Vegetable storage, 17,670 square feet or 193,000 cubic feet.
Butter storage, 1,110 square feet or 12,130 cubic feet.
Egg storage, 2,254 square feet or 24,650 cubic feet.
Boxed goods storage, 4,705 square feet or 53,400 cubic feet.
Beef storage, 20,710 square feet or 333,100 cubic feet.
Chilled rooms, 4,440 square feet or 72,500 cubic feet.

The beef-storage rooms are all equipped with overhead tracks, which will accommodate 4,815 head of dressed beef if stored in halves, or 2,957 head if stored in quarters.

The building has office and toilet accommodations for the employees.

Abattoir.—This building, which covers 95 by 134 feet in ground area is three stories high and of the same type of construction as the cold storage and ice plant.

The live stock is driven up from the stockyards over a 6-foot wide exterior concrete runway to the third floor, where all killing is done. Provision has been made for slaughtering 300 cattle per day on six killing beds, with allowance for installation of a seventh bed, and 200 hogs per day, with capacity for further expansion, as a dehairing machine with a capacity of 200 per hour is to be installed. The dressed beef and hogs are run upon overhead rails across a bridge and directly into the chill rooms of the cold-storage plant.

All offal and by-products from the killing floor are dropped through chutes and delivered by gravity to the floor below, where they are cleaned and sent to the proper department. On this floor are also located the bone room, the upper part of the tank house, and the upper part of the lard and oleo oil department.

The tank house, which extends to the basement, is equipped with six rendering tanks, two blood cookers, and a press from which the tankage is conveyed by trucks to the fertilizer plant and the grease in barrels to the soap plant.

The lard and oleo department extending through the first and second floors is provided with machinery required for the manufacture of steam lard, open-kettle lard, oleo oil and stearine, together with the cold room for storage of the finished products.

A small chicken killing space has been provided on the first floor where 600 chickens may be killed daily.

The remainder of the first floor is occupied by the hide department. The hides are dropped direct from the killing floor, after which they are trimmed, dipped, and finally stored in salt vats, which have a storage capacity of 6,000 hides.

The building occupies a convenient location with respect to the cold-storage building, boiler house, and repair shops, and is reached by a road on the east side and by railroad tracks on the west.

Freezing room.—This structure adjoins the cold-storage building and is connected with it by a 30-foot platform, and also through the ice-storage room. Three 50-ton freezing tanks with necessary agitators, air blowers, filters, tipping tables, precoolers, and dipping tanks are located in this room.

Raw water ice will be manufactured in 300-pound cakes, and three overhead cranes, one for each tank, are provided for handling the ice.

Engine room.—Engine-room equipment consists of three 200-ton refrigerating units of vertical high speed type, direct connected to 400 horsepower motors. One pump-out machine is provided. Three vertical centrifugal pumps, 1,000 gallons per minute capacity are located in a sump under the engine room, directly connected to vertical motors located on the main floor of the engine room. Water is furnished to this sump from the East Diversion by gravity through a

24-inch concrete pipe, 3,900 feet long, and is pumped to double tube condensers on the roof of the freezing room.

A 20-ton overhead electric crane is provided covering the entire area of the engine room.

The main electrical switchboard, transformers, and distribution system are also located along one side of this room.

MINDI DAIRY FARM.

The buildings of this industry consist of those described below:

Barns.—The barns are in four units, each having two rows of milch cow stalls of 40 stalls each, making a total of 320 stalls in the group of buildings. Each of the four building units has a feed room, 16 by 33 feet, and a 16-foot diameter silo 36 feet high. The over-all dimensions of the concrete floor forming the floor and yards of the four units of barn buildings are 196 feet 8 inches by 232 feet 8 inches. The stall sections are screened above the block and stuccoed side walls of 5 feet minimum height up to the roof plate. The roof has a continuous ridge ventilator and a 6 by 10 foot skylight in each 14-foot bay. The feed rooms and silos are built of blocks, stuccoed, the silo walls being reinforced by rods in the horizontal block joints. All of these buildings have roofs of asphalt shingles on wood framing.

Milk house.—This is a hollow block structure, stuccoed, 27 feet 6 inches by 47 feet, one story above platform height, with asphalt shingle roof on wood framing.

It contains the dairy office, boiler, refrigerator, and washing rooms, an 11 foot 4 inch by 12 foot 8 inch refrigerator, a workroom, sterilizing room, can storeroom, and toilet and showers for the help. All of the above rooms, except the office, boiler room, and toilet, but including two exterior platforms, are paved in red ceramic tile.

Cattle pens.—This is an open wooden structure, 29 feet 6 inches by 48 feet 8 inches, of concrete flood and asphalt shingle roof, and contains 8 pens for calving and calves.

Bull pen.—This is a similar structure to the cattle pen, 12 feet two inches by 48 feet 8 inches, containing 4 pens.

Quarters.—The quarters consist of one 1-story wooden dwelling for the gold roll manager, and one wooden barracks for the quartering of 40 silver roll employees.

TIVOLI HOTEL KITCHEN.

The new Tivoli Hotel kitchen is located adjacent to the Tivoli Hotel at Ancon, and is designed to not only replace the present kitchen of the hotel but with the purpose to fit and be a part of the hotel in permanent materials that is proposed for the site at a future date.

The new kitchen is 60 feet by 78 feet, one story and basement high. The type of construction is reinforced concrete foundations, columns, beams, floor and roof slabs, with walls and partitions of hollow concrete blocks, stuccoed.

The kitchen proper is on the first floor and has an area of 2,400 square feet, with red tile floor and white tile wainscot. The equipment is grouped in the kitchen to form departments; the dishwashing

department with pantry for silver and glassware and plate warmer; a pantry with coffee urns; the bakers' department with mixer and oil-burning ovens; and the cooks' department with two oil-burning ranges, broiler, stock pots and steamers, cook tables, steam tables, and short-order refrigerators. On the same floor are the cold-storage rooms, storerooms, servants' dining rooms, and boiler room with two oil-burning boilers to supply hot water and steam. The refrigeration machinery is on the mezzanine floor and over the cold-storage rooms. In the basement are the servants' toilets and locker rooms, and an equipment storeroom.

LOCAL FREIGHT AND BAGGAGE BUILDING.

This building occupies the angle between Docks Nos. 9 and 10 at Cristobal, and is connected with the former through wide openings without doors in every bay. It is 75 feet 8 inches wide by 919 feet long, and is constructed of reinforced concrete floor, walls, and foundations, on piles, the floor having an additional reinforcement of steel rails. The roof is of corrugated asbestos on steel trusses, offering a clear span between the side walls.

This building receives, stores, and discharges all local incoming and outgoing freight and baggage. Held-over baggage and mail consigned to other boats for distant ports are stored here. For the latter, special sorting compartments are provided, and the building also contains a 16-foot by 20-foot fire and burglar proof vault for the storage of specie and valuables. This building, being virtually an annex of Dock No. 9, is used in its far end in the same capacity when the dock is congested.

MOUNT HOPE OIL TANK.

This is located on a spur near the Mount Hope railroad station. It is cylindrical in form, 115 feet in diameter and 30 feet high, and has a capacity of 55,000 barrels.

Because of the price and the difficulty at this time in securing delivery of steel, and the fact also of a lowered temperature being obtained in concrete, which lessens the loss of oil by evaporation, the wall is of reinforced concrete, being 12 inches thick at the bottom and battered on the inside to 6 inches at the top. The roof is of steel plates on iron-pipe columns and steel framing.

The inlet and outlet pipe is 8 inches in diameter and located near the bottom of the tank. Connected to it is a swivel-jointed adjustable spout which permits drawing off of the oil from the surface. A wall drain at the bottom is also provided for drawing off collected water.

ANCON HOSPITAL.

The construction of the Ancon Hospital group of buildings, which began three years ago in permanent materials, will be completed during the fiscal year as a thoroughly equipped hospital of 660 beds, with the exception of the quartering of employees of all classes other than the superintendent and the nurses. Physicians, surgeons, internes and other technicians, the administration force, and a few other employees on the gold roll—both married and bachelor—and

maids and orderlies on the silver roll, are still housed in wooden buildings. With the construction of the buildings covered by the last appropriation the hospital will consist of the following units in the main group, all of which are connected by covered passageways:

Administrative and clinics building: Kitchen and mess, section A ward group, section B ward group, section C ward group, section D ward group, isolation section.

Besides, there are the following detached buildings within the hospital grounds: Dispensary, medical storehouse, laboratory and crematory, power house and shops, superintendent's home, nurses' quarters, garage.

The main group of buildings extends irregularly about a tract that in over-all dimensions is 600 by 1,200 feet, and they are from two to four stories in height. The total length of covered passageways connecting the different buildings, including the porches of the wards, which vary in width from 6 to 10 feet, is about 6,800 linear feet.

The buildings on which work was performed during the past fiscal year are herewith briefly described.

Ward group, section C.—This building is designed in the shape of the letter V, to conform to the peculiar topography of the site, and a covered passageway connects this unit with the kitchen building and other buildings of the hospital group. The building has a capacity of 192 patients, and consists of a central unit 53 feet wide by 129 feet long, and two side wings each 42 feet wide and 129 feet and 137 feet long, respectively—all three stories and basement in height.

The central unit comprises the waiting room for visitors, service rooms, kitchens, dining rooms, cells, quiet rooms, dressing rooms, nurses' and doctors' offices, laboratories, and toilets. The basement of the side wings is intended for storage space and the other floors are arranged for large wards opening on continuous porches on either side with a capacity of 29 patients in each.

In each ward a built-in cabinet and service room equipped with a linen closet, ice box, sink, and hot plate outlet, are provided. One electric elevator and dumbwaiter, ice water bubbling fountains, and linen chute are also installed.

The construction of the building is reinforced concrete skeleton, concrete floor slabs, and cement block curtain walls and partitions. The roof is built up of trussed wood rafters, sheathed and covered with Spanish style vitreous red tile. The interior of the building is finished in white lime plaster excepting in a few special rooms where Keene's cement plaster is used. In conformity with the finish in the other hospital buildings best grade vitreous porcelain plumbing fixtures are installed, and all electric light fixtures are finished in white enamel. All of the woodwork is painted and enameled, and 6 by 6 inch red floor tile is used throughout, excepting in the private rooms and cells, where wood floor occurs.

Ward group, section D.—Ward group, section D, is a separate section from an administrative standpoint, but it is built as a continuation of section C. This group is the shape of the letter T, consisting of a central unit 53 by 94 feet and side wings 42 feet wide and 123 feet and 131 feet long, respectively. The building is three stories and basement in height except one wing, which has only a portion of its area excavated for a basement.

The building has a capacity of 192 patients and besides three large wards, with a capacity of 29 patients each. This building provides special wards for white and colored children and an obstetrical section for colored patients. In the central unit is located a waiting room for visitors, service rooms, kitchens, dining rooms, cells, quiet rooms, dress rooms, nurses' and doctors' offices, laboratory, toilets, and obstetrical operating rooms.

The children's wards are provided with special service rooms, where bathtubs, sinks, and other equipment is installed. Special service rooms are also arranged in the obstetrical department for the nursery and adult patients. In this department the women's ward has a capacity of 16 beds and the nursery 12 beds.

The construction and general finish of this section is the same as section C.

Nurses' quarters.—The nurses' quarters are located in proximity to the ward and other hospital buildings on a prominent spur overlooking Panama City and its environs. The building, three stories in height, 233 feet 6 inches long and 46 feet 1 inch wide, provides a suite for one chief nurse and quarters for 72 nurses.

Besides a reception room, 29 feet wide and 52 feet long, a kitchen and tea room is provided on the first floor. In the basement, two maids' rooms, a laundry, and several small service rooms are provided. A central corridor on each floor affords circulation between the various rooms, stair halls, and toilets, and each room opens upon a common screened porch. Each room has a lavatory with hot and cold water, medicine cabinet, and built-in dry closet. A linen chute and bubbling drinking fountains are also installed in the corridors. A telephone booth is provided on each floor in order to eliminate the necessity of installing a telephone outlet in each room, excepting in a few rooms where nurses are subject to call at all hours, and magnifying phones are installed in the corridors of each floor, operated by the maid on the first floor.

The type of construction of the building is reinforced concrete skeleton, with concrete floor slabs and cement-block curtain walls, cement plastered on the exterior. The roof is built of wood rafters, sheathed and covered with red vitreous roof tile. The interior is finished in white-lime plaster with wood trim and staircases.

Boiler house and shops.—The power plant of the hospital is 48 feet 6 inches by 62 feet 6 inches in dimensions, one story high, of open sides, with wide overhanging eaves. The construction is reinforced concrete, with a corrugated asbestos roof on wood rafters.

Besides two 50-horsepower oil-burning boilers that supply steam to all the hospital buildings, this structure contains the hospital carpenter and plumbing shop.

Garage.—Dimensions, 21 feet 3 inches by 80 feet 6 inches. This building is of the general type of hospital permanent construction, and contains stalls for eight hospital trucks, ambulances, etc. Two of the stalls are partitioned off as a workroom, with bench and pit for repairs.

LARVACIDE PLANT.

This is a one-story building, located near the Ancon laundry, 40 feet 6 inches by 70 feet, of cement block, stuccoed, and reinforced concrete construction, with an asbestos-shingle roof.

The building contains an office for the sanitary inspector, storeroom for the health department, toilets, and workroom for the manufacture of larvacide, which is used for the extermination of mosquitoes. The carbolic-acid storage tank of 10,000 gallon capacity is of concrete and located below the floor, as is also the larvacide storage tank of 3,300 gallons. All other necessary chemicals and the barreled-finished product are stored upon the first floor, being handled by a small one-fourth-ton overhead trolley. Shipping entrance to the building is from the switch track adjoining the shipping platform, which is reached also by wagons.

NURSES' QUARTERS, COLON HOSPITAL.

The nurses' house is a two-story building, 45 by 70 feet, situated near Colon beach, adjacent to the hospital, and provides quarters for 13 nurses and 2 maids.

The construction is of reinforced concrete columns, girders, and floor slabs, with walls and partitions of hollow concrete blocks and with red-tile roof on wood framing. Interior finish is wood floors, trim, and stairway, white plastered walls and ceilings. The exterior finish is cement plaster.

A bedroom, 12 by 12 feet, is provided for each person, and contains a dry closet, lavatory, and built-in medicine cabinet. The rooms are arranged along a directly lighted central corridor, and open onto common-screened cement-floored porches on the front and rear of the building.

Each floor has a white-tiled toilet, shower, and bathroom, and, in addition, the building contains a living room, dining room, kitchen, laundry, and an isolated maid's room with separate toilet and shower.

GATUN DISPENSARY.

This building, 36 by 66 feet and two stories high, is constructed of a reinforced concrete slab forming the first floor, and the columns and beams up to the roof are of the same material. All exterior walls and the first-story interior walls are of hollow blocks, stuccoed or plastered. The second-story floor is on wood joists, and the interior partitions of this story are wood studs plastered on expanded metal. The roof is of red Spanish tile on wood framing. The first floor houses the district dispensary, with all the necessary rooms for patients on both the gold and silver roll, and, with an independent entrance, the district sanitary department. On the second floor is the business suite of the district dentist, and one married living apartment for the district physician.

GATUN HYDROELECTRIC EXTENSION.

The Gatun hydroelectric plant was extended to double its original size, in the same materials and character of construction as the original building. The dimensions of the new extension are 120 feet by 61 feet 2 inches.

A detailed description of the equipment is in the report of the electrical engineer.

BALBOA GARBAGE INCINERATOR.

This plant consumes the garbage of Panama and the towns at the Pacific terminal of the canal. It is located on the point of land formerly known as Gavilan Island, which extends into the sea near the Zone line. The structure is 42 feet by 66 feet 6 inches, of reinforced concrete slabs, trams, and columns, with block walls, and red Spanish tile roof, and is constructed on an irregular rock formation that was blasted level to receive the building. The concrete chimney, 150 feet high, was built by the firm that contracted to supply and install the furnace and equipment.

A more extended description of this plant is in the report of the health department.

The following table shows the buildings on which construction work was performed during the year:

PANAMA CANAL BUILDINGS.

Item.	Description.	Number of buildings	Class	Date started.	Per cent completed June 30, 1918.	Cost to June 30, 1918.
1	Storehouse, lumber, Balboa	1	L. 1-story	July, 1916	100	$127,126.03
2	1-family quarters, Cristobal	25	A. 1-story	Apr., 1917	100	63,236.88
3	4-family quarters, Cristobal	19	A. 2-story	Apr., 1917	100	122,269.22
4	4-family quarters, Cristobal	8	A. 2-story	Apr., 1917	100	52,497.04
5	12-family silver quarters	32	A. 2-story	June, 1917	100	198,632.70
6	Restaurants, Balboa, Ancon, Cristobal (Pedro Miguel)	4	J. 1-story	Aug., 1916	96	237,761.64
7	Balboa shops' mess building and pattern-making shop	1	J. 2-story	Feb., 1916	100	58,405.77
8	School buildings, Cristobal, Gatun, Pedro Miguel, Ancon, Balboa	4	I. 1 and 2 story	June, 1916	100	435,194.15
9	Ancon Hospital administration building	1	H. 2-story	Mar., 1917	100	173,249.90
	Passageway Ancon Hospital		H. 1-story	July, 1917	100	30,366.28
10	Kitchen and mess, Ancon Hospital	1	I. 3-story	June, 1917	100	127,831.33
11	Ancon Hospital, group 7	.....	I. 2-story	Mar., 1918	60	134,682.95
12	Ancon Hospital, group 8	.....	I. 2-story	Mar., 1918	40	68,330.81
13	Isolation ward, Ancon Hospital	1	I. 2-story	June, 1917	100	120,235.66
14	Nurses' home, Ancon Hospital	1	I. 2-story	Aug., 1917	98	125,235.87
15	Garage, Ancon Hospital	1	I. 1-story	June, 1918	50	1,978.84
16	Nurses' home, Colon Hospital	1	I. 2-story	Sept., 1917	100	34,387.51
17	Larvacide plant, Ancon	1	P. 1-story	Jan., 1918	50	7,639.21
18	Boiler house, Ancon Hospital	1	P. 1-story	Nov., 1917	95	13,328.65
19	Dispensary, Gatun	1	I. 2-story	Aug., 1917	100	34,490.17
20	Crude-oil tank, Mount Hope	1	Special	Jan., 1918	90	36,986.42
21	12-family silver quarters, Balboa	1	A. 2-story	Nov., 1917	100	9,171.57
22	Tivoli Hotel kitchen	1	Q. 2-story	Dec., 1917	90	32,709.39
23	Extension hydroelectric plant, Gatun	1	J. 3-story	Nov., 1916	99	280,580.31
24	Office building, dentist and sanitary inspector	1	I. 2-story	Jan., 1917	100	25,811.91
25	Incinerator, Gavilan Island	1	J. 2-story	Jan., 1917	100	116,065.92
26	Dispensary, Pedro Miguel	1	I. 2-story	Dec., 1915	100	36,995.61

PANAMA RAILROAD BUILDINGS.

1	Ice Plant, Cristobal	1	Q. 3-story	Aug., 1917	50	$397,930.96
2	Slaughter house, Cristobal	1	Q. 3-story	June, 1918	2	1,111.48
3	12-family silver quarters, Balboa	1	A. 2-story	Aug., 1917	100	7,418.04

ARMY BUILDINGS.

Item.	Description.	Number of buildings.	Glass.	Date started.	Per cent completed June 30, 1918.	Cost to June 30, 1918.
	MANZANILLO BAY					
1	Seaplane hangars	1	A	Feb., 1918	85	$49,118.91
2	Boathouse	1	A	Feb., 1918	100	4,448.42
3	Stable	1	A	Feb., 1918	100	3,155.96
4	Garage	1	A	Mar., 1918	100	2,514.09
5	Technical storehouse	1	M	Jan., 1918	100	11,441.28
6	Machine shop and garage building	1	M	Feb., 1918	80	37,155.58
	FORT GRANT					
7	Lieutenants' quarters	2	I. 2-story	Oct., 1916	100	50,709.83
8	Lieutenants' bachelor quarters	1	I. 2-story	Mar., 1917	100	33,322.90
9	Band stand	1	I. 1-story	May, 1917	100	3,305.37
	FORT SHERMAN					
10	Headquarters building	1	A. 2-story	Oct., 1916	100	39,261.53
11	Noncommissioned officers' quarters	5	A. 2-story	Dec., 1916	100	39,062.35
12	Field officers' quarters	3	A. 2-story	Mar., 1917	100	25,067.76
13	Lieutenants' quarters	5	A. 2-story	Mar., 1917	100	52,632.35
14	Incinerator	1	P. 2-story	June, 1917	100	9,859.33
	FORT DE LESSEPS					
15	Noncommissioned officers' quarters	3	I. 2-story	Dec., 1916	100	57,471.87
16	Captains' quarters	3	I. 2-story	Dec., 1916	100	60,715.35
17	Field officers' quarters	2	I. 2-story	Jan., 1917	100	43,242.32
18	Headquarters barracks, storehouse	1	I. 2-story	Jan., 1917	100	97,294.98

NAVY BUILDINGS

1	Provision storehouse Coco Solo	1	Q. 1-story	June, 1918	4	$856.21
2	Ordnance workshop and torpedo storage building.	1	M. 1-story	June, 1917	95	27,637.08
3	Shop and power house	1	M. 1-story	Nov., 1917	30	9,470.67
4	Barracks	2	A. 2-story	Dec., 1917	100	71,793.75
5	Barracks and kitchen	1	A. 2-story	Nov., 1917	100	53,614.68
6	Laundry and boiler house	1	A. 1-story	Nov., 1917	100	3,108.88
7	Boathouse	1	R. 1-story	Nov., 1917	90	17,711.70
8	Sick quarters and dispensary	1	A. 1-story	Nov., 1917	100	11,827.94
9	Individual stores building	1	A. 1-story	Nov., 1917	50	2,557.43
10	Dirigible hangar	1	R. 1-story	Sept., 1917	100	79,429.51
11	Hydro generating shed	1	A. 1-story	Sept., 1917	95	3,092.90
12	Barracks	1	A 2-story	Nov., 1917	100	10,237.22
13	Officers' quarters	1	A. 2-story	Dec., 1917	100	7,676.88
14	Paymasters' storehouse	1	A. 1-story	Nov., 1917	100	18,972.74
15	Seaplane hangar	1	R. 1-story	Sept. 1917	100	33,844.83
16	Oil storehouse	1	Q. 1-story	Nov., 1917	100	14,475.51
17	Officers' quarters	1	A. 2-story	Nov., 1917	100	37,056.53
18	Officers' mess	1	A. 2-story	Nov., 1917	100	9,066.21
19	Commanding officers' quarters	1	A. 2-story	Nov., 1917	100	8,765.85
20	Officers' building	1	A. 1-story	Nov., 1917	100	10,799.26
21	Storage battery and acid store building.	1	M. 1-story	Nov., 1917	95	16,533.48

ORDNANCE DEPARTMENT BUILDINGS.

1	Stable and carriage building	1	A. 1-story	Feb., 1917	100	$4,808.63
2	Lumber and target storage shed	1	A. 1-story	Feb., 1917	100	2,908.11
3	Office building	1	I. 1-story	June, 1918	20	818.79
4	Artillery vehicle shed	1	I. 1-story	Feb. 1917	100	6,242.56
5	Captains' quarters	1	I. 2-story	Feb., 1917	100	15,750.00
6	Barracks	1	A. 2-story	Feb., 1917	100	17,350.00
7	Current issue and reserve storehouse	1	J. 1-story	Feb., 1917	100	84,125.52
8	Shop building	1	J. 1-story	Feb., 1917	100	16,990.46
9	Oil storehouse	1	H. 2-story	Feb., 1917	100	6,000.00
10	Commanding officer's quarters	1	I. 2-story	Feb., 1917	100	16,800.00

The following table gives the comparative unit costs of completed buildings of various types:

TABLE OF COMPARATIVE UNIT COSTS OF BUILDINGS.

Item.	Name of building.	Class.	Cost of project.	Foundations.	Handling material.	Plumbing.	Electrical work.	Municipal work.	Elevators.	Cost of building.			Cubical contents (feet).	Cost per cubic foot.
										Labor.	Material.	Total.		
1	Dispensary, Pedro Miguel	I. 2-story	$36,995.61	$174.88	$1,689.45	$2,316.87	$1,300.72	$103.08	.....	$16,236.25	$13,089.90	$29,326.15	88,040	$0.3331
2	Sanitary inspectors, Balboa	I. 2-story	25,811.91	285.49	1,861.01	2,015.89	807.03	12.52	.....	9,508.29	9,541.28	19,049.57	56,420	.3376
3	Ancon Hospital administration building.	I. 2-story	173,249.90	1,410.70	8,616.90	15,734.24	10,770.08	3,734.95	$7,567.40	60,011.57	57,971.75	117,983.32	554,106	.2129
4	Incinerator, Balboa	J. 2-story	116,065.92	1,970.98	6,359.83	474.96	345.77	3,213.75	.....	17,669.96	89,371.29	107,041.25	114,240	.9369
5	Ancon Hospital isolation ward	I. 2-story	120,235.66	1,169.82	5,889.92	12,684.78	7,547.86	317.81	6,886.94	39,328.53	38,900.50	78,229.03	339,233	.2306
6	Ancon Hospital kitchen and mess.	I. 3-story	127,831.33	1,530.53	10,013.80	6,234.60	4,958.58	9.04	9,626.28	37,407.12	50,440.05	87,847.17	323,468	.2715
7	Headquarters building, Fort Sherman.	A. 2-story	39,261.53	2,172.57	4,023.91	3,393.36	1,307.28	34.54	.....	10,954.99	16,401.59	27,356.58	312,067	.0877
8	Noncommissioned officers' quarters, Fort Sherman.	A. 2-story	7,812.47	518.14	806.77	730.07	582.41	513.88	.....	2,335.19	2,162.23	4,497.42	60,412	.0744
9	Captains' quarters, Fort Sherman.	A. 2-story	7,690.07	89.98	705.12	632.13	349.43	.....	.....	2,073.11	3,700.11	5,774.07	46,474	.1242
10	Field officers' quarters, Fort Sherman.	A. 2-story	8,355.92	111.52	765.35	761.10	434.43	.....	.....	2,288.29	3,845.00	6,133.29	71,904	.0853
11	Lieutenants' bachelor quarters, Fort Sherman.	A. 2-story	16,170.09	511.43	1,483.17	1,125.66	1,251.77	.....	.....	3,892.40	7,444.62	11,337.02	54,145	.2093
12	Noncommissioned officers' quarters, Fort De Lesseps.	I. 2-story	19,157.29	55.65	735.06	598.98	825.26	118.33	.....	8,045.21	8,020.76	16,065.97	70,234	.2287
13	Captains' quarters, Fort De Lesseps.	I. 2-story	20,238.45	106.49	738.10	1,542.33	619.72	42.13	.....	9,050.69	7,933.57	16,984.26	67,680	.2509
14	Field officers' quarters, Fort De Lesseps.	I. 2-story	21,621.16	15.94	844.73	1,229.30	858.82	6.17	.....	11,041.59	7,098.50	18,140.09	67,680	.2680
15	Headquarters barracks storehouse, Fort De Lesseps.	I. 2-story	97,294.98	386.34	2,772.01	4,099.63	2,925.62	165.74	.....	41,938.75	41,874.88	83,813.63	764,086	.1097
16	Barracks Panama ordnance depot.	A. 1-story	17,350.00	66.63	1,663.77	783.02	503.91	35.46	.....	7,005.59	6,400.20	13,405.79	138,249	.0969
17	Commanding officers' quarters, ordnance depot.	I. 2-story	16,800.00	99.77	970.19	670.73	591.43	.....	.....	5,812.44	6,522.37	12,334.81	67,680	.1823
18	Shop building, ordnance depot	J. 1-story	16,990.46	114.76	809.23	46.22	715.74	23.26	.....	4,807.75	8,151.00	12,958.75	93,600	.1384
19	Current issue and reserve storehouse, ordnance depot.	J. 1-story	84,125.52	2,529.30	3,081.27	146.97	1,739.43	122.45	.....	19,000.35	45,150.19	64,150.54	235,248	.2727
20	Toilet building, ordnance depot	I. 1-story	1,772.79	12.70	37.96	648.21	64.20	12.76	.....	427.67	320.37	748.04	6,471	.1156
21	Reserve magazine and high explosive magazine ordnance depot.	J. 2-story	19,549.14	196.01	1,148.37	45.52	386.65	11.49	.....	4,728.87	9,164.70	13,893.57	113,400	.1225
22	Oil storehouse, ordnance depot	H. 2-story	6,000.00	121.73	472.17	73.84	143.97	19.95	.....	1,972.99	3,181.33	5,154.32	32,032	.1609
23	Oil storehouse, Navy submarine base, Coco Solo.	Q. 1-story	14,475.51	299.10	971.45	.....	171.03	.....	.....	5,656 13	6,646.73	12,302.86	74,880	.1931
24	Paymasters' storehouse, Navy submarine base, Coco Solo.	A. 1-story	18,972.74	761.95	1,083.03	121.52	542.46	.....	.....	6,986.42	8,200.16	15,186.58	103,740	.1464
25	Junior officers' quarters, Navy submarine base, Coco Solo.	A. 2-story	37,056.53	543.35	1,504.37	3,591.98	2,288.39	.....	.....	9,411.62	17,967.62	27,379.24	273,224	.1002
26	Kitchen building, Navy submarine base, Coco Solo.	A. 2-story	9,066.21	.....	560.78	958.33	6.33	28.40	.....	2,698.56	4,352.85	7,051.41	25,234	.2794

27	Office building, Navy submarine base, Coco Solo.	A. 1-story..	10,799.26	168.15	913.48	524.09	841.54	21.60	.....	2,821.78	4,900.60	7,722.38	101,046	.0764
28	Quarters for di i ion commander, Navy submarine base, Coco Solo.	A. 2-story..	8,765.85	71.32	434.22	532.69	445.38	.....	.....	3,298.43	3,560.72	6,859.15	70,655	.0971
29	Storage battery and acid store building, Navy submarine base, Coco Solo.	M. 1-story..	16,533.48	387.48	1,559.99	498.28	122.57	20.80	.....	6,813.13	5,690.97	12,504.10	98,520	.1269
30	Technical storehouse, U. S. aviation base, Manzanillo Bay.	M. 1-story..	11,441.28	92.74	324.80	112.77	283.00	.....	.....	4,076.51	5,823.25	9,899.76	98,820	.1002
31	Seaplane hangar, U. S. aviation base, Manzanillo Bay.	A. 1-story..	33,844.83	2,160.31	1,074.05	273.06	395.52	.....	.....	8,268.02	18,903.39	27,171.41	987,840	.0275
32	Machine shop and garage, U. S. aviation base, Manzanillo Bay.	M. 1-story..	37,155.58	378.06	1,635.70	313.57	856.40	8.01	.....	10,872.77	21,288.12	32,160.89	494,900	.0649

DESCRIPTION OF VARIOUS CLASSES OF BUILDINGS.

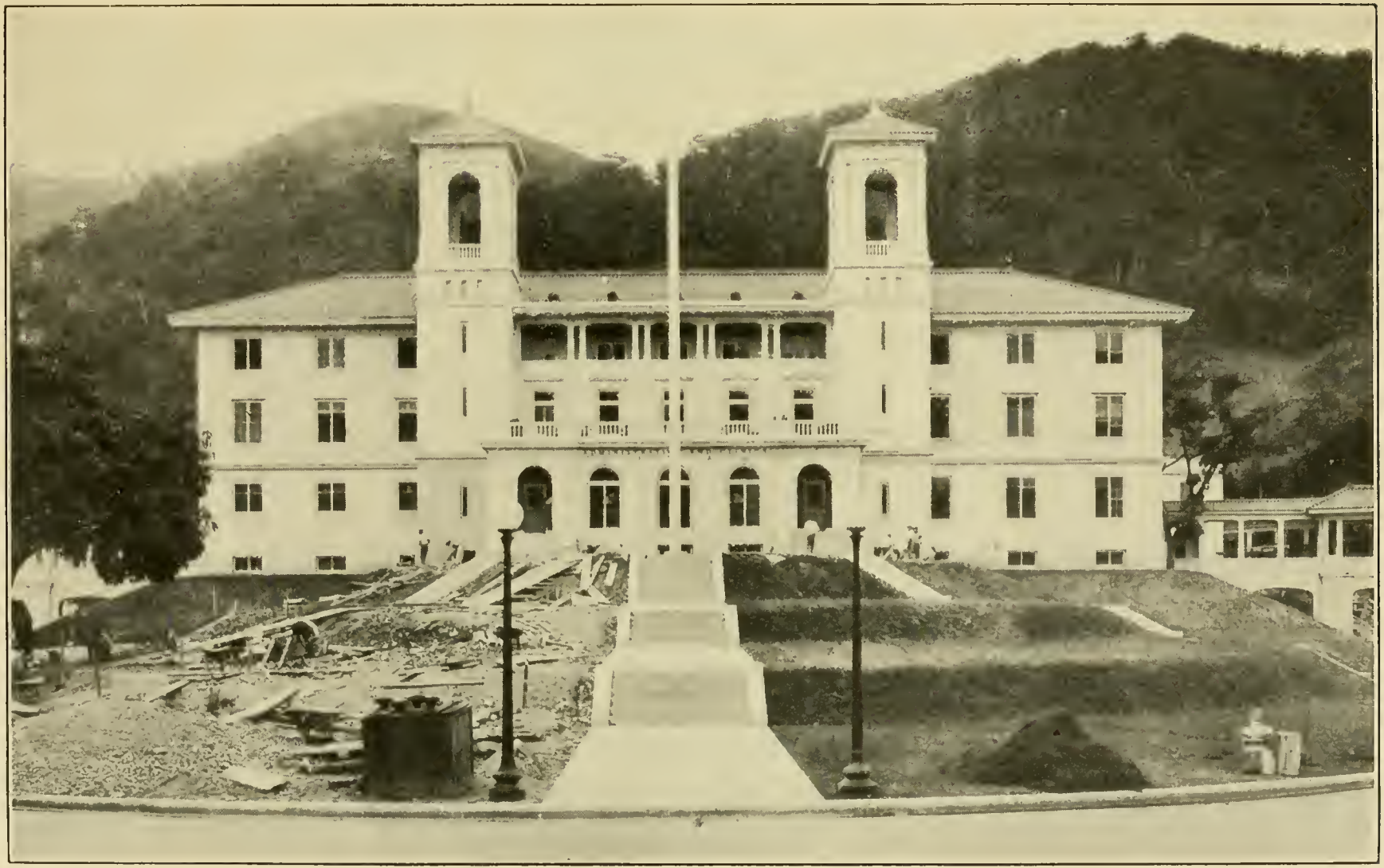
Class A.—Frame; wood post foundation; asphalt shingle roof.
Class B.—Reinforced concrete exterior walls; wood floors; wood partitions; Spanish red tile on frame roof.
Class C.—Cement block and stucco walls; wood floors; Spanish red tile on frame roof.
Class D.—Reinforced bearing walls andfloors; cement block partition; cement plaster; oil painted; Spanish red tile on frame roof.
Class E.—Cement block and stucco walls; concrete floors; Spanish red tile on frame roof.
Class F.—Reinforced concrete walls and floor; steel roof trusses; Spanish red tile roof; steel doors.
Class G.—Reinforced concrete floor; block and stucco walls; asphalt shingles on frame roof.
Class H.—Two feet thick reinforced concrete walls, floor and roof, double-steel doors.
Class I.—Reinforced concrete bearing walls; cement block partitions, cement plaster; oil painted, tile floor and base; Spanish red tile on frame roof.
Class J.—Reinforced concrete bearing walls and partitions, cement plaster, enamel painted; tile floors and walls; Spanish red tile on steel trusses.
Class K.—Reinforced concrete walls and floors; steel roof trusses; corrugated asbestos roof; steel doors.
Class L.—Structural steel column trusses, cement block partitions; corrugated asbestos roof.
Class M.—Reinforced concrete foundation and walls; asphalt shingles on frame roof.
Class N.—Reinforced concrete foundations and walls; Spanish red tile on frame roof.
Class P.—Reinforced concrete foundations and walls; asbestos covering on frame roof.
Class Q.—Reinforced concrete bearing walls; cement block partitions; concrete floor and roof.
Class R.—Reinforced concrete columns and floors; steel truss roof; asphalt shingles.

In addition to the work outlined in the above tables, construction and repair work was performed for the various departments and divisions.

Respectfully submitted.

H. Rowe,
Resident Engineer.

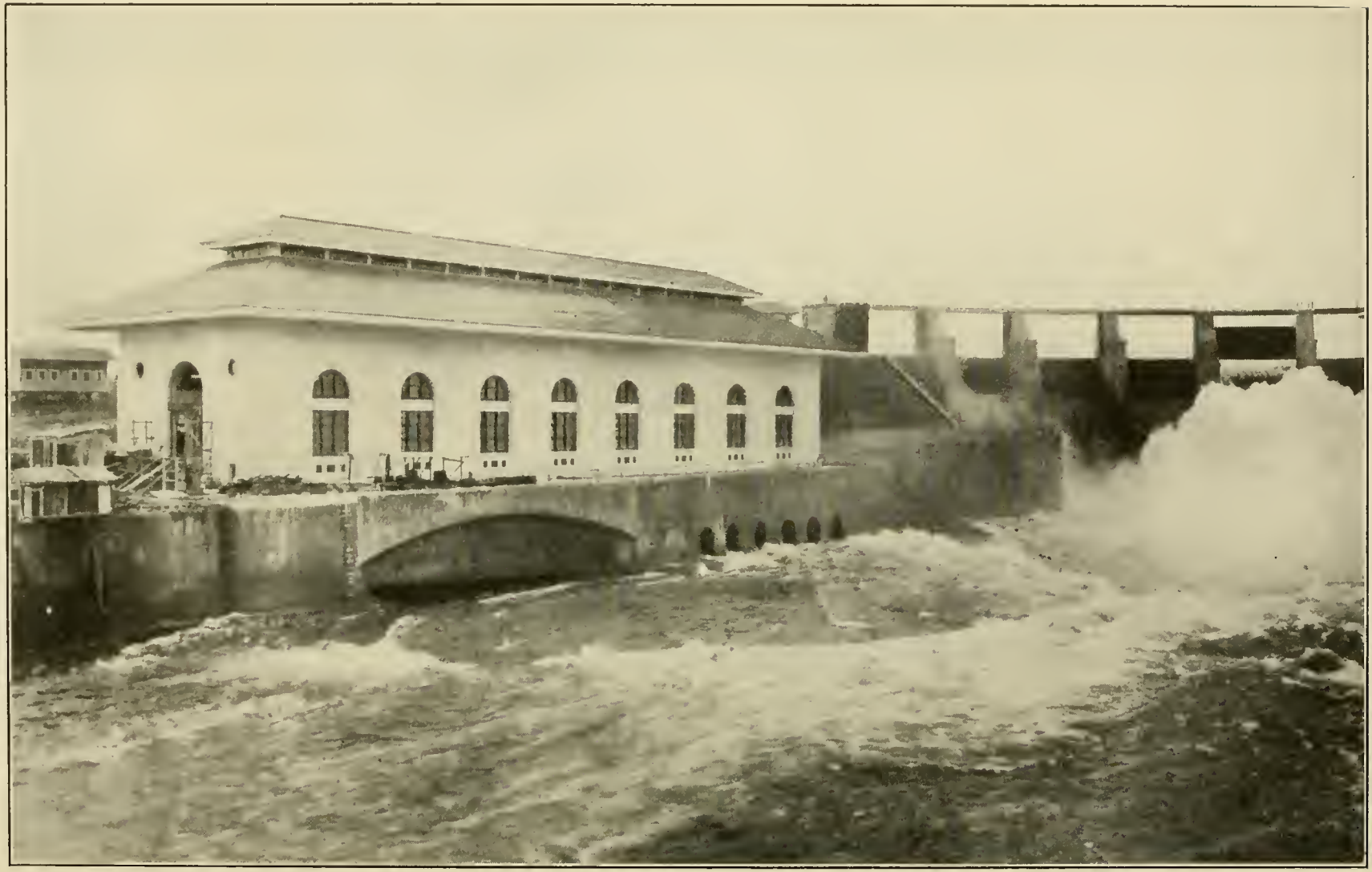
Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.



ANCON HOSPITAL. ADMINISTRATION BUILDING.

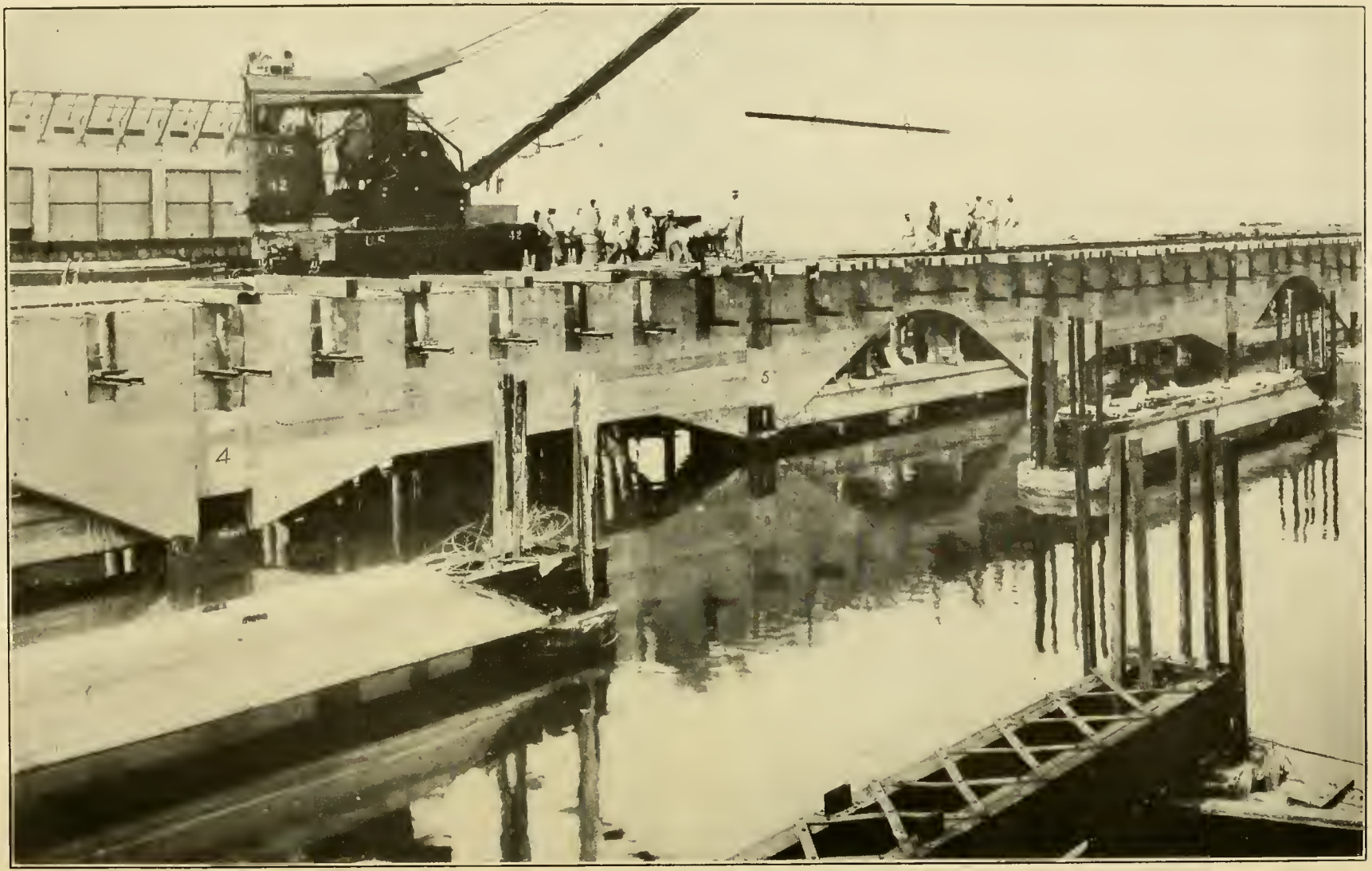
ANCON HOSPITAL. KITCHEN AND MESS.

ANCON HOSPITAL. ISOLATION WARD.



GATUN HYDROELECTRIC STATION. VIEW FROM BRIDGE SHOWING ONE SPILLWAY GATE OPEN. JUNE 6, 1918.

ATLANTIC TERMINALS. GENERAL VIEW OF PIER NO. 6, CRISTOBAL.



ATLANTIC TERMINALS. REINFORCED CONCRETE GIRDERS AND ARCHES TO SUPPORT FLOOR SYSTEM OF PIER NO. 6, CRISTOBAL.

APPENDIX C.

REPORT OF THE RESIDENT ENGINEER, DREDGING DIVISION, DEPARTMENT OF OPERATION AND MAINTENANCE.

PARAISO, CANAL ZONE, *July 28, 1918.*

SIR: I have the honor to submit the following report of operations in the dredging division during the fiscal year ended June 30, 1918:

DIVISION ORGANIZATION.

From July 1, 1917, to March 31, 1918, the division was divided into two districts, the first embracing all dredging operations in the Pacific entrance, Miraflores Lake, and Gaillard Cut; the second district, all dredging operations in the Atlantic entrance and Gatun Lake. On April 1, 1918, the two districts were consolidated and all dredging operations handled direct from the division headquarters at Paraiso.

DREDGING PLANT.

The following dredges and other floating plant were in operation during the year:

The seagoing suction dredge *Culebra* was engaged in deepening the channel through Gaillard Cut from July 1 to July 20, 1917; in the service of the supply department as a cattle boat from July 21 to October 8, 1917; salvaging and wrecking operations, steamer *Somerset* aground at Old Providence Island from October 9 to 13, 1917; maintaining and deepening the Pacific entrance channel and Balboa Harbor, and excavating and transporting sand from Chame Point from October 14, 1917, to April 3, 1918; salvaging and wrecking operations, steamship *Grays Harbor* aground on Old Providence Island, April 4 to 10, 1918, and in the service of the supply department as a cattle boat from April 11 to the end of the year.

The 20-inch pipe-line dredge *No. 82* was engaged in reclaiming sand and gravel from the Chagres River above Gamboa, from July 1, 1917, to May 26, 1918, on which date it was permanently retired from the canal service, towed to Cristobal and turned over to the chief quartermaster for transfer to the States.

The 20-inch pipe-line dredge *No. 83* was engaged during the year excavating the Coco Solo submarine basin, filling the swamp areas around Coco Solo, filling at the Navy and Army aviation fields near Coco Solo and widening the Cristobal approach channel.

The 20-inch pipe-line dredge *No. 84* was engaged during the year excavating the Coco Solo submarine basin, deepening the Atlantic entrance channel, filling swamp areas at the Navy and Army aviation fields near Coco Solo, uncovering the submerged oil and water lines across Cristobal Harbor and excavating in the Inner Harbor at Balboa.

The 20-inch pipe-line dredge *No. 85* was engaged in excavating Balboa Harbor and maintaining the Pacific entrance channel from July 1, 1917, to May 15, 1918; and was permanently retired from the canal service on May 16, 1918, and turned over to the chief quartermaster for transfer to the States.

The 20-inch pipe-line dredge *No. 86* was engaged during the year in maintaining the channel and removing slides in Gaillard Cut, excavating the Coco Solo submarine basin, filling the Navy and Army aviation fields near Coco Solo, and reclaiming sand and gravel from the Chagres River above Gamboa.

The 15-yard dipper dredge *Cascadas* was operated in the Pacific entrance channel, excavating rock and hard clay from Balboa Harbor, deepening the channel along the Panama Railroad steel wharf at Balboa, excavating the submarine basin at Coco Solo, deepening the channel at the Fort De Lesseps wharf and widening the Cristobal approach channel.

The 15-yard dipper dredge *Gamboa* was operated in Gaillard Cut, excavating and deepening the channel at Cucaracha, Culebra, and various other small slides, and at the Paraiso P. I. channel improvement work.

The 15-yard dipper dredge *Paraiso* was operated throughout the year in excavating and deepening the channel at Cucaracha, Culebra, and various other small slides, and at the Paraiso P. I. channel improvement work.

The seagoing ladder dredge *Corozal* was engaged in excavating the Balboa Harbor, widening and deepening the Pacific entrance channel and excavating rock from the oil berths along the old Panama Railroad steel wharf.

The French ladder dredge *Marmot* was engaged in excavating various small slides, the Tower-R incline, Gamboa dike, and on general maintenance work in Gaillard Cut, deepening the Balboa Inner Harbor and excavating at the Miraflores P. I. improvement work near Miraflores locks.

The drill *Teredo No. 2* was operated during the year at Culebra and Powderhouse slides in Gaillard Cut, at the dry dock cofferdam, in Balboa Harbor, and at the old Panama Railroad steel wharf at Balboa, in the Pacific entrance channel, and at the Miraflores and Paraiso P. I's channel improvement works.

The hydraulic grader *No. 1* was engaged during the year ditching and grading the east and west Culebra, Powderhouse, Whitehouse, Las Cascadas, Buena Vista, and Cucaracha slides, cleaning out the old drainage ditches and sluicing ahead of drills at Paraiso P. I. improvement work.

The hydraulic graders *No. 2* and *No. 3* were engaged in sluicing at east and west Culebra slides and on the high level bank improvement work at Rio Grande and north of Contractors Hill.

The floating air compressor *No. 27* was operated from July 11, 1917, to January 12, 1918, supplying air to the drills at work on the high level bank improvement work north of Contractors Hill, was retired from service from January 13, 1918, to April 9, 1918, was placed in commission again on April 10, 1918, and operated to supply air for the drills at work at the Paraiso P. I. improvement work to the end of the year.

The United States tug *Reliance* sunk off the west breakwater at Cristobal on December 27, 1916, was floated and towed to the Cristobal dry dock on July 13, 1917, where it was overhauled and again placed in commission on August 19, 1917.

Of the 10 tugboats in the dredging service on July 1, 1917, 3 have been transferred to the marine division, 1 to the States, and 1 to the Navy. On June 30, 1918, the division was operating 5 tugboats and 2 steam launches in dredging, and sand and gravel service.

A total of 20 launches, including the watch boats *Siri* and *Pequeni*, inspection boats *Search* and *Patrol*, and the steam launch *Hyacinth*, were in operation on July 1, 1917. During the year the *Pequeni*, *Patrol*, and 6 smaller launches were retired or transferred to other departments.

The following table shows the number of days the dredges were retired from dredging service for repairs, alterations, or on detached service:

TABLE No. 1.—*Number of days dredges were retired from dredging service.*

Dredge.	Type.	Days out of service.	Remarks.
Culebra	Seagoing suction	194	12 days wrecking service; 21 days repairs; 161 days cattle industry.
No. 82	Pipe-line suction	50	Retired May 26, 1918.
No. 83	do	32	Repairs.
No. 84	do	34	Do.
No. 85	do	66	Retired May 16, 1918.
No. 86	do	22	Repairs.
Corozal	Seagoing ladder	44	Do.
Marmot	French ladder	29	Do.
Cascadas	15-yard dipper	16	Do.
Gamboa	do	32	Do.
Paraiso	do	29	Do.

DREDGING.

Dredges operating in the canal prism, at the Atlantic and Pacific terminals, and in the sand and gravel service, removed a total of 6,765,031 cubic yards of material.

The following table shows the output of each dredge during the year, with the total and unit costs of same:

TABLE No. 2.—*Output of all dredges, with total and unit costs.*

Dredge.	Output in cubic yards.				Unit cost.
	Earth.	Rock.	Total.	Cost.	
Culebra	461,687	.....	461,687	$127,196.82	$0.2755
No. 82	275,400	.....	275,400	99,593.53	.3616
No. 83	260,800	184,900	445,700	160,916.20	.3610
No. 84	449,662	109,838	559,500	173,212.58	.3096
No. 85	769,700	.....	769,700	143,197.83	.1860
No. 86	775,044	61,100	836,144	190,932.09	.2283
Cascadas	291,085	451,015	742,100	397,913.97	.5362
Gamboa	15,350	801,850	817,200	563,343.72	.6894
Paraiso	37,500	853,900	891,400	599,914.48	.6730
Corozal	548,000	148,500	696,500	471,836.50	.6774
Marmot	112,280	157,420	269,700	180,773.75	.6703
Total	3,996,508	2,768,523	6,765,031	3,108,831.47	.45954
Total, 1917	7,315,487	8,130,398	15,445,885	4,291,124.02	.27782

While the above table shows the actual cost of the yardage removed, the cost of the total yardage handled by dredges would be a trifle less, as there were 16,013 cubic yards of material rehandled for which no credit was taken upon second handling.

With the exception of dredges *No. 82* and *No. 85*, costs are for materials placed on the dump. Costs of dredge *No. 82* are for material delivered alongside the gravel dock at Gamboa, and of *No. 85* for material delivered to the first relay pump, which was about 3,300 feet from the dredge.

The following tables show the monthly output of all dredges exclusive of the sand and gravel plants, by geographical districts:

TABLE No. 3.—*Yardage removed from the —42-foot mean sea level contour in the Atlantic Ocean to Gamboa Dike.*

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1917.							
July	19,452	.....	19,452	44,088	19,048	63,136	82,588
August	.....	.....	.....	40,020	32,894	72,914	72,914
September	.....	.....	.....	38,202	38,396	76,598	76,598
October	.....	.....	.....	52,300	68,100	120,400	120,400
November	.....	.....	.....	51,400	43,900	95,300	95,300
December	.....	.....	.....	62,900	45,200	108,100	108,100
1918.							
January	.....	.....	.....	152,100	11,300	163,400	163,400
February	.....	.....	.....	118,600	72,200	190,800	190,800
March	.....	.....	.....	167,800	57,300	225,100	225,100
April	.....	.....	.....	165,100	72,900	238,000	238,000
May	.....	.....	.....	167,300	82,900	250,200	250,200
June	.....	.....	.....	90,700	100,700	191,400	191,400
Total	19,452	.....	19,452	1,150,510	644,838	1,795,348	1,814,800

TABLE No. 4.—*Yardage removed from Gaillard Cut, Gamboa Dike to Pedro Miguel locks.*

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1917.							
July	178,549	336,485	515,034	.....	.....	.....	515,034
August	95,680	308,930	404,610	.....	.....	.....	404,610
September	102,999	279,915	382,914	.....	.....	.....	382,914
October	70,800	177,600	248,400	.....	.....	.....	248,400
November	71,500	169,200	240,700	.....	.....	.....	240,700
December	28,300	112,900	141,200	.....	.....	.....	141,200
1918.							
January	.....	104,900	104,900	.....	.....	.....	104,900
February	8,000	84,400	92,400	.....	.....	.....	92,400
March	11,800	61,315	73,115	.....	.....	.....	73,115
April	8,300	61,600	69,900	.....	.....	.....	69,900
May	24,300	40,100	64,400	.....	.....	.....	64,400
June	9,500	58,200	67,700	.....	.....	.....	67,700
Total	609,728	1,795,545	2,405,273	.....	.....	.....	2,405,273

TABLE No. 5.—*Yardage removed, Pedro Miguel lock to the —45-foot mean sea level contour in the Pacific Ocean.*

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1917.							
July	.....	.....	.....	197,846	43,700	241,546	241,546
August	36,715	45,565	82,280	168,718	17,675	186,393	268,673
September	51,475	11,200	62,675	85,331	27,600	112,931	175,606
October	194,900	15,000	209,900	84,200	29,400	113,600	323,500
November	50,000	9,600	59,600	183,300	10,000	193,300	252,900
December	77,100	9,600	86,700	60,500	12,700	73,200	159,900
1918.							
January	117,200	5,700	122,900	72,800	6,900	79,700	202,600
February	67,500	9,700	77,200	91,400	.....	91,400	168,600
March	29,700	9,500	39,200	126,600	.....	126,600	165,800
April	53,000	16,100	69,100	36,698	.....	36,698	105,798
May	39,700	20,100	59,800	47,300	5,000	52,300	112,100
June	24,400	23,100	47,500	12,000	.....	12,000	59,500
Total	741,690	175,165	916,855	1,166,693	152,975	1,319,668	2,236,523

DREDGING CANAL PRISM.

Dredges were at work throughout the year dredging and maintaining the canal channel in the Atlantic entrance, Gaillard Cut, and the Pacific entrance, excavating a total of 3,341,580 cubic yards of construction and maintenance yardage as shown in the following table:

TABLE No. 6.—*Number of cubic yards removed from the canal prism.*

Location.	Construction.	Maintenance.	Total.
Atlantic entrance	.....	19,452	19,452
Gatun Lake	.....	.....	.....
Gaillard Cut	120,000	2,285,273	2,405,273
Miraflores Lake	.....	.....	.....
Pacific entrance	319,880	596,975	916,855
Total canal prism	439,880	2,901,700	3,341,580

At the close of the past fiscal year there remained to be removed from the canal prism, including siltage, slides, and original material, 3,337,640 cubic yards of earth and 834,000 cubic yards of rock.

The following table shows the classification and location of all yardage remaining to be removed from the canal prism on June 30, 1918:

TABLE No. 7.—*Yardage remaining to be removed from the canal prism.*

Location.	Construction.			Maintenance.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
Atlantic entrance				732,210		732,210	732,210
Gatun Lake	50,000		50,000	165,000		165,000	215,000
Gaillard Cut		25,000	25,000	444,400	489,000	933,400	958,400
Miraflores Lake				175,000		175,000	175,000
Pacific entrance	268,600	109,600	378,200	1,502,430	210,400	1,712,830	2,091,030
Total	318,600	134,600	453,200	3,019,040	699,400	3,718,440	4,171,640

It is estimated that during the present fiscal year the following amounts of shoaling will occur in the canal prism:

Location.	Earth.	Rock.	Total.
Atlantic entrance	200,000		200,000
Gaillard Cut	250,000	500,000	750,000
Pacific entrance	300,000		300,000
Total	750,000	500,000	1,250,000

At the Miraflores P. I., just below Miraflores locks, the discharge water from the locks, together with the tidal currents, have made the handling of ships at this point most difficult. A project to widen the channel by cutting off the point of land on the west bank was approved and dredging begun in April, 1918. The total estimated quantities to be removed are 230,000 cubic yards of earth and 225,000 cubic yards of rock, of which 68,400 cubic yards of earth and 14,600 cubic yards of rock had been excavated on June 30, 1918.

At the Paraiso P. I., one-half mile from Pedro Miguel locks, in Gaillard Cut, a project to widen the canal to give a better and easier approach to the locks was approved, and dredging operations started in March, 1918. The total estimated quantities are 66,000 cubic yards of earth and 370,000 cubic yards of rock, of which 21,100 cubic yards of earth and 81,000 cubic yards of rock had been excavated up to June 30, 1918.

Of the material removed from Gaillard Cut 51.5 per cent was from Culebra slide, 6.1 per cent from Cucaracha slide, and 42.4 per cent from other small slides and canal areas.

The following table shows the distribution of all material removed from Gaillard Cut during the year:

TABLE No. 8.—*Distribution of material removed from Gaillard Cut.*

Location.	Fiscal year.			Total to date.		
	Earth.	Rock.	Total.	Earth.	Rock.	Total.
Gamboa Dike	.....	6,400	6,400	23,856	59,505	83,361
Tower "R" incline	.....	83,505	83,505	.....	83,505	83,505
Hout Obispo slide, west	3,235	.....	3,235	3,235	.....	3,235
Buena Vista slide, west	5,470	.....	5,470	5,470	.....	5,470
Cascadas slide, east	2,525	16,300	18,825	2,525	32,670	35,195
Whitehouse slide, east	2,740	5,900	8,640	9,928	17,132	27,060
Powderhouse slide, east	8,860	27,085	35,945	39,768	57,992	97,760
La Pita (lower) slide, east	.....	7,350	7,350	.....	59,803	59,803
Empire slide, east	12,600	88,670	101,270	23,945	206,217	230,162
Division Office slide, west	.....	6,280	6,280	.....	6,280	6,280
Lirio slide, west	.....	32,400	32,400	990	69,080	70,070
Culebra, new slide, east and west [1]	144,202	1,093,775	1,237,977	1,677,799	21,730,301	23,408,100
Culebra, old slide, east and west [2]	.....	.....	.....	28,449	1,061,337	1,089,786
Contractors Hill, north	13,800	139,600	153,400	13,800	139,600	153,400
65-foot berm, west	.....	47,700	47,700	.....	73,430	73,430
Cucaracha slide, east	42,129	105,080	147,209	1,464,906	4,364,546	5,829,452
Contractors Hill slide, west	6,400	28,100	34,500	6,400	28,100	34,500
Paraiso Incline, east	.....	20,300	20,300	.....	20,300	20,300
Paraiso P. I., west	21,100	81,000	102,100	21,100	81,000	102,100
Pedro Miguel slide, east	.....	.....	.....	1,956	7,254	9,210
Miscellaneous [3]	346,667	6,100	352,767	2,853,578	157,860	3,011,438
Total	609,728	1,795,545	2,405,273	6,177,705	28,255,912	34,433,617

[1] Since Oct. 14, 1914. [2] Prior to Oct. 14, 1914. [3] Small slides and fills in the canal.

Cucaracha slide, which had been quite active during a part of the past year, has been fairly quiescent throughout the year and at no time has it been a menace to the safe navigation of the canal. A total of 5,829,452 cubic yards has been removed from this slide to date by dredges.

Culebra slide has been more or less active throughout the year but the channel has been maintained at all times and no delays to shipping occurred. The slide areas have not materially increased during the year. There has been removed from the Culebra slides to date by dredges a total of 24,497,886 cubic yards of material, and it is estimated that 1,000,000 cubic yards more will have to be removed before slides become permanently quiescent.

The west bank of the canal between Contractors Hill and West Culebra slide, which was from 280 to 310 feet in elevation, was considered a menace to canal navigation, as a slide, which threatened to occur at any time, would probably have closed the canal to navigation for a considerable period of time. A project for reducing the slope and weight of this bank was approved, which involved the removal of 241,000 cubic yards of material. There were 87,600 cubic yards removed by steam shovel from the higher levels; 153,400 cubic yards were sluiced down and removed by dredges and 158,255 cubic yards, too hard for the graders to handle, were drilled and shot before grading. The entire project was completed within the year.

The smaller slides have been semiquiescent during the year and at no time have they given serious trouble or in any way affected the channel.

The passage of commercial shipping through the canal was not delayed nor suspended at any time during the year by the slides in Gaillard Cut.

Drag surveys were made daily in the vicinity of all active slides, and all lumps or shoals found were immediately removed by the dredges.

DUMPS.

The material removed from the Atlantic entrance was deposited in the swamp lands west of the canal at Mindi.

The spoil from Gaillard Cut was disposed of on dumps located in Gatun Lake from Tabernilla, mile 24, to Mamei, mile 27, in the Rio Grande Valley south of Cucaracha, and in Miraflores Lake. There were 2,038,877 cubic yards dumped in Gatun Lake, 335,096 yards in the Rio Grande Valley, and 11,300 cubic yards in Miraflores Lake. Dredge *No. 86* rehandled 11,300 cubic yards.

The material excavated in the Pacific entrance was deposited in the swamp along the west bank of the canal opposite Balboa and on the sea dump located to the westward of the canal entrance in Panama Bay. There were 117,700 cubic yards deposited in the swamp along the west bank, and 799,155 cubic yards on the sea dump.

SUBAQUEOUS ROCK EXCAVATIONS.

During the year 2,123,685 cubic yards of hard and soft rock were removed from the canal prism and Balboa Harbor as follows: 160,565 cubic yards from the Pacific entrance channel; 1,093,775 cubic yards from Culebra slide; 105,080 cubic yards from Cucaracha slide; 218,185 cubic yards from various small slides; 139,600 cubic yards from the bank improvement work north of Contractors Hill; 6,400 cubic yards from Gamboa Dike; 83,505 cubic yards from Tower-R incline; 20,300 cubic yards from Paraiso incline; 47,700 cubic yards from the 65-foot berm; 81,000 cubic yards from the Paraiso P. I. improvement work; 14,600 cubic yards from Miraflores P. I. improvement work; 141,020 cubic yards from Balboa Harbor, and 11,955 cubic yards from in front of the Panama Railroad steel wharf at Balboa.

Of this amount, 75,578 cubic yards were drilled and blasted by the drillboat *Teredo No. 2*, and 230,697 cubic yards by well and tripod drills at Culebra slide and the Paraiso P. I. 299,704 pounds of dynamite were used during the year by the *Teredo No. 2*, well and tripod drills, by dredges in dobying large rocks and on other small jobs.

The following tables show the location, feet drilled, area covered, theoretical breakage, and costs of all rock mined by the *Teredo No. 2*, well and tripod power drills:

TABLE No. 9.—*Mining—Performance of drill boat "Teredo No. 2."*

Month.	Location.	Number holes.	Total feet drilled.	Powder (number of pounds).	Area (square yards).	Breakage (cubic yards).	Cost.	Unit cost.
1917.								
July	Dry-dock entrance, Balboa	421	4,513	13,584	1,684	6,017	$10,492.57	$1.7438
August	do	697	5,918	13,093	2,788	7,890	10,375.16	1.3150
September	Stations 2212–2214, 2266, Pacific entrance							
	Stations 1619, 1793, Gaillard Cut							
	Dry-dock entrance, Balboa	616	5,319	14,003	2,464	7,090	10,669.54	1.5049

TABLE No. 9.—*Mining—Performance of drill boat "Teredo No. 2"*—Continued.

Month.	Location.	Number holes.	Total feet drilled.	Powder (number of pounds).	Area (square yards).	Breakage (cubic yards).	Cost.	Unit cost.
October	Stations 2265–2267, Pacific entrance	620	5,583	14,280	2,480	7,442	$11,630.16	$1.5628
November	Stations 2263–2265, Pacific entrance	.....	.....	.....	.....	.....	.....	.....
	Oil dock, Balboa	527	4,625	10,014	2,108	6,165	9,270.97	1.5038
December	Stations 2262–2264, Pacific entrance	.....	.....	.....	.....	.....	.....	.....
	Oil dock, Balboa	394	2,941	6,181	1,400	3,408	8,844.72	2.5953
1918.								
January	Stations 2260–2262, Pacific entrance	.....	.....	.....	.....	.....	.....	.....
	Oil dock, Balboa	461	2,976	6,998	1,776	3,890	10,273.60	2.6403
February	Stations 2259–2261, 2089–2090, Pacific entrance	.....	.....	.....	.....	.....	.....	.....
	Oil dock, Balboa	289	2,252	6,176	1,099	2,811	8,759.64	3.1162
March	Stations 2089–2097, Pacific entrance	562	4,623	14,024	2,248	6,163	10,510.22	1.7054
April	Stations 2085–2089, Pacific entrance	454	6,539	19,784	1,816	8,716	13,230.68	1.5180
May	Stations 2080–2081, Pacific entrance; 1893–1895, Gaillard Cut	351	6,864	19,475	1,702	11,420	13,340.30	1.1682
June	Station 1893, Gaillard Cut	.....	.....	.....	.....	.....	.....	.....
	Stations 2110–2113, Pacific entrance	370	3,325	8,501	1,502	4,566	6,637.84	1.4538
Total		5,762	55,478	146,113	23,067	75,578	124,035.40	1.6412

TABLE No. 10.—*Mining—Performance of well and tripod drills.*

Month.	Location.	Number holes.	Total feet drilled.	Powder (number of pounds).	Area (square yards).	Breakage (cubic yards).	Cost.	Unit cost.
1917.								
July	Station 1800, west	214	7,069	810	856	8,855	$5,760.53	$0.6505
August	Stations 1800–1803, west	630	24,382	11,987	2,520	30,829	15,721.28	.5100
September	do	865	21,889	18,435	3,460	26,879	13,322.61	.4956
October	Stations 1795–1800, west	1,309	25,712	17,703	5,236	30,792	17,788.91	.5777
November	Stations 1796–1800, west	774	20,172	12,472	3,096	24,832	15,870.87	.6391
December	Stations 1797–1799, west	950	24,495	14,977	3,800	30,127	14,959.98	.4966
1918.								
January	Station 1797, west	210	4,876	12,920	840	5,941	4,407.44	.7419
February	.....	.....	.....	.....	.....	.....	.....	.....
March	.....	.....	.....	.....	.....	.....	.....	.....
April	Stations 1893–1895, Gaillard Cut	73	4,567	1,250	519	9,960	10,469.85	1.0512
May	Stations 1894–1897, 1900–1901, Gaillard Cut	531	22,763	17,885	2,572	35,135	18,708.48	.5325
June	Stations 1895–1897, 1899–1903, Gaillard Cut	387	18,705	39,250	1,906	27,347	16,643.81	.6781
Total		5,943	174,630	147,689	24,805	[1]230,697	133,653.76	.5793

[1] Includes 32,051 cubic yards drilled, but not blasted.

MISCELLANEOUS DREDGING.

ATLANTIC TERMINALS.

There were 1,150,510 cubic yards of earth and 644,838 cubic yards of rock removed from the Atlantic terminals as follows: 7,100 cubic yards of earth and 19,500 cubic yards of rock removed from the approach channel extension; 8,700 cubic yards of earth from the oil and water pipe line trench crossing to the Cristobal coaling station;

300,710 cubic yards of earth and 408,438 cubic yards of rock from the submarine base at Coco Solo; 3,000 cubic yards of earth from Coco Solo Harbor; 828,400 cubic yards of sand and 216,900 cubic yards of rock from borrow pits, and 2,600 cubic yards of earth from alongside wharf at the Fort De Lesseps.

All material excavated was disposed of as follows: 421,148 cubic yards in sanitary fills and the aviation field at Coco Solo; 764,800 cubic yards in the Army aviation fields; 585,100 cubic yards on the toes of the east and submarine breakwater fills; 21,700 cubic yards in sanitary fills near the coaling station, and 2,600 cubic yards on the Cristobal mole.

PACIFIC TERMINALS.

There were 1,166,693 cubic yards of earth and 152,975 cubic yards of rock removed from the Pacific terminals as follows: 1,160,068 cubic yards of earth and 95,765 cubic yards of rock from the Balboa Inner Harbor; 1,700 cubic yards of earth and 45,255 cubic yards of rock from the dry-dock cofferdam, and 4,925 cubic yards of earth and 11,955 cubic yards of rock from the oil dock berths.

This material was disposed of as follows: 683,000 cubic yards excavated by pipe line dredges were used in reclaiming swamp lands east of the Corozal-Panama Road; 636,668 cubic yards excavated by seagoing suction, ladder, and dipper dredges were towed to sea and deposited on the sea dump. In addition, 4,713 cubic yards of material were rehandled by pipe line dredges and placed in swamp fills.

Sand and Gravel Production.

The sand and gravel necessary for construction purposes was excavated by pipe line dredges *No. 82* and *No. 86* from the gravel beds in the overflow district of the Chagres River above Gamboa, and by the seagoing dredge *Culebra* at Chame Point on the Pacific coast. There were 47,345 cubic yards of sand, 10,625 cubic yards of No. 1 gravel, 45,737 cubic yards of No. 2 gravel, and 200,641 cubic yards of run-of-bank gravel excavated from the Chagres River and delivered to the gravel plant and stock piles at Gamboa. In addition, the dredge *Culebra* excavated 8,800 cubic yards of sand at Chame Point, of which 4,087 cubic yards were delivered at the Gamboa gravel plant, and 4,713 cubic yards unfit for use were dumped in Balboa Harbor and rehandled by dredge *No. 85*.

Diversions and Drainage.

The ditches diverting the water of the Obispo diversion into the canal were cleaned of grass and small earth slides. Ditches were maintained at east and west Culebra, Cucaracha, and all other smaller slides by the hydraulic graders to provide the necessary drainage for surface and storm waters which would otherwise collect in pools and keep the sliding material constantly saturated, thereby tending to accelerate its movement toward the canal.

Slide Inspection and Reports.

Inspections were made of all slide areas from time to time, new breaks reported, and drainage conditions noted.

Mindi Dikes and Groins.

The rock and timber dikes and groins in Mindi Beach, south of Limon Bay, have been successfully maintained throughout the year. No new dikes or groins have been built, and only minor repairs have been necessary to those previously constructed.

The erosion of the beach, which in past years had been as much as 88 feet annually, has been practically stopped and during the past year the only noticeable change was where the beach had filled or eroded slightly in the gradual adjusting of the sands into a uniform shore line.

Water Hyacinths.

Regular monthly inspections were made of the waters of the canal, Gatun Lake, and tributaries. All hyacinths found were destroyed either by spraying with an arsenic solution or by hand pulling where the plants were young and scattered.

No new beds of old plants were found, but great difficulty was experienced in keeping the old beds of previous years clean, as the water grasses, lettuce, and other plants, matted up with the logs and débris from the dead timbers in the overflowed areas, made it most difficult for the workmen to thoroughly cover the area. There were 328,859 square yards of hyacinths killed by arsenic spraying, and 564,132 young plants pulled and deposited on shore. So far as is known, no plants were allowed to seed or grow to maturity during the year.

Surveys.

The usual progress surveys were made of the dredged areas in the canal prism, Cristobal Harbor, Coco Solo, Limon Bay, Gaillard Cut, Miraflores Lake, and Balboa Harbor.

Topographic surveys were made of Culebra and Cucaracha slides, and maps prepared.

The points established at the request of the chairman of the slide commission on Gold, Zion, and Contractors Hills were checked from time to time to determine any movement or indication of sliding.

The test borings being made at the site of the proposed dry dock at Cristobal were completed, profiles plotted, data tabulated, and report made.

Office.

Routine clerical work, preparation of progress records, estimates, requisitions, etc., were satisfactorily performed during the year.

Respectfully submitted.

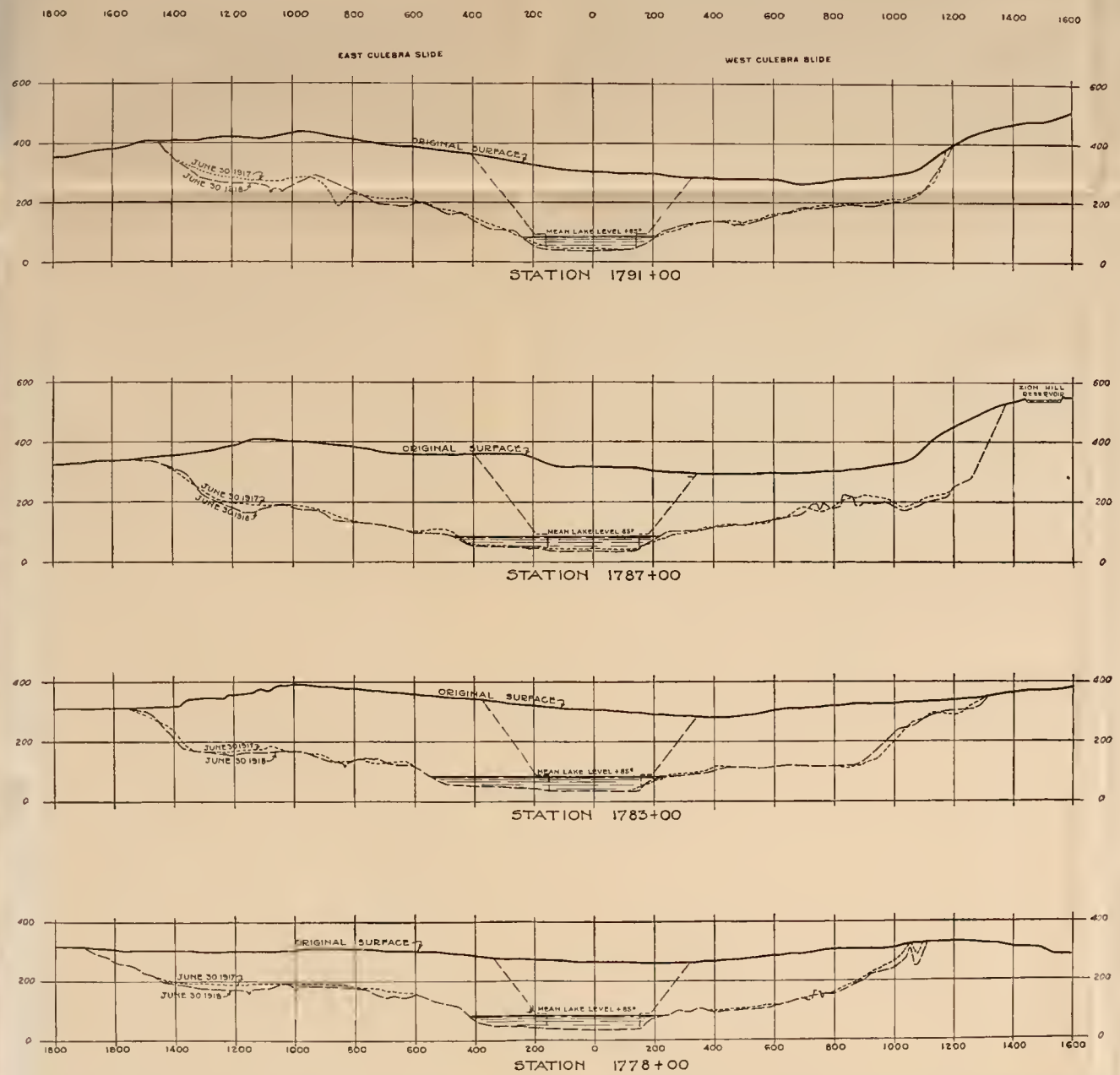
J. M. Pratt,
Superintendent of Dredging.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

GAILLARD CUT. LOOKING NORTH FROM CONTRACTOR'S HILL, SHOWING EAST AND WEST BANKS. JUNE, 1918.

GAILLARD CUT. LOOKING SOUTH, SHOWING CONDITIONS ON WEST BANK. JUNE, 1918.


EAST CULEBRA SLIDE 91 ACRES
CUCARACHA SLIDE 45 ACRES
GOLD HILL
WEST CULEBRA SLIDE 73 ACRES
TO ATLANTIC
TO PACIFIC
EAST PRISM LINE
WEST PRISM LINE
CANAL ℄
AZIMUTH 327°-23'-06"
AZIMUTH 307°-40'-14"
CONTRACTOR'S HILL
ZONA HILL
THE PANAMA CANAL
DEPARTMENT OF OPERATION AND MAINTENANCE
Dredging Division
Parrot, Canal Zone.
TOPOGRAPHY
EAST & WEST CULEBRA
AND
CUCARACHA SLIDES
SCALE
TO ACCOMPANY ANNUAL REPORT OF
1917 – 1918
Contour Interval 5 ft. Mean Sea Level Datum
Subaqueous Contours, Interval 10 ft., Mean Lake
Level Datum, which is 85 ft. above Mean Sea Level



THE PANAMA CANAL

DEPARTMENT OF OPERATION & MAINTENANCE

DREDGING DIVISION

PARAISO C.Z.

TYPICAL CROSS-SECTIONS CULEBRA SLIDES

TO ACCOMPANY ANNUAL REPORT 1917-1918

Scale as shown June 30 1918.

Made by
Traced by
Checked by C.H.B.

Submitted:
C.P. Vandenburgh
Assistant Engineer

Approved
Director

Recommended:
J.H. Pratt
Acting Assistant Engineer

Distances out from canal ℄ in feet.
Elevations in feet above mean sea level.

APPENDIX D.

REPORT OF THE MARINE SUPERINTENDENT, MARINE DIVISION, DEPARTMENT OF OPERATION AND MAINTENANCE.

BALBOA HEIGHTS, CANAL ZONE, *July 29, 1918.*

SIR: I have the honor to submit the following report of operations of the marine division for the fiscal year ended June 30, 1918:

On August 15, 1917, Lieut. John G. Fels, U. S. N. R. F., and Lieut. Charles Svensson, U. S. N. R. F., were appointed captain of the port at Cristobal and Balboa, respectively, vice Lieut. Commander P. P. Bassett, United States Navy, and Lieut. Commander A. B. Reed, United States Navy, detached from Panama Canal service. Under date of March 19, 1918, Lieuts. Fels and Svensson were promoted to the grade of lieutenant commander, U. S. N. R. F.

Commander H. I. Cone, United States Navy, marine superintendent, was detached from Panama Canal service on August 21, 1917, from which date until January 23, 1918, the office was administered under the direct supervision of the Governor, The Panama Canal. On January 24, 1918, Commander L. R. Sargent, United States Navy, was appointed marine superintendent, in addition to his other duties as commander, naval forces, Canal Zone, and commandant, fifteenth naval district.

Canal Pilot Fred Kariger continued throughout the year in charge of the lighthouse subdivision (aids to navigation).

Additions to the complement of pilots and changes in assignment were made as found necessary. By arrangement with the local naval establishment, pilots belonging to the Naval Reserve were ordered, in appropriate number, to active naval duty, and in that capacity were employed as mine field pilots, under the joint cognizance of the naval patrol and the marine division (captains of the ports). Results of this procedure, adopted to meet peculiar requirements incident to a state of war, have been satisfactory.

A new concrete boathouse between Piers Nos. 7 and 8, Cristobal, was placed in service under the captain of the port on March 1, 1918, replacing temporary shed between Piers Nos. 1 and 2, Colon.

The floating equipment of the division has been augmented by three launches and a new hull has been supplied for an engine previously installed in a launch recently condemned. Effects of service have become noticeable in the case of certain launches of the older equipment, forecasting the necessity of replacement, and the preeminent fitness for local requirements has become increasingly apparent in the case of certain types of small craft—both as to engines

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and hulls, as contrasted with other types that have been found less successful under test to date. The necessity of a consistent and progressive practice of standardization in that regard is apparent.

Cooperation in the effort of The Panama Canal to contribute to the limit of its resources to the needs of the military and naval branches of the Government in the existing exigency has reduced the marine division's complement of tugs somewhat below a conservative minimum. Adjustment is in progress. It is considered necessary to maintain at each terminal port at least two seagoing tugs.

Circular No. 660–33, dated August 1, 1917, has served a useful purpose in defining and strengthening the coordination in the offices of the port captains of the authority and obligations incident to the control and service of shipping.

The enforcement of bunker license regulations has been delegated to the marine division. The marine superintendent and both port captains have been designated special agents of the Bureau of Transportation, War Trade Board, performing their functions in that capacity under the direction of the Governor, who represents the War Trade Board.

Executive order, dated May 28, 1918, authorizes the Governor of The Panama Canal to exercise in the Canal Zone the powers mentioned in section 1, Title II, of the espionage act, approved June 15, 1917 (anchorage, movement, searching, etc., of vessels). Pending the approval of "Rules and Regulations" submitted to the President, the marine division has represented the Governor in the immediate exercise of these powers along the same general lines as defined in Circular No. 660–33 of August 1, 1917.

(NOTE.—"Rules and Regulations," confirming the above, were approved by the President on July 9, 1918.)

Arrangements have been made with the local naval establishment for the furnishing of "naval port guards" to safeguard vessels during canal transit and while in terminal ports, and similarly to safeguard canal utilities from enemy activities initiated on shipboard. The combination of the duties of marine superintendent in the same person with those of commandant, fifteenth naval district (Canal Zone), has tended to facilitate legitimate arrangements of this character and their subsequent administration.

STEAMBOAT-INSPECTION SERVICE.

The details of the operations of the board of local inspectors for the fiscal year ended June 30, 1918, are covered in the report of that board, which follows:

REPORT OF BOARD OF LOCAL INSPECTORS.

On August 7, 1917, Lieut. Commander John G. Fels, U. S. N. R. F., was appointed chairman, and Lieut. Commander Charles Svensson, U. S. N. R. F., was made junior member, relieving Commanders P. P. Bassett and A. B. Reed, United States Navy, respectively, soon thereafter detached from canal service. Since the departure of Mr. James Macfarlane from the Isthmus on March 30, 1918, no appointment was made to the position of engineer member; Mr. John Ross acted in that capacity from February 6, until his resignation from the canal service on May 21, 1918.

With a view to the preservation of life and property and the upkeep of the plant under all conditions, an inspection was made of the floating equipment of the canal and railroad, the report thereof was approved, and the heads of divisions interested were notified to make their equipment conform thereto.

Annual inspections were made and certificates of seaworthiness issued to 4 American steamers, 19 foreign steamers, 46 motor boats of The Panama Canal, 3 motor boats of the Panama Railroad Company, and 63 privately owned motor boats.

With a view to determining the alterations necessary to fit them for safe voyages overseas, inspections and reports were made on the following pieces of canal equipment: Tugs *U. S. Miraflores* and *U. S. La Boca*, *dredges U. S. 4 U. S. 82*, and *U. S. 85*, and barges *U. S. 26* and *U. S. 28*.

Tugs *U. S. Reliance* and *U. S. Porto Bello* were inspected in order to determine what changes will be necessary in order to fit them for occasional offshore service without lessening their value for canal work.

Various small craft on survey requests were inspected and disposition recommended.

Inspection and hydrostatic tests were made of 73 boilers on floating equipment of the canal and railroad, and the heads of divisions interested were furnished reports and certificates thereof.

On requests from the several heads of divisions, inspections and appraisals were made from time to time of floating plant for sale and transfer.

Licenses were issued to 27 pilots, 25 masters, 28 mates, 32 engineers, 102 operators of motor boats, and 673 chauffeurs.

Licenses were refused 1 pilot, 1 master, 4 mates, 4 engineers, 44 operators of motor boats, and 304 chauffeurs.

The licenses of 1 operator of motor boats and 9 chauffeurs were revoked.

The grade of 1 motor-boat operator's license was raised.

ADMEASUREMENT OF VESSELS AND APPLICATION OF TOLLS.

No report from the marine division would be complete that failed to reiterate the comments contained in previous reports relative to the desirability of adopting the Panama Canal rules as the sole criterion in determining tonnage for the purpose of computing Panama Canal tolls. Discrimination as between individual vessels as well as between vessels of various nationalities (with particular prejudice to United States vessels), together with serious loss of revenue to the United States, results from the present alternative method, and will continue as long as that method is tolerated. Careful and sustained study on the part of this division has failed to reveal just ground for its tolerance. Remedial legislation is recommended.

Tolls collected under existing alternative rules of measurement amounted to $6,439,083.99. Had all tolls been based upon Panama Canal rules alone, the amount collected would have been $7,522,195.68; increasing the revenue from this source by $1,085,111.69.

The total number of ships making the transit of the canal during the fiscal year in seagoing traffic was 2,130. The aggregate gross and net tonnage of these ships, according to the rules of measurement for The Panama Canal, were 9,371,339 and 6,658, 858 tons, respectively.

The cargo carried through the canal amounted to 7,562,133 tons of 2,240 pounds.

Ships making the passage of the canal without cargo, including naval ships and pleasure craft which did not carry cargo, as well as merchant ships in ballast, aggregated 509. Of these, 299 were in transit from the Atlantic to the Pacific, and 210 from the Pacific to the Atlantic; net tonnages were 802,271 and 427,107, respectively.

The average net tonnage of all ships was 3,126 tons. The average net tonnage of the ships carrying cargo was 3,242 tons. The average loading of the ships with cargo was 3,681 tons of 2,240 pounds.

The ratio of tons of cargo to net tonnage of ships with cargo was 1.336. As distributed over the aggregate of traffic for each of the 6,658,858 net tons that passed through the canal, there were handled 1.13 tons of cargo.

Statistics of seagoing traffic through the canal are presented in attached tables Nos. 1 and 2.

Respectfully,

L. R. SARGENT,
Marine Superintendent.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—*Summary of traffic through The Panama Canal during fiscal year 1918 and since its opening to commercial traffic.*

	Atlantic to Pacific.				Pacific to Atlantic.				Total.			
	Vessels.	Canal tonnage.		Cargo tons.	Vessels.	Canal tonnage.		Cargo tons.	Vessels.	Canal tonnage.		Cargo tons.
		Gross.	Net.			Gross.	Net.			Gross.	Net.	
1917.												
July	97	402,753	279,487	292,470	90	396,660	297,177	384,642	187	799,413	576,664	677,112
August	79	347,176	244,883	228,732	93	379,636	276,151	354,693	172	726,812	521,034	583,425
September	79	301,926	214,409	222,564	111	511,042	370,020	513,878	190	812,968	584,429	736,442
October	87	392,592	274,206	274,766	87	361,827	253,770	327,526	174	754,419	527,976	602,292
November	84	382,078	265,496	311,024	106	463,195	328,413	396,115	190	845,273	593,909	707,139
December	67	261,245	181,265	194,624	98	424,908	301,551	354,774	165	686,153	482,816	549,398
Total for first half fiscal year 1918	493	2,087,770	1,459,746	1,524,180	585	2,537,268	1,827,082	2,331,628	1,078	4,625,038	3,286,828	3,855,808
1918.												
January	72	329,333	225,427	212,596	91	384,192	270,082	340,910	163	713,525	495,509	553,506
February	63	274,848	187,506	131,567	94	432,758	309,606	339,188	157	707,606	497,112	470,755
March	67	271,695	192,335	164,253	126	555,467	403,763	490,154	193	827,162	596,098	654,407
April	79	339,371	234,992	219,362	95	421,969	307,154	400,696	174	761,340	542,146	620,058
May	77	326,465	228,106	206,233	123	612,096	439,106	573,808	200	938,561	667,212	780,041
June	70	308,560	222,266	181,275	95	489,547	351,687	446,283	165	798,107	573,953	627,558
Total for second half fiscal year 1918	428	1,850,272	1,290,632	1,115,286	624	2,896,029	2,081,398	2,591,039	1,052	4,746,301	3,372,030	3,706,325
Total for fiscal year 1918	921	3,938,042	2,750,378	2,639,466	1,209	5,433,297	3,908,480	4,922,667	2,130	9,371,339	6,658,858	7,562,133
Fiscal year ending June 30, 1915	530	2,657,865	1,884,728	2,125,735	558	2,758,922	1,958,307	2,844,057	1,088	5,416,787	3,843,035	4,969,792
Fiscal year ending June 30, 1916	411	1,912,846	1,308,231	1,434,236	376	1,683,683	1,171,531	1,705,810	787	3,596,529	2,479,762	3,140,046
Fiscal year ending June 30, 1917	905	4,170,733	2,925,414	3,076,843	971	4,360,088	3,083,944	4,152,412	1,876	8,530,821	6,009,358	7,229,255
Fiscal year ending June 30, 1918	921	3,938,042	2,750,378	2,639,466	1,209	5,433,297	3,908,480	4,922,667	2,130	9,371,339	6,658,858	7,562,133
Total	2,767	12,679,486	8,868,751	9,276,280	3,114	14,235,990	10,122,262	13,624,946	5,881	26,915,476	18,991,013	22,901,226

TABLE No. 2.—*Number of vessels of various nationalities passing through The Panama Canal.*

	Argentinan.	British.	Canadian	Chilean.	Chinese.	Costa Rican.	Cuban.	Danish.	Dutch.	French.	German.	Greek.	Honduran.	Italian.	Japanese.	Mexican.	Nicaraguan.	Norwegian.	Panaman.	Peruvian.	Russian.	Spanish.	Swedish.	United States.	Total.
ATLANTIC TO PACIFIC.																									
1917:																									
July	....	33	....	5	....	1	....	3	5	.....	....	....	....	....	3	.....	....	15	.....	5	.....	.....	.....	27	97
August	....	24	....	5	....	2	....	3	4	1	....	....	....	1	5	.....	....	12	.....	4	.....	.....	1	17	79
September	....	22	....	3	....	1	....	3	1	.....	....	....	....	1	3	.....	....	15	.....	4	.....	.....	2	24	79
October	....	25	....	5	....	1	....	6	3	.....	....	....	....	....	7	.....	....	14	.....	3	.....	2	2	19	87
November	....	27	....	2	....	2	....	4	9	1	....	....	....	....	1	.....	....	11	.....	4	.....	2	4	17	84
December	....	22	....	6	....	1	....	3	3	1	....	....	....	....	1	.....	....	15	.....	4	.....	.....	1	10	67
1918:																									
January	....	22	....	4	....	.....	....	8	1	1	....	....	....	....	3	.....	....	9	.....	3	.....	.....	.....	21	72
February	....	27	....	3	....	1	....	1	2	1	....	....	....	....	4	.....	....	13	.....	3	.....	.....	.....	8	63
March	....	26	....	3	....	.....	....	6	2	3	....	1	....	....	.....	.....	....	11	1	4	.....	.....	.....	10	67
April	....	22	....	5	....	.....	....	3	.....	3	....	....	....	....	2	.....	....	11	.....	2	.....	1	2	28	79
May	....	28	....	6	....	1	....	2	.....	4	....	....	....	....	3	.....	....	10	.....	3	.....	.....	.....	20	77
June	....	25	....	3	....	.....	....	2	1	4	....	....	....	....	1	.....	....	9	.....	2	.....	.....	.....	23	70
Total	....	303	....	50	....	10	....	44	31	19	....	1	....	2	33	.....	....	145	1	41	.....	5	12	224	921
Total fiscal year 1917	....	371	....	50	....	11	3	26	36	4	4	....	....	1	54	6	1	74	5	43	1	10	7	198	905
Total fiscal year 1916	....	193	....	16	....	.....	....	10	11	.....	....	....	1	1	19	.....	....	19	5	16	1	.....	5	114	411
Total fiscal year 1915	....	226	1	16	....	.....	....	10	5	2	....	....	2	1	4	.....	1	16	.....	2	5	.....	8	231	530
PACIFIC TO ATLANTIC.																									
1917:																									
July	....	31	....	5	....	.....	....	3	2	1	....	....	....	....	3	.....	....	7	.....	4	.....	.....	1	33	90
August	....	32	....	4	....	3	....	3	1	.....	....	....	....	....	2	.....	....	15	.....	4	.....	.....	.....	29	93
September	1	43	....	6	....	1	....	3	4	1	....	....	....	1	1	.....	....	13	.....	4	.....	.....	.....	33	111
October	....	22	....	3	....	1	....	5	1	.....	....	....	....	1	.....	1	....	14	.....	3	.....	.....	1	35	87
November	....	35	....	3	....	2	....	9	.....	.....	....	....	....	....	3	.....	....	14	.....	4	.....	1	4	31	106
December	....	29	....	3	....	1	....	6	.....	1	....	....	....	....	2	.....	....	12	1	3	.....	3	2	35	98
1918:																									
January	....	28	....	5	....	.....	....	3	3	4	....	....	....	....	2	.....	....	14	.....	4	.....	.....	.....	28	91
February	....	34	....	3	....	1	....	6	2	7	....	....	....	....	2	.....	....	9	.....	3	.....	1	1	25	94
March	....	39	....	3	....	.....	....	4	2	4	....	....	....	....	2	.....	....	15	1	4	.....	.....	3	49	126
April	....	35	....	4	1	.....	....	.....	2	8	....	1	....	....	.....	.....	....	12	.....	3	.....	.....	1	28	95
May	....	31	....	4	1	1	....	7	1	3	....	....	....	....	2	.....	....	18	1	3	2	1	.....	48	123
June	....	37	....	3	....	.....	....	7	.....	4	....	....	....	....	1	.....	....	8	.....	3	.....	1	1	30	95
Total	1	396	....	46	2	10	....	56	18	33	....	1	....	2	20	1	....	151	3	42	2	7	14	404	1,209
Total fiscal year 1917	....	409	....	49	....	12	3	17	38	5	2	....	....	1	18	7	1	76	2	43	1	10	11	266	971
Total fiscal year 1916	1	165	....	17	....	.....	....	8	4	1	....	....	2	....	5	.....	....	26	1	14	.....	.....	8	124	376
Total fiscal year 1915	....	239	....	19	....	.....	....	13	2	1	....	....	1	1	2	.....	....	26	2	2	1	.....	10	239	558

AGGREGATES BY FISCAL YEAR.																										
1918	1	699	....	96	2	20	....	100	49	52	....	2	....	4	53	1	....	296	4	83	2	12	26	628	2,130
1917	....	780	....	99	....	23	6	43	74	9	6	....	....	2	72	13	2	150	7	86	2	20	18	464	1,876
1916	1	358	....	33	....	.....	....	18	15	1	....	....	3	1	24	.....	....	45	6	30	1	.....	13	238	787
1915	....	465	1	35	....	.....	....	23	7	3	....	....	3	2	6	.....	1	42	2	4	6	.....	18	470	1,088
Grand total	2	2,302	1	263	2	43	6	184	145	65	[1] 6	2	6	9	155	14	3	533	19	203	11	32	75	1,800	5,881

[1] Refers to German vessels seized in Canal Zone but not issued United States registers until subsequent to canal transits, as shown.

APPENDIX E.

REPORT OF THE SUPERINTENDENT, MECHANICAL DIVISION.

BALBOA, CANAL ZONE, *July 18, 1918.*

SIR: Complying with instructions of your circular letter of May 3, 1918, I submit herewith the following report relative to the operations of the mechanical division for the fiscal year ended June 30, 1918.

ORGANIZATION.

The general organization of the division remained essentially the same as obtained at the close of the last fiscal year, except for Paraiso shops which were closed down, effective August 25, 1917, owing to the constantly decreasing amount of repairs for the dredging division, and the force absorbed by Balboa and Cristobal shops with the exception of two or three men who requested their discharge.

Effective March 15, 1918, Mr. William J. Daglish, as the result of competitive examination, was assigned as general foreman of the Cristobal shops, vice Mr. W. H. Stone, who resigned to accept a commission in the Corps of Engineers for service in France.

Effective June 14, 1917, Mr. William J. Auten was appointed mechanical engineer, vice Mr. A. L. Bell, who resigned to accept appointment with the United States Shipping Board.

The chief draftsman at Balboa shops resigned, effective July 20, 1917, and the amount and character of drafting work has been such that this position has not been refilled.

The chief clerk of the mechanical division, Mr. F. G. Swanson, resigned and, effective April 11, 1918, Mr. R. H. Adams, United States requisition clerk, was appointed in his stead with duties of the two positions combined.

Effctive October 1, 1917, the electrical forces of the mechanical division were transferred to the electrical division, with the exception of the retention of two electricians at Balboa shops and two electricians at Cristobal shops for the maintenance of plant work.

WAR ACTIVITIES.

The following comments are made relative to the war as a factor in the life of the division.

(1) Notwithstanding the fact that there has been no draft registration on the Canal Zone, numerous employees have registered while on vacation in the States and several have resigned to enter the

Army; 30 ex-employees of the division became service men and also doubtless a considerable number more of those resigning of whose whereabouts this office has no knowledge.

(2) This division has actively participated in Liberty loan rallies, and its employees have for the most part made liberal subscriptions to the Liberty loans and contributed regularly (by pay roll deduction) to the Red Cross.

(3) For alleged disloyal expression, the Governor's office ordered the discharge of a small number of employees of the division with objection to their reemployment for the duration of the war.

(4) A greatly increased amount of work has been performed for the Army and Navy.

WAR WORK.

During this fiscal year the efforts of the division have been directed particularly toward the "war work" requested of it, a separate report of which has already been submitted, the principal items of which are as follows:

(1) Construction of a Coast Guard cutter for the Navy and various small craft and two troop cars for transporting troops and supplies for the Army.

(2) Overhauling, changing gauge, and preparing for shipment numerous locomotives, flat cars, dump cars, rock barges, tugs, locomotive cranes, steam shovels, etc.

(3) Repairs to a damaged transport.

(4) Repairs and conversion of a large steamer into a troop transport.

(5) The manufacture of a large number of anchors for the Navy at a price of from 7 to 8 cents per pound less than could be obtained from private manufacturers in the United States, with earlier delivery than was obtainable in the United States.

(6) Manufacture of large steel castings for the Navy.

(7) Manufacture of about 60,000 linear feet of boat fenders of almendra native wood for use on all the small boats of the Navy.

(8) The cutting and shipping of over 15,000 feet of seasoned lignum-vitæ from the Gatun Lake area for use on the new ships being constructed.

(9) Work of greater or less extent on over 50 naval vessels, indicating that these shops fill a need toward maintaining naval units in thoroughly first-class service ready for the emergencies of war.

PRINCIPAL WORK PERFORMED.

The items of work mentioned above under "war work" together with the following constituted the principal items of work carried on during the year by the mechanical division.

At Cristobal, overhauling the tug *Reliance* (which was sunk at Colon breakwater and later floated), including overhaul of boilers, rebuilding engines, replacing pilot house which was entirely gone, and renewing all the wood in the deck, deck house, and fenders which were destroyed by the teredo worms, the tug being put in commission in 30 working days after the work commenced; overhauling of the tugs *La Boca* and *Miraflores;* the tugs *La Boca* and *Mira-*

flores being shipped to the United States for the Army. The tug *Mariner* was overhauled and is in use by the Navy Department on the Isthmus. Miscellaneous work was performed on a large number of commercial steamships, including those of the Panama Railroad Steamship Line.

At Balboa important items of work were: Repairs to six submarines of the Chilean Navy; alterations and repairs to the cargo-carrying boat *Caribbean;* extensive overhauling and converting of the tug *La Boca* into an oil burner from a coal burner; converting the *Culebra* from a dredge into a cattle-carrying boat for the supply department in five days' time; repairs to damaged bow of the steamship *Republic*, working 24 hours a day, the ship being at the plant from February 2 to 26; repairs to the French schooners *Dixmude* and *Santa Elena*, including general overhaul of the engines; the construction of a 33-foot motor sailing launch for the supply department, two 31-foot launches for the Canal Zone police department, and one 28-foot launch for the health department: about 70 locomotives, 5 steam shovels, 400 flat cars, 30 Rodger ballast cars, and 30 dump cars overhauled and shipped from the Isthmus for the Alaskan Engineering Commission and private firms.

The following canal equipment was in dry dock for repairs either at Cristobal or Balboa dry dock during the year: Dredges *82*, *85*, *83*, *86*, *Chagres*, *Cascadas*, *Culebra*, *Corozal*, *Gamboa*, *Marmot*, *Paraiso;* barges *2*, *3*, *13*, *16*, *17*, *19*, *26*, *36*, *47*, *82*, *86*, *91*, *96*, *106*, *131*, *133*, *136*, *137*, *140*, *141*, *149*, *156*, *157*, *159*, *161*, *171;* scows *108*, *117*, *119*, *122*, *123;* tugs *Porto Bello*, *Chame*, *Engineer*, *Miraflores*, *De Lesseps*, *La Valley*, *Bohio*, *La Boca* and *Mariner*.

The total number of vessels other than tugs, barges and dredges worked on at Balboa and Cristobal shops during the year was 466.

One of the largest marine jobs performed during the year at Balboa shops was on the steamship *Ancon*, of the Panama Railroad Steamship Line. This ship was given a thorough overhaul, involving the installation of new boilers, and extensive structural repairs to inner bottom, floors, and bulkheads throughout ship. All work was completed with practically no overtime in a period of four months, at a cost of approximately $400,000.

On account of the very high prices of lumber from the States and difficulties of arranging transportation, the native lumber field has been developed, and during the present fiscal year nearly 2,000,000 feet b. m. of lumber have been obtained from the jungles and sawn into serviceable lumber. At the close of the fiscal year the new band-saw mill was turning out an average of about 12,000 feet of lumber daily. Following are some of the more prominent native woods which have proven very satisfactory substitutes for oak, pine, fir, etc., and which have been obtained in quantities: Almendra, alcavu, alcareto, belario, bateo, caoba blanca, maria, and roble.

RESULTS ACCOMPLISHED.

This division has been successful in its efforts to encourage individuals and companies to bring their work to this plant, as indicated by the increased number of vessels on which work has been performed. An arrangement has been made whereby all major repairs on ships of the Panama Railroad Steamship Line will be made in the future on the Isthmus.

Within the division progress has been made along the following lines:

(1) It has been found possible to reduce the organization by about 130 positions on the gold roll, which positions were abolished; and the actual working force, gold and silver, has been reduced by about 500 during the year.

(2) The hours of clerks and draftsmen employed in the office building continued to be seven hours per diem.

(3) Effective October 1 and May 1, the wages of silver employees were raised; and material increases in gold wages were also made, effective July 1, 1917, September 24, November 16, and May 1, 1918.

(4) A further reduction in direct labor surcharge to 25 per cent to apply on work performed for The Panama Canal and Panama Railroad was effected October 1, the surcharge on work for individuals and companies continuing to be 35 per cent. Statement relative to the nature of this surcharge was included in last year's report.

(5) A modern lunch room was installed at Balboa shops at a cost of about $35,000. It has a seating capacity of 250. During the past year the average number of men at the noon meal has been 200, and the average cost of the meals 32 cents.

(6) Rearrangements have been made in the office to obtain greater efficiency. The planning section was placed on the first floor instead of the second floor, thus bringing it in more convenient touch with the main office and with the shops and the public. The personnel section and the general file section have been united into one filing division under one head.

(7) The shops at Balboa have been inclosed with a steel paling fence, and entrance and exit of employees and other authorized persons are concentrated at the main entrance to the plant; here an employment office has been established for the employment of all silver labor, which office provides a means for keeping unauthorized men out of the shops and precludes the annoyance to foremen of constant applications from the unemployed and also provides a convenient medium of exchange or adjustment of labor between one shop and another.

(8) A "safety-first" campaign has been successfully carried on during the fiscal year; during which time there were 493 injuries and 1 death from accident in the forces of the division. During the previous fiscal year 746 injuries and 2 accidental deaths were reported.

(9) The old and unsightly Panama Railroad shed covering Pier No. 15 was removed and the space made available as repair wharves.

(10) The old terminal construction building at the northwest end of Dry Dock *No. 1* was renovated and now consists of a rigging and sail loft, a garage, and outside tool room.

(11) Extension of the roof over the west end of foundry building No. 12 was made; and the north end of building No. 2, used as a copper shop, pipe shop, and tin shop, was extended to avoid a crowded condition and now the work is carried on in three separate shops instead of in a combined shop as previously.

(12) An extension of the car shop was recently completed for the use of the cabinetmakers, and machines installed there, including scraper, scraper-grinder, planer, universal saw, and woodworker, all purchased in the United States; also the following transferred from Paraiso and from the machine shop, Balboa—bolt cutter, furnace (oil), punch and shear, axle lathe, wheel press, boring mill, and triple valve-testing machine.

(13) Owing to great difficulty in getting the parts for cars from the sawmill, which is now engaged mostly in carrying on marine work, it was decided to shift the machinery in connection with car-building work from the sawmill and locate it in the east end of the lumber shed, building No. 10, which is in close proximity to the car shop. All wood work for cars is being carried on there at the present time. The following machines were transferred to building No. 10: Timber sizer, tenoner, gainer, mortiser, ripsaw.

(14) In addition to the machines referred to above as having been installed in the car department, the following equipment has been purchased and installed during the year at Balboa shops: A pipe-bending machine for the sheet-metal shop; bending rolls and plate planer installed in the boiler shop; a band-saw mill with capacity for center-splitting hardwood logs 48 inches in diameter by 60 feet long, complete with motor and transmission equipment.

(15) To supplement the electric-driven air compressors, at Balboa shops, a 2,500 cubic foot steam-driven air compressor has been transferred from the

power plant (building No. 14) at the north end of the dry dock and installed in the air-compressor plant (building No. 29) near the south end of the dry dock, and these two buildings connected through a tunnel with a 6-inch steam line. The steam-driven air compressor is an independent unit, capable in emergency of furnishing sufficient compressed air for all needs of the dry dock repair work and forge shop.

(16) At the Cristobal shops repairs were made to the dry dock gates, involving building a cofferdam to enable repairs to be made.

(17) The following equipment has been purchased during the year and installed at the Cristobal shops: Pipe threading and cutting machine, power hack saw, 14-inch drill press, and an electric welding machine.

NEEDS FOR THE COMING FISCAL YEAR.

The principal needs of the division for the coming year, exclusive of those for which estimates have already been submitted covering purchase of additional machine tool equipment, are the following:

(1) The construction at Balboa and Cristobal of additional quarters for gold and silver employees, the lack of which is a serious handicap toward maintaining an efficient force. This recommendation was made a year ago and is renewed.

(2) The construction of new shops and dry dock facilities at Cristobal. This was also recommended in last year's report, to which report attention is invited in this connection.

(3) Further development and study of native woods, including a study of methods for reducing the cost of handling to make the business as profitable as possible, and a more thorough cruise and study of the country with a view to enlarging the sources of supply.

(4) Adoption of a better system of identification for employees than that furnished by the identification metal check now in use.

Attached hereto are plates and tables as follows showing the various phases of the operation of the mechanical division for the fiscal year 1918:

Plate No. 27. Showing the classes of work and source of revenue.

Plate No. 28. Showing the gross overhead expense percentage of the Balboa shops compared with the total direct labor charges.

Plate No. 29. Showing development of shop work for outsiders concurrent with the decrease of canal and Panama Railroad work since the official opening of The Panama Canal.

Table No. 1. Abstract of expenditures.

Table No. 2. Statement of overtime work performed, showing the per cent of the total pay roll.

Table No. 3. Force report.

Table No. 4. Statement of foundry outputs.

Table No. 5. Expenditures and output of the oxyacetylene plant.

Table No. 6. Operation of Panama Canal dry docks.

Table No. 7. Number of repairs to rolling stock.

Table No. 8. Statement of hostling costs.

Table No. 9. Amounts of completed work and for whom performed.

Table No. 10. Comparative statement of work performed by shops at Balboa.

Respectfully submitted.

R. D. Gatewood,
Superintendent, Mechanical Division.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—*Abstract of expenditures.*

Month.	Labor.	Material.	Other expense.	Total.
BALBOA SHOPS.				
1917.				
July	$165,897.70	$126,869.38	$18,496.20	$311,263.28
August	162,220.87	197,022.06	14,946.95	374,189.88
September	149,599.66	135,036.59	16,203.77	300,840.02
October	155,606.19	139,974.29	15,188.20	310,768.68
November	141,866.20	139,581.45	19,191.39	300,639.04
December	161,637.99	174,261.68	13,133.11	349,032.78
1918.				
January	174,466.38	151,866.89	27,441.82	353,775.09
February	150,062.39	162,218.31	27,593.82	339,874.52
March	185,859.64	144,922.94	28,946.20	359,728.78
April	170,847.90	108,916.67	22,056.21	301,820.78
May	175,052.13	156,672.49	18,111.24	349,835.86
June	168,950.55	105,178.62	31,209.37	305,338.54
Total	1,962,067.60	1,742,521.37	252,518.28	3,957,107.25
Average per month this year	163,505.63	145,210.11	21,043.19	329,758.93
Average per month last year	150,140.51	145,246.55	19,091.89	314,478.95
CRISTOBAL SHOPS.				
1917.				
July	57,251.90	28,367.32	4,386.89	90,006.11
August	49,167.80	23,744.05	14,103.43	87,015.28
September	47,287.19	26,657.36	9,331.66	83,276.21
October	49,239.80	13,915.11	924.20	62,230.71
November	43,368.51	19,160.34	4,458.26	66,987.11
December	46,192.10	13,846.25	6,822.99	66,861.34
1918.				
January	39,267.92	15,985.89	3,758.34	59,012.15
February	34,639.24	18,030.93	1,238.88	53,909.05
March	46,571.78	27,194.55	4,339.72	78,106.05
April	38,995.52	25,656.08	5,164.85	69,816.45
May	41,010.13	25,104.77	967.76	65,147.14
June	36,530.33	14,897.30	3,369.00	54,796.63
Total	529,522.22	252,559.95	55,082.06	837,164.23
Average per month this year	44,126.85	21,046.66	4,590.17	69,763.68
Average per month last year	48,046.62	17,672.52	4,809.82	70,528.96
TOTAL.				
1917.				
July	223,149.60	155,236.70	22,883.09	401,269.39
August	211,388.67	220,766.11	29,050.38	461,205.16
September	196,886.85	161,693.95	25,535.43	384,116.23
October	204,845.99	153,889.40	14,264.00	372,999.39
November	185,234.71	158,741.79	23,649.65	367,626.15
December	207,830.09	188,107.93	19,956.10	415,894.12
1918.				
January	213,734.30	167,852.78	31,200.16	412,787.24
February	184,701.63	180,249.24	28,832.70	393,783.57
March	232,431.42	172,117.49	33,285.92	437,834.83
April	209,843.42	134,572.75	27,221.06	371,637.23
May	216,062.26	181,777.26	17,143.48	414,983.00
June	205,480.88	120,075.92	34,578.37	360,135.17
Total	2,491,589.82	1,995,081.32	307,600.34	4,794,271.48
Average per month this year	207,632.49	166,256.77	25,633.36	399,522.62
Average per month last year	218,543.65	179,934.83	26,261.55	424,740.03

TABLE No. 2.—*Statement of overtime work performed, showing the per cent of the total pay roll.*

Month.	Balboa shops.		Cristobal shops.		Total.	
	Overtime.	Per cent of pay roll.	Overtime.	Per cent of pay roll.	Overtime.	Per cent of pay roll.
1917.						
July	$14,579.50	8.79	$12,126.26	21.18	$26,705.76	11.97
August	12,359.68	7.62	5,688.33	12.49	18,048.01	8.54
September	8,428.05	5.94	5,202.26	11.85	13,630.31	6.92
October	10,597.44	6.81	7,450.23	16.01	18,047.67	8.81
November	8,187.24	5.84	5,035.72	11.61	13,222.96	7.14
December	11,100.39	6.87	2,728.95	6.38	13,829.34	6.65
1918.						
January	26,587.74	[1] 15.22	4,525.61	12.51	31,113.35	14.56
February	7,661.15	5.11	2,653.27	8.90	10,314.42	5.58
March	8,172.81	4.40	8,260.86	17.74	16,433.67	7.07
April	9,233.57	5.40	4,550.40	12.59	13,783.97	6.57
May	7,807.34	4.47	7,645.09	20.59	15,452.43	7.15
June	20,990.85	[1] 12.42	5,610.62	17.10	26,601.47	12.95
Total	145,705.76	7.43	71,477.60	13.50	217,183.36	8.72
Average per month this year	12,142.15	7.43	5,956.47	13.50	18,098.62	8.72
Average per month last year	11,916.34	7.94	4,449.75	9.26	[2] 18,903.36	[2] 8.65

[1] Urgent military work on steamships Von Steuben and Koningin der Nederlanden.
[2] Includes Paraiso shops.

TABLE No. 3.—*Force Report.*

Month.	Balboa shops.			Cristobal shops.			Total.		
	Gold.	Silver.	Total.	Gold.	Silver.	Total.	Gold.	Silver.	Total.
1917.									
July	$745	$1,448	$2,193	$195	$534	$729	$940	$1,982	$2,922
August	636	1,273	1,909	164	439	603	800	1,712	2,512
September	590	1,204	1,794	144	424	568	734	1,628	2,362
October	599	1,140	1,739	150	412	562	749	1,552	2,301
November	611	1,160	1,771	156	378	534	767	1,538	2,305
December	593	1,120	1,713	143	368	511	736	1,488	2,224
1918.									
January	628	1,251	1,879	116	314	430	744	1,565	2,309
February	653	1,406	2,059	117	306	423	770	1,712	2,482
March	623	1,393	2,016	110	335	445	733	1,728	2,461
April	618	1,401	2,019	109	351	460	727	1,752	2,479
May	589	1,394	1,983	96	322	418	685	1,716	2,401
June	548	1,144	1,692	93	276	369	641	1,420	2,061
Total	7,433	15,334	22,767	1,593	4,459	6,052	9,026	19,793	28,819
Average per month this year	620	1,278	1,898	133	372	505	752	1,649	2,401
Average per month last year	797	1,585	2,382	209	522	731	1,006	2,107	3,113

TABLE No. 4.—*Statement of foundry outputs.*

Month.	Nonferrous.			Iron.		
	Patterns.	Castings.	Weight.	Patterns.	Castings.	Weight.
1917.						
July	21	1,059	26,836	20	1,651	131,348
August	49	1,528	23,849	50	1,571	151,427
September	14	937	16,811	37	1,450	171,925
October	29	541	8,117	55	1,667	121,919
November	20	568	7,400	57	3,464	136,717
December	51	922	5,813	54	3,658	215,133
1918.						
January	17	2,142	9,767	29	3,960	224,907
February	40	1,102	11,319	44	3,336	167,069
March	42	1,245	14,112	61	3,315	108,215
April	32	915	7,411	58	3,341	168,377
May	30	715	12,346	47	3,969	177,111
June	60	1,943	20,253	87	3,469	145,625
Total	405	13,617	164,034	599	34,851	1,919,773
Average this year	34	1,135	13,669	50	2,904	159,980
Average last year	40	1,320	21,163	59	2,734	162,611

Month.	Steel.			Total.		
	Patterns.	Castings.	Weight.	Patterns.	Castings.	Weight.
1917.						
July	13	990	85,503	54	3,700	243,687
August	12	855	81,674	112	3,954	256,950
September	23	736	95,764	74	3,123	284,500
October	16	1,042	164,782	100	3,250	294,818
November	18	804	135,568	95	4,836	279,685
December	5	862	132,716	110	5,442	353,662
1918.						
January	6	788	128,896	52	6,890	363,570
February	21	1,147	152,646	105	5,585	331,034
March	10	1,351	129,820	113	5,911	252,147
April	14	1,077	130,961	104	5,333	306,749
May	11	872	140,434	88	5,556	329,891
June	7	1,496	105,279	154	6,908	271,157
Total	156	12,020	1,484,043	1,161	60,488	3,567,850
Average this year	13	1,002	123,670	97	5,041	297,321
Average last year	28	1,008	169,993	127	5,062	353,766

TABLE No. 5.—*Expenditures and output of the oxy-acetylene plant—Balboa shops.*

Month.	Total expenditures.	Oxygen output.	Acetylene output.	Hydrogen output.
1917.		*Cubic feet.*	*Cubic feet.*	*Cubic feet*
July	$2,062.99	97,900	59,923	1,000
August	1,788.66	110,600	54,225	9,942
September	3,107.04	115,100	59,373	3,050
October	1,977.31	118,500	62,393	4,700
November	1,998.44	109,400	61,723	4,500
December	2,416.60	117,200	56,921	7,200
1918.				
January	2,351.97	116,500	55,584	11,100
February	3,026.03	110,800	47,167	9,600
March	5,043.65	140,700	56,423	13,300
April	2,893.55	110,500	61,699	17,800
May	2,188.79	106,300	48,069	10,400
June	2,297.01	105,700	51,132	10,100
Total	31,152.04	1,359,200	674,632	102,692
Average this year	2,596.00	113,267	56,220	9,558
Average last year	6,347.97	91,615	50,554	4,268

TABLE No. 6.—*Operation of Panama Canal dry docks.*

BALBOA.

Month.	Operating expense.	Vessels docked.				
		Panama Canal.	War and Navy.		Commercial.	
		Number.	Number	Tonnage.	Number.	Tonnage.
1917.						
July	$8,037.17	5	.....	.....	4	19,571
August	8,082.14	5	.....	.....	1	7,050
September	6,798.17	3	.....	.....	4	8,289
October	6,953.20	5	2	3,540	2	9,907
November	6,384.05	3	.....	.....	3	14,119
December	6,488.77	1	3	34,549	2	7,160
1918.						
January	6,866.37	2	1	420	1	3,772
February	6,940.33	.....	1	3,420	.....	.....
March	6,800.94	.....	.....	.....	1	9,698
April	6,166.11	.....	.....	.....	.....	.....
May	9,053.64	1	3	6,465	3	19,435
June	7,498.71	2	.....	.....	4	8,597
Total	86,069.60	27	10	48,394	25	107,598
Average this year	7,172.47	2+	1—	4,033	2+	8,966
Average last year	4,534.58	3—	1+	7,848	1+	6,109

CRISTOBAL.

1917.						
July	$2,218.72	3	6	4,711	.....	.....
August	2,314.20	1	2	717	1	114
September	2,138.56	2	1	240	2	199
October	2,438.09	3	3	900	2	643
November	2,579.34	3	6	1,116	2	2,606
December	3,492.45	1	2	485	2	799
1918.						
January	3,245.72	2	1	60	3	2,513
February	2,059.55	4	1	1,205	4	3,227
March	1,935.47	6	2	630	3	2,814
April	1,876.97	4	2	480	1	600
May	2,092.99	7	3	720	4	2,989
June	2,170.00	3	3	384	6	2,679
Total	28,562.06	39	32	11,648	30	19,183
Average this year	2,380.17	3+	3—	971	3—	1,599
Average last year	1,660.90	4+	1+	214	1+	1,341

TABLE No. 7.—*Number of repairs to rolling stock.*

Month.	Locomotives.		Cars.		Cranes.	Other.	Total.
	Heavy.	Running.	Shop.	Field.			
1917.							
July	10	1,122	561	2,575	22	.....	4,290
August	8	1,295	469	2,459	40	2	4,273
September	8	966	363	2,065	29	1	3,432
October	7	1,165	445	2,053	52	1	3,723
November	8	1,022	209	1,909	54	.....	3,202
December	8	943	206	2,060	30	.....	3,247
1918.							
January	5	972	247	2,279	37	.....	3,540
February	8	800	220	1,809	31	.....	2,868
March	6	851	180	1,956	47	.....	3,040
April	4	978	255	1,276	50	5	2,568
May	3	795	213	1,127	35	6	2,179
June	8	730	226	1,467	27	7	2,465
Total	83	11,639	3,594	23,035	454	22	38,827
Average this year	7	970	299	1,920	38	2	3,236
Average last year	5	1,096.83	572	4,330	24.5	4.17	6,028

TABLE No. 8.—*Statement of hostling costs.*

Month.	Number of hostlings.	Direct labor.	Surcharge.	Material and service.	Total cost.	Average labor per hostle.	Average total cost per hostle.
1917.							
July	2,264	$1,691.46	$592.01	$304.40	$2,587.87	$0.7471	$1.1431
August	2,206	1,774.39	621.04	340.22	2,735.65	.8043	1.2401
September	2,208	1,720.26	602.09	224.23	2,546.58	.7791	1.1533
October	2,235	1,697.82	424.45	350.32	2,472.59	.7597	1.1063
November	2,219	1,741.28	608.99	234.33	2,584.60	.7847	1.1648
December	2,249	1,805.29	631.85	316.86	2,754.00	.8027	1.2245
1918.							
January	2,188	1,763.25	609.69	194.90	2,567.84	.8059	1.1736
February	1,864	1,658.57	570.65	259.21	2,488.43	.8898	1.3350
March	2,051	1,603.36	559.77	211.32	2,374.45	.7817	1.1577
April	1,952	1,661.13	574.27	201.62	2,437.02	.8510	1.2485
May	1,872	1,746.23	609.87	174.27	2,530.37	.9328	1.3517
June	1,846	1,572.94	549.00	181.12	2,303.06	.8521	1.2476
Total	25,154	20,435.98	6,953.68	2,992.80	30,382.46	.8124	1.2079
Average per month this year	2,096	1,702.99	579.47	249.40	2,531.86	.8124	1.0498
Average per month last year	3,004	1,968.14	945.92	239.39	3,153.45	.6552	1.0498

TABLE No. 9.—*Amounts of completed work and for whom performed.*

Individuals and companies	$1,025,020.74
Panama Railroad	928,025.46
Manufacturing	741,818.09
Dredging division	714,881.16
United States Navy	339,142.88
Quartermaster Department	164,859.16
War Department	129,329.36
Building construction	90,727.56
Marine division	39,868.71
Other departments of Government	38,902.57
Fortifications	37,232.32
Municipal engineering division	25,356.11
Electrical division	16,724.73
Damage to vessels	14,437.88
Subsistence	9,186.80
Lock operation	$8,026.35
Health department	7,028.87
Dams and backfill	4,321.71
Administration	4,227.64
Official motor cars	3,758.51
Civil government	2,845.28
Meteorology and hydrography	1,064.08
Clubs and playgrounds	823.65
Auditor	637.36
Paymaster	245.81
Surveys	176.47
Special attorney	135.14
Office engineer	128.56
Collector	121.20
Land office	102.46
Joint commission	32.73
Total	4,349,189.35

TABLE No. 10.—*Comparative statement of work performed by shops at Balboa.*

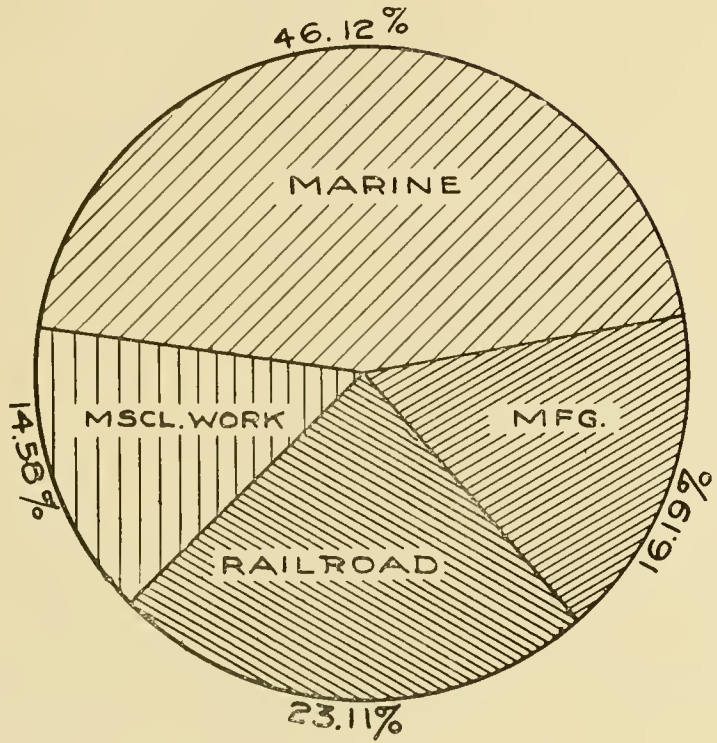
	Productive labor.		Indirect expense.	
	1917–18	1916–17	1917–18	1916–17
PRODUCTIVE SHOPS.				
Boiler and ship fitting	$309,025.16	$255,466.66	$112,407.33	$146,468.77
Car shop	185,423.69	168,019.63	60,543.57	72,904.22
Rigging loft	52,216.04	25,776.54	15,047.28	9,945.31
Forge shop	40,872.44	48,257.91	44,390.86	63,328.88
Balboa roundhouse	70,563.81	56,661.46	36,012.81	37,192.54
Cristobal roundhouse	26,959.18	30,833.64	12,629.64	20,260.82
Instrument repair shop	24,224.80	16,376.36	11,364.98	10,309.94
Machine shop	231,700.60	241,598.03	131,257.80	198,889.13
Pattern shop	13,246.38	.....	8,440.57	.....
Paint shop	46,342.96	30,075.73	7,172.81	10,215.28
Outside marine gang	136,090.52	74,031.37	41,916.19	28,216.02
Wood shop	100,827.79	96,729.39	44,340.14	47,699.24
Yard gang	5,996.91	11,338.16	24,491.46	20,628.30
Superintendent's office	44,043.78	24,525.85	124,085.56	113,116.29
Total	1,287,534.06	1,079,690.73	674,101.00	779,174.74

TABLE No. 10.—*Comparative statement of work performed by shops at Balboa*—Continued.

	Productive labor.	
	1917–18	1916–17
FOUNDRIES.		
Brass foundry	$4,341.40	$4,257.62
Iron foundry	20,609.98	14,688.02
Steel foundry	18,552.83	20,602.99
Total	43,504.21	39,548.63
	Total expenditures.	
POWER.		
Steam	$13,329.49	$18,898.47
Oil	140,625.48	112,501.38
Electricity	43,995.46	58,955.98
Air	39,308.65	64,999.88
Water	26,982.93	29,074.09
Total	264,242.01	284,429.80
MISCELLANEOUS.		
Wrecking outfit	17,315.95	18,584.61
Locomotive cranes	40,157.50	51,924.24
Total	57,473.45	70,508.85

Plate 27.

CHARTS SHOWING CLASSES OF WORK AND SOURCE OF REVENUE



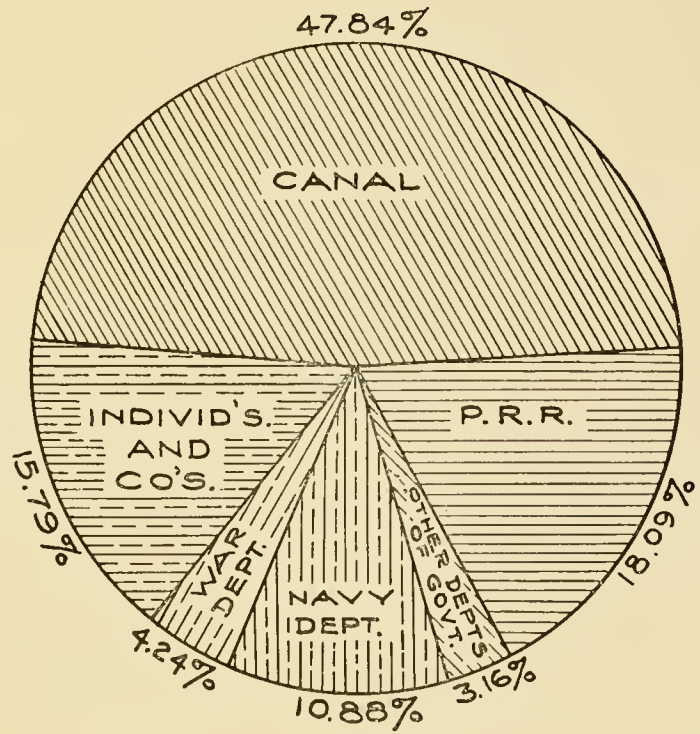


Plate 28.

BALBOA SHOPS GROSS OVERHEAD EXPENSE PERCENTAGE
COMPARED WITH THE TOTAL DIRECT LABOR CHARGES
FISCAL YEARS

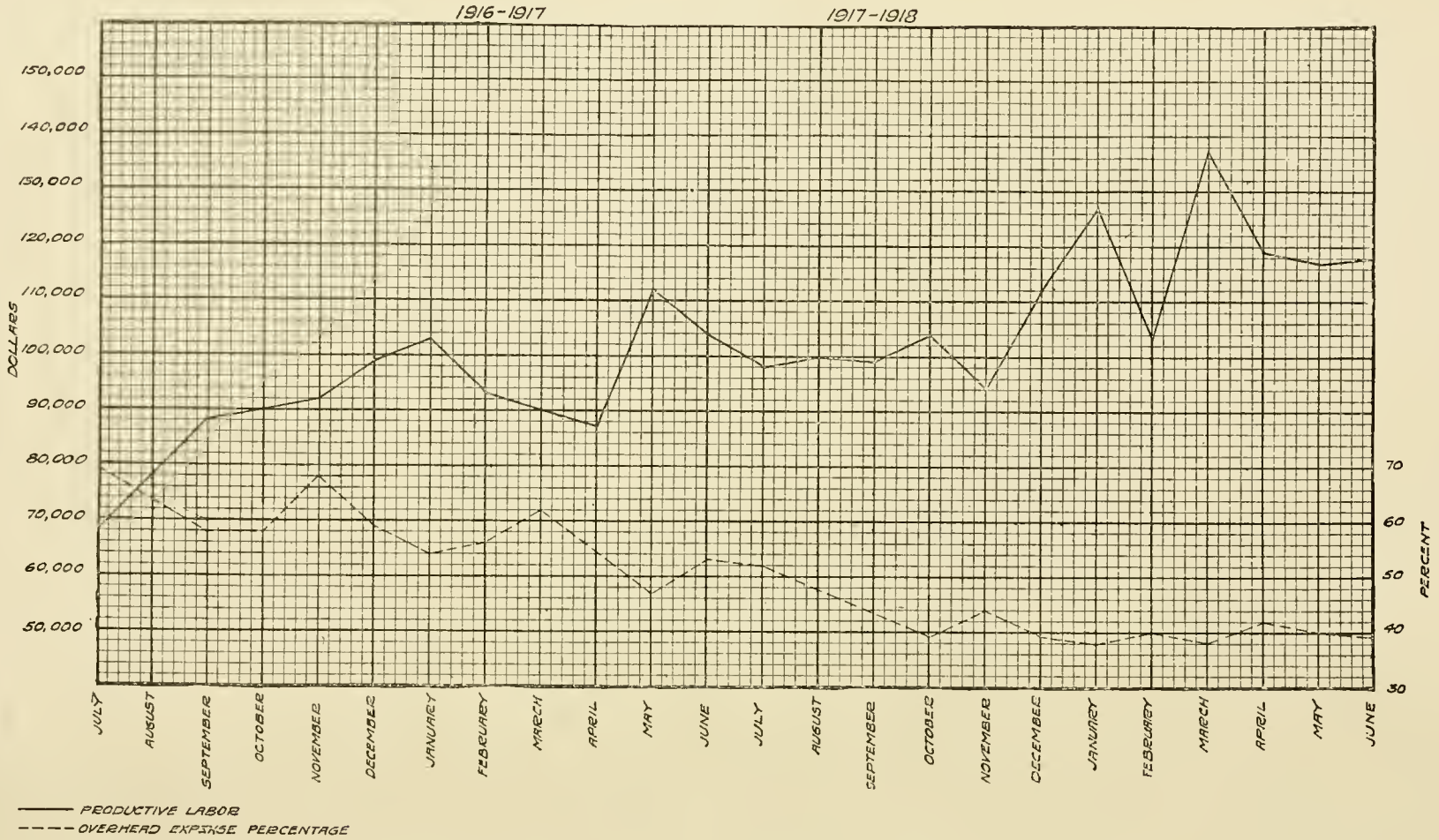


Plate 29.

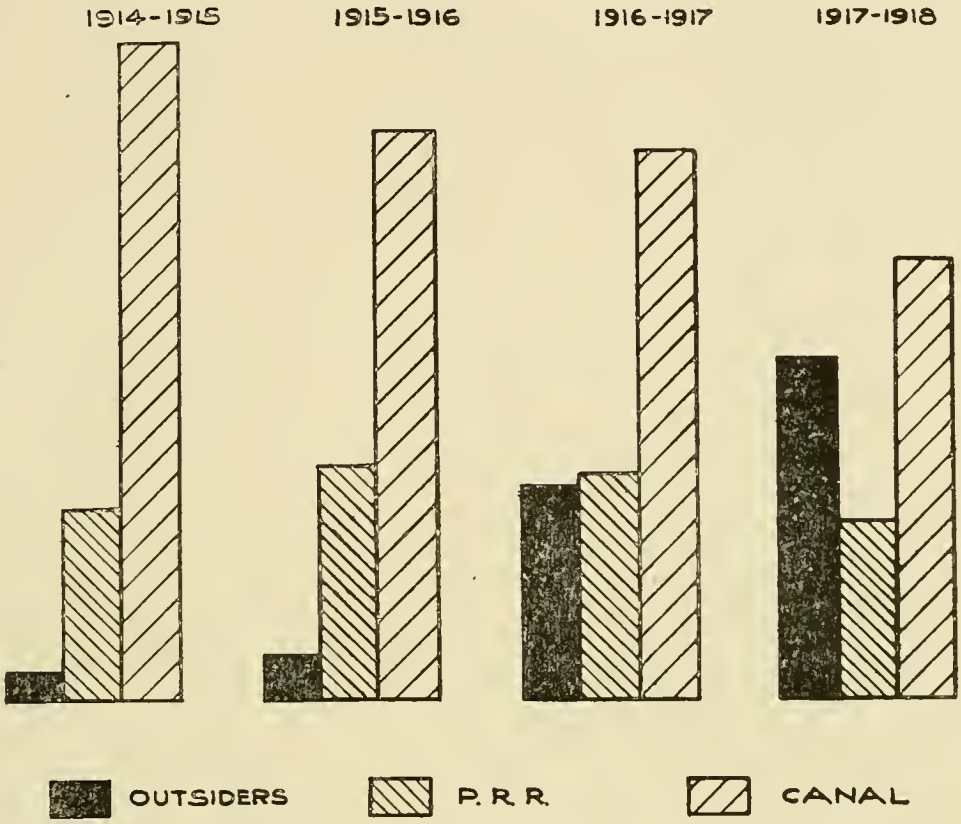


CHART SHOWING THE DEVELOPMENT OF SHOP WORK FOR OUTSIDERS CONCURRENT WITH THE DECREASE OF CANAL AND PANAMA RAILROAD WORK SINCE THE OFFICIAL OPENING OF THE PANAMA CANAL.

APPENDIX F.

REPORT OF THE CHIEF QUARTERMASTER, SUPPLY DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE, *July 20, 1918.*

SIR: I have the honor to submit the following report covering the operations of the supply department for the fiscal year ended June 30, 1918.

ORGANIZATION.

The organization continued the same as for the fiscal year 1917, up until October 8, 1917, at which time the following organization was put into effect:

The position of assistant chief quartermaster was abolished and the department was subdivided as follows:

(*a*) District quartermasters, hotels, restaurants, messes, and storehouses. These units were placed under the direct supervision of the newly created position of superintendent, supply department, who reports to the chief quartermaster.

(*b*) Commissary division: This division is operated under the direction of the general manager, reporting to the chief quartermaster, and has charge of the various commissary warehouses, cold-storage plants, manufacturing plants, abattoir, laundries, and retail commissaries.

(*c*) Pastures, plantations, hog farms, chicken farms, and dairies, were placed under the immediate charge of the supervisor, cattle industry, on October 8, 1917; but were later—April 15, 1918—turned over to the superintendent, cattle industry, reporting to the chief quartermaster. The superintendent of cattle industry also has direct charge of the two cattle boats, the *Caribbean* and *Culebra.*

(*d*) Purchase of live stock and cattle: Under date of October 8, 1917, the purchase of live stock and cattle was placed in charge of the superintendent, cattle industry; but was later—April 15, 1918—placed in charge of the cattle buyer, cattle industry, reporting to the chief quartermaster.

(*e*) United States requisition bureau, in charge of United States requisition clerk, reporting to the chief quartermaster: This bureau prepares and checks all requisitions for material and supplies to be purchased in the United States, except for the commissary division. The clerk in charge is now rated as chief, United States requisition bureau.

(*f*) Printing plant: This plant is in charge of a printer, reporting to the chief quartermaster. All stationery for use on the Isthmus is

issued from the printing plant. The plant is now designated as The Panama Canal Press.

PERSONNEL.

Mr. R. K. Morris was appointed chief quartermaster under date of October 8, 1917, vice Lieut. Col. William R. Grove, relieved from duty with The Panama Canal and ordered to military duty on September 22, 1917. Maj. F. H. Smith was relieved from duty as assistant chief quartermaster, The Panama Canal, under date of October 10, 1917, and ordered to military duty. The following promotions were made effective October 8, 1917: Mr. R. R. Watson was appointed superintendent, supply department, being promoted from district quartermaster, Ancon-Balboa district. Mr. J. J. Jackson was appointed general manager, commissary division, being promoted from general storekeeper. Mr. M. D. Smith was appointed general storekeeper, being promoted from United States requisition clerk. Mr. W. B. Brown continued as superintendent, cattle industry, and Dr. W. J. Taylor continued as supervisor, cattle industry.

LABOR.

There has been a surplus of silver labor throughout the year. The number of silver employees June 30, 1917, was 20,597; of gold, 3,549; total of all employees, 24,146. For 1918, the total silver employees was 16,157; total gold, 3,108; total of all employees, 19,265. This is a decrease of 4,440 silver and 441 gold employees. The decrease was due to considerable construction work being finished. Repatriation of those for whom it was impossible to give employment was continued and a number of them emigrated to Cuba. The reduction was gradual throughout the year.

QUARTERS.

There were 257 applications for family quarters on file June 30, 1917, as compared with 226 applications June 30, 1918.

Number of applications on file for married quarters for silver employees:

District quartermaster, Balboa	602
District quartermaster, Pedro Miguel	114
District quartermaster, Gatun	30
District quartermaster, Cristobal	975
Total	1,721

The following new quarters were completed and assigned during the year:

Applications at New Cristobal for gold employees	137
Applications at Mindi dairy farm	1
Applications at Summit poultry farm	4
Total	142

Applications at Mount Hope cattle ranch for silver employees	4
Applications at Mindi dairy farm for silver employees	6
Applications at Summit poultry farm for silver employees	6
Applications at Red Tank (Pedro Miguel) for silver employees	64
Applications at Balboa for silver employees	24
Total	104

The following buildings used for gold quarters and hotels were converted into silver quarters at Paraiso during the year:

	Apartments.
1 hotel converted into	16
2 type 18 bachelor quarters converted into	24
2 type 5 bachelor quarters converted into	16
Total	56

The following were undergoing alteration at the close of the year and will be completed by August 1, 1918:

	Silver apartments.
5 type 14–4 family quarters converted into	40
10 type 15–1 family quarters converted into	20
10 type A–1 family quarters converted into	10
5 type O. F. 1 family quarters converted into	10
Total	80

The buildings were made available for conversion because of the gold force of the dredging division being greatly reduced due to cessation of slides.

The operation of electric ranges in gold quarters was found to cost slightly more than coal-burning ranges and no further installations were made. The increased cost of operation and maintenance is due principally to high cost of repair parts for these ranges.

No funds have been granted for the building of additional quarters to care for the present applicants, and the list is increasing gradually, as the majority of new appointments to canal service are married men due to war conditions taking a number of single men.

The bachelor-quarters situation is better than last year, permitting 60 per cent of all bachelors to have single rooms. Some bachelors in the force have been replaced by married men, but no reduction has been made in the number of bachelor houses.

More bachelor quarters should be built in order to provide every bachelor employee with a room, and such quarters should be of permanent concrete construction.

ZONE SANITATION.

No change has been made in the method of collecting and disposing of garbage and cutting grass. This work has been carried on by the supply department for the health department. Cost, 1918, $22,797.36; 1917, $29,481.91.

Improved methods of taking care of garbage and replacement of pit closets with standard water-closets and disposing of pit closets where construction work was completed accounts for reduction in costs.

MOTOR TRANSPORTATION.

Motor transportation has increased to take care of moving of construction material for building and municipal engineering division animals released from this service have been transferred to plantations.

Vehicles on hand, operated by all departments.	1917	1918	Vehicles on hand, operated by all departments.	1917	1918
Ford trucks	40	77	Combination	[1] 1	.....
1-ton trucks	2	2	1-ton Buick hearse	1	1
1½-ton trucks	6	7	Ambulances	.....	7
3½-ton trucks	13	17	Motorcycles	36	47
3½-ton trucks, electric	3	3			
Ford passenger cars	13	15	Total	115	176

[1] Converted into passenger car.

The above includes commissary delivery, electrical material delivery, mail, and garbage cars.

The use of motor transportation has not only lessened construction and maintenance costs in transporting material and supplies, but has speeded up the work for which transportation was required.

Experience has shown that one 3½-ton truck will perform the work of seven teams. The cost of operating truck, including all direct expenses, overhead, repairs, and depreciation is $18 per day. The corresponding cost for seven teams is $26.25, or a saving of $8.25 per day in favor of the truck. Further economy is found in the operation of trucks as compared with the teams in loading by the use of clamshell cranes in handling sand and gravel and other bulky supplies.

Animal transportation is being replaced by motor transportation. The following animals were on hand and disposed of during the year:

	Horses.	Mules.
CORRALS.		
Number on hand, July 1, 1917	52	289
Number received, fire department and plantation	2	9
Number sold, died, and condemned	12	20
Number transferred to plantation	3	77
Number on hand June 30, 1918	39	210
PASTURES AND PLANTATIONS.		
Number on hand July 1, 1917	131	52
Number received by transfer	3	77
Number purchased	48	48
Number sold, died, and condemned	44	11
Number transferred	2	9
Number on hand June 30, 1918	136	157

MATERIAL AND SUPPLIES.

A total of 880 requisitions were prepared and forwarded to the general purchasing officer, as compared with 1,347 during the preceding fiscal year. The total value of material received during the fiscal year was $8,700,356.62, as compared with $10,817,106.51 for the preceding fiscal year. The local purchases amounted to $1,349,783.84 as compared with $1,516,914.79 for the last year.

The total tonnage of material received was 119,894 short tons, exclusive of lumber, piling, spud timbers, etc., as compared with 335,464 for the fiscal year 1917. Material consigned to The Panama Canal came forward in 218 steamers.

On June 30, 1918, the value of material in stock was $6,511,392.86, as against $5,835,977.37 on June 30, 1917, not including the stock of obsolete material and scrap. The following statement shows ma-

terial on hand at beginning and end of year and total of all issues from the different storehouses for 1917 and 1918, exclusive of obsolete material and scrap:

	General storehouse.	Cristobal storehouse.	Paraiso storehouse.	Total.
On hand, 1917	[1] $4,291,310.27	[2] $609,151.24	$935,515.86	[3] $5,835,977.37
On hand, 1918	4,932,204.69	675,412.40	903,775.77	6,511,392.86
Issued, 1916–17	[4] 9,576,799.71	[4] 1,398,972.13	[4] 1,416,581.28	[4] 12,392,353.12
Issued, 1917–18	9,439,032.03	1,740,223.65	858,601.44	12,037,857.12

[1] Shown in annual report for fiscal year 1917 as $4,017,836.54, which figure is in error, as it did not include fuel oil on hand.
[2] Shown in annual report for fiscal year 1917 as $1,373,259.50, which figure is in error, as it included obsolete material and scrap on hand at Cristobal.
[3] Shown in annual report for fiscal year 1917 as $6,326,611.90, which is in error, as explained by foregoing paragraphs (1) and (2).
[4] Difference between figure shown in this year's report and report for last fiscal year due to fact that issue of fuel oil is taken into consideration this year, which was not the case for the fiscal year 1917.

The increase in stock as compared with June 30, 1917, is attributed to the following:

First. The unusual increase in cost of all items of material, ranging from 15 to 500 per cent. A recent calculation indicates that the net increase in cost of 100 representative stock items during the past two years amounts to 131 per cent.

Second. Due to existing conditions resulting from the present war, it has been necessary to increase stock of some commodities such as fuel oil, gasoline, lubricating oils, chemicals, foundry supplies, etc., in order to provide for emergencies.

Sales.—Table No. 3 covers the total of all classes of sales made on the Isthmus for the year, showing 25,642 sales, amounting to $1,630,827.60, or an increase of $1,037,204.60 over the previous year. Sales to steamships show an increase of $677,428.79, and 1,917 vessels were handled as compared with 1,648 for the fiscal year ending June 30, 1917.

Sales to the United States Army amounted to $422,753.32 and sales to the United States Navy totaled $107,738.68. The principal items sold were lumber, building material, general hardware, rope, cable, gasoline, kerosene, and lubricating oils.

During the year a total of 244,392 requisitions and foreman's orders were handled, distributed as follows:

General storehouse	158,838
Cristobal storehouse	65,371
Paraiso storehouse	20,183

The consumption of cement for the year was 149.039 barrels.

Surplus and obsolete material, equipment, and scrap.—The Mount Hope obsolete storehouse, under the supervision of the storekeeper, Cristobal store, was operated as during the previous year as a concentration point for obsolete and surplus material, equipment, and scrap.

Table No. 10 shows the status of obsolete and surplus material at the beginning and end of the fiscal year, the receipts and issues during this period, and the balance on hand June 30, 1918.

Scrap.—Table No. 11 covers American scrap operations during the fiscal year.

The French scrap situation is as follows:

	Gross tons.
On hand July 1, 1917	18,332.41
Receipts, 1918	
Total	18,332.41
Shipped on Rovetta contract	3,166.21
Balance, June 30, 1918	15,166.20

Table No. 5 covers the sales of material, supplies, and equipment heretofore purchased or acquired for the construction of The Panama Canal, made by authority of the Governor without advertisement and on which time did not permit securing approval of the Secretary of War, required by Executive order of May 12, 1915, fiscal year 1918.

Fuel-oil plants.—The operation of the Balboa and Mount Hope oil plants continued under the supervision of the general storekeeper during the fiscal year.

The contract with the Standard Oil Co. of California for delivery of 700,000 barrels of fuel oil at Balboa at a price of $1.60 per barrel expires September 1, 1918. A balance of 188,357 barrels remains to be delivered under this contract.

The contract with the Atlantic Refining Co. for delivery of 240,000 barrels fuel oil at Cristobal at a price of $2.04 per barrel, expired June 30, 1918. An outstanding order against this contract provides for delivery of 75,000 barrels.

Construction of a 55,000-barrel capacity concrete fuel-oil tank for The Panama Canal was started February 25, 1918, and as of June 30 was 75 per cent completed.

Table No. 12 indicates total fuel oil handled by the Balboa and Mount Hope fuel-oil plants in amount 2,517,217 barrels for 438 vessels.

Gasoline storage.—Storage of bulk gasoline in tanks Nos. 31 and 37 at Balboa and Mount Hope was continued during the year, the principal issues from same having been made to Navy vessels and to the Army on the Isthmus.

PANAMA CANAL PRESS.

The value of stock on hand at the close of the fiscal year was $86,542.96, as against $81,767.72 for the preceding fiscal year, which increase was due almost entirely to the increased cost of material as well as to the heavier supply of forms carried in stock.

There were added to the equipment of the printing plant during the year equipment valued at $3,072.21, as follows:

1 heater, glue, electric	$30.75
1 machine, lacer, clipper belt	22.78
1 machine, Monroe, calculating	250.21
1 machine, Oswego paper cutter	1,168.46
1 motor, electric, Boston wire stitcher	74.00
1 motor, electric, Tatum punch	150.00
1 motor, electric, Oswego paper cutter	166.73
1 motor, electric, Brown & Carver paper cutter	170.73
1 motor, electric, air compressor	163.50
1 motor, electric, press No. 28	135.00
1 motor, electric, press No. 3081	68.00
1 motor, electric, press, No. 2158	75.00

1 motor, electric, press No. 16144, 16284	$166.00
1 motor, electric, press D29, D822, D989, D1077	372.00
1 torch, vulcanizing, rubber stamp	11.50
Miscellaneous [1]	47.55
Total	3,072.21

Unserviceable items surveyed and disposed of during the year amounted to $220.27, as follows:

1 machine saw, stereotype	$25.00
1 machine, paper cutting	125.00
Miscellaneous [1]	70.27
Total	220.27

The following table shows the principal items of manufacture:

Forms	32,727,992	Pads, desk	404
Books	164,807	Pads, scratch	101,991
Sheets, carbon	15,700	Sheets, rules	68,530
Time-tables	19,100	Tags, assorted	1,154,250
Cards, guide, etc	1,010,141	Canal records	482,650
Stamps and daters	4,709	Binders	1,609
Cardboard	56,550	Programs	30,450
Sheets paper	3,574,234	File boxes	81
Badges	4,211		

The total value of material issued was $107,302.55, as compared with $87,482.47 for the preceding period. The total value of material used in manufacture was $51,096.31, as compared with $38,736.70 for the fiscal year ending June 30, 1917.

SUBSISTENCE.

The supply department continued the operation of the hotels Tivoli and Washington during the fiscal year, also the line restaurants and messes.

The Hotel Aspinwall, Taboga, was reopened on May 20, 1918, after having been closed and used as intern camp by the Army from April 12, 1917.

The Hotel Washington is financially supported and owned by the Panama Railroad, but is operated under the management of the supply department.

The general method of administration was the same as in the past.

The net revenue for the year from restaurants and messes was $598,153.51, a decrease of $42,914.08 from the previous year, while the total cost of operations was $594,395.99, a decrease of $39,754.34, making a profit of $3,757.52, a decrease of $3,159.74 from last year. Had the charges for building repairs, fuel, and light been made, a net loss of $17,356.45 would have been shown. No charge for equipment has been made, the charge being absorbed by allotments of The Panama Canal.

The ratio of supplies consumed to revenue was 2.91 per cent less than last year. The ratio of total cost of operation to revenue was 0.45 per cent less than last year, making the percentage of profit to revenue 0.45 per cent more than last year. The net expense for salaries and wages was $90,931.64, an increase of $11,177.18, making

[1] Items the value of which is under $10.

the proportion of net pay roll to revenue 15.20 per cent, or 2.80 per cent more than last year.

The Balboa shops' lunch room was completed September, 1917. Rebuilding of Pedro Miguel restaurant will be completed by the middle of August, also the new kitchen for the Hotel Tivoli. No appreciable change was made in the forms of any of the restaurants or hotels, except that at Paraiso, where the gold forces of the dredging division have been transferred to Pedro Miguel, and the restaurant at this point has been abandoned. A cafeteria restaurant for silver employees was opened at Camp Bierd (Cristobal) as a branch of regular silver mess.

The Hotel Tivoli showed a net loss of $8,169.95 compared with a net profit of $1,084.86 for the previous year.

The Hotel Washington showed a net loss of $15,465.92, compared with a net profit of $11,185.33 for last year.

There is a considerable decrease in revenue in both the Hotels Tivoli and Washington. This is due mostly to the war conditions and the difficulty of traveling, as there are few people traveling for pleasure at present; also the great inconveniences that business men find in traveling has, no doubt, contributed to the decrease over previous years.

COMMISSARY OPERATIONS.

The commissary division has been in charge of Mr. J. J. Jackson since October 8, 1917. Prior to that date it was in charge of the undersigned. This division operates the line commissaries, wholesale and manufacturing plants, etc. The plantations and hog, chicken, and dairy farms were operated by this division up until October 8, 1917, at which time they were taken over by the cattle industry.

An increase is recorded in the business of all the manufacturing plants with the exception of Cristobal laundry. This unit shows only a slight decrease in output, despite the large amount of work transferred to Ancon when the laundry at that point was opened. The most notable growth in production was at the abattoir, the output as compared with the preceding year having more than doubled. This is mainly accounted for by the fact that during the previous year no poultry was killed and dressed at the abattoir, and the number of hogs slaughtered was practically negligible. The kill of beef is steadily mounting, being almost treble that of the fiscal year 1916—the first year this unit was in operation. The use of native beef on the Isthmus and by the steamship trade has grown to such an extent that no beef was imported from the United States during the year, with the exception of 25 hind quarters and a very few items, such as beef tenderloins, sweetbreads, beef and calves' liver, and these only in limited quantities. The sausage plant also doubled its output, and marked increases are shown in the sales of the industrial laboratory and ice-cream plant. Table No. 13 gives a detailed comparative statement covering the output of manufacturing plants for fiscal years 1914 to 1918, inclusive.

Since January 1, 1918, the United States troops stationed on the Isthmus have protected their own requirements on nearly all important foodstuffs, other than cold storage, which has resulted in decreased purchases by this division of articles thus affected. The

quantity of sugar bought was approximately half that of the previous year, explained largely by the fact that a big stock was stored during 1916–17, with consequent diminished orders in 1917–18. Table No. 14 covers the detail of purchases made during fiscal year 1918, as compared with purchases made during the preceding fiscal year.

The steady upward trend in price revealed by the 1917 report continued throughout the past year, notably so on cold-storage products. The increase in price on grocery items was small, and, in some instances, prices have been kept at the same level as last year. There has been practically no increase worth mentioning on vegetables, and on three staples—potatoes, onions, and beans—prices are lower than last year, especially on the first-named item, where we have been enabled to make a reduction from 8 cents to 3 cents per pound. Table No. 15 gives a comparative statement of selling prices obtaining June 30, 1918, as against prices on June 30, 1917.

The total value of supplies bought in Costa Rica—$80,192.12—represents a decrease of $33,331 from the total for the previous fiscal year. This is accounted for by the fact that heavy purchases of coffee and sugar—to the extent of approximately $65,000—were made in the last few months of the fiscal year ending June 30, 1917. The coffee purchased was sufficient to cover the requirements of the commissary division for a long period in advance, and as a consequence it was found unnecessary to buy any of this commodity in Costa Rica during the past fiscal year. It may be stated, however, that of a purchase of 250,000 pounds of coffee made in Panama early in 1918 approximately one-half had been produced in Costa Rica. Purchases of sugar show a decline of about 75 per cent, this, in large measure, being due to conditions resulting from the entrance of the United States into the war, and the trading restrictions imposed thereby upon firms from which practically all our Costa Rican purchases of this product had been made.

Purchases of fruits and vegetables represent an increase of $18,315.55 over those of the previous year. The quantity of potatoes, cabbage, and carrots bought was more than double the amount of the previous year, while other staple items, in practically all instances, showed increases of greater or lesser proportion.

Two ships carrying commissary cargo from Port Limon to Cristobal were lost, the *Colombia*, which was bringing fruits, vegetables, and sugar valued at $3,200, burning to the water's edge, and the *San Blas* capsizing at the wharf at Bocas del Toro, Panama. The latter vessel was bringing to Cristobal a cargo of fruits and vegetables worth approximately $1,000. After the sinking of the *San Blas* the commissary division's cargo was handled for a time entirely on the schooner *Caroline*, which was too small for this purpose. In October, the *Orotina*, a 100-ton boat of American registry, was chartered for a period of six months, this being necessary because of the dearth of small vessels plying regularly between Cristobal and Port Limon, and at the expiration of that time was rechartered for another period of six months. On June 15, the products buyer established a temporary subagency in San Jose in order that he might buy fruits and vegetables in increasing quantities. Table No. 16 gives a detail of the purchases made in Costa Rica for the fiscal year 1918.

A representative of this division was sent to Cuba, Porto Rico, Dominican Republic, and Haiti to investigate the possibility of purchasing supplies. The best field appeared to be in Haiti, and an office was opened on October 11, 1917, at St. Marc. The main agency for Haiti was transferred to Port au Prince on June 30, 1918, due to the change in routing of the Panama Railroad steamships. A warehouse, however, is still maintained at St. Marc. So far, the products buyer has purchased foodstuffs and miscellaneous products to the amount of $16,478.76. A list of the items shipped is given in Table No. 17.

Also included in Table No. 17 are local purchases, from which it will be seen that large quantities of foodstuffs were bought on the Isthmus; some from producers, some from contractors, and some from importing agencies. The commissary local buyer in Panama City bought a great number of hogs and large shipments of corn during the past year.

The Colombian purchases listed in the same table do not include the beef cattle shipped from that country, as such information will be shown in the report of the cattle industry. A greater quantity of sugar was purchased in Colombia than in any other market excepting the United States.

Transfer of plantations and farms.—On October 8, 1917, the plantations, poultry farm, hog farm, and dairy were transferred from the commissary division to the cattle industry and placed under the supervision of Mr. W. B. Brown.

New commissaries.—A commissary at Red Tank was opened during the past year. It is operated as a branch of the retail store at Pedro Miguel and was necessary in order to relieve the congestion on the silver side at Pedro Miguel commissary. Branches of Gamboa commissary were opened on April 16 at Juan Mina plantation and at Limon plantation, on the Chagres River. These stores handle only a small stock of groceries, tobacco, etc., for the benefit of the men employed in the plantation and pasture clearing gangs in that vicinity.

Changes in retail stores.—Alterations were made at the Paraiso commissary during the past year which considerably improved the appearance of that store and effected economies in the handling of the silver trade, most of the gold trade (because of changed conditions of employment) having removed to Pedro Miguel.

At La Boca commissary a 20-foot extension was made and a change in the lighting provided.

On January 1 the United States Army took over the commissaries theretofore operated by this division at Fort Sherman, Fort Randolph, Las Cascadas, Empire, and Culebra. In order to serve the Panama Canal employees working on the left bank of the canal, this division still continues to operate a commissary at Empire.

Necessary minor repairs were made at the Monte Lirio commissary. Among other things, a new roof was put on and a small wareroom added. The addition replaced the box car formerly used as a warehouse. Painting was done throughout.

Business at Cristobal commissary increased to such an extent that it was imperative to take measures to relieve the congestion and inadequate service in certain silver grocery sections. This was accom-

plished by building booths each inclosing a section having a complete stock of practically all items carried. Besides enabling customers to make all purchases of nonperishable foodstuffs at one counter, the efficiency of the sales force, all selling the same article, may be more readily determined and regulated.

The commissary at Corozal was closed on June 1, the establishment of an Army commissary there having made unnecessary the maintenance of a Panama Railroad commissary also. However, the residents of that town still enjoy solicitor and delivery privileges, the district being taken care of by the Ancon commissary.

Soap factory.—On February 15 the soap factory went into operation as a separate unit, having been before that time a department of the industrial laboratory. The present capacity of the plant is about 100,000 pounds monthly, and soap of all grades can be turned out. At present, soft soap, family soap, and yellow, white, and brown laundry soap are being manufactured.

Sauerkraut.—Machinery for the manufacture of sauerkraut was installed in the industrial laboratory the latter part of August, 1917, but on account of the time required for proper fermentation this product was not offered for sale in the line commissaries until November 1. The output of this plant has sold readily in the line stores. In fact, it has been impossible to manufacture enough to take care of the demand. The average production is 1,200 pounds per week.

Milk.—Another step in the direction of becoming independent of the United States on perishable products was the establishment of the dairy farm at Mindi, and the installation of equipment in the ice-cream plant for the pasteurization and bottling of milk from this farm.

Prior to the opening of this farm, the average consumption on the Canal Zone was 400 gallons of fresh milk daily, all of which had to be brought from the United States in refrigeration. The one other supply was from the Corozal Hospital farms, the milk from which place was used only in the hospitals, on physician's prescription, and for babies.

Since Mindi dairy farm milk has been available, the consumption on the Canal Zone of milk brought from the United States has decreased to 265 gallons daily, 175 gallons of this being bottled for the retail trade, the remaining 90 gallons being used in the manufacture of ice cream. Of the milk being produced at the new farm, approximately 185 gallons are sold per day.

Sausage factory.—Besides manufacturing eight kinds of sausage in the sausage factory during the past year, as soon as importation of hogs from Colombia and interior Panama became heavy the commissary division began curing its hams and bacon, with such good results that it was unnecessary to draw on the United States for this product until recently, when a small order for hams was placed.

Bone mill.—In line with the policy of waste prevention wherever possible was the setting up of a bone mill in connection with the abattoir in March, 1918. Although most of the bones from the cattle killed are sent to the United States, there have been produced 105,373 pounds of bone meal, a greater part of which has been used by the cattle industry on the plantations.

Tailor shop.—In February the commissary division opened a tailor shop in Ancon laundry, a cutter and tailor having been brought from the United States for the purpose. A large volume of business was done from the very outset, at present 27 men being employed.

To take care of the increased demand two American cutters came to the Isthmus in April, one being placed in charge of the shop in Cristobal commissary, the other making weekly trips to Pedro Miguel commissary, besides assisting the chief cutter.

Sales of dress goods have increased greatly since the opening of this establishment.

Bakery.—The manufacture of rolls was discontinued in February, and the baking of Victory bread, in 12, 16, and 30 ounce loaves, made of 80 per cent wheat flour and 20 per cent corn meal, was begun in March. When the Victory loaf was put on the market, the baking of pies, doughnuts, fancy cakes, and of every kind of bread, except rye and graham, was discontinued. This has resulted in a saving of flour estimated at approximately 100,000 pounds per month. Working only five days the week has, of course, resulted in pay roll economies, in addition to the labor saving effected when fancy baking was discontinued. Production has fallen from 194,507 loaves the week in July, 1917, to 102,000 loaves the week in June, 1918. The present force consists of 42 men, whereas prior to the enforcement of conservation regulations 70 men were employed.

Saving in flour.—The regulations prescribing the observance of wheatless Mondays and the baking of Victory bread have resulted in a considerable and gratifying decrease in the amount of flour consumed. During the period March 20 to June 20, 1917, 2,073,180 pounds of flour were issued from the wholesale grocery warehouse of the commissary division. During the same period in 1918, representing the first three months in which the new regulations were in effect, 1,622,882 pounds were issued, showing an actual decrease in consumption of 450,298 pounds.

Chilean flour.—In order to avoid, as much as possible, drawing on the wheat supply of the United States, it was decided to try other markets in which to purchase flour. It was found that a very good grade was to be obtained from the Chilean markets, and purchases were immediately begun from that source. Up to the present time 1,308,000 pounds have been received, and 1,692,000 pounds are still due. The commissary division will probably continue to buy from these markets in the future—at least until such time as flour can be more easily obtained from the United States.

Beef-corning plant.—On March 13 a beef-corning plant was opened at the Balboa ice and cold storage plant. There are five tanks, with a capacity of 10,000 pounds. Nothing but corned beef is being turned out at this unit. The demand for this product from Balboa, Ancon, and La Boca commissaries, and Ancon market has recently grown to such an extent that approximately 40 per cent of the commissary sales of this article are made on the Pacific side. Considerations of transportation and space prompted arrangements for the handling of this product for the commissaries mentioned.

Industrial laboratory products.—In addition to the items already manufactured by the industrial laboratory of the commissary division, a number of new products were put out and sold in the line

stores during the past year. Included in these were mapeline extract, lard compound, leaf lard, mango preserve, watermelon preserve, guava, peach, grape, and roselle jelly, Worcestershire sauce, chili sauce, extract of peppermint, extract of wintergreen, canned tomatoes, tomato ketchup, apple sauce, chowchow, India relish, mustard pickles, and fig preserve.

Ice cream peddle service.—An ice cream peddle service, operated on Sundays and holidays, was begun on September 16 by the Cristobal commissary, and includes the routes in Cristobal, Colon Beach, and New Cristobal, two wagons being used in this work between the hours of 4.30 and 6 p. m. A similar service has been in effect at Ancon and Balboa commissaries for some time.

Eggs.—For the first time, the commissary division imported during the past year a grade of eggs known as "candled firsts." Heretofore, nothing has been brought down from the States except the very best stock known as "fresh-gathered extras." The egg market, however, reached such high levels during the midwinter months that the necessity arose of having eggs which could be offered to the public at a lower price.

Requisitioning material.—When the United States declared war rail transportation in the United States was already badly congested. Uncertainty was felt as to just what the immediate consumption would be and it was thought there might possibly be some interruption of ocean transportation. The commissary division therefore purchased heavily in essential items with the idea of securing a large stock of supplies and transporting them to the Isthmus as soon as possible. This policy resulted in the division not only securing a large stock of essential supplies before war demands became insistant, but resulted in a substantial saving to employees, as in all cases prices greatly increased a few months after the declaration of war. Principal among these items may be mentioned work shirts, work pants, overalls, khaki pants, white-duck pants, Palm Beach suits, men's and women's hosiery, mutton, evaporated milk, condensed milk, beans, rice, and canned goods of all kinds.

Foreign shipments.—A large consignment of chinaware, cloth, and notions, shipped from England in August, was lost at sea. This is the first and only inconvenience of the kind suffered by the commissary division since the beginning of the war, with the exception of a shipment of Porto Rican cigars lost when the steamship *Carolina* was sunk in June, 1918.

The largest single shipment.—The largest single shipment by the commissary division during the fiscal year was made in January. When news reached the Isthmus of the destruction and suffering caused by the earthquake in Guatemala City, the local chapter of the Red Cross requested the National Red Cross to appropriate $100,000 for the relief of the suffering there. Within 24 hours of the receipt of advice from Washington that the appropriation had been approved, the commissary division had loaded 26 cars of foodstuffs, amounting in value to over $100,000, sent them across the Isthmus and placed this cargo aboard the steamship *Caribbean* for dispatch to San Jose, Guatemala. Some of the items included in the shipment are as follows: Rice, 380,000 pounds; flour, 406,796 pounds; evaporated milk, 178,272 tins; hard bread, 63,200 packages;

sugar, 7,600 pounds; lard compound, 20,000 pounds; salt, 32,000 pounds; onions, 10,500 pounds; salt pork, 20,600 pounds; cotton blankets, 300; beans, 76,023 pounds; baking powder, 2,196 tins.

By-products from the abattoir to the value of $373,310 were shipped to the United States during the year.

Beef to the value of $273,475.80 was shipped to the United States for the Army during the year.

Central American sugar.—During the past year the demand for the so-called Central American sugar has greatly increased. This sugar is not as finely processed as the grade purchased in the United States, and is a trifle darker in color, but the saccharine content compares very favorably with that of the American granulated and, besides, it is considerably lower in price.

In order to make no further withdrawals from the sugar supply of the United States, every effort was made to supply the entire requirements of The Panama Canal with Central or South American white and brown sugar exclusively, but with only a partial measure of success.

Construction of ice and cold-storage plant.—The cold-storage and ice plant now under construction at Mount Hope is rapidly nearing completion. The cold-storage plant will be three stories in height. The length will be 371 feet over all, including platforms and approaches. The main building will have a length of 330 feet. The width is 115 feet 6 inches on the first floor, which will be diminished to 105 feet 8 inches for the second and third floors.

The first floor has five rooms for boxed goods, freezer, cutting and packing and storing rooms for the butchers, meat coolers, etc. At the south end is the hardening room of the ice-cream plant.

On the second floor will be located the vegetable storeroom and separate storerooms for eggs, butter, cheese, milk, etc., and salted and cured meats.

An auxiliary room for the ice-cream plant will occupy the south end of the second floor, directly over the hardening room. On the third floor will be a sausage-manufacturing plant, with pork and beef storage room and a chill room occupying the remainder of the floor.

The building is insulated throughout with 4-inch cork.

The ice plant will be a one-story structure adjacent to the cold-storage plant.

New abattoir.—It is estimated that this plant will be ready for operation by January 1, 1919. The plant will afford facilities for the slaughtering of 300 steers and 600 hogs per day.

The abattoir will be located just east of the new cold-storage plant at Mount Hope with which it will be connected by a passage at the third-floor level. The length will be 134 feet 8 inches, the width 95 feet 2 inches, and it will have three stories and basement.

CATTLE INDUSTRY.

The cattle industry was in charge of Mr. W. B. Brown up until October 8, 1917, at which time the pastures, plantations, hog farms, chicken farms, and dairies, which were taken over on that date from the commissary division, were placed in immediate charge of the supervisor, Dr. W. J. Taylor. Under date of April 15, 1918, however, Mr. Brown was placed in charge of all operations of the cattle

industry, with the exception of cattle purchases, including pastures, plantations, etc., and has continued in charge to the present time as superintendent, cattle industry. Mr. J. H. Humphrey was appointed cattle buyer, cattle industry, under date of April 1, 1918, reporting to the chief quartermaster.

Purchases.—The cattle contract for 1917–18 was completed during April of this year. A new contract for 1918–19 was entered into with Colombian cattle men for 37,500 head of beef cattle at $0.04975 per pound. The purchase price has changed very little in the last three years, as is evidenced by the following table:

Year.	Beef cattle purchased.	Minimum gross weight per head.	Price paid per pound.
	Number.	*Pounds.*	
1916	10,000	927	$0.0445
1917	14,000	950	.0448
1918	37,500	870	.04975

In addition to beef cattle purchased during this fiscal year, 3,000 3-year-olds were also purchased at $26.25 per head, and several thousand head of beef cattle were bought in the open market in addition to those on contract, at prices varying from $0.0425 cents per pound to $41 per head.

The large increase in purchase of cattle this year was made in order that we might supply the United States Army in the States with beef. It is expected to supply the Army from this source with 18,000 to 20,000 head during the year.

Bulls.—Fifteen Herefords and five Short Horns were selected on the San Gertrodes ranch in southwest Texas and brought to the Isthmus for breeding purposes. Also six registered Duroc boars were purchased in the States for breeding purposes on our hog farm.

In addition to cattle purchased in Colombia the following is a list of other articles purchased in that country and delivered to the commissary division during the year:

	Unit.	Quantity imported.	Price.
Hogs (8,227)	Pound	1,064,371	11 cents per pound.
Corn	do	135,483	2 cents per pound.
Sugar	do	423,510	5.79 cents per pound.
Shoats (419)			$4.75 each.
Chickens (42,157)	Pound	105,389	18 cents per pound.
Ducks (4,747)	do	19,088	15 cents per pound.
Turkeys (5,377)	do	45,716	21½ cents per pound.
Coffee	do	175,284	10½ cents per pound.
Bran	do	150,000	90 cents per hundredweight.
Blackstrap	Gallon	138,000	8 cents per gallon.
Yams	Pound	355,376	1.8 cents per pound.
Palm oil	do	11,200	10 cents per pound.
Lard	do	3,600	11 cents per pound.
Peas	do	10,000	5 cents per pound.
Coconuts		42,980	2½ cents each.
Butter	Pound	4,065	45 cents per pound.
Plantains	do	17,650	¼ cent per pound.
Mochila Indian bags		600	22 cents each.
Colombian grass mats		438	75 cents and $1.25 each.
Horses		20	$70 each.
Grass seed	Pound	70,000	14 and 20 cents per pound.

The above items were all brought to the Isthmus on the steamship *Caribbean.*

Transportation.—The steamship *Caribbean* completed 40 trips to Colombian ports during the year, bringing to the Canal Zone 18,499 head of beef cattle, 1,300 head of 3-year-olds, and 975 cows. This ship had alterations made during August and September, increasing her carrying capacity from 450 to 550 head of fat cattle. In February the steamship *Caribbean* commenced carrying a limited amount of commercial freight from Colombia to the Isthmus for reshipment to New York. From the period of February to May, inclusive, 1,800 such shipments had been handled, in which were included gold and platinum to the amount of $388,688.55.

The dredge *Culebra* had temporary alterations made and was placed in the cattle service during the period of August and September, 1917. This ship was again taken for cattle service in April of this year, and is now transporting cattle. She completed 20 trips during the year, bringing a total of 4,440 head of beef cattle and 1,834 head of 3-year-olds.

PASTURES.

Mount Hope.—Beef pasture, total area 4,147 acres remaining, 2,045 acres having been set aside as dairy pastures. An average of 2,000 head of cattle pastured during the year.

Monte Lirio.—A total of 1,628 acres; no additions. An average of 600 head of cattle pastured during the year.

Summit.—Total of 4,867 acres, 833 acres of which were added this year. From 500 to 1,500 cattle pastured during the year.

Miraflores.—A total of 3,972 acres, 1,628 acres of which are additional this year. From 800 to 2,000 cattle pastured during the year.

Pedro Miguel.—A total of 2,697 acres, 840 of which were added this year. From 600 to 3,500 cattle pastured.

Caimito.—A total of 4,516 acres. This area was cleared from December, 1917, to May, 1918, and sowed with Guinea grass seed. The grass is coming in excellent condition.

Mandingo Valley.—A total of 6,375 acres, 1,789 acres of which were added this year. This area was formerly known as Mandingo, Alligator Creek, Bas Obispo, and Gorgona tracts. All have been consolidated and will hereafter be known as Mandingo Valley pastures. From 1,200 to 1,500 cattle pastured during the year. Corn was planted on 600 acres of the new clearing, which gives promise of an extra good crop.

Dips.—Additional dips and corrals have been installed at Mandingo and Summit.

Health.—The general health of all animals has been good. With the dipping facilities available the tick infestation has been greatly reduced, resulting in the general better physical condition of all stock cattle.

Anthrax.—Since February 1 about 100 head of cattle died of anthrax. It is now definitely known that the infection takes place in Colombia. Practically all cases of anthrax have occurred in fat cattle, and within 10 days or 2 weeks after arrival. No deaths in stock cattle on the Isthmus have occurred.

Breeding.—Cows to the number of 650 were selected for breeding, and with the imported bulls have been placed on the range at Miraflores. The results have been so satisfactory that an order has been placed for 30 additional bulls, to consist of 15 Herefords and 15 Short Horns.

Clearing.—The total virgin clearing for the year amounts to 9,602 acres, reclearing 5,700 acres, and 10,200 acres seeded. The total area of completed pasture on June 30 was 21,253 acres. The grand total of complete and uncompleted pastures was 30,247 acres.

All constructing gangs were laid off at the commencement of the rainy season, May 1, except small fencing gangs that had been kept in the fields. The total of fence lines run amount to 94 miles of four-strand barbed-wire fence.

Sales of cattle.—Sent to the abattoir to June 30, 21,731 head of beef steers, 155 bulls, and 224 cows. Sales were made to ships of live cattle numbering 99 head.

PLANTATIONS.

Of 15 plantations and farms in operation at the close of the last fiscal year, 1 has been eliminated, i. e., Emiliani, consisting of a cocoanut grove, this area being taken over by the Army. Three plantations have been consolidated with other adjoining plantations to minimize the accounting and supervision, as follows: Mindi and Bracho, and now known as Bracho-Mindi; Davis Place with Frijoles; and Las Guacas with Limon. Two plantations have been added, Flat Rock on the Chagres River and Gatun corn farm.

While it is true that the operating expenses for the past fiscal year exceeded the revenues, the productiveness of the plantations have been greatly increased and an important step taken toward placing the Isthmus on a self-supporting basis, thus decreasing the tonnage required to import foodstuffs. Our experience has demonstrated that small crops and truck gardening is unprofitable to handle directly. Crops of this character will be operated under contract with Chinese, as is now being done at Frijoles and Summit, the Chinese being the only labor that can be relied upon to give the intensive cultivation these crops require.

Table No. 18 covers the items produced by the various plantations and furnished the commissary division during the year.

Pena Guapa.—Coconuts. This place has been continued on the contract basis as heretofore.

Manawa.—Consists at this time of 60 acres planted in sugar cane and 50 acres in cocoa, bananas, and plantains. This plantation will be limited to the above area, as it is not considered a location favorable to other crops.

Bracho-Mindi.—This plantation reached its highest yield in May, producing more than 11,000 pounds of papayas. A production of 8,000 to 10,000 pounds monthly may be expected from this point.

Sweetwater.—Approximately 50 acres, bearing coconuts, is now producing 2,500 to 8,000 nuts monthly. This acreage will not be increased and will be placed on contract basis after July 1.

Gatun corn farm.—A new farm of approximately 80 acres located north of New Gatun. This farm is planted to corn with the exception of 10 acres in sweet potatoes.

Frijoles.—Operated as an avocado orchard of about 35 acres. Additional trees to the number of 800 have been set out in the past year. There are 1,600 avocado trees at this point. Also 100 imported mangoes of Cuban varieties have been set out here. The truck farm at this point, operated under agreement with Chinese gardeners, has been very satisfactory.

Juan Mina.—Has been continued as a citrus grove and has now approximately 40 acres planted to citrus fruit trees. The progress of these trees during the past year has been excellent. A major part of this grove should be bearing in two years. Also 40 avocado trees have been set out. Approximately 20 acres of this place had been planted in April and 20 acres in May to cowpeas. An irrigation system has been installed, and there is now no lack of water during the dry-season months. A nursery of fruit trees was started in April to provide trees for citrus groves at other points. There have been 12,000 trees set out from this nursery.

Flat Rock.—This is a new plantation consisting of 60 acres on the upper Chagres River and lying between the plantations of Juan Mina and Limon. This is now planted in yucca, but it is expected to establish this place as a citrus grove during the coming year.

Chilibre.—This was planted with plantains a year ago and has been increased by another 19 acres of plantains, having now 58 acres of same. Ten acres of plantains were also planted with yucca.

Limon.—The acreage at this place has been almost doubled within the past year. The following acreage is now under cultivation: 163 in bananas, 5 in yams, 5 in dasheen, 35 in corn, 30 in sugar cane, 155 in sweet potatoes. An irrigation system has been installed covering about 50 acres.

Las Cascadas.—This plantation, consisting of 150 acres, has been continued in cocoa. About 25 acres have been planted with bananas to afford temporary shade for the young cocoa. A thousand young avocado trees have been set out and an additional 1,000 to 1,500 will be planted during the next year. The production of cocoa from January to May was 16,655 pounds.

Summit (formerly known as New Culebra Plantation).—Has the following under cultivation: 25 acres in corn, 5 acres in yams, 10 acres in pineapple. Experiments made here recently with a grain —Guinea corn—imported from Haiti have been very promising, and about 40 acres will be put in this crop. This grain closely resembles feterita and is well adapted for chicken and stock feed. The truck farm here has been continued under the Chinese, with very satisfactory results.

Venado.—Consists of 150 acres of coconuts and contains approximately 18,000 trees. There have been set out 250 new trees, but no additional area will be cleared.

POULTRY FARM.

Mindi.—At the close of December the Mindi poultry farm was abandoned, principally due to heavy losses sustained by the birds during the rainy season. These losses were due to unfavorable location, making it impossible to expand or properly take care of the stock.

Summit.—This farm was completed early in the year and provided with model yards, buildings, and equipment. The plant represents an investment of approximately $100,000.

In October 1,180 birds of pure-bred stock were imported from the States, and again in December 153 were so imported. These birds were selected by an expert from the farms in the Eastern States, and represent the following breeds: Single and Rose Comb Rhode Island Reds, Blue Andalusians, Silver Grey Dorkins, White Plymouth Rocks, Single Comb Minorcas, Single Comb White Leghorns, White Wyandottes, and Buttercups.

Weekly shipments of fowl are received from Colombia and the best of these are selected and retained for the farm, the balance being sent to the abattoir. With the native Colombian birds retained the imported strains are bred.

Two 3,600-egg incubators are now being used, and hatches are obtained approximately every three weeks.

In the past six months 23,914 dozen eggs have been supplied the commissary from this farm, and the monthly shipments are now averaging 3,500 to 4,500 dozen eggs. In addition, weekly shipments of broilers are being made to the commissary.

This farm is practically on a paying basis at the present time and a promising future is assured.

HOG FARM.

All construction work has been completed, and the cost of the plant is approximately $50,000. The most serious obstacle we have had to contend with here is hog cholera, introduced through native hogs. This has been finally controlled, and the months of May and June were our first months without loss from this source.

We have gradually built up a good breeding stock, consisting of 210 sows, of which 100 are Berkshire, and also have 5 registered Duroc and 2 registered Berkshire boars. This breeding is meeting with much success, and in another year will go far toward supplying pork on the Isthmus. During the year 8,640 hogs were sent to the abattoir, most of which were imported from Colombia.

DAIRY FARM.

The construction of the dairy farm was commenced in July on a location about half way between Gatun Road and Mindi station on a line with the Mindi diversion. Four milking barns, with a capacity of 80 head per barn, 4 silos, a refrigerator and milk house—all concrete—have been erected. Also a frame cottage for foreman, two-story barracks for laborers, and stable have been erected. The plant investment represents approximately $103,000.

A thousand head of range cows were brought from Colombia to stock this dairy. It is expected to purchase in the States 100 Holstein cows and a few good Holstein bulls, and from this stock gradually build a representative herd. The silos are being filled with cane and corn ensilage, to be used in feeding dairy cows. This farm has been in operation since January, and the milk production has steadily grown from 971 gallons in that month to 5,373 gallons in June. In

addition to this milk production, 336 calves have been sent to the abattoir for veal. This plant is on a paying basis.

Respectfully submitted.

R. K. MORRIS,
Chief Quartermaster.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—*Occupants of Panama Canal and Panama Railroad quarters June 30, 1918.*

Place.	Gold.			Europeans.			West Indians.		
	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Balboa [1]	1,069	752	902	88	14	20	1,018	488	862
Ancon	819	532	462	.....	.....	.....	165	11	47
Corozal	13	10	5	.....	.....	.....	83	16	4
Pedro Miguel [2]	248	157	146	4	4	13	[3] 645	354	568
Paraiso	31	25	21	40	11	25	492	150	308
Culebra [4]	14	11	6	.....	.....	.....	[5] 125	76	138
Gamboa [6]	23	9	3	8	1	2	[7] 231	70	97
Gatun	179	144	172	7	1	4	887	453	470
Cristobal [8]	860	440	500	72	.....	.....	[9] 2,274	421	887
Total	3,256	2,080	2,217	219	31	64	5,920	2,039	3,381

[1] Includes Palo Seco and quarantine station.
[2] Includes Miraflores and Red Tank.
[3] Includes 49 Panamans.
[4] Includes Empire and Las Cascadas.
[5] Includes 17 Panamans.
[6] Includes Summit and Gold Hill.
[7] Includes 29 Panamans.
[8] Includes Colon Beach and Colon Hospital.
[9] Includes 8 East Indians, 6 colored American citizens, and 330 Panamans

TABLE No. 2.—*Applications for married quarters on file June 30, 1918.*

Ancon	166	(35)
Ancon Hospital	2	
Paraiso	27	(7)
Empire	1	
Gatun	12	
Cristobal	69	(9)
Total	277	(51)

NOTE.—The figures in parentheses show the number of applicants already occupying regular or nonhousekeeping family quarters at stations other than those at which applications are filed.

TABLE No. 3.—*Sales.*

	General storehouse.	Cristobal storehouse.	Paraiso storehouse.	Total.
Number of local sales	9,876	5,810	2,160	17,846
Number of sales to steamships [1]	799	1,118	.....	1,917
Number of credit sales [2]	5,017	846	16	5,879
Total	15,692	7,774	2,176	25,642
Value of local sales	$70,240.92	$113,054.64	$3,578.28	$186,873.84
Value of sales to steamships [1]	715,725.75	213,376.67	.....	929,102.42
Value of credit sales [2]	403,273.20	110,977.04	610.10	514,851.34
Total	1,189,239.87	437,408.35	4,179.38	1,630,827.60

[1] Includes fuel oil sold at Balboa and Cristobal.
[2] Does not include material issued on foreman's orders.

TABLE NO. 4.—*Value of material received during the fiscal year 1917–18 on requisition.*

	1917						1918						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Construction, operation, and maintenance:													
Supply department (stock)	$416,094.19	$416,073.63	$320,547.93	$446,675.34	$576,755.09	$617,745.14	$615,654.35	$376,906.49	$440,030.31	$780,777.71	$533,000.42	$248,497.10	$5,788,748.70
Printing plant (stock)	7,105.80	2,110.04	8,699.19	6,365.59	12,308.05	10,751.26	5,246.00	4,304.56	7,718.32	15,447.05	9,246.22	6,518.19	95,820.27
Lock operation	5,313.10	1,279.87	1,012.05	493.45	540.05	2,735.99	2,154.78	1,528.94	3,730.58	6,002.77	2,688.67	802.25	28,282.50
Dredging division	1,429.04	3,401.28	4,641.93	6,030.60	25,644.24	14,398.07	1,292.97	13,893.55	11,435.75	10,315.94	1,997.45	5,786.26	100,267.08
Electrical division	49,826.31	56,647.84	80,446.63	51,208.28	48,103.25	112,820.08	60,692.69	39,692.01	36,164.45	162,222.67	95,191.07	84,989.06	878,004.34
Municipal engineering division	4,692.24	3,179.64	179.63	11,379.68	20,133.50	11,279.18	13,719.48	9,143.26	1,788.50	1,117.47	5,249.93	3,928.32	85,790.83
Mechanical division	23,040.14	41,904.92	25,975.38	7,561.58	23,634.23	17,445.11	4,967.09	5,920.23	7,422.21	3,074.23	28,237.72	7,435.17	196,618.01
Accounting department	4,107.49	5,463.62	12,538.21	3,104.66	2,177.09	2,550.50	1,626.14	5,169.00	2,861.67	122.00	3,893.77	1,005.25	44,619.40
Supply department—chief quartermaster and subsistence	14.00	172.39	1,884.29	1,860.35	1,470.23	2,256.00	3,037.03	27.00	435.29	11,595.97	1,506.39	181.50	24,440.44
Commissary division	568.57	2,425.20	5.50	2,755.75	1,211.44	15.50	3,201.77	260.75	3,283.23	.....	2,093.15	373.55	16,194.41
Building division	66,834.19	33,668.59	36,707.15	77,098.27	28,606.25	69,969.81	22,496.62	36,088.34	93,569.51	99,988.62	29,453.89	24,902.41	619,383.65
Engineer of docks	1,684.10	844.51	17,331.15	145,090.71	34,512.12	58,277.82	91,979.42	.....	6,130.03	.....	.....	8,204.58	364,054.44
Fortifications	4,314.98	2,083.35	15,043.76	1,255.84	6,409.69	1,521.65	3,239.80	2,836.82	4,674.30	50,380.47	16,241.75	32.70	108,035.11
Marine division	.....	1,461.40	29.52	539.18	4,504.65	1,005.73	81.00	64.06	.....	995.21	382.00	1,684.56	10,747.31
Operation and maintenance, general	.....	458.58	2,545.10	476.75	412.05	774.99	163.88	3,155.34	108.67	1,117.96	1,148.93	460.90	10,823.15
Total	585,024.15	571,174.86	527,587.42	761,896.03	786,421.93	923,546.83	829,553.02	498,990.35	619,352.82	1,143,158.07	730,331.36	394,801.80	8,371,829.64
Health department	4,350.74	4,428.62	5,973.86	28,990.86	25,587.95	28,617.50	8,158.00	8,966.50	12,490.09	6,873.59	15,142.49	6,339.90	155,920.10
Civil affairs	425.50	5.51	395.41	49.85	130.24	.....	9,056.00	25.69	7.50	122.72	378.67	.....	10,597.09
Posts and schools	245.02	3,113.46	4,564.19	15,411.25	4,445.11	2,917.27	248.26	961.01	1,596.03	2,011.57	1,384.11	1,028.26	37,925.54
Panama Railroad Company	19,674.49	7,648.89	29,623.47	29,293.48	7,170.75	15,280.90	1,657.74	2,138.50	6,297.22	4,077.30	803.01	418.50	124,084.25
Grand total	609,719.90	586,371.34	568,144.35	835,641.47	823,755.98	970,362.50	848,673.02	511,082.05	639,743.66	1,156,243.25	748,030.64	402,588.46	8,700,356.62
Local purchases on the Isthmus:													
Coal purchased from Panama Railroad Company	30,928.17	33,221.95	32,255.24	29,511.20	35,744.89	42,222.00	37,188.58	26,555.24	46,259.51	29,400.09	23,487.83	19,790.73	386,565.43
Miscellaneous purchases from Panama Railroad Company	9,378.85	9,215.99	5,318.36	7,908.73	4,380.41	4,138.74	3,931.61	3,498.27	3,697.93	3,158.86	3,991.78	3,627.30	62,246.83

TABLE No. 4.—*Value of material received during the fiscal year 1917–18 on requisition*—Continued.

	1917						1918						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Local purchases on the Isthmus—Continued.													
Subsistence supplies purchased from Panama Railroad commissaries—													
Hotels	$43,033.58	$42,318.79	$40,391.41	$42,491.14	$37,567.24	$38,839.97	$38,618.87	$34,020.23	$36,333.31	$33,192.16	$38,631.52	$36,074.93	$461,513.15
Tivoli	6,686.24	6,832.59	3,853.71	4,478.53	4,298.27	5,491.36	5,736.91	5,241.65	5,662.07	5,826.53	6,039.40	5,195.94	65,343.20
Dredging division	18,266.91	18,562.65	15,946.42	16,559.93	15,518.40	12,988.92	8,615.69	8,076.76	8,526.40	6,360.96	6,101.35	4,998.54	140,522.93
Health department	14,586.45	10,615.22	13,643.22	12,958.65	13,239.35	11,803.30	11,807.01	11,930.05	11,788.68	11,314.91	12,348.21	17,148.49	153,182.94
Miscellaneous purchases from local merchants	2,544.81	2,041.87	1,870.26	3,403.69	4,778.25	1,629.42	4,914.56	5,011.45	6,063.78	4,328.78	4,692.46	4,068.35	45,347.68
Ice	3,118.62	3,063.66	2,777.31	3,225.97	2,947.53	3,098.43	3,099.87	2,858.07	2,880.50	2,743.93	2,671.20	2,576.59	35,061.68
Total local purchases on Isthmus	128,543.63	125,872.72	116,055.33	120,537.84	118,474.34	120,212.14	113,913.10	97,191.72	121,212.18	96,326.22	97,963.75	93,480.87	1,349,783.84

TABLE No. 5.—*Statement showing sales of material, supplies, and equipment heretofore purchased or acquired for the construction of The Panama Canal, made by authority of the Governor without advertisement and on which time did not permit securing approval of the Secretary of War, required by Executive order of May 12, 1915, fiscal year 1918.*

Sale No.	Name of purchaser.	Article sold.	Sale value.
CS-232..	Secretary public works, Panama.	500 feet dredge pipe, 16–20 inch	$175.00
CS-273..	Messrs. J. A. White & Co	Star well drill	150.00
CS-324..	A. Levingston	8.9584 GT pipe fittings	179.17
CS-359..	Chile Exploration Co	Lot 101 cl. loco. parts	1,060.13
CS-360..	A. Levingston	Locomotive, Cooke No. 27	450.00
		Locomotive, Cooke No. 36	400.00
CS-947..	.....do	21.071 GT scrap rail, 30-pound	842.84
CS-951..	.....do	Lathe, turret, DD-70	125.00
		Machine, shear, rotary, splitting, B-3	200.00
CS-1015.	Pearce & Sexton	Engine, hoisting, dbl. drum	150.00
CS-1207.	A. M. Loeb	7,317 pounds scrap iron	737.17
CS-1467.	F. Beaufrand	1 boiler, Nagle, 80-horsepower, B-11	200.00
		1 boiler, Nagle, 80-horsepower, B-12	200.00
CS-1553.	A. Levingston	Steam shovel, 70-ton, No. 108	900.00
		Steam shovel, 70-ton, No. 124	900.00
		Steam shovel, 70-ton, No. 134	900.00
		Steam shovel, 95-ton, No. 205	1,200.00
		Steam shovel, 95-ton, No. 206	1,200.00
		Steam shovel, 95-ton, No. 212	1,200.00
CS-1636.	.....do	2 boilers, Nagle, 100-horsepower	200.00
BS-3784.	Sisters of Charity	Roofing, galvanized	200.00
BS-3897.	H. R. Carson	.....do	307.03
BS-3966.	Panama Electric Co	Pipe, 6-inch	3,060.00
BS-3944.	.....do	Channels	2,880.00
BS-4102.	Coca Cola Co	Nails, fin. 10-D	373.03

TABLE No. 6.—*Houses, apartments, and occupants, by districts, of gold and silver quarters, as of June 30, 1918.*

Districts.	Gold.		Silver.		Total.	
	Family.	Bachelor.	Family.	Bachelor.	Family.	Bachelor.
Ancon-Balboa:						
Houses occupied	473	73	53	30	526	103
Rooms or apartments	1,036	784	429	174	1,465	958
Number of occupants	3,660	878	1,780	769	5,440	1,647
Corozal:						
Houses occupied	6	3	1	3	7	6
Rooms or apartments	8	6	2	25	10	31
Number of occupants	18	10	6	62	24	72
Paraiso-Pedro Miguel:						
Houses occupied	97	9	67	19	164	28
Rooms or apartments	172	94	517	142	689	236
Number of occupants	511	110	1,905	640	2,416	750
Gamboa:						
Houses occupied	4	4	12	9	16	13
Rooms or apartments	9	13	64	49	73	62
Number of occupants	21	14	239	170	260	184
Gatun:						
Houses occupied	52	6	55	10	107	16
Rooms or apartments	138	32	504	110	642	142
Number of occupants	448	41	1,386	436	1,834	477
Cristobal:						
Houses occupied	158	26	61	25	219	51
Rooms or apartments	395	383	409	41	804	424
Number of occupants	1,299	501	1,722	1,932	3,021	2,433
Total:						
Houses occupied	790	121	249	96	1,039	217
Rooms or apartments	1,758	1,312	1,925	541	3,683	1,853
Number of occupants	5,957	1,554	7,038	4,009	12,995	5,563

NOTE.—The above does not include 9 and 64 apartments at Culebra, Empire, and Las Cascadas, accommodating 9 gold families and 64 silver families, respectively.

TABLE No. 7.—*Operation of Hotel Tivoli July 1, 1917, to June 30, 1918.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operation.	Revenue.	Profit.	Loss.
1917.							
July	$6,454.36	$2,705.64	$3,048.82	$12,208.82	$12,136.35	.....	$72.47
August	6,050.00	2,805.10	3,253.63	12,108.73	9,913.20	.....	2,195.53
September	4,669.23	2,598.39	3,728.99	10,996.61	8,264.60	.....	2,732.01
October	4,143.97	2,643.11	2,308.09	9,095.17	8,192.25	.....	902.92
November	3,999.92	2,589.70	2,244.95	8,834.57	7,849.45	.....	985.12
December	5,027.79	2,573.27	2,534.13	10,135.19	10,120.75	.....	14.44
1918.							
January	5,329.46	2,630.07	2,817.24	10,776.77	11,664.50	$887.73	.....
February	5,359.37	2,654.85	3,622.79	11,637.01	11,443.05	.....	193.96
March	5,233.17	2,715.84	2,723.20	10,672.21	10,168.70	.....	503.51
April	5,111.89	3,009.51	2,998.09	11,119.49	11,245.70	126.21	.....
May	5,863.31	2,757.90	2,867.03	11,488.24	11,736.95	248.71	.....
June	4,813.66	2,912.17	2,617.67	10,343.50	9,744.75	.....	598.75
Total	62,056.13	32,595.55	34,764.63	129,416.31	122,480.25	1,262.65	8,198.71

Net loss, $6,936.06; net loss, including repairs to building, $8,169.95.

TABLE No. 8.—*Summary of operations of restaurants, July 1, 1917, to June 30, 1918.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operation.	Revenue.	Profit.	Loss.
1917.							
July	$31,551.07	$5,993.71	$3,221.48	$40,766.26	$40,594.15	.....	$172.11
August	30,025.39	6,165.76	3,383.19	39,574.34	38,894.67	.....	679.67
September	28,931.41	6,190.08	2,929.03	38,050.52	36,727.03	.....	1,323.49
October	30,202.96	6,927.12	2,806.56	39,936.64	38,729.13	.....	1,207.51
November	26,854.22	6,547.78	2,918.81	36,320.81	36,626.82	$306.01	.....
December	28,947.36	6,231.89	2,853.85	38,033.10	38,151.00	117.90	.....
1918.							
January	28,927.56	6,380.26	3,312.59	38,620.41	39,553.17	932.76	.....
February	25,071.98	6,356.81	2,566.61	33,995.40	34,362.33	366.93	.....
March	29,195.27	6,615.01	2,827.70	38,637.98	38,158.93	.....	479.05
April	26,228.73	6,375.72	2,728.06	35,332.51	35,403.53	71.02	.....
May	26,931.71	6,391.72	2,987.98	36,311.41	37,112.82	801.41	.....
June	27,471.82	6,788.01	2,962.78	37,222.61	39,915.86	2,693.25	.....
Total	340,339.48	76,963.87	35,498.64	452,801.99	454,229.44	5,289.28	3,861.83

Profit	$1,427.45
Charges against restaurants for fuel, light, repairs to buildings, etc	21,113.97
Total	19,686.52
Profit on messes (see Table No. 9)	2,330.07
Net loss on laborers' messes and restaurants if charges for fuel, light, repairs to buildings, etc., had been made	17,356.45

TABLE No. 9.—*Summary of operations, laborers' messes, July 1, 1917, to June 30, 1918.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operation.	Revenue.	Profit.	Loss.
1917.							
July	$12,046.42	$1,094.31	$919.84	$14,060.57	$14,090.36	$29.79	.....
August	11,989.04	1,056.36	1,022.63	14,068.03	12,909.74	.....	$1,158.29
September	11,029.11	1,063.72	693.65	12,786.48	12,400.26	.....	386.22
October	11,024.69	1,213.53	1,137.94	13,376.16	13,226.07	.....	150.09
November	10,315.92	1,215.76	890.22	12,421.90	13,088.85	666.95	.....
December	8,415.73	1,252.75	708.88	10,377.36	11,046.54	669.18	.....
1918.							
January	9,207.03	1,223.84	922.84	11,353.71	12,219.89	866.18	.....
February	8,162.12	1,141.19	965.71	10,269.02	10,339.21	70.19	.....
March	8,873.60	1,163.05	918.94	10,955.59	11,154.58	198.99	.....
April	8,429.08	1,170.84	753.55	10,353.47	11,212.33	858.86	.....
May	9,573.47	1,185.82	1,883.68	12,642.97	12,887.36	244.39	.....
June	6,746.21	1,186.60	995.93	8,928.74	9,348.88	420.14	.....
Total	115,812.42	13,967.77	11,813.81	141,594.00	143,924.07	4,024.67	1,694.60

TABLE No. 10.—*Obsolete and surplus material.*

(Appraised value.)

On hand July 1, 1917	$583,583.50	
Received during fiscal year 1918	185,758.98	
Not yet taken up, but included in sales (surveys unaccomplished)	10,500.00	
	779,842.48	
Account sales, over appraised values, sales, and issues R. F. S. (cars, etc.)	250,904.37	
		$1,030,746.85
Shipped to the United States	38,601.17	
Sales	352,400.91	
Transfers and issues	78,056.11	
Surveyed and scrapped	201,785.08	
		670,843.27
Balance to account for June 30, 1918		359,903.58

TABLE 11.—*American scrap operations.*

American and shop scrap.	$4 net ton.		$8 net ton.		$10 net ton.		Total tons.	Total value.
	Tons.	Value.	Tons.	Value.	Tons.	Value.		
On hand July 1, 1917	12,725	$50,900.00	.....	.....	.....	.....	12,725	$50,900.00
Received during year ending June 30, 1918	928.05	3,712.20	5,951.97	$47,615.76	600	$6,000.00	7,480.02	57,327.96
Total to account for	13,653.05	54,612.20	5,951.97	47,615.76	600	6,000.00	20,205.02	108,227.96
Account price changes from $4 to $8	.....	54,612.20	.....	.....	.....	.....	.....	54,612.20
	13,653.05	109,224.40	5,951.97	47,615.76	600	6,000.00	20,205.02	162,840.16
Issued during fiscal year	.....	.....	2,756.988	22,055.90	85.9	859.00	2,842.888	22,914.90
Balance	13,653.05	109,224.40	3,194.982	25,559.86	514.1	5,141.00	17,362.132	139,925.26
Shipped to United States	.....	.....	[1] 137.9	[1] 1,103.20	.....	.....	137.9	1,103.20
Balance on hand June 30, 1918	13,653.05	109,224.40	3,057.082	24,456.66	514.1	5,141.00	17,224.232	138,822.06

Material taken from regular scrap and sold at $50 gross ton.

TABLE No. 12.—*Fuel oil handled.*

	Balboa.	Mount Hope.	Total.
Number of barrels received by The Panama Canal	602,249	70,107	672,356
Number of barrels used by The Panama Canal	321,108	119,297	440,405
Number of barrels pumped for individuals and companies	810,049	121,502	931,551
Number of barrels sold by The Panama Canal	325,181	49,803	374,984
Number of barrels representing miscellaneous transfers on tank farm	67,428	30,493	97,921
Total number of barrels handled	2,126,015	391,202	2,517,217
Number of ships handled	276	162	438

TABLE No. 13.—*Comparative statement of output of manufacturing plants, commissary division, supply department, fiscal years 1913–14 to 1917–18.*

	1913–14	1914–15	1915–16	1916–17	1917–18
Laundry (Cristobal):					
Total number pieces handled	4,534,503	4,327,859	3,970,674	3,649,814	3,341,613
Value of output	$116,266.12	$101,949.75	$94,719.68	$91,722.87	$87,271.73
Laundry (Ancon):					
Total number pieces handled	.....	3,889,855	4,509,308	4,094,273	5,642,383
Value of output	.....	$78,148.92	$96,242.83	$93,262.51	$132,047.11
Bakery:					
Total output of bread, loaves	6,779,726	5,784,546	6,385,981	7,211,417	7,504,920
Total output of rolls, each	710,334	1,026,816	1,093,792	1,129,400	637,656
Total output of cakes, pounds	135,435	133,082	140,477	132,493	81,386
Total output of doughnuts, packages	.....	.....	50,982	54,840	38,075
Total output of pies, each	.....	.....	19,019	28,559	48,357
Value of output	$284,639.63	$255,878.44	$297,439.63	$365,962.92	$539,239.48
Coffee roasting:					
Roasted coffee produced, pounds	368,870	300,391	381,630	427,921	382,233
Value of output	$69,200.21	$66,100.94	$83,535.69	$94,023.30	$106,584.48
Ice manufacturing:					
Ice manufactured, tons	38,884	37,479	39,461	45,044	48,672
Value of output	$241,858.02	$191,041.22	$230,834.69	$263,507.40	$282,297.60
Ice-cream plant:					
Ice cream manufactured, gallons	169,850	160,505	167,528	163,326	216,262
Milk bottled, quarts	.....	.....	.....	386,164	[1] 452,697
Cream bottled, quarts	.....	.....	.....	[2] 11,697	7,809
Value of output	$134,327.50	$159,376.36	$251,880.93	$226,024.22	$339,926.34
Sausage factory:					
Corned beef produced, pounds	265,906	173,112	196,169	188,271	238,142
Hamburger steak produced, pounds	8,774	46,498	125,712	135,677	208,859
Home-made sausage produced, pounds	.....	1,514	8,553	37,718	47,451
Corned pork produced, pounds	.....	.....	2,932	12,027	56,687
Tongue produced, pounds	.....	.....	5,450	12,913	9,730
Bacon smoked, pounds	.....	.....	.....	.....	60,144
Ham smoked, pounds	.....	.....	.....	.....	65,208
Miscellaneous sausage produced, pounds	.....	.....	.....	10,856	240,521
Value of output	$34,960.36	$38,307.68	$54,969.67	$55,525.14	$101,516.07
Industrial laboratory: Value of output	$28,185.29	$72,016.63	$116,176.40	$179,363.56	$275,682.50
Abattoir:					
Cattle killed, head	.....	.....	7,762	13,180	21,731
Hogs killed, each	.....	.....	.....	[3] 681	11,483
Chickens, turkeys, ducks, etc., killed, each	.....	.....	.....	.....	41,435
Weight of dressed beef produced, pounds	.....	.....	3,843,377	7,118,803	10,788,446
Weight of dressed hogs produced, pounds	.....	.....	.....	66,999	991,903
Value of output	.....	.....	$446,882.89	$927,551.06	$2,025,280.75

[1] Of the quantity shown, 59,086 quarts were Mindi dairy farm milk.
[2] Through error this item was reported as 23,402 in statement for 1916–17.
[3] Slaughtering of hogs at the abattoir was commenced in December, 1916.

TABLE No. 14.—*Statement showing quantities of certain staple articles purchased during the fiscal year ending June 30, 1918, as compared with the previous year.*

		1917	1918
Groceries and meats:			
Sugar	pounds	5,448,536	2,741,921
Milk, evaporated and condensed	do	4,325,136	3,675,566
Tomatoes, in tins	do	1,105,648	691,290
Flour	do	8,118,193	7,673,504
Corn	do	.....	[1] 1,881,566
Rice	do	2,239,304	3,740,219
Fish, canned	do	377,498	71,666
Coffee	do	689,071	535,703
Beef, native	do	7,117,613	20,171,423
Fresh meats	do	1,832,714	457,385
Cured and pickled meats	do	923,206	200,508
Butter	do	430,702	458,976
Milk, fresh	gallons	145,800	138,745
Eggs	dozen	753,874	728,522
Hogs	pounds	.....	2,091,231
Fresh vegetables:			
Potatoes, white	do	7,742,630	6,528,482
Onions	do	1,062,012	959,684
Cabbage	do	803,540	1,149,456
Yams	do	653,833	888,724
Fresh fruits:			
Apples	do	970,068	813,183
Oranges	dozen	189,155	225,931
Grapefruit	each	216,533	241,853

[1] Does not include 5,015 pounds of seed corn.

TABLE No. 15.—*Statement of comparative selling prices for June 30, 1918, as against June 30, 1917.*

	Unit.	Prices.	
		1917	1918
Fresh meats:			
Beef, stew (native)	Pound	$0.07	$0.08
Beef, chuck roast, 3 pounds and over (native)	do	.10	.12
Beef, rib roast, not under 3 pounds (native)	do	.15	.17
Beef, rump roast (special)	do	.29	.53
Beef, rump roast (native)	do	.15	.18
Beefsteak, sirloin (special)	do	.30	.53
Beefsteak, sirloin (native)	do	.15	.18
Mutton, loin chops	do	.38	.57
Pork, hams, fresh	do	.25	.32
Pork, loin, chops	do	.32	.46
Veal, loin, chops	do	.42	.47
Cured and pickled meats:			
Bacon, breakfast, whole piece	do	.43	.46
Ham, sugar-cured, whole	do	.34	.45
Poultry and game: Chickens, corn-fed	do	.43	.50
Dairy products:			
Butter, creamery, special	do	.49	.52
Eggs, fresh	Dozen	.46	.53
Fish:			
Codfish, dried	Pound	.11	.18
Fish, fresh (native)	do	.11	.12
Vegetables:			
Onions	do	.06	.04
Potatoes, white	do	.08	.03
Fruits, fresh: Apples	do	.06	.10
Groceries:			
Beans, navy, dried	do	.13	.10
Coffee, ground, No. 1	do	.20	.20
Corn, sugar	Tins, 2s	.14	.16
Flour	Pound	.055	.075
Lard compound	do	.17	.24
Milk, evaporated	Tins, 1s	.14	.14
Peas, extra sifted	Tins, 2s	.15	.18
Rice, 2d grade	Pound	.05	.08
Soap, laundry	Cake	.05	.08
Sugar, granulated	Sacks, 5s	.39	.42
Tomatoes	Tins, 3s	.16	.19

TABLE No. 16.—*Statement of articles purchased by the products buyer in Costa Rica during period from July 1, 1917, to June 30, 1918.*

Commodity.	Quantity.	Amount.
Sugar	214,800 pounds	$11,283.15
Oranges, tropical	1,003,267	1,767.83
Beets	34,210 pounds	562,23
Cabbage	268,103 pounds	3,176.64
Carrots	332,282 pounds	3,954.34
Kohl-rabi	153 pounds	2.07
Turnips	73,768 pounds	860.19
String beans	9,942 pounds	191.44
Green peas	8,423 pounds	230.82
Parsley	169 bunches	1.83
White potatoes	2,226,111 pounds	32,957.58
Tomatoes	65,749 pounds	7,325.86
Lettuce	7,406 pounds	138.29
Preserves	3,430 bottles	2,401.00
Plantains	111,678	641.11
Young onions	2,353 bunches	17.43
Grapefruit, select	665 boxes	1,410.00
Sweet potatoes	229,459 pounds	2,416.08
Honey	1,245 pounds	63.85
Chayotes	9,105 pounds	41.47
Bananas	8,776 bunches	2,194.00
Chocolate	159 pounds	45.00
Sweet peppers	5,106	27.81
Grapefruit, tropical	140,368	490.84
Eggplant	158 pounds	5.56
Hay	2,409 pounds	15.66
Balsa wool	1,747 pounds	268.12
Cucumbers	1,475 pounds	39.89
Artichokes	69 pounds	4.18
Squash	27,494 pounds	197.87
Seeds		15.25
Radishes	289 bunches	3.20
Banana flour	1 sack	7.50
Guinea grass seed	6,343 pounds	1,099.34
Oranges, select	999 boxes	2,990.50
Horse-radish	131 pounds	5.11
Cheese	93 pounds	36.27
White beans	6,000 pounds	210.00
Pineapple	8,342 pounds	92.81
Total		80,192.12

TABLE No. 17.—*Statement of Haitian, Colombian, and local purchases.*

List of the more important articles[1] purchased by the products buyer in Haiti[2] during period from Oct. 11, 1917,[3] to June 30, 1918:

Chickens	968
Ducks	498
Turkeys	146
Beans ... pounds	105, 862
Coffee ... do	97, 298
Cottonseed meal ... do	66, 364
Corn ... pounds	196, 216
Corn, guinea ... do	10, 212
Grapefruit	27, 437
Honey ... pounds	7, 014
Plantains	94, 870
Potatoes, sweet ... pounds	44, 097

List of the more important articles[4] purchased by the cattle buyer in Colombia[5] for the commissary division during the period from July 1, 1917, to June 30, 1918:

Chickens	41, 837
Ducks	4, 677
Turkeys	5, 372
Hogs	8, 229
Shoats	423
Butter ... pounds	4, 065
Coconuts	42, 980
Coffee ... pounds	50, 125
Corn ... do	121, 728
Molasses ... gallons	13, 800
Sugar ... pounds	380, 000
Yams ... do	375, 889

[1] In addition to those enumerated, moderate quantities of other products were supplied, such as alligator pears, eggs, baskets, cottonseed oil, etc.

[2] Total value of all purchases made in Haiti was $16,478.76.

[3] Date of opening of agency.

[4] Small quantities of various other commodities were purchased at different times, among them being sweet potatoes, bananas, grapefruit, palm oil, bran, lard, etc., and several items of native manufacture, such as mochilas (hand bags), grass mats, etc.

[5] Total value of all purchases made in Colombia for the commissary division was $202,381.70. The superintendent, cattle industry, will include in his report information as to the cattle, horses, and seed purchased in Colombia and received on the Isthmus during the fiscal year 1918.

List of the more important articles[1] purchased locally[2] by the commissary division from the plantations of the cattle industry,[3] from Corozal farm and Army truck gardens, from local producers and importing agencies, and by the commissary local buyer, Panama:

Hogs	pounds	813, 586
Coconuts		67, 123
Coffee	pounds	251, 224
Corn	do	1, 137, 957
Eggs	dozen	55, 922
Fish	pounds	1, 377, 712
Grapefruit		13, 008
Lettuce	pounds	31, 410

List of the more important articles purchased locally by the commissary division, etc.—Continued.

Milk, fresh	gallons	19, 745
Onions	pounds	69, 685
Oranges		928, 574
Papaya	pounds	41, 547
Pineapples	do	67, 784
Potatoes, white	do	95, 772
Potatoes, sweet	do	278, 469
Rice	do	2, 161, 500
Squash	do	36, 387
String beans	do	34, 389
Sugar	do	340, 374
Tomatoes	do	53, 539
Yams	do	512, 835

[1] In addition to the commodities listed, various small purchases of fruits and vegetables in season were made, including turnips, carrots, spinach, chayotes, parsley, eggplant, celery, cucumbers, okras, watermelons, mangoes soursop, alligator pears, peppers, etc.

[2] Total value of all local purchases was $398,775.77.

[3] Detail of all supplies received from Panama Canal pastures, plantations, etc., will be included in the report of the cattle industry.

TABLE No. 18.—*Produce furnished the commissary division by various plantations during the fiscal year 1918.*

Akee		2, 148
Beans, string	pounds	43, 930
Beans, green	do	2, 290
Beans, Lima	do	10, 009
Beets	do	31
Bananas, large	bunches	8, 126
Bananas, medium	do	4, 856
Bananas, small	do	851
Breadfruit		11, 360
Cabbage	pounds	3, 573
Cucumber	do	18, 606
Celery	bunches	24, 673
Corn	ears	3, 594
Corn, green	dozen	3, 313
Corn, shelled	pounds	572
Corn, unshelled	do	6, 238
Corn, seed	do	1, 687
Chayotes	do	12, 152
Cabbage, Chinese	bunches	143
Citron	pounds	107
Coconuts, dry		66, 865
Coconuts, water		5, 781
Carrots	pounds	518
Cane sugar	sticks	10, 882
Chocolate	balls	4, 015
Cane sugar	pounds	115, 800
Cane seed	do	253, 000
Corn, Milo maize	do	29, 500
Corn, seed head kafir	do	19, 226
Lettuce	do	23, 698
Onion green	do	130, 094
Radishes	bunches	72, 991
Spinach	do	29, 065
Parley	do	71, 867
Pepper, hot	pounds	3, 172
Pepper, hot	dozen	20, 715
Pepper, green	pounds	16, 149
Eggplant	do	9, 657
Tomatoes	do	14, 399
Tomatoes	do	45, 082
Mustard, green	bunches	3, 653
Kale	pounds	651
Squash	do	14, 603
Limes		136, 269
Lemons		11, 682
Potatoes, sweet	pounds	431, 144
Potatoes, white	do	9, 223
Oranges, sweet		239, 468
Oranges, sour		835
Pineapples		278
Watermelons	pounds	22, 864
Melons, Cascaba		51
Okras	pounds	39, 622
Endive, green	bunches	2, 550
Mint	do	3, 637
Ginger	pounds	78
Papaya	do	83, 372
Yams	do	442, 660
Roselle	do	884
Tangerines		1, 272
Palmettoes		386
Plantains		49, 196
Guavas	dozen	17, 298
Peas, cow	pounds	4, 310
Grapefruit		11, 360
Soursop	pounds	4, 043
Yucas	do	68, 472
Dasheen	do	734
Yampee	do	1, 805
Pears, Alligator		11, 405
Pears, Avocado		269
Mangoes		92, 443
Mami		17
Nut palm	pounds	1, 144
Oat grain	do	2, 000
Tania	do	2, 157
Sunflower seed	do	1, 710
Feterita	do	738, 139
Grass, sudan	do	50

APPENDIX G.

REPORT OF THE AUDITOR IN CHARGE OF THE ACCOUNTING DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE,
September 23, 1918.

SIR: I have the honor to submit the following report of transactions of the accounting department for the fiscal year ended June 30, 1918:

ORGANIZATION.

There has been little change in the organization of the accounting department during the year. The department is divided into three main divisions, viz, the division of auditing and accounting, under the immediate direction of the auditor, and the assistant auditor on the Isthmus, Mr. Elwyn Greene; the division of collections, under the collector, Mr. T. L. Clear; and the division of disbursement, under the paymaster, Mr. John H. McLean. Judge B. F. Harrah has continued as assistant auditor in charge of the office of the department in the United States. Mr. H. P. Merrill is disbursing clerk in the Washington office. The work of the auditor's office is conducted through four main bureaus—canal accounting and cost keeping, canal auditing, railroad accounting, and claims—with other less important bureaus and sections.

PAYMASTER.

Disbursements to the amount of $29,962,046.32 were made during the year by the paymaster. Of this amount the sum of $11,273,380.32 was on account of the Panama Railroad Company. Employees on the gold rolls of The Panama Canal were paid $6,269,614.59, and those on the silver rolls $5,442,626.14, while the sum of $6,976,425.27 was paid on miscellaneous vouchers. (See Table No. 34.) Collections on pay rolls amounted to $3,897,644.15. Of this amount, the sum of $3,048,091.07 was collected for coupon books and meal tickets, $87,002.45 for rent, the remainder being for miscellaneous items. Of the collections made on pay rolls, the sum of $3,659,820.51 was disbursed directly by the paymaster, the balance, $237,925.56, being transferred to the collector's accounts. The Panama Branch of the Commercial National Bank of Washington, D. C., was transferred to the American Foreign Banking Corporation, the latter continuing as a Government depository as well as fiscal agent. Small deposits of both Government and Panama Railroad funds are carried in this

bank. The cash situation on the Isthmus has tightened greatly during the year. The use of gold as well as Panaman silver in making payments has been practically discontinued. Paper currency and a small quantity of American silver have been substituted. The climate greatly deteriorates paper money and requires its frequent replacement. The sum of $1,622,000 has been brought by the paymaster from the States for use in making payments.

COLLECTOR.

The collections during the year repaid to appropriations amounted to $8,625,298.20. The sum of $6,738,334.09 was collected for deposit as miscellaneous receipts. Of these amounts, the sum of $254,226.03 was received by the disbursing clerk in Washington. Deposits for the payment of tolls and bills for supplies and services were made with the assistant treasurers of the United States, to the credit of the collector, in the sum of $4,169,125.60. Similar deposits were made with the collector on the Isthmus in the sum of $9,690,341.45. Of the total, $13,859,467.05, the sum of $691,044.36 was refunded upon settlement of accounts. Money-order funds to the amount of $1,655,000 were transferred to the Postmaster General in the United States in payment of money orders drawn on the United States. Other disbursements of miscellaneous trust funds to the amount of $297,260.46 were made by the collector. Collections were also made for account of the Panama Railroad Company in the amount of $17,271,667.70. (See tables Nos. 35, 36, 40.)

ACCOUNTING TO THE TREASURY FOR COLLECTIONS.

During the past fiscal year, no examination of the collection accounts was made by employees from the offices of the Auditor for the War Department and the Comptroller of the Treasury as contemplated by the provisions of section 3 of the sundry civil act of March 3, 1915, probably due to the stress of Government affairs in Washington. The reports submitted by the inspectors in prior years have indicated that they were very well satisfied with the manner in which the receipt and disbursement of Government funds on the Isthmus were safeguarded.

TOLLS.

Tolls actually collected on vessels transiting the canal during the year amounted to $6,439,083.99. In addition, the sum of $2,321.25 was collected for a vessel that passed through the canal during the prior fiscal year. The statement of operation and maintenance shows tolls earned as $6,454,198.35. This includes unpaid bills amounting to $15,114.36, the main items being the tolls charged on certain Government-operated vessels that may not be finally held liable for tolls. Under the ruling of the Attorney General, tolls on vessels with cargo or passengers are collected in accordance with the Panama Canal rules of measurement only in cases where the amount derived by multiplying the Panama Canal net tonnage by $1.20 per ton is less than the amount ascertained by using the rate of $1.25 and the net registered tonnage as defined by United States statutes. Had

Panama Canal rules been applied in all cases, the sum of $7,522,195.68 would have been collected. The limitation therefore resulted in a loss to The Panama Canal during the past year of $1,083,111.69, as compared with a loss of $1,034,001.88 for the fiscal year 1917, and $390,714.05 for the fiscal year ending June 30, 1916, or a loss to the canal since the decision of the Attorney General was applied, of $2,507,827.62. This amount, plus the sum of $189,432.64, which was the amount refunded during the year under the authority of the act of Congress of June 12, 1917, on account of the erroneous collections made prior to the ruling of the Attorney General, and approximately $100,000 still to be refunded, gives the total loss suffered by the canal as $2,797,260.26. Vessels under foreign registry have been the beneficiaries and not the vessels of the United States, except a few American vessels carrying deck loads. The sum of $45,614.40 would have been collected on deck loads had Panama Canal rules of measurement been applied. The loss is 13.11 per cent of the total of $21,336,526.06 that would have been collected if Panama Canal rules only had been applied.

CLAIMS FOR DAMAGES TO VESSELS PASSING THROUGH THE LOCKS.

Several small claims for damages to vessels passing through the locks have been made in accordance with the provisions of section 5 of the Panama Canal act; also a few claims for damage arising in the canal and harbors. The sum of $26,525.82 has been paid in settlement of these claims. All claims so far have been adjusted and settled by mutual agreement without recourse to the courts, as authorized by the Panama Canal act.

EXAMINATION OF PAY ROLLS.

The work of checking pay rolls under the provisions contained in the legislative, executive, and judicial appropriation act, approved August 23, 1912, that "Disbursing officers shall make only such examination of vouchers as may be necessary to ascertain whether they represent legal claims against the United States," has continued very satisfactorily.

LIBERTY LOANS.

Through an arrangement with the local banks, subscriptions to the first, second, and third Liberty loans were accepted for pay roll deduction in five equal monthly installments. In this manner collections were made on the pay rolls during the past fiscal year to the amount of $218,618.47 for the first Liberty loan, $339,960.35 for the second Liberty loan, and $260,870.49 for the third Liberty loan. War savings stamps were also sold for pay roll deduction to the amount of $6,142.73. Collections were made on the pay rolls to the amount of $34,276.80 for the Red Cross war relief fund.

CANAL APPROPRIATIONS.

Congress, to June 30, 1918, appropriated for the canal and the fortification thereof, a total of $441,375,781.44. Of this amount, $29,950,572.30 were for fortifications, $1,750,000 to cover seven annual

payments of $250,000 each to the Republic of Panama for Canal Zone rights, and $6,000 for the expense of presenting the launch *Louise* to the French Government. The sum of $24,050,006.22 has been specifically appropriated for the operation and maintenance, sanitation, and civil government of the canal and Canal Zone. Of the amounts appropriated other than specifically for maintenance and operation, the sum of $4,289,159 was charged against operation and maintenance to the end of the fiscal year 1915, while $2,225,000 of the general appropriations have been used for the stock of material and supplies for the operation and maintenance of the canal. (This amount has been found to be too small for the stock required; the subject is discussed further below.) Deducting from the total appropriations the amount appropriated for fortifications, $29,950,572.30, for Panama $1,750,000, for presentation of the launch *Louise* $6,000, for operation and maintenance $30,564,165.22, including the amount for the stock of material and supplies, leaves $379,105,043.92 appropriated for the construction of the canal and its immediate adjuncts. Of this amount, $3,600,000 appropriated for colliers and coal barges, $2,093,190 for Dock No. 6, Cristobal, $300,000 for work on the colliers *Ulysses* and *Achilles*, $720,000 for reboilering and repairing the steamships *Ancon* and *Cristobal*, were specifically exempted by law as charges against the authorized bond issue. This leaves the sum of $372,391,853.92 as chargeable against the bond issue. The balance available for appropriation within the limit of the cost of the canal and the authorized bond issue is $2,831,302.08, the actual difference between the amount appropriated and the items which are exempted as a charge against the bond issue being increased by the appraised value of the American legation building in Panama, $22,256, which was transferred to the Department of State.

Miscellaneous receipts to June 30, 1918, amounted to $26,434,907.57. Deducting tolls, $18,654,380.16, Canal Zone revenues collected since July 1, 1915, $401,773.61, profits on business operations, $57,485.66, interest on the cost of public works in the cities of Panama and Colon and on bank balances, $441,225.85, and miscellaneous collections, $764.26, gives the amount repaid on the cost of construction as $6,879,278.03. I have taken credit for the amount paid by the Panama Railroad for subsidies, dividends and interest for The Panama Canal would have obtained the benefit of these amounts in reduced rates if they had not been added to the expenses of the railroad. Deducting the amount repaid on the cost of construction leaves the sum of $365,512,575.89 as the amount expended or on hand for immediate expenditure for projects included within the estimate upon which the cost of the canal was based. The amount now shown as the cost of the canal will be further reduced by receipts from the sale of construction material and equipment and by the collections to be made to cover the amount expended for waterworks, sewers and pavements in the cities of Panama and Colon. The cost of the canal as a commercial venture is also entitled to credit to the value of buildings and other public works, equipment and plant transferred to the Army, to the Alaskan Engineering Commission, and to the State Department without any actual payment therefor. The estimated value of items so transferred is $1,973,011.17, of which $470,387.50 was paid for by the Canal Zone government. (See tables Nos. 3, 4, and 12.) The status of the authorized bond issue is

shown in Table No. 1; the general balance sheet is published as Table No. 2.

EXCHANGE OF PROPERTY WITH PANAMA RAILROAD.

There is a loan standing against the Panama Railroad Company to enable the company to reequip its line, $1,399,114.61, also one to enable the company to take up its first-mortgage bonds, $1,848,217.50, a total of $3,247,332.11. By section 2 of the act of Congress of March 4, 1911, it was provided that the company should not make any further payment on the principal of or interest on the notes given to the United States for the money appropriated for its use. As a result, the company has been enabled to construct docks at Cristobal at an expenditure about equal to the amount of the loans. Considerable equipment was purchased and paid for by The Panama Canal which is required in connection with the operation of the railroad and its steamship line, viz, the steamships *Panama* and *Colon* and a large amount of rolling stock. Certain docks at Balboa have been constructed by The Panama Canal and others by the Panama Railroad Company. I can only repeat recommendations made previously, that to simplify the transactions between the two interests, an exchange of property be made and that one interest only have the title to each class of property. A provision authorizing this was included in the estimates for the fiscal years 1917, 1918, and 1919, but no action so far has been taken by the Congress. The railroad should own all equipment used in railroad operations; also the steamships it operates in its commercial business. The exchange that has been contemplated would effect this result and the United States would own directly all docks and terminal facilities at both ends of the canal, and the outstanding accounts would be settled.

PUBLIC WORKS, PANAMA AND COLON.

Under the agreement with the Republic of Panama, which requires the reimbursement of the United States for expenditures connected with the construction, operation, and maintenance of waterworks, sewers, and pavements in the cities of Panama and Colon, the expenditures to June 30, 1918, in Panama were $2,248,667.56 and in Colon $2,113,123, a total of $4,361,790.56, including accrued interest to date at the rate of 2 per cent per annum on the capital cost balances and on the proportionate cost of waterworks in the Canal Zone used for supplying water to the two cities, based upon the quantity of water consumed. For the work in Panama, this interest has amounted to $252,673.31, for the work in Colon $209,052.97, and for the proportionate cost of waterworks in the Canal Zone $96,757.20, a total of $558,483.48. There has been reimbursed to the United States, or is immediately due, the sum of $2,339,860.10, leaving a balance due of $995,569.49 for the work in Panama and $1,026,360.97 for the work in Colon, a total of $2,021,930.46 payable in installments in the next 42 years. The amount which is payable immediately under the agreement is $62,404.64 and is covered by bills for the difference between the current charges for the work plus the quarterly payments required and the amount collected as water rentals. The Panama Canal continues to maintain the pavements in the

two cities under the temporary agreement reached at the beginning of the fiscal year.

OPERATION AND MAINTENANCE.

[*Table No. 6.*]

There was expended in the operation and maintenance of the canal the sum of $5,903,719.69 as against $6,788,047.60 last year. The reduction was due entirely to the decreased expenditures for dredging Gaillard Cut. The total cost of maintenance dredging was reduced from $2,854,631.25 to $1,726,803.54. There were 2,285,273 cubic yards of material removed from slides in Gaillard Cut at an average cost of $0.6373 per cubic yard, while last year 8,149,634 cubic yards of material were removed at an average cost of $0.3206 per cubic yard. (For detailed costs see Table No. 26.)

The expense for operation and maintenance of the locks increased from $737,430.39 expended during the fiscal 1917, to $744,961 expended for the fiscal year 1918. The marine division expenses were reduced from $313,036.43 to $293,546.28. This decrease was largely due to the transfer of many pilots to the Naval Reserve Force and the payment of a part of their salaries from naval funds. The charges for the operation of floating derricks were reduced from $202,034.37 to $148,889.03. This reduction resulted from a change made in charges to the reserve to cover repairs, it being found that the earlier rate used was too high. The direct charges for operation and maintenance totaled $3,077,068.37 as against $4,250,163·99 for the prior year. The overhead expenses charged to operation and maintenance amounted to $2,826,651.32, as against $2,537,883.61 charged for the prior year. In the overhead expense accounts are included charges for civil government amounting to $678,232.88; expenses for hospitals, quarantine, and sanitation, $635,854.03, and for administration, including among the overhead accounts the executive department, the accounting department, the Washington office, operation and repairs to storehouses and quarters for employees, lighting of streets, operation and maintenance of waterworks and maintenance of sewer systems and roads—$2,822,156.23, of which $1,512,564.44 was charged to operation and maintenance. The increase in overhead expenses is due largely to an increase of over $200,000 in the amount expended in repairing roads during the fiscal year.

Offsetting the total expenses for operation and maintenance are the amounts earned as tolls for vessels transiting the canal during the year, $6,454,198.35 (this amount differs from the amount actually collected for vessels transiting the canal by about $15,000, as tolls were not received for a few Government-operated vessels); as licenses and taxes, court fees and fines, $140,918.01; and as profits on business operations, $6,159·56, or a total of $6,601,275.92. The revenues earned in excess of expenses amounted to $697,556.23, as against a loss for the prior fiscal year of $979,648.90. These charges to operation and maintenance, with a few minor exceptions, do not include charges for depreciation of plant and equipment. Interest on the capital investment is also excluded.

The total of the expenses charged to operation and maintenance to date is $23,980,676.44, as against the total revenues from tolls, civil government collections and profits on business operations of

$19,136,786.73, a deficit of $4,843,889.71, which will be increased by not exceeding $100,000 when refunds of tolls erroneously collected are made. This deficit would have been reduced to $2,146,629.45 had Panama Canal tonnage rules been applied.

BUSINESS OPERATIONS.

[*Table No. 7.*]

The total revenues derived from business operations carried on with Panama Canal funds amounted to $10,324,071.91, as against a total of $7,579,588.44 received during the prior fiscal year. The cost of carrying on these operations during the present fiscal year amounted to $10,317,912.35, leaving a net profit of $6,159.56 to be covered into the Treasury as miscellaneous receipts under the Panama Canal act and the regular Panama Canal appropriation act. The net profit for the fiscal year 1917 was $39,427.66 and for 1916 $11,898.44. This is an exceedingly small profit for the amount of business transacted and is due to the policy that has been adopted of making the charges in most cases so as to barely cover the cost. Shopwork, work for the Panama Railroad and other departments of the Government, and all services rendered for employees (the major items), are performed at cost, except that subsistence and hospital services rendered employees are consistently rendered at a loss. This rule has been applied to the following items: General construction and repair work, $1,826,134.91, mainly for the Panama Railroad and other departments of the United States Government; shop and electrical work, $2,901,643.55, for the Panama Railroad, other departments of the Government, and shipping; subsistence, mainly to employees, $813,924.93; sales of material from stock, $1,629,393.44 (a surcharge is added on material sold to outsiders, but these sales are small); health department services, $561,942.44; and miscellaneous services for the Panama Railroad, $411,088.56; a total of $8,147,211.80.

Fair profits were made on sales of water, dry dockage at Balboa, and sales of fuel oil. The profit on the use of the dry dock at Balboa was due to the fact that it was used considerably more than contemplated when the rates were originally fixed. The increase in business operations at the canal are well shown by the increase in the numbers and amounts of formal bills registered, as follows: In 1915, 8,686, amounting to $12,197,170.74; in 1916, 12,754, amounting to $11,786,187.91; in 1917, 16,386, amounting to $17,007,342.16; and in 1918, 22,070, amounting to $20,887,460.60. In addition, Panama Railroad commissary bills increased from 10,733, amounting to $3,459,038.28, in 1917, to 13,100, amounting to $4,838,725.57, in 1918; the regular Panama Railroad bills increased from 9,285, amounting to $8,993,007.41, to 9,652, amounting to $10,282,388.24, or a total increase from 1917 to 1918 in numbers from 36,404 to 44,822 bills and in amount from $29,459,387.85 to $36,008,574.41.

The charges to the various accounts into which the business operations are classified include the direct costs, the proper proportion of the indirect expenditures of the division performing the work, in some cases a charge for depreciation of plant and equipment, and 10 per cent additional to cover the general overhead expenses of the

canal. Charges for depreciation are made in comparatively few cases, the main accounts to which depreciation is charged being electric work, electric current, tug services, handling and sales of fuel oil, dry dockage, dredging operations, and storehouse accounts. No charge is made for the use of the plant or equipment of the shops, it having been considered that the shops were built and equipped on their present large scale so as to provide facilities for repairing naval vessels, and that commercial business could not bear the charges necessary to cover these items. The percentage to cover overhead expense that is added to the business operations is not the average overhead expense incurred by the canal. The percentage was fixed to include as nearly as practicable only the additional expenses incurred by the Panama Canal organization on account of handling other operations than the primary functions of operating and maintaining the canal. The overhead expenses that are absorbed in part by charges to business operations include the expenses incurred in operating and maintaining quarters and storehouses, purchasing, inspecting, distributing, and accounting for material and supplies, transporting employees to and from the Isthmus, together with the expenses of paying them and furnishing them such privileges as transportation on the Isthmus and as are afforded by the clubhouses.

The total overhead expenses for the year amounted to $5,518,837.02. This includes not only the classes of expenses referred to above but also expenses of the executive office, which in part only are considered as properly chargeable to outside interests, the expense of surveys, meteorology and hydrography, civil government, and sanitation. This amount was distributed against maintenance and operation of the canal, construction, fortification, business operations, and certain miscellaneous items. Against the expenses for construction, fortifications, and the miscellaneous items 10 per cent of the division cost was added to cover overhead expenses; in the cost of business operations $627,211.16 was added on the basis of 10 per cent; $411,088.56 was charged directly on account of work being done for the Panama Railroad, or a total charge for overhead expenses of $1,038,299.72 on a division cost of $9,276,247.27, the amount charged being a little less than 12 per cent. The expense of handling material in the storehouses is about 18 per cent of the value of the material issued, while only 10 per cent is charged as the additional cost of handling such material for operations other than the operation and maintenance of the canal. The percentage added for overhead expenses is certainly a reasonable one, is believed to have been fair to all interests, and no change therein is recommended at the present time.

MATERIAL AND SUPPLIES.

For use in making estimates for appropriations, for furnishing to stores and divisions statements of the value of material issued by or to them, and to aid in controlling the purchases to the amount appropriated, a material classification of 145 different classes has been adopted. Tabulating machines are used in the compilation of the necessary data, and these machines are operating very satisfactorily.

The value of materials and supplies in the storehouses on June 30, 1918, amounted to $6,747,688.26, as compared with $6,048,984.70 on

July 1, 1917. In addition there was in the hands of divisions material not charged into the accounts to the amount of $1,077,438.31. Material issued during the year amounted to $8,773,192.96, while the sales amounted to $1,484,849.90. For the prior year, issues and sales amounted to $8,797,096.55 and $548,988.32, respectively. (For further information see Tables Nos. 57 and 58.)

The value of the stock carried is out of all proportion to the amount of cash that is appropriated and is available for the maintenance and operation of the canal. In 1915 it was estimated that $2,225,000 would be sufficient to cover the material and supplies required. The great expansion in business operations, including work for other departments of the United States Government, repairs to ships, the supplying of fuel oil and other material and supplies, the difficulty in replacing stock within what was a reasonable time under peace conditions, and the rapid increases in prices, have made it necessary to use for material a sum three times the amount originally estimated. It has only been possible to carry this stock by making use of construction appropriations and by drawing more largely upon the maintenance and operation appropriations than satisfactory, though perfectly legal, use of that appropriation warranted. By the end of the present fiscal year there must be a reduction in stock of $3,000,000 or an additional appropriation for stock must be obtained to properly and satisfactorily handle this matter. A reduction of about $1,000,000 is assured through the use of stock of that value in construction work which will not require replacement. An appropriation of $2,000,000 should therefore be obtained for the purpose of carrying the balance, as the supply department claims that it is impossible to reduce further and supply the necessary requirements of the canal, the railroad, the other United States interests located on the Isthmus, and shipping, etc. The making of the appropriation will not result in an increase in the present stock; it will enable the present stock on hand to be paid for without encroaching on moneys primarily designed for other uses.

The capital for carrying on the business operations of the canal, which last year amounted to over $10,000,000, is supplied by the appropriation for maintenance and operation. Until last year the estimates that have been made under this appropriation and all the appropriations that have heretofore been made have been limited to the amount required for current expenses. The time has come when a fund must be provided which will permit the carrying on of the essential functions of the canal without the necessity for the exceedingly careful watching required in the past and without using funds necessary for other purposes. An appropriation of $2,000,000 is immediately necessary and should be urgently requested.

CONSTRUCTION OF CANAL AND CAPITAL ADDITIONS.

[*Tables Nos. 16 et seq.*]

During the fiscal year just ended there were classified as construction of canal $4,144,218.31, which amount included $348,137.74 for overhead expenses, leaving $3,827,870.58 directly charged by divisions. In addition there were expended for capital additions $861,924.21, which amount included $78,250.48 for overhead expenses. The principal items included in the cost of the above are as follows:

Dredging from Gatun to Pedro Miguel, $67,864.78, includes 120,000 cubic yards of rock removed from Gaillard Cut at an average cost of $0.5630 per cubic yard. (See Table No. 24.)

From Pedro Miguel to the sea there were expended $292,558.52 in dredging 319,880 cubic yards of material at an average cost of $0.9146 per cubic yard. Of this material 48 per cent was earth and 52 per cent rock. (See Table No. 24.)

There were expended for the power producing and transmitting system $618,886.72, which includes the extension of the Gatun hydro-electric station $176,013.23, and operating machinery for same $329,-165.62; transformer substations, $108,177.24; duct lines, $1,695; and distribution lines, $3,241.53.

In continuing the construction of the Atlantic terminal, $26,127.55 were expended for the Cristobal coaling plant and $41,243.18 for the Mount Hope fuel-oil plant; $36,986.42 of this amount being expended in construction of concrete tank No. 43.

In the construction of concrete quays, wharves, and piers at Cristobal, $611,142.44 were expended for the construction of Pier No. 6, and boathouse between Piers Nos. 7 and 8. (See Tables Nos. 18 and 19.)

In continuing the construction of the Pacific terminal there were expended in preparatory work $47,792.85; dredging inner harbor, $379,573.88, involving the removal of 1,255,833 cubic yards of material by dredges at an average cost of $0.3244 per cubic yard, and the pumping of 687,713 cubic yards of spoil in connection with the reclamation of land at an average cost of $0.0440 per cubic yard.

Balboa shops, $204,508.97, the principal item being $146,996.46 for equipment.

Quays, wharves, and piers, $58,307.67, the principal item entering into this expense being rat-proofing, $46,673.89.

Fuel-oil plant, $29,171.49, this entire amount being expended in connection with dredging berth for ships.

For permanent townsites there were expended $174,281.57, the principal items entering into this expense being Balboa townsite, $65,423.03, of which amount $26,513.99 covered lot improvements and $33,860.99 underground duct system; Colon Beach townsite, $78,581.33, the main items being for general work and sewer system. (For further details, see Table No. 21.)

For permanent buildings there were expended $1,284,935.04, the principal items and their cost being: Storehouses, $12,500.58; hotels and mess halls, $29,669.08; gold quarters, $46,464.13; silver quarters, $94,293.79; hospitals, $774,038.17, consisting of $35,235.01 for Colon Hospital and $738,803.16 for Ancon Hospital; dispensaries, $46,254.74; schoolhouses, $56,188.48; incinerator, $105,034.28. (For further details, see Table No. 22.)

For construction of roads, not included in townsites, there were expended $150,707.79.

There were charged to real estate for depopulation of the Canal Zone, $298,556.17, being awards of the Joint Commission and settlements by the land office.

Among the miscellaneous items of construction there were $26,185.26 charged to Zone water supply system, and $17,225.77 to Cristobal shop.

MANUFACTURING PLANTS.

During the fiscal year just ended 219,514 cubic yards of sand and gravel were reclaimed from the Chagres River at an average cost of $0.8422 per cubic yard. (See Table No. 27.)

The Gatun hydroelectric plant and the Miraflores steam electric power plant generated 45,214,312 kilowatt hours during the past year at an average production cost of $0.0077 per kilowatt hour. Included in the above cost is a charge for depreciation of the power transmission system of $96,000, or $0.0021 per kilowatt hour. (See Table No. 28.)

The Ancon-Balboa-Panama waterworks system produced 2,383,670,000 gallons of water at an average cost of $0.0754 per thousand gallons. Of this amount, 865,058,000 gallons were used in the city of Panama. The Gatun system produced 428,401,000 gallons of water at an average cost of $0.1036 per thousand gallons. The Colon-Cristobal system produced 1,442,275,000 gallons at an average cost of $0.0871 per thousand gallons. Of this amount, 591,209,000 gallons were used in the city of Colon. (See Tables Nos. 29–31.)

CANAL ZONE ACCOUNTS.

Since July 1, 1915, the revenues derived by the Canal Zone government from licenses and taxes, court fees and fines, postal receipts, etc., which had theretofore been appropriated separately for the support of the Canal Zone government, have been deposited in the Treasury of the United States and credited to miscellaneous receipts. The collections for licenses and taxes during the year amounted to $12,532.38; court fees and fines, $19,668.28; postal receipts, $107,165.85; with miscellaneous items amounting to $1,323.50; a total of $140,690.91. During the prior year the sum of $131,478.90 was collected. The cash balances of Canal Zone and miscellaneous funds in the hands of the collector have decreased from $1,090,252.70 on June 30, 1917, to $945,061.95 on June 30, 1918. All of the expense of the Canal Zone were paid out of the regular appropriations for civil government, as contemplated by the appropriation acts. (See Table No. 40.)

During the year 168,022 money orders to the value of $3,382,663.69 were issued, as against 173,475 to the value of $3,782,763.71 during the previous year, or a decrease of $400,100.02. This decrease was due to the fact that employees have diverted their savings from money orders to Liberty loan bonds and war savings stamps. Since the establishment of the money order business on the Isthmus, 2,188,262 orders have been issued to the value of $51,216,396.56. There have been paid $36,498,269.93 on money orders drawn on the United States. (See Tables Nos. 41–45.)

CLUBHOUSE ACCOUNTS.

The revenues derived from the operation of the various clubhouses amounted to $365,701.50, as compared with $233,544.22 received during the prior fiscal year. The disbursements amounted to $352,912.70. Soda fountain receipts amounted to $160,563.63; cigars and candies,

$112,332.77; moving pictures, $24,253.73. These items show large increases over prior years' receipts, while the receipts on account of membership fees were reduced from $8,738.07 to $3,835.27. The cash balance on hand June 30, 1918, including amounts due for commissary coupons and from other sources, amounted to $38,671.41. (See Tables Nos. 46–49.)

CLAIMS FOR INJURIES AND DEATHS.

During the past fiscal year there were reported 3,413 accidental injuries and 35 accidental deaths of employees, as against 4,068 accidental injuries and 39 accidental deaths reported during the prior year. Of the number reported during the fiscal year 1918, compensation was allowed in 1,495 cases of injuries and 3 cases of deaths. Of the injury cases disallowed, 1,728 were on account of the fact that period of disability was for less than 3 days, 2 for the reason that disability commenced more than 6 months after the injury, 44 because evidence was insufficient to establish claim, 48 for the reason that injury was not received in the performance of duty, 27 because disability was not the result of the injury, 5 for failure to give notice required by the act, 2 for the reason that the evidence showed intention to cause injury to self or another, and 5 because the evidence showed diability to have been caused by willful misconduct.

Ten death claims were disapproved, 8 for the reason that death resulted from injuries received while not in the performance of duty or directly engaged in actual work, 1 for the reason that the evidence showed death to have been caused through intention to cause injury to self or another, and 1 because death was caused by willful misconduct of the employee.

The sum of $42,396.54 was allowed on account of injuries to employees of The Panama Canal and Panama Railroad Company, and the sum of $3,848.77 was allowed on account of deaths, or a total of $46,245.31 allowed under the act of September 7, 1916. In addition, payments to the amount of $185.98 for injuries and $740.18 for deaths were made under the Executive order of March 20, 1914. The total amount paid by The Panama Canal as compensation on account of injuries and deaths of employees from August 1, 1908, the effective date of the act of May 30, 1908, to June 30, 1918, was $1,471,115.91. Further details as to the amounts paid, the causes of accidents, and the nature of the injuries received, will be found in Tables Nos. 50–56.

COUPON BOOKS.

The use of the coupon book in the form of a mileage book has been continued through the year. Books to the value of $4,131,235 have been issued to employees for pay roll deduction, and $1,703,154.13 sold for cash, as compared with $3,726,495 issued for pay roll deduction and $1,660,000.25 sold for cash during the prior year. In addition, commissary books were issued to officers of the United States Army, contractors, etc., to the value of $90,237.50. The use of sales slips in the commissaries has almost entirely been discontinued. When a sale is made, the saleman registers the amount on a cash register and immediately deposits the detached coupons in a

locked compartment; these coupons are sent to this office each day without being tampered with in any way. In a package separate from the coupons are sent the tapes from the cash registers, which are collected each day by the manager or other responsible employee of the commissary and on which are inserted the cash register readings. The coupons are counted by means of measuring machines, three of which are electrically operated and five hand operated. If there is any material difference between the amount of the coupons as determined by the measuring machines and the amount as shown by the cash register readings, a recount is made, and if a shortage still exists which can not be explained the salesman is held responsible for the difference.

During the past year meal tickets to the value of $132,766 were issued to the silver employees as compared with $137,649.89 issued during the prior year. (For further details see Table No. 39.)

INSPECTION OF ACCOUNTS.

The accounts of all officials and employees charged with the collection, disbursement, and custody of Panama Canal, Canal Zone, and Panama Railroad funds, or with other funds which are semi-public, have been examined at frequent and irregular periods, as contemplated by the regulations. There were 563 examinations made during the year. These inspections involve the counting of cash and the examination of over 160 money accounts, besides a number of accounts of clerks issuing coupon books, meal tickets, and other papers having a money value. No cases of default developed during the year.

TIME INSPECTION.

The inspection of time books and methods of timekeeping has been continued on the same general plan as heretofore used. During the year, 11,634 gangs were inspected, involving the checking of 755,568 employees. Many minor errors in the keeping of time were discovered and corrected. There were also discovered some cases of "padded" time books and cases where time had been given erroneously by timekeepers for the purpose of securing commissary books for themselves, in a few of which cases it was possible to make arrests and secure convictions. The known saving to the canal through the time-inspection bureau was slightly over $4,500; the indirect saving can not be estimated.

FREIGHT CLAIMS.

During the fiscal year 1918 the freight-claim section handled 3,034 new claims, involving approximately $240,000, as compared with 4,687 claims involving over $300,000 handled during the prior year. The amount paid on account of claims and charged to the Isthmus operating accounts was $61,952.17, while considerably in excess of $60,000 will be charged against steamer operations. The exact figures of the latter are not available on the Isthmus.

BONDS OF EMPLOYEES.

The schedule bond of employees of the canal, executed to insure the faithful performance of their duties, was renewed with the Maryland Casualty Co. at the rates provided for the preceding year, namely, 65 cents for postal clerks, $1.25 for postmasters, and $1.70 for other employees. An agreement was also entered into with the Maryland Casualty Co. whereby said company became surety for Panama Railroad employees on the Isthmus at the same rates and under the same conditions applying to Panama Canal employees. This agreement, however, will not become effective until during the fiscal year 1919. This will greatly simplify the transfer of bonded employees between The Panama Canal and the Panama Railroad, which is frequently necessary in the best interests of the service. Upward of 200 employees were bonded during the whole or part of the year.

OPERATIONS WITH PANAMA RAILROAD COMPANY FUNDS.

The railroad operations on the Isthmus consist of the operation of the railroad proper, harbor terminals (mainly covering the transfer of cargo between vessels), coaling plants at Cristobal and Balboa, and the stables in Colon and Panama, the transfer of baggage, the operation of motor busses in Ancon and Balboa and the motor-car repair shop, all under the superintendent of the railroad; the operation of the telephone system under the electrical engineer of The Panama Canal; the rental of lands and buildings under the land agent, reporting to the special attorney; and operations under the supply department of The Panama Canal, which include the commissaries, plantations, cattle industry, dairy farm, poultry farm, hog farm, and the Hotel Washington. No change of importance has been made in the system of accounts of the railroad company during the past year. Monthly statements are prepared which show at a glance the total revenues, the total expenses, the net income from month to month from the various operations.

RAILROAD, HARBOR, TERMINALS, ETC.

The operations of the railroad proper show a profit of $315,967.46 during the fiscal year ending June 30, 1918, as compared with a profit of $18,730.66 for the prior year, or an increase of $297,236.80. This increase was largely due to a decrease of $265,087.61 in railroad expenses, the balance being due to an increase in railroad revenues. The gross revenues from harbor terminal operations amounted to $1,405,579.62, and the expenses to $1,170,435.49, leaving the net revenue derived from this source as $235,144.13 as compared with a net revenue of $135,425.78 for the prior year. The revenues at the Atlantic terminals amounted to $1,332,853.31, as compared with $1,281,169.50 for the prior year, or an increase of $51,683.81. The revenues at the Pacific terminals amounted to $72,726.31, which is an increase of $3,625.87 over the previous year. The expenses at the Pacific terminals show a decrease of over $50,000.

The receipts from the sale of coal during the year amounted to $5,283,029.25. netting a profit of $1,016,784.91, as compared with

sales to the amount of $3,467,178.40, netting a profit of $523,003.03 for the prior year. The total cost of unloading, storing and delivering coal, including repairs to plants, depreciation on plants and equipment, and interest on the Panama Canal investment, amounted to $1,022,742.70.

Stable operations, baggage transfer, motor busses, and motor-car machine shop also showed losses during the year; although the revenues at the Hotel Washington during the year were increased by $1,714.78, the cost of operation increased to such an extent that the net results was a loss in operation of $15,465.92, as compared with a gain of $2,464.99 last year.

The amount derived from the rental of land during the past year was $111,565.23, against which an expense of $16,691.72 was charged, leaving a net revenue of $94,873.51, as compared with $95,085.14 for the fiscal year ending June 30, 1917. After deducting repairs, depreciation, and other operating expenses, the net revenue derived from the rental of buildings was $2,728.52, as compared with $7,623.63 for the prior year.

The operation of the telephone system during the year cost $126,117.04, while the revenues amounted to only $119,992.54, resulting in a loss of $6,124.50, as compared with a profit of $7,607.97 last year. The telephone system, however, is operated primarily for the convenience of the canal and railroad and is not a commercial venture.

COMMISSARY.

The commissary accounts show that supplies to the value of $8,186,209.83 were purchased during the year, as compared with purchases during the preceding year amounting to $8,218,597.56. Included in these purchases is the sum of $1,738,854.65 for cattle, hogs, and poultry slaughtered on the Isthmus during the year 1918 and $811,923.97 for the year 1917. Supplies costing delivered on the Isthmus $8,499,138.31, including the beef, hogs, and poultry just referred to, were sold for $10,239,703.37, an increase of $1,690,782.24 over the previous year. The net profits for the year were $242,677.27, as compared with $194,605.01 for the prior year. The c. i. f. value of supplies on hand June 30, 1918, was $2,395,388.47, as against $2,708,316.95 on June 30, 1917. On January 1. 1918, the branch commissaries at Las Cascadas, Empire, Culebra, Corozal, Toro Point, and Fort Randolph were turned over to the United States Army. At present there are 11 retail commissaries in operation, and 21 manufacturing plants. During the year a new commissary was built at Red Tank at a cost of a little over $15,000. The total commissary investment amounts to $5,480,686.84 made up as follows: Commissary plant, stores, and other property, $1,570,634.81; equipment, $90,561.05; uncompleted improvement and construction work, $424,102.51; supplies on hand, $2,395,388.47; floating capital approximately, $1,000,000. The profits were 4.43 per cent on the investment, and 2.37 per cent on the sales. The total profits from commissary operations since August, 1905, amount to $1,167,254.98, but considerably in excess of that amount has been expended since that time in improving and enlarging the plant. The amount set up as accrued depreciation is $500,955.01. A new cold-storage plant is being

built at Mount Hope, estimated to cost approximately $800,000. The amount expended to June 30, 1918, was $418,703.27. A new slaughterhouse at Cristobal is also under construction estimated to cost $225,000. (See Tables Nos. 59 and 60.)

FARM INDUSTRIES.

The accounts of the cattle industry have continued to be kept so as to show separately the amount paid for cattle, purchasing expenses, transportation expenses, consisting mainly of the operation of the steamships *Caribbean* and *Culebra* (the latter having been transferred from The Panama Canal in April, 1918), and pasturing expenses. During the year there were purchased 23,275 fat cattle, costing $1,028,964.15, and 5,170 young cattle, costing $124,296.79, or a total expenditure for cattle of $1,153,260.94, as compared with $641,634.52 expended for the prior year. The purchasing expenses during the year amounted to $9,280.47; operating expenses of the steamers *Caribbean* and *Culebra*, $262,642.39, against which there is a credit of $26,143.81 for freight earned outside of cattle shipments; and pasture operations, $90,094.54, making a total of $335,873.59 for operating the industry. During the year 21,898 cattle were turned over to the abattoir, for which the commissary was charged $1,246,749.91, and which resulted in a profit to the cattle industry of $100,863.36. The following amounts are invested in the cattle industry: Cost of making pastures, including cost of construction of buildings, fences, etc., $604,940; uncompleted work in the pastures, $79,444.80; equipment, $299,613.48; other material, $13,925.72; value of cattle on hand, $423,062.26; other live stock, $21,852.80; making a total of $1,442,839.06.

Expenses in connection with the operation of plantations during the fiscal year 1918, amounted to $203,401.68. The value of produce sold amounted to $75,634.10, and the difference, $127,767.58, is partly made up of losses on crops already harvested, and partly represents the cost of planting and cultivating crops which have not been harvested. The total investment in plantations to June 30, 1918, representing the cost of clearing and preparing the ground, planting fruit trees, and the erection of necessary buildings, etc., amounts to $212,134.30, with an additional sum of $1,546.34 to cover uncompleted improvement and construction work and $21,853.80 for equipment. If there is added to these items the amount of $138,461.83, expended in the operation of the plantations during the fiscal years 1917 and 1918, in excess of the revenues derived from produce, the result gives a total investment in plantations of $373,996.27.

During the last fiscal year a dairy farm was started at Mindi for the purpose of supplying fresh milk to employees. The investment in buildings and equipment amounts to $107,949.76. Cows to the number of 576, valued at $30,523.16, produced 23,704 gallons of milk during the last six months of the fiscal year 1918. The sale value of this milk was $12,746.98, and the operations of the dairy for this period resulted in a profit of $6,815.69. The operations of the poultry farm and the hog industry resulted in a slight loss for these industries. The amount expended on buildings, etc., for the poultry farm was $108,056.22, and for poultry, $29,539.92. The investment in

buildings, fences, etc., at the hog farm amounts to $47,604.78; the value of the hogs on hand June 30, 1918, was $12,201.19.

All the operations of the railroad on the Isthmus show a net revenue of $1,762,122.98, as compared with $1,000,419.06 for the preceding year. During the year nearly $2,000,000, representing completed improvements, was set up in the capital account of the company. This includes $775,000 paid The Panama Canal toward the Panama Railroad Company's $1,000,000 investment in the Cristobal coaling plant, that being the amount the railroad company agreed to consider as its proportion of the total cost of the plant. The statements of revenues, expenses, and statistics of the Panama Railroad Company will be published in the annual report of that company. The essentials are included here so as to cover in one place, in a general way, all of the operations on the Isthmus.

Respectfully submitted.

H. A. A. Smith,
Auditor, The Panama Canal.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

INDEX OF TABLES SUBMITTED WITH REPORT OF THE AUDITOR, THE PANAMA CANAL, FOR THE FISCAL YEAR 1918.

THE PANAMA CANAL.

Table No. 1.—*Status of authorized bond issue.*

Authorized bond issue			$375,200,900.00
Appropriations by Congress to June 30, 1918		$441,375,781.44	
Less appropriations for—			
Fortifications	$29,950,572.30		
Presentation of launch *Louise*	6,000.00		
Annual payment to Republic of Panama	1,750,000.00		
Maintenance, operation, sanitation and civil government of canal	24,050,006.22		
		55,756,578.52	
Appropriated for canal construction		385,619,202.92	
Less amounts exempted by law—			
Two colliers	$2,000,000.00		
Two barges	1,600,000.00		
Dock No. 6, Cristobal	2,093,190.00		
Equipping colliers *Ulysses* and *Achilles*	250,000.00		
Covering unprotected surfaces of colliers	50,000.00		
Repairs to steamships *Ancon* and *Cristobal*	720,000.00		
Expended for operation and maintenance of canal to June 30, 1915	4,289,159.00		
Stock of material and supplies for operation and maintenance of canal	2,225,000.00		
		13,227,349.00	
			372,391,853.92
Balance available for appropriation after June 30, 1918, within limit of cost of canal and authorized bond issue			2,809,046.08
Appraised value of American legation building in the city of Panama, exempted from charge to bond issue, act July 1, 1916			22,256.00
Balance available for appropriation within the limit of cost of canal and authorized bond issue			2,831,302.08

Note.—Of the amount authorized for construction under the authorized bond issue there have been collected for reimbursement of capital cost of public works in cities of Panama and Colon, $201,040.40, and for material sold, services rendered, etc., $4,989,573.28, a total of $5,190,613.68, which has been deposited as miscellaneous receipts to the credit of the general fund of the United States Treasury.

TABLE No. 2.—*General balance sheet, June 30, 1918.*

ASSETS.		LIABILITIES.	
Construction of canal (Table No. 16)	$348,870,782.40	Appropriations by Congress (Table No. 3)	$441,375,781.44
Capital additions (Table No. 17)	1,840,263.54	Trust funds and security deposits	112,063.25
Equipment (Table No. 8)	9,247,263.14	Reserves (Table No. 15)	3,725,952.51
Material and supplies, etc. (Table No. 10)	8,111,571.52	Assets received from the Canal Zone government (Table No. 11)	544,792.37
Fortifications	24,760,368.79	Panama Railroad property operated by Panama Canal (Table No. 14)	851,080.78
Public works in Panama and Colon	2,479,521.99	Property received from United States Shipping Board	2,432.71
Presentation of launch *Louise* to French Government	5,840.99	Reimbursement account public works in Panama and Colon repaid to appropriations	396,956.06
Reequipment loans to Panama Railroad Company	1,399,114.61	Miscellaneous receipts not deposited in United States Treasury (Table No. 4)	314,812.27
First-mortgage bond loan to Panama Railroad Company	1,848,217.50	Accounts payable	3,053,292.48
Operation and maintenance of canal (Table No. 6)	23,980,676.44		
Annual payment to Republic of Panama for Canal Zone rights	1,500,000.00		
Property transferred to other departments, United States Government (Table No. 12)	1,973,011.17		
Panama Canal property operated by Panama Railroad (Table No. 13)	1,925,166.71		
Miscellaneous receipts credited to assets	5,047,058.94		
Work in progress (Table No. 9)	348,010.45		
Accounts receivable	3,053,931.95		
Unclassified credits	[1] 468,047.07		
Appropriation balances subject to requisition	10,375,902.57		
Cash in hands of fiscal officers	4,078,508.23		
Total	450,377,163.87	Total	450,377,163.87

TABLE No. 3.—*Statement of appropriations by Congress.*

Canal rights from French company (act of June 28, 1902)		$40,000,000.00
Canal Zone rights from Republic of Panama (act of Apr. 28, 1904)		10,000,000.00
Canal connecting Atlantic and Pacific Oceans:		
Act of June 28, 1902	$10,000,000.00	
Act of Dec. 21, 1905	11,000,000.00	
		21,000,000.00
Deficiency for fiscal year 1906 (act of Feb. 27, 1906):		
Miscellaneous material purchases in United States	1,000,000.00	
Miscellaneous material purchases on Isthmus	400,000.00	
Payments to Panama Railroad Company	200,000.00	
Isthmus pay rolls	2,100,000.00	
Salaries and services in the United States	75,000.00	
New equipment purchases	1,565,786.00	
Reequipment of Panama Railroad	650,000.00	
		5,990,786.00
Total for purchase of rights and for lump-sum appropriations common to all departments		76,990,786.00
Expenses in the United States:		
Salaries	$1,476,056.33	
Incidental expenses	583,179.36	
		2,059,235.69
Construction and engineering:		
Pay of officers and employees	29,443,212.00	
Pay of skilled and unskilled labor	101,809,961.00	
Miscellaneous material purchases, etc.	109,881,514.24	
Incidental expenses on Isthmus	6,640,250.00	
		247,774,937.24

[1] Credit.

Civil administration:		
Pay of officers and employees	$4,507,000.00	
Pay of skilled and unskilled laborers	191,000.00	
Material and expenses	1,178,200.00	
		$5,876,200.00
Sanitary department:		
Pay of officers and employees	5,391,000.00	
Pay of skilled and unskilled laborers	3,036,968.00	
Material and expenses	5,662,367.15	
		14,090,335.15
Reequipment of Panama Railroad		4,185,000.00
Relocation of Panama Railroad		7,815,000.00
Redemption of first-mortgage bonds of Panama Railroad Company		2,298,367.50
Sanitation in cities of Panama and Colon		800,000.00
Survey of lands, Canal Zone		75,000.00
Relief of Pembroke B. Benton for injuries		10,000.00
Construction and equipment		23,598,190.00
Total fiscal years 1907 to 1918, inclusive		308,582,265.58
Total for canal construction, rights, etc., to June 30, 1918		385,573,051.58
Private acts for relief:		
Elizabeth G. Martin, June 17, 1910	$1,200.00	
Marcellus Troxell, Jan. 13, 1911	1,500.00	
W. L. Miles, Feb. 13, 1911	1,704.18	
Chas. A. Caswell, Mar. 2, 1911	1,056.00	
Heirs of Robert S. Gill, July 3, 1912	2,520.00	
Douglas B. Thompson, July 3, 1912	1,500.00	
Allesandra Comba, July 10, 1912	500.00	
Peter Wiggington, Feb. 7, 1913	500.00	
Raymond R. Ridenour, Feb. 7, 1913	500.00	
Heirs of Charles E. Stump, Feb. 7, 1913	1,500.00	
Parents of Edward Maher, Feb. 18, 1913	1,980.00	
Oscar F. Lackey, Feb. 18, 1913	1,500.00	
Pedro Sanchez, Feb. 18, 1913	2,000.00	
John H. Cole, Feb. 18, 1913	1,951.38	
Robert Coggen, Feb. 18, 1913	1,500.00	
Wife of William Goodley, July 17, 1914	1,000.00	
John Burrows, Feb. 27, 1915	1,433.33	
F. W. Theodore Schroeter, Mar. 3, 1915	1,397.66	
L. V. Thomas, Mar. 3, 1915	1,680.00	
Joseph A. Buckholdt, Aug. 4, 1916	3,000.00	
Olaf Nelson, Aug. 8, 1916	1,200.00	
		31,122.55
Judgments of the Court of Claims, War:		
Act of Aug. 26, 1912	196.45	
Act of Mar. 4, 1913	900.00	
Act of July 29, 1914	905.38	
Act of Feb. 28, 1916	1,000.00	
Act of Sept. 8, 1916	2,537.20	
		5,539.03
Judgment, United States court (act of Apr. 6, 1914)		9,489.76
Presenting steam launch *Louise* to French Government, act of Aug. 25, 1914		6,000.00
Fortifications:		
Aeronautic stations	$250,000.00	
Aviation seacoast defenses	500,000.00	
Armament of fortifications	13,103,000.00	
Army quarters, storehouses, etc	3,990,000.00	
Buildings and materials	57,375.00	
Causeway	150,000.00	
Electric light and power plants	264,631.00	
Field fortifications and camps	394,350.00	
Fire control	633,301.30	
Land for military purposes	50,000.00	

Fortifications—Continued.		
Land defenses	$29, 500. 00	
Maintenance of clearings and trails	116, 900. 00	
Maintenance, etc., of fire-control installations	20, 000. 00	
Maintenance of searchlights and electric-power equipment	22, 500. 00	
Ordnance depot	367, 900. 00	
Preservation and repair of fortifications	49, 400. 00	
Protecting Panama Canal and structures	450, 000. 00	
Reserve equipment for fortifications	50, 000. 00	
Sanitary clearing, filling, etc	210, 000. 00	
Seacoast batteries	6, 102, 000. 00	
Searchlights for seacoast fortifications	443, 440. 00	
Submarine mines	659, 450. 00	
Submarine-mine structures	322, 200. 00	
Submarine base	1, 652, 625. 00	
Surveys	62, 000. 00	
		$29, 950, 572. 30
Annual payment to Republic of Panama:		
Act of Mar. 4, 1913	250, 000. 00	
Act of Apr. 6, 1914	250, 000. 00	
Act of Jan. 25, 1915	250, 000. 00	
Act of Feb. 28, 1916	250, 000. 00	
Act of July 1, 1916	250, 000. 00	
Act of Mar. 3, 1917	250, 000. 00	
Act of Apr. 15, 1918	250, 000. 00	
		1, 750, 000. 00
Maintenance and operation of the canal:		
Maintenance and operation	19, 950, 000. 00	
Sanitation	2, 250, 000. 00	
Civil government	1, 840, 000. 00	
Increases of compensation, Panama Canal, 1918	10, 006. 22	
		24, 050, 006. 22
Total appropriations by Congress to June 30, 1918		441, 375, 781. 44

DETAIL OF ACTS FOR MAINTENANCE AND OPERATION, SANITATION, CIVIL GOVERNMENT, AND CONSTRUCTION AND EQUIPMENT.

	Maintenance and operation.	Sanitation, Canal Zone.	Civil government, Panama Canal, Canal Zone.	Total.	Construction and equipment.
Act of Mar. 3, 1915	$5, 200, 000. 00	$700, 000. 00	$540, 000. 00	$6, 440, 000. 00	$10, 500, 000. 00
Act of July 1, 1916	5, 750, 000. 00	700, 000. 00	600, 000. 00	7, 050, 000. 00	9, 750, 000. 00
Act of June 12, 1917	9, 000, 000. 00	700, 000. 00	700, 000. 00	10, 400, 000. 00	2, 755, 000. 00
Act of Mar. 28, 1918					593, 190. 00
Act of June 4, 1918		150, 000. 00		150, 000. 00	
Increases of compensation, Panama Canal, 1918	10, 006. 22			10, 006. 22	
Total	19, 960, 006. 22	2, 250, 000. 00	1, 840, 000. 00	24, 050, 006. 22	23, 598, 190. 00
Amount appropriated for construction but used for maintenance and operation and not chargeable against authorized bond issue (act of Aug. 1, 1914, sec. 12):					
Maintenance and operation prior to July 1, 1915				4, 289, 159. 00	
Stock of material for maintenance and operation				2, 225, 000. 00	
Total for maintenance and operation				30, 564, 165. 22	

TABLE No. 4.—*Detail of miscellaneous receipts, United States funds.*

Receipts involving no appropriation expenditures:		
Subsidies from Panama Railroad Company	$631, 875. 00	
Dividends on Panama Railroad stock	344, 945. 00	
Interest on reequipment loan	320, 799. 11	
Interest on first mortgage bond loan	152, 395. 16	
Interest on public works, Panama and Colon	321, 321. 35	
Interest on Zone water-supply systems, proportion	96, 757. 20	
Interest on bank balances	23, 147. 30	
Miscellaneous rentals	238, 650. 08	
Overages	505. 66	
Forfeitures	28. 00	
Salvaging steamship *Moselle*	210. 50	
Miscellaneous	20. 10	
		$2, 130, 654. 46
Receipts involving expenditures from appropriations:		
Not credited to assets—		
Capital cost, Panama waterworks and sewers	54, 115. 44	
Capital cost, Panama pavements	46, 981. 55	
Capital cost, Colon waterworks and sewers	52, 081. 58	
Capital cost, Colon pavements	47, 861. 83	
Tolls	18, 654, 380. 16	
Licenses and taxes	41, 989. 42	
Court fees and fines	54, 594. 65	
Postal receipts	301, 965. 97	
Miscellaneous, Canal Zone	3, 223. 57	
		19, 257, 194. 17
Credited to assets—		
Sale of property	850, 500. 11	
Sale of French material and equipment	117, 730. 03	
Sale of Panama Canal building in city of Panama	80, 000. 00	
Sale of water	255. 43	
Mess accounts	46, 879. 48	
Hospital receipts	79, 992. 68	
Quarantine receipts	24, 900. 53	
Laundry receipts	7, 382. 01	
Rental of lands and buildings	41, 427. 24	
Rentals, miscellaneous	137, 822. 99	
Telegraph and telephone receipts	3, 547. 35	
Hotels and messes	758, 470. 34	
Hotel coupon books	32, 238. 28	
Corral receipts	8, 628. 56	
Labor furnished Panama Railroad Company	180, 336. 97	
Other labor furnished	27, 449. 55	
Repayments, reequipment loan	1, 387, 714. 92	
Repayments, first mortgage bond loan	300, 000. 00	
Sale of Panama Railroad stock	1, 300. 00	
Miscellaneous	93, 805. 47	
Sale of construction material and equipment	796, 897. 82	
Profit on business operations	57, 485. 66	
Forfeitures by contractors	12, 293. 52	
		5, 047, 058. 94
Total		26, 434, 907. 57
Miscellaneous receipts deposited in United States Treasury		26, 120, 095. 30
Cash on hand June 30, 1918		202, 836. 99
Amount of water rentals, Panama and Colon, credited to miscellaneous receipts	$619, 118. 95	
Amount of water rentals, Panama and Colon, deposited as miscellaneous receipts	567, 788. 82	
		51, 330. 13
Profit on business operations, 1917 and 1918, not transferred to miscellaneous receipts		45, 587. 22
Unpaid bills		15, 057. 93
Total		26, 434, 907. 57

TABLE No. 5.—*Statement of overhead expenses, fiscal year 1918.*

	Fiscal year—	
	1918	1917
Civil government:		
Civil affairs—		
Administration	$10, 104. 59	$9, 381. 03
Posts	163, 915. 39	155, 030. 12
Customs	28, 503. 61	22, 615. 25
Estates	69. 93	17. 35
Total civil affairs	202, 593. 52	187, 043. 75

TABLE No. 5.—*Statement of overhead expenses, fiscal year 1918*—Continued.

	Fiscal year—	
	1918	1917
Schools	$141,091.67	$85,820.09
Fire protection	85,924.22	68,528.28
Police and prisons	265,000.57	244,274.18
District court	17,852.02	17,643.62
Magistrate courts	13,025.65	11,459.90
District attorney	8,443.06	7,621.69
Canal Zone marshal	7,711.91	8,281.66
Municipal expenses	45.27	49.36
Total civil government	741,687.89	630,722.53
Charged to other interests	63,455.01	34,402.32
Amount apportioned	678,232.88	596,320.21
Health department:		
Administration	11,564.64	4,374.54
Medical storehouse	16,696.23	3,774.20
Ancon Hospital	455,553.30	382,961.50
Colon Hospital	70,208.71	59,501.80
Santo Tomas Hospital	12,608.64	11,740.69
Palo Seco Leper Asylum	29,687.78	24,102.89
Corozal Farm and Insane Asylum	92,159.80	92,898.02
Other hospitals and dispensaries	47,530.07	40,988.69
Quarantine service	85,988.04	71,410.33
Sanitation—		
Panama	52,531.08	47,910.90
Colon	42,701.49	33,555.35
Canal Zone	114,736.91	164,874.99
Street cleaning and garbage disposal—		
Panama	61,785.26	56,088.62
Colon	31,155.62	29,041.82
Total health department	1,124,907.57	1,023,224.34
Charged to other interests	489,053.54	441,303.13
Amount apportioned	635,854.03	581,921.21
Supply department:		
Maintenance and care of administration building	29,946.21	26,403.87
Operation of storehouse	548,072.20	586,486.15
Repairs to storehouse	1,671.35	912.32
Handling freight on docks	16,611.69	93,423.26
Operation of quarters	479,708.59	395,117.68
Material stock losses	55,695.64	.....
Repairs to quarters	202,851.04	219,026.89
Inventory adjustments	[1] 49,659.28	.....
Repairs to other buildings	27,948.25	1,314.63
United States bills, adjustments	[1] 3,587.13	.....
Ancon nursery	9,212.34	2,062.16
Total	1,318,470.90	1,324,746.96
Charged to other interests	219,194.98	155,702.45
Amount apportioned	1,099,275.92	1,169,044.51
Accounting department:		
Accounting office	370,478.48	333,645.55
Paymaster's office	50,778.13	45,303.77
Collector's office	38,461.64	34,860.57
Total	459,718.25	413,809.89
Charged to other interests	164,815.95	136,002.87
Amount apportioned	294,902.30	277,807.02
Washington office:		
Assistant auditor's office	37,532.26	41,543.32
Disbursing clerk's office	10,265.71	11,008.83
General bureau	52,215.88	60,235.29
Purchasing expenses	184,566.69	200,924.26
Total	284,580.54	313,711.70
Charged to other interests	3,627.52	1,637.67
Amount apportioned	280,953.02	312,074.03

[1] Credits.

TABLE No. 5.—*Statement of overhead expenses, fiscal year 1918*—Continued.

	Fiscal year—	
	1918	1917
Miscellaneous:		
Transportation of employees on Isthmus	$141,667.20	$144,025.50
Recruiting and repatriating	43,064.35	55,823.04
Compensation to injured employees	5,523.39	25,894.45
Land office	11,902.64	11,348.37
Special attorney	11,241.78	10,772.99
Payments to deported alien cripples	2,925.00	.....
Total	216,324.36	247,864.35
Charged to other interests	24,085.55	22,865.69
Amount apportioned	192,238.81	224,998.66
Administration:		
Executive office—		
Executive	33,753.66	33,005.40
Miscellaneous bureaus—		
Correspondence	45,614.14	47,913.60
Record bureau	48,195.94	43,677.78
Personnel bureau	25,367.10	21,217.42
Property and requisition bureau	31,126.07	25,769.54
General bureau	51,287.82	42,791.44
Timekeeping bureau	95,720.27	86,560.85
Clubs and playgrounds	90,434.79	62,481.89
Canal Record	8,669.36	11,514.48
Official motor cars	17,600.70	18,529.41
Cables and radiograms	9,017.64	8,070.11
Miscellaneous	5,369.01	7,197.55
Bureau of statistics	13,235.38	10,823.37
Total executive office	475,391.88	419,552.84
Charged to other interests	109,872.19	93,579.93
Amount apportioned	365,519.69	325,972.91
Engineer of maintenance:		
Office engineer	66,364.45	64,418.53
Surveys	28,660.26	30,774.66
Meteorology and hydrography	29,174.28	31,081.04
Total	124,198.99	126,274.23
Charged to other interests	66,420.88	59,998.63
Amount apportioned	57,778.11	66,275.60
Electrical division:		
Lights—street, lodge halls, and churches	7,802.40	7,529.78
Amount apportioned	7,802.40	7,529.78
Municipal engineering:		
Operation and maintenance of waterworks	403,329.40	342,567.45
Repairs to sewer system	18,851.91	12,823.73
Repairs to roads	346,923.51	123,605.62
Total	769,104.82	478,996.80
Charged to other interests	245,418.84	219,650.00
Amount apportioned	523,685.98	259,346.80
Grand total—administration	3,655,592.14	3,332,486.55
Charged to other interests	833,435.91	689,437.24
Amount apportioned	2,822,156.23	2,643,049.31
Total overhead expenses	5,522,187.60	4,986,433.42
Charged to other interests	1,385,944.46	1,165,142.69
Total amount apportioned	4,136,243.14	3,821,290.73
Distribution:		
Operation and maintenance of canal	2,826,651.32	2,537,883.61
Construction of canal	416,529.24	702,234.23
Fortifications	213,686.63	187,298.95
Business operations	627,211.16	370,133.78
Expenses of sales—construction, material, and equipment	28,788.92	18,751.39
Public works in cities of Panama and Colon	436.35	4,988.77
Repairs to steamships *Ancon* and *Cristobal*	21,958.07	.....
Village—New Chagres	981.45	.....
Total	4,136,243.14	3,821,290.73

TABLE No. 6.—*Panama Canal operation and maintenance to June 30, 1918.*

	Fiscal year 1917.	Fiscal year 1918.	Total to date.
Marine division:			
Admeasurement of vessels	$13,759.01	$16,167.58	$48,499.24
Local inspection	4,515.46	3,940.34	17,210.24
Aids to navigation	97,823.93	82,855.73	288,399.71
Pilotage	104,216.83	95,237.08	302,573.12
Operation of harbor tugs—balance	60,566.91	58,285.37	164,064.63
Operation of port captain's office—balance	26,120.91	36,975.53	63,096.44
Assisting vessels through cut	6,033.38	84.65	6,118.03
Total marine division	313,036.43	293,546.28	889,961.41
Locks, operation and maintenance:			
Gatun locks—			
Superintendence	19,174.89	24,316.13	73,860.21
Operation	107,750.57	132,137.54	424,511.71
Maintenance	140,327.78	127,979.14	592,217.52
Total Gatun locks	267,253.24	284,432.81	1,090,589.44
Gatun spillway	19,852.49	11,602.24	63,370.29
Pedro Miguel locks—			
Superintendence	20,969.18	17,846.54	70,106.67
Operation	62,159.26	94,867.83	286,772.60
Maintenance	126,349.70	93,176.86	396,388.85
Total Pedro Miguel locks	209,478.14	205,891.23	753,268.12
Pedro Miguel dams	35.37	.....	168.96
Miraflores locks—			
Superintendence	24,826.93	18,682.42	78,409.81
Operation	105,966.93	145,067.82	421,244.53
Maintenance	108,290.76	77,927.05	425,502.37
Total Miraflores locks	239,084.62	241,677.29	925,156.71
Miraflores spillway and east dam	1,619.05	1,357.43	16,642.69
Miraflores west dam—Maintenance	107.48	.....	832.37
Total lock operation and maintenance	737,430.39	744,961.00	2,850,028.58
Dredging:			
Atlantic entrance	22,864.17	7,577.76	182,483.58
Gatun Lake	442.88	.....	442.88
Gaillard Cut	2,612,480.17	1,456,297.08	9,215,157.37
Miraflores Lake	83,024.52	.....	85,277.96
Pacific entrance	135,819.51	262,928.70	427,564.63
Total dredging	2,854,631.25	1,726,803.54	9,910,926.42
Gatun dam, maintenance	15,889.75	8,202.78	93,095.86
Removal of floating obstructions	23,203.11	36,014.71	110,648.94
Gatun-Mindi levee, maintenance	2,582.14	32.31	31,326.04
Colon west breakwater, maintenance	41,479.89	[1] 1,419.29	81,523.46
Colon east breakwater, maintenance	.....	.....	.....
Naos Island breakwater, maintenance	9,642.89	.....	14,193.55
Damages to vessels in locks	141.36	5,950.09	6,879.23
Damages to vessels in canal	3,818.44	20,574.73	27,759.07
Operation floating derricks	202,034.37	148,889.03	452,781.44
Maintenance of transportation tracks	46,273.97	55,906.20	164,954.43
Dry excavation—Rio Grande	.....	37,606.99	37,606.99
Shop expense, Balboa—balance	.....	.....	19,158.55
Loss on sales and services to outsiders	.....	.....	61,823.17
Total operation and maintenance	4,250,163.99	3,077,068.37	14,752,667.14
Proportion of overhead expenses	2,537,883.61	2,826,651.32	9,228,009.30
Total	6,788,047.60	5,903,719.69	23,980,676.44
Revenues:			
Tolls	5,631,781.66	6,454,198.35	18,654,380.16
Licenses and taxes, fees, fines, etc.	137,189.38	140,918.01	424,920.91
Profit on sales and services to outsiders	39,427.66	6,159.56	57,485.66
Total revenues	5,808,398.70	6,601,275.92	19,136,786.73
Revenues earned in excess of expenses	.....	697,556.23	.....
Expenses in excess of revenues earned	979,648.90	.....	4,843,889.71

[1] Indicates credit.

TABLE No. 7.—*Statement of profit and loss on business operations for fiscal year ended June 30, 1918.*

	Cost.	Revenues.	Profit or loss.
DEPARTMENT OF OPERATION AND MAINTENANCE.			
Construction and repairs	$1,826,134.91	$1,826,779.84	$644.93
Shopwork	2,635,680.15	2,659,271.44	23,591.29
Electric work	235,963.40	267,917.36	1,953.96
Electric current	96,195.21	97,798.98	1,603.77
Train service and use of rolling equipment	2,508.50	2,595.12	86.62
Tug service	199,292.53	200,874.92	1,582.39
Service of other floating equipment	69,036.13	70,345.84	1,309.71
Pilotage	30,877.33	35,085.00	4,207.67
Wharfage	5,341.62	24,572.16	19,230.54
Sales of water	178,304.42	191,776.48	13,472.06
Panama waterworks	85,975.44	85,975.44	.....
Panama pavements	8,990.81	8,990.81	.....
Colon waterworks	63,302.99	63,302.99	.....
Colon pavements	12,187.71	12,187.71	.....
Handling lines on docks	33,354.71	.....	— 33,354.71
Handling lines on locks	30,420.53	23,650.10	— 6,770.43
Steamship inspection	932.32	3,240.01	2,307.69
Minor services, supplies and property	47,509.18	47,689.19	180.01
Dry dockage—Balboa	81,906.09	131,573.95	49,667.86
Dry dockage—Cristobal	23,708.64	16,826.29	— 6,882.35
Total, department of operation and maintenance	5,697,622.62	5,770,453.63	72,831.01
SUPPLY DEPARTMENT.			
Subsistence:			
Hotel Tivoli	143,371.82	122,098.60	— 21,273.22
Hotel Aspinwall	5,543.83	3,099.31	— 2,444.52
Line hotels	514,039.21	448,006.51	— 66,032.70
Messes	150,970.07	139,404.71	— 11,565.36
Total, subsistence	813,924.93	712,609.13	—101,315.80
QUARTERMASTER.			
Material from stock	1,629,393.44	1,646,218.35	16,824.91
Fuel oil	811,839.21	838,374.76	26,535.55
Rock, sand, gravel, and screenings	13,519.68	13,519.68	.....
Printing and binding	24,792.47	25,076.12	283.65
Corral	58,599.64	61,404.35	2,804.71
Rental of gold quarters	2,151.86	2,151.86	.....
Rental of silver quarters	101,181.25	103,651.22	2,469.97
Garage rental	1,919.67	5,806.02	3,886.35
Ancon nursery	4,440.72	4,440.72	.....
Handling of fuel oil	28,489.04	29,604.72	1,115.68
Operation of stores	54,000.00	54,000.00	.....
Operation of quarters	87,000.00	87,000.00	.....
Minor services, supplies and property	100,363.47	101,474.66	1,111.19
Total, quartermaster	2,917,690.45	2,972,722.46	55,032.01
ACCOUNTING DEPARTMENT.			
Lost metal checks	47.78	1,102.05	1,054.27
Cablegrams	2,366.55	3,603.69	1,237.14
Service of Panama Railroad	159,057.80	159,058.20	.40
	161,472.13	163,763.94	2,291.81
HEALTH DEPARTMENT.			
Ancon Hospital:			
Fees	262,720.71	147,253.69	—115,467.02
Mess	19,614.60	19,614.60	.....
Burials	4,595.93	4,595.93	.....
Miscellaneous	1,790.52	1,790.52	.....
Colon Hospital:			
Fees	30,476.25	23,745.65	6,730.60
Mess	3,922.24	3,922.24	.....
Miscellaneous	173.75	173.75	.....
Palo Seco Leper Asylum	18,386.70	11,656.51	— 6,730.19
Line dispensaries	1,795.18	1,795.18	.....
Quarantine:			
Subsistence	18,858.16	66,063.35	47,205.10
Other charges	11,964.54	30,694.21	18,729.67
Sanitation:			
Panama	8,615.70	8,615.70	.....
Colon	10,907.92	10,907.92	.....
Zone	10,221.34	10,221.34	.....
Street cleaning:			
Panama	38,914.01	38,914.01	.....
Colon	18,336.28	18,336.28	.....

TABLE No. 7.—*Statement of profit and loss on business operations for fiscal year ended June 30, 1918*—Continued.

	Cost.	Revenues.	Profit or loss.
HEALTH DEPARTMENT—continued.			
Corozal Hospital:			
Produce	$20,993.57	$20,993.57	.....
Pasturage	62.00	62.00	.....
Burials	595.19	595.19	.....
Insane asylum	49,674.70	76,304.72	$26,630.02
Sales from medical store	29,323.15	30,303.38	980.23
Total, health department	561,942.44	526,559.74	−35,382.70
CIVIL GOVERNMENT.			
School tuition	4,364.64	4,364.64	.....
Sale of schoolbooks	768.70	760.72	− 7.98
Police service	26,980.65	26,980.65	.....
Postal service	7,668.07	7,668.07	.....
Minor services, supplies and property	3,348.33	3,395.47	47.14
Total, civil government	43,130.39	43,169.55	39.16
EXECUTIVE DEPARTMENT.			
Service to Panama Railroad Company	87,133.68	87,133.68	.....
Photographs and prints	390.26	390.26	.....
Motor-car service	4,838.11	4,852.40	14.29
Minor services, supplies and property	270.21	270.21	.....
Canal Record	133.82	267.65	133.83
Total, executive department	92,766.08	92,914.20	148.12
MISCELLANEOUS.			
Land rental	7,933.34	14,198.60	6,265.26
Building rental	1,511.01	5,565.87	4,054.86
Land office expense	12,002.30	12,002.30	.....
Rental Pier No. 18	7,823.86	9,999.99	2,176.13
Boathouse rental	92.80	112.50	19.70
Total, miscellaneous	29,363.31	41,879.26	12,515.95
Total	10,317,912.35	10,324,071.91	6,159.56

NOTE.—Losses are indicated by the minus (−) sign.

TABLE No. 8.—*Detail of equipment.*

	Amount.		Amount.
Steamship Cristobal	$716,085.43	Locks operation	$113,070.32
Steamship Ancon	728,271.88	Fortifications	9,961.00
Two colliers	2,025,934.87	Building	200.00
Two floating cranes	933,573.38	Mechanical	750.00
Floating caisson	347,880.15	Executive	15,644.22
Dredge Gamboa and Paraiso	560,583.32	Quartermaster	188,380.34
Dredge Cascadas	444,677.66	Health	7,445.76
Dredging	2,469,424.90	Miscellaneous	7,413.63
Marine	658,462.27		
Municipal engineering	19,504.01	Total	9,247,263.14

TABLE No. 9.—*Detail of work in progress.*

	Amount.
Uncompleted work, mechanical division	$313,327.15
Uncompleted work, other divisions	25,621.50
McClintic-Marshall lock gate claim	9,061.80
Total	348,010.45

TABLE No. 10.—*Detail of material and supplies.*

Balboa store		$4,667,215.70	
Cristobal store		667,218.60	
Paraiso store		903,775.77	
Medical store		114,635.74	
Fuel oil		264,988.99	
Stationery store, administration building		18,972.41	
Printing plant store		85,377.30	
District quartermaster store:			
Cristobal	$919.24		
Gatun	19,641.44		
Paraiso	977.80		
Balboa-Ancon	3,965.27		
		25,503.75	
Total, quartermaster stores			$6,747,688.26
Material on hand with divisions, not yet charged to the work			1,077,438.31
Containers in transit			63,442.02
Obsolete store			223,002.93
Total			8,111,571.52

TABLE No. 11.—*Detail of assets received from the Canal Zone government.*

School buildings	$72,115.00
Roads	451,887.50
Waterworks and sewer system	18,500.00
Stationery stock	2,167.04
Miscellaneous	122.83
Total	544,792.37

TABLE No. 12.—*Detail of assets transferred to other departments of the United States Government.*

To Army on Canal Zone:		
Buildings—		
Corozal	$206,552.25	
Cristobal	22,261.51	
Culebra	244,586.41	
Empire	368,606.67	
Gatun	51,925.15	
Las Cascadas	126,416.00	
Margarita Island	375.50	
Toro Point	24,076.24	
		$1,044,799.73
Roads		249,200.00
Waterworks and sewer system		361,550.00
Chagres village		34,846.27
To State Department, legation building, city of Panama		22,256.00
To Alaskan Engineering Commission		258,709.56
To Army and Navy on Canal Zone, boathouse, Colon		1,649.61
Total		1,973,011.17

TABLE No. 13.—*Detail of Panama Canal property operated by Panama Railroad.*

Floating equipment		$134,013.94
Rolling stock		753,834.76
Machinery		10,913.41
Docks, wooden:		
Cristobal	$62,000.00	
Balboa	8,100.00	
		70,100.00
Steamships:		
Colon	400,000.00	
Panama	400,000.00	
Caribbean	156,304.60	
		956,304.60
Total		1,925,166.71

TABLE No. 14.—*Detail of Panama Railroad property operated by Panama Canal.*

Buildings	$297,847.08
Floating equipment	38,585.00
Rolling stock	50,290.32
Machinery	10,655.00
Gamboa gravel plant	79,961.28
Concrete dock, Balboa	373,742.10
Total	851,080.78

TABLE No. 15.—*Detail of reserves.*

For gratuity			$779,095.08
For depreciation:			
Structures—			
Shop buildings	$20,267.02		
Power system	355,028.70		
Docks and piers	22,569.91		
Waterworks systems	36,863.13		
Storehouses	43,162.16		
Balboa dry dock	60,000.00		
		$537,890.92	
Equipment—			
Mechanical division	33,272.00		
Storehouses	17,666.62		
Dredging division	1,493,311.03		
Building division	426.99		
Terminal division	8,106.65		
Corrals	34,420.24		
Marine division	33,045.18		
Gatun locks division	[1] 423.97		
Balboa power house	30,607.34		
Pacific locks division	[1] 3,813.99		
Electrical division	6,050.80		
Health department	22,510.10		
Colon breakwater	8.85		
Gamboa gravel plant	116,859.30		
Fuel oil plants	76,500.00		
Contractors	1,916.19		
Gamboa crusher	9,708.80		
United States tank No. 62	84.00		
Atlantic tank farm	3,483.55		
Pacific tank farm	4,328.23		
		1,888,067.91	
			2,425,958.83
For repairs:			
Structures—			
Balboa shops buildings	25,042.29		
Storehouses	17,934.32		
Power system	15,717.51		
Cristobal roundhouse	985.33		
Fuel oil plants	72,765.58		
		132,445.03	
Equipment—			
Mechanical division	41,380.23		
Storehouses	27,838.49		
Dredging division	318,776.47		
Marine division	10,107.81		
Pacific locks division	[1] 586.18		
Motor cars	2,171.91		
Locomotives	912.27		
Cranes, lock operation	586.18		
United States tank No. 62	102.00		
Gamboa crusher	[1] 4,107.25		
Municipal engineering	[1] 8,728.36		
		388,453.57	
			520,898.60
Total			3,725,952.51

[1] Debit balance.

TABLE No. 16.—*Construction of canal, fiscal year 1918 and to June 30, 1918.*

[Amounts include canal overhead.]

	Fiscal year 1918.	To June 30, 1918.
CANAL CONSTRUCTION.		
Prism excavation:		
Gatun to sea		$11,932,801.89
Gatun to Pedro Miguel (Table No. 24)	$74,651.26	107,500,957.14
Pedro Miguel to sea (Table No. 24)	321,814.36	18,241,165.76
Total prism excavation	396,465.62	137,674,924.79
Gatun locks		35,849,813.31
Pedro Miguel locks		15,769,015.33
Miraflores locks		23,121,849.04
Gatun spillway		4,101,671.11
Miraflores spillway and east dam		1,326,906.40
Gatun dam		9,871,635.81
Gatun-Mindi levee		141,329.45
Trinidad River dam		66,713.27

TABLE No. 16.—*Construction of canal, fiscal year 1918 and to June 30, 1918*—Con.

	Fiscal year 1918.	To June 30, 1918.
CANAL CONSTRUCTION—continued.		
Pedro Miguel dams	.....	$433,835.38
Miraflores west dam	.....	1,165,516.74
La Boca locks and dams—abandoned	.....	751,748.32
Colon east breakwater	[1] $11,955.86	3,785,604.79
Colon west breakwater	.....	4,291,747.21
Naos Island breakwater	.....	1,020,666.41
Aids to navigation	.....	818,697.37
Total canal	[1] 11,955.86	102,516,749.94
AUXILIARY WORKS.		
Power producing and transmitting system (Table No. 23):		
Gatun hydroelectric plant	555,696.72	1,564,591.97
Miraflores steam-electric plant	.....	307,485.78
Power-transmission system	65,519.93	3,545,231.97
Total power producing and transmitting system	621,216.65	5,417,309.72
Pacific terminals (Table No. 20):		
Coaling station	54,836.67	2,289,394.44
Fuel-oil plant	[1] 8,596.42	404,093.48
Dry dock	2,341.82	3,536,296.45
Docks	64,138.43	3,172,276.04
Dredging inner harbor	451,912.14	2,693,793.67
Entrance basin	.....	489,480.39
Preparatory work	52,572.15	1,808,921.65
Total Pacific terminals	617,204.79	14,394,256.12
Atlantic terminals (Table No. 19):		
Coaling station	121,058.40	3,672,890.09
Fuel-oil plant	45,367.50	235,838.87
Dry dock	5,849.35	73,475.51
Docks	672,256.68	1,257,194.67
Total Atlantic terminals	844,531.93	5,239,399.14
Gatun dock	.....	8,951.33
Permanent townsites (Table No. 21):		
Cristobal	52,235.03	350,643.34
Colon Beach	.....	.....
Gatun	1,583.12	22,758.43
Pedro Miguel	6,342.39	181,199.02
Red Tank	5,352.71	25,178.64
Balboa-Ancon	28,245.56	1,641,744.72
La Boca	.....	192,562.94
Total permanent townsites	93,758.81	2,414,087.09
CANAL CONSTRUCTION.		
Buildings (Table No. 22):		
Designing and preliminary expenses	40,345.88	73,232.90
Offices—		
Administration, Balboa	.....	1,203,601.01
Administration, Santa Rosa	.....	130,892.39
Balboa shops	.....	238,553.94
Balboa terminals	.....	80,634.42
Shops—		
Balboa	22,921.94	3,799,211.75
Paraiso	.....	.....
Cristobal	.....	145,460.61
Storehouses	10,320.18	1,087,532.43
Hotels and mess halls	26,346.71	518,453.26
Gold quarters	20,303.99	4,623,993.26
Silver quarters	19,252.17	607,676.56
Ancon Hospital	08,759.98	1,354,913.62
Colon Hospital	38,758.50	248,937.91
Dispensaries	50,880.19	160,528.96
Asylums	.....	184,073.47
Quarantine stations	.....	72,469.36
Medical storehouses	.....	25,471.15
Miscellaneous buildings, health department	17,264.81	46,719.23

TABLE No. 16.—*Construction of canal, fiscal year 1918 and to June 30, 1918*—Con.

	Fiscal year 1918.	To June 30, 1918.
CANAL CONSTRUCTION—continued.		
Buildings (Table No. 22)—Continued.		
Post offices	.....	$35,982.62
Schoolhouses	$59,450.63	474,446.61
Courthouses, police stations, jails, etc	.....	90,454.10
Fluviographs	.....	13,709.02
Miscellaneous buildings	127,684.88	473,221.57
Total buildings	1,242,289.86	15,690,170.15
Playgrounds, including Balboa grand stand	5,065.51	50,273.49
Sanitary fills	.....	601,463.67
Sanitary ditches	.....	99,299.61
Landscape improvements	18,184.36	18,184.36
Waterworks systems:		
Colon-Cristobal	.....	585,642.89
Panama-Gamboa	.....	1,765,222.58
Gatun	.....	.....
Other Zone systems	279.42	550,376.89
Total waterworks systems	279.42	2,901,242.36
Zone sewage system	.....	68,457.15
Zone roadways	13,666.44	316,132.34
Real estate:		
For canal construction and flooded areas	.....	879,583.06
For auxiliary works and buildings	.....	146,258.94
For depopulation of the Canal Zone	308,415.15	1,750,279.35
Total, real estate	308,415.15	2,776,121.35
Miscellaneous:		
Gravel reclaiming plant, Gamboa	.....	[1] 1,168.96
Relocation, Panama Railroad	.....	9,800,626.46
Investment, Panama Railroad stock	.....	155,818.24
Concessions from Republic of Panama	.....	10,000,000.00
Purchase from New Panama Canal Co	[1] 4,904.36	38,728,484.05
Total miscellaneous	[1] 4.904.36	58,683,759.79
Total construction of canal	4,144,218.32	348,870,782.40

[1] Credit.

TABLE No. 17.—*Capital additions.*

	Fiscal year 1918.	To June 30, 1918.
Maintenance and operation:		
Gatun locks	$34,573.85	$35,154.73
Pedro Miguel locks	[1] 899.44	12,180.00
Miraflores locks	48,612.50	61,178.86
Aids to navigation	10,280.80	34,886.00
Improvements, Cristobal Harbor	16,027.61	16,027.61
Power-transmission system	59,558.73	61,088.39
Cristobal fuel-oil plant	40,685.06	40,685.06
Other Zone water-supply systems	.....	232.79
Zone sewage system	28,803.78	28,813.04
Roadways	152,112.14	152,112.14
Permanent townsite, Cristobal	49,042 06	49,042.06
Permanent townsite, Gatun	3,340.48	3,340.48
Permanent townsite, Pedro Miguel	1,848.62	1,848.62
Permanent townsite, Ancon-Balboa	43,719.78	43,719.78
Landscape improvements	317.10	317.10
Gamboa gravel plant	1,168.96	1,168.96
Shops, Balboa	199,717.79	419,854.82
Shops, Cristobal	18,948.36	53,090.47
Storehouses	2,695.23	16,990.08
Hotels and mess halls	7,879.27	11,123.91
Quarters, gold	32,276.57	34,642.10
Quarters, silver	82,641.01	86,144.61
Miscellaneous buildings	45,404.29	71,698.13
Miscellaneous buildings, health	83.99	83.99
Courthouses, police and fire stations, jails, etc	11,111.51	11,111.51
Total, maintenance and operation	889,950.05	1,246,535.23

[1] Credit.

TABLE No. 17.—*Capital additions*—Continued.

	Fiscal year 1918.	To June 30, 1918.
Sanitation:		
Sanitary fills	$31,971.37	$31,971.37
Sanitary ditches	35,828.04	35,828.04
Health, Ancon hospital	3,923.48	3,923.48
Health, asylums	.....	2,468.29
Health, quarantine station	6,971.92	6,971.92
Total, sanitation	78,694.81	81,163.10
Civil government: Schoolhouses	2,776.71	5,031.71
Assets received from Canal Zone government:		
Other water-supply systems	.....	18,500.00
Roadways	.....	451,887.50
Schoolhouses	.....	37,146.00
Total, assets received from Canal Zone government	.....	507,533.50
Total capital additions	971,421.57	1,840,263.54

TABLE No. 18.—*Detailed cost, Pier No. 6, Cristobal, to June 30, 1918.*

	Quantity.	Amount.	Unit cost.
Surveys	.....	$9,596.50	.....
Designing	.....	27,791.75	.....
Testing	.....	676.01	.....
Preliminary borings ... linear feet	2,924.6	1,514.78	$0.5179
Final borings ... do	6,603	2,496.69	.3781
Preparing site	.....	5,999.38	.....
Preliminary work	.....	55,029.58	.....
Dredging ... cubic yards	243,198	15,273.89	.0628
Maintenance range lights	.....	131.68	.....
Caissons, 6 feet diameter ... linear feet	22,610	344,962.46	15.2571
Excavation inside caissons ... cubic yards	14,117 01	84,967.24	6.0188
Concrete in caissons ... do	22,005.80	121,119.12	5.5040
Pedestals ... each	190	1,338.93	7.0470
Bumping posts	.....	256.37	.....
Column anchor bolts	.....	3,036.19	.....
Mooring bitts	.....	3,520.34	.....
Winch motor anchors	.....	784.78	.....
Fender system	.....	1,602.90	.....
Arches and large girders, concrete floor system:			
Placing forms ... square feet	117,876	72,960.96	.6189
Placing reinforcing ... pounds	1,958,640	87,955.58	.0449
Placing concrete ... cubic yards	8,219.4	50,449.63	6.1378
Struts ... pounds	1,565,795	107,893.94	.0689
Floor beams:			
Placing forms ... square feet	30,596	13,610.45	.4448
Placing reinforcing ... pounds	251,940	16,378.26	.0650
Placing concrete ... cubic yards	829.3	6,136.59	7.3997
Slab, concrete floor system:			
Placing forms ... square feet	5,991	2,133.74	.3561
Placing reinforcing ... pounds	23,150	1,300.73	0562
Placing concrete ... cubic yards	329.4	2,155.87	6 5448
Placing apron trucks	.....	713.73	.....
Temporary water lines	.....	59.47	.....
Temporary power lines	.....	53 36	.....
Drains	.....	865 19	.....
Electrical work in floor	.....	193.55	.....
Total division cost, Pier No. 6	.....	1,042,959 64	.....

TABLE No. 19.—*Detailed cost, Atlantic terminals, fiscal year 1918, and to June 30, 1918.*

	Fiscal year 1918.	To June 30, 1918.
COALING PLANT.		
Preliminary and general work	.....	$177,963.68
Foundations:		
Retaining-wall construction	.....	110,376.98
Caisson construction	.....	647,178.27
Total foundations	.....	757,555.25
Back filling	.....	32,518.20
Floors	[1] $4,001.30	472,804.06
Superstructure:		
Stocking and reclaiming bridges	35.94	495,636.85
Unloader towers	5,374.45	373,839.83
Reloader towers	729.09	237,733.92
Conveyor system	11,073.91	608,596.77
Total superstructure	17,213.39	1,715,807.37
Accessories	.....	7,452.29
Miscellaneous	2,842.24	140,830.75
Boat landings	10,073.22	10,073.22
Plant	.....	[1] 11,431.76
Total division cost, coaling plant	26,127.55	3,303,573.06
Dredging	.....	719,565.48
Total division cost, coaling plant, including dredging	26,127.55	4,023,138.54
Less Panama Railroad Co.'s proportion	100,000.00	[1] 775,000.00
Net division cost, coaling plant	126,127.55	3,248,138.54
FUEL-OIL HANDLING PLANT.		
Storage:		
United States tanks Nos. 1 and 2	.....	51,928.55
United States tank No. 9	.....	23,054.16
United States tank No. 43	36,986.42	36,986.42
Total storage	36,986.42	111,969.13
Oil-pump plant	1,252.22	73,239.31
Oil docks	.....	243.15
Pipe lines	[1] 162.32	43,295.13
Tank farm	3,166.86	3,166.86
Total division cost, oil-fuel storage	41,243.18	231,913.58
Gasoline storage: United States tank No. 27	.....	12,704.07
Total division cost, fuel-oil handling plant	41,243.18	244,617.65
Dry dock	5,317.59	72,705.01
Pier No. 6	553,117.53	1,042,959.64
Boathouse between Piers Nos. 7 and 8	58,024.91	99,944.61
Cristobal shops	17,225.77	145,201.13
Cristobal roundhouse	.....	45,441.89
Total division cost, Atlantic terminals	805,057.83	4,903,009.77

[1] Credit.

TABLE No. 20.—*Detailed test, Pacific terminals, fiscal year 1918 and to June 30, 1918.*

	Fiscal year 1918.	To June 30, 1918.
PREPARING SITES, GENERAL.		
Preliminary and general work	[1] $6,528.84	$409,628.87
Preparing site	.....	734,904.69
Corundu River drainage culvert	.....	41,137.01
Cofferdam construction	.....	58,970.29
Cofferdam, dredging	55,445.81	133,636.99
Plant	[1] 1,124.12	71,981.59
Total division cost, preliminary work and preparing site	47,792.85	1,450,259.44
Dredging inner harbor—total division cost (Table No. 25)	379,573.88	1,957,937.46
Reclaiming land, total division cost (Table No. 25)	31,255.34	362,223.85
Entrance basin dry excavation, total division cost	.....	380,988.19

[1] Credit.

TABLE No. 20.—*Detailed test, Pacific terminals, fiscal year 1918 and to June 30, 1918*—Continued.

	Fiscal year 1918.	To June 30, 1918.
MAIN DRY DOCK.		
Preliminary and general work	.....	$142,902.05
Dry excavation	[1] $20.60	585,665.96
Preparing foundations	.....	89,861.29
Concrete masonry, mass	[1] 254.10	584,853.62
Concrete masonry, reinforced	[1] 183.23	292,083.05
Granite	.....	36,069.35
Pumping plant	588.15	179,823.35
Miter gates, original cost of gates and operating machinery	.....	132,147.15
Erection of gates	45.00	111,142.25
Installation miter-gate machinery	.....	5,437.06
Miter-gate anchorage	.....	337.24
Back filling	.....	62,006.16
Miscellaneous	1,445.52	572,498.10
Total division cost, main dry dock	1,620.74	2,794,826.63
ENTRANCE PIER		
Preliminary and general work	.....	15,588.54
Dry excavation	.....	72,544.90
Preparing foundation	.....	22,764.84
Concrete masonry, mass	.....	80,065.00
Concrete masonry, reinforced	.....	23,972.10
Back filling	.....	127.65
Miscellaneous	508.18	79,327.12
Total division cost, entrance pier	508.18	294,390.15
Total division cost, main dry dock and entrance pier	2,128.92	3,089,216.78
COALING PLANT.		
Preliminary and general work	.....	46,667.64
Coal-storage area:		
Dry excavation	.....	144,909.98
Preparing foundations	.....	7,674.40
Concrete masonry	.....	61,362.86
Back filling	.....	24,856.39
Grading floor	116.50	11,017.13
Miscellaneous	.....	3,636.52
Total division cost, coal-storage area	116.50	253,457.28
Coal-handling plant:		
Foundations for stocking and reclaiming cranes	.....	69,477.24
Erection of stocking and reclaiming cranes	10,327.12	168,798.65
Unloader towers	9,143.02	187,943.93
Reloader towers	9,572.63	118,438.69
Conveyor system	11,744.63	365,828.35
Miscellaneous	.....	8,568.51
Total division cost, coal-handling plant	40,787.40	919,055.37
SEA WALL AND UNLOADER WHARF.		
Preliminary and general work	.....	13,723.03
Dry excavation	.....	121,465.23
Preparing foundation	.....	15,943.43
Substructure	.....	4,865.55
Concrete masonry, mass	.....	95,871.57
Concrete masonry, reinforced	.....	26,351.23
Miscellaneous	4,296.77	110,104.17
Total division cost, sea wall and unloader wharf	4,296.77	388,324.21
RELOADER WHARF.		
Preliminary and general work	74.07	65,266.08
Substructure	.....	157,907.82
Superstructure	.....	131,650.47
Filling	481.74	16,422.17
Miscellaneous	6,468.93	105,728.89
Total division cost, reloader wharf	7,024.74	476,975.43
Total division cost, coaling station	52,225.41	2,084,479.93

[1] Credit.

TABLE No. 20.—*Detailed test, Pacific terminals, fiscal year 1918 and to June 30, 1918*—Continued.

	Fiscal year 1918.	To June 30, 1918.
PERMANENT SHOPS.		
Tool-storage house	[1] $594.88	
Miscellaneous	14,893.25	$637,614.99
Steel erection		34,508.77
Machine and erection shop	[1] 51.72	687,582.13
Forge shop		224,722.28
Steel-storage shed		116,342.69
Boiler and ship fitters' shop		235,314.09
Paint shop		57,216.79
Car shop		101,198.70
Planing mill		194,748.13
Galvanizing building		77,349.11
Lumber and equipment shed	48.56	116,925.79
Pattern-storage room		57,983.65
Foundry		263,091.05
Coke shed		10,208.63
Boiler house		26,206.65
Roundhouse		173,593.06
Gas house		39,360.37
Toilets		86,148.21
Paint house		10,753.73
Main office		200,413.92
Sand house		12,395.81
Lye house		2,592.65
Compressor plant and pump house	1,932.82	170,273.77
Ice-storage house		656.80
New pattern storage		4,747.17
Shop tunnel	7,515.53	163,865.07
Mechanical division charges	180,765.41	180,765.41
Total division cost, permanent shops	204,508.97	3,886,579.42
DOCKS.		
Quay wall, north of concrete dock	946.62	444,984.91
Quay wall, south of concrete dock	810.97	533,147.78
Bulkhead quay wall, between wharf and Pier No. 18	257.05	228,328.18
Pier No. 18 (old No. 1)	4,663.39	1,109,806.64
Concrete lumber wharf		255,667.79
Electrical installation		13,002.29
Water mains		7,162.62
Air mains		3,389.93
Lot improvement	4,955.75	4,955.75
Rat proofing	46,673.89	66,568.68
Total division cost, all docks	58,307.67	2,667,014.57
FUEL-OIL HANDLING PLANT.		
Storage:		
United States tanks Nos. 3 and 4		46,983.00
United States tank No. 5		25,991.63
United States tank No. 62		2,083.57
Tank farm		15,256.87
Total division cost, storage		90,315.07
Oil-pump plant		75,337.49
Oil docks		59,079.28
Pipe lines		79,428.42
Dredging berth for ships	29,171.49	37,104.89
Total division cost, oil-fuel storage	29,171.49	250,950.08
Gasoline storage: United States tank No. 31		15,445.65
Total division cost, fuel-oil handling plant	29,171.49	356,710.80
Total division cost, Pacific terminals[2]	804,964.53	16,235,410.44

[1] Credit.
[2] General storehouse, Balboa, and Balboa terminal office building not included in these totals.

TABLE 21.—*Detailed cost, permanent townsites, to June 30, 1918.*

Item.	La Boca.	Balboa.	Pedro Miguel.	Red Tank.	Gatun.	Cristobal.	Colon Beach.
Preliminary and general work	$37,557.50	$176,171.18	$45,884.40	.....	$1,330.09	.....	$93,093.09
Preliminary maintenance	31,869.40	10,519.78	.....	.....	.....	.....	.....
Road construction	.....	364,491.90	20,777.72	$11,515.41	.....	.....	38,489.36
Drainage	14,842.53	7,903.21	22,488.65	.....	.....	.....	.....
Waterworks	20,779.72	53,622.87	19,597.24	2,118.70	.....	.....	9,582.07
Sewer system	26,328.15	186,925.43	11,572.72	2,059.46	.....	.....	99,522.74
Walks	6,084.34	58,370.86	281.62	3,285.71	.....	.....	7,298.10
Balboa nursery	.....	1,576.79	.....	.....	.....	.....	.....
Lot improvements	.....	279,705.01	.....	1,823.32	3.75	.....	16,801.17
Street lighting	.....	35,957.52	13,588.89	498.20	5,064.72	$10,887.44	5.63
Underground duct system	.....	218,560.66	3,267.45	.....	16,938.88	80,828.37	.....
Improvements, block A	10,221.73	.....	.....	.....	.....	.....	.....
Division expense	4,440.38	47,272.34	3,637.60	1,588.86	109.10	.....	6,791.05
Total division cost	152,123.75	1,441,077.55	141,096.29	22,889.66	23,446.54	91,715.81	271,583.21

TABLE No. 22.—*Detail of buildings, fiscal year 1918 and to June 30, 1918.*

	Fiscal year 1918.		Total to June 30, 1918.	
Designing and preliminary expenses, new buildings (includes building division plant)	.....	$36,678.09	.....	$68,282.49
Administration building, Balboa Heights	.....	.....	.....	932,544.28
Administration building, Santa Rosa	.....	.....	.....	128,083.99
Paraiso shops, appraisal of old buildings	.....	.....	.....	.....
Storehouses:				
General storehouse, Balboa	.....	.....	$294,615.32	
Lumber storehouse, Balboa	$11,172.09		127,126.03	
Paint storehouse, Balboa	.....		27,882.85	
Oil storehouse, Balboa	.....		31,067.22	
Forage storehouse, Balboa	.....		6,140.66	
Explosives storehouse, Balboa	.....		461.14	
Dredge parts storehouse	.....		5,053.36	
Oil storehouse, Cristobal	.....		5,800.00	
Electrical storehouse, Balboa	911.91		82,366.63	
Electrical storehouse, Gatun	[1] 1,952.50		.....	
General storehouse, Cristobal	2,369.08		44,712.96	
Dynamite storehouse, Gamboa	.....		3,938.69	
Fuse storehouse, Gamboa	.....		1,673.97	
Appraisal of old buildings	.....	12,500.58	86,357.07	717,195.90
Hotels and mess halls:				
Hotel Aspinwall landing stage	.....		1,897.34	
Cristobal restaurant	2,136.66		76,264.79	
Balboa restaurant	3,413.91		73,428.87	
Ancon restaurant	14,010.49		72,346.83	
Pedro Miguel restaurant	15,711.13		15,711.13	
Tivoli kitchen	32,709.39		32,709.39	
Gatun mess hall	.....		5,876.19	
La Boca mess hall	.....		7,386.39	
La Boca kitchen	.....		2,606.67	
Camp Bierd mess hall and kitchen	.....		6,440.04	
Appraisal of old buildings	[1] 38,312.50	29,669.08	207,130.50	501,798.14
Gold quarters:				
Four-family concrete quarters	[1] 400.00		1,172,785.09	
Two-family concrete quarters	.....		177,536.86	
Bachelor concrete quarters	.....		68,926.42	
New wooden quarters	75,650.45		1,205,062.51	
Reerected wooden quarters	4,751.18		256,078.80	
Appraisal of old buildings	[1] 33,537.50	46,464.13	1,348,037.34	4,228,427.02
Silver quarters:				
New wooden quarters	36,046.89		259,970.34	
Reerected wooden quarters	.....		198,653.82	
Appraisal of old buildings	44,960.00		181,797.97	
Alterations and repairs of old buildings	13,286.90	94,293.79	16,085.25	656,507.38
Hospitals:				
Colon Hospital	35,235.01		226,066.45	
Ancon Hospital	738,803.16	774,038.17	1,235,306.46	1,461,372.91
Dispensaries:				
Balboa	.....		16,677.79	
Ancon	[1] 2,196.74		57,142.25	
Pedro Miguel	13,961.31		37,295.61	
Gatun	34,490.17	46,254.74	34,490.17	145,605.82

[1] Credit.

TABLE No. 22.—*Detail of buildings, fiscal year 1918 and to June 30, 1918*—Contd.

	Fiscal year 1918.		Total to June 30, 1918.	
Quarantine stations:				
Colon quarantine barracks	$6,338.11		$6,338.11	
Balboa quarantine station			38,756.88	
Balboa quarantine landing		$6,338.11	26,078.40	$71,173.39
Asylums:				
Corozal asylum building			72,782.28	
Dairy shed			23,562.45	
Dairy building			12,546.53	
Hog shed			13,333.49	
Guinea pig house			311.79	
Chicken house			1,589.19	
Compost pit			552.22	
Palo Seco building			45,396.19	
				170,074.14
Medical storehouse, Ancon				22,393.93
Health department, miscellaneous:				
Garage, Colon hospital	25.59		6,237.60	
Kitchen, Colon quarantine station	76.35		742.90	
Dentists' and sanitary inspectors' offices and quarters	8,027.49		25,811.91	
Larvacide plant, Ancon	7,642.21		7,642.21	
Corozal cemetery		15,771.64	2,113.77	42,548.39
Post offices:				
Corozal			1,592.62	
Appraisal of old buildings			34,390.00	
				35,982.62
Schoolhouses:				
Concrete white school, Balboa	30,165.06		163,590.73	
Manual training school, Balboa			4,611.85	
Concrete white school, Ancon	13,519.31		77,224.67	
Concrete white school, Pedro Miguel	14,021.45		46,902.68	
Concrete white school, Gatun	12,869.51		47,843.55	
Concrete white school, Cristobol	14,878.87		99,632.52	
Addition to colored school, Paraiso	1,438.73		1,438.73	
Industrial school, Balboa	1,085.55		1,085.55	
Colored school, Pedro Miguel			2,050.00	
Appraisal of old buildings	[1] 31,790.00	56,188.48	30,825.00	475,205.28
Courthouses, fire and police stations, etc.:				
La Boca fire station			280.22	
Balboa fire station			18,335.31	
Balboa police station			11,190.59	
Chinese detention camp, Balboa	10,101.38		10,101.38	
Appraisal of old buildings		10,101.38	60,635.44	100,542.94
Fluviographs				11,534.38
Terminal office building, Balboa				73,304.01
Miscellaneous buildings:				
Clubhouses—				
Balboa			17,481.20	
Balboa (addition)	1,966.64		1,966.64	
La Boca, silver employees			3,989.62	
La Boca annex			3,500.00	
Pedro Miguel			19,695.77	
Paraiso	837.51		16,839.08	
Gatun, silver employees			1,500.00	
Cristobal		2,804.15	16,000.00	80,972.31
Balboa motor-car houses				11,448.16
Motor truck garage, Ancon corral				19,493.04
Garages:				
Ancon-Balboa district	9,085.15		37,284.78	
Pedro Miguel district	78.10		4,898.66	
Gatun			2,411.85	
Cristobal	4,410.43		5,227.61	
Colon	1,375.99	14,949.67	2,943.58	52,766.48
Office and storeroom, Ancon				1,035.04
Office and storeroom, Pedro Miguel				311.56
Store and shop, district quartermaster, Pedro Miguel		4,948.20		4,948.20
Office, store and shop, district quartermaster, Balboa Heights		687.28		17,371.40
Fuel shed, district quartermaster, Balboa Heights		2,302.81		2,302.81
Extension, corral building, Cristobal		1,042.48		1,042.48
Toilet, corral building, Cristobal		543.70		543.70
Paraiso shop building		2,480.31		2,480.31
Dredging division shop, Paraiso		4,253.46		4,253.46
Electrical work and storehouse, Gatun		1,952.50		1,952.50

[1] Credit.

TABLE No. 22.—*Detail of buildings, fiscal year 1918 and to June 30, 1918*—Contd.

	Fiscal year 1918.		Total to June 30, 1918.	
Miscellaneous buildings—Continued.				
Alterations, old Ancon school		$2,194.18		$2,194.18
Anemometer tower, Balboa Heights				1,747.69
Boathouses, marine division:				
Colon, piers 1 and 2	[1] $1,649.61		$237.80	
Balboa, Pier 18			1,656.48	
		[1] 1,649.61		1,894.28
Five small buildings				845.17
La Boca lodge hall				1,689.23
Three toilets, Gatun locks				3,888.88
Incinerator, Gavilan Island		105,034.28		116,065.92
Balboa shops, mess hall and pattern shop		12,033.44		58,405.77
Appraisal of old buildings		3,060.00		115,267.26
Total, buildings		1,284,935.04		10,345,496.84

[1] Credit.

COST TO JUNE 30, 1918, OF QUARTERS COMPLETED DURING THE FISCAL YEAR 1918.

	Number.	Amount.	Unit cost.
One-family, type 17, frame: Cristobal	25	$63,236.88	$2,529.47
Four-family, type 14, frame: Cristobal	27	174,766.26	6,472.82
Sixteen-family, frame, silver: Pedro Miguel (Red Tank)	1	7,709.72	7,709.72
Twelve-family, frame, silver: Balboa	1	9,171.57	9,171.57
Fifty-family, frame, silver: Pedro Miguel (Red Tank)	1	17,991.66	17,991.66
Total		272,876.09	

TABLE No. 23.—*Detailed cost power producing and transmitting system, fiscal year 1918 and to June 30, 1918.*

	Fiscal year 1918.	To June 30, 1918.
Gatun hydroelectric power plant:		
Excavation		$54,862.07
Building	$176,013.23	565,548.06
Operating machinery	329,165.62	701,010.88
Total division cost	505,178.85	1,321,421.01
Miraflores steam-electric power plant:		
Building and site		233,629.74
Operating machinery		27,448.90
Total division cost		261,078.64
Power transmission system:		
Transformer substations—		
Cristobal	27,407.29	324,850.03
Gatun	57,937.87	429,901.05
Gamboa		23,775.03
Miraflores	18,857.34	356,188.91
Balboa	2,414.95	284,563.98
Gold Hill	1,559.79	1,559.79
Transmission line	594.10	1,083,410.02
Duct lines	1,695.00	359,812.71
Distribution lines	3,241.53	62,224.66
Total division cost	113,707.87	2,926,286.18
Total division cost, power producing and transmission system	618,886.72	4,508,785.83

TABLE No. 24.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1918.*

GAILLARD CUT—CONSTRUCTION.

Item.	Quantities.	Unit cost.
	Cubic yards.	
Operation, small ladder dredges	6,700	$0.2174
Repairs, small ladder dredges	6,700	.0992
Depreciation, small ladder dredges	6,700	.0108
Operation, large dipper dredges	113,300	.0940
Repairs, large dipper dredges	113,300	.0977
Depreciation, large dipper dredges	113,300	.0350
Operation, tugs, clapets, and scows	120,000	.0860
Repairs, tugs, clapets, and scows	120,000	.1058
Depreciation, tugs, clapets, and scows	120,000	.0478
Operation, miscellaneous floating equipment	120,000	.0180
Repairs, miscellaneous floating equipment	120,000	.0055
Depreciation, miscellaneous floating equipment	120,000	.0023
Channel lights	120,000	.0012
Division expense	120,000	.0642
Total division cost	120,000	.5630
Rock excavated ... per cent	120,000	100

PACIFIC ENTRANCE—CONSTRUCTION.

Operation, small ladder dredges	265,000	$0.1605
Repairs, small ladder dredges	265,000	.2006
Depreciation, small ladder dredges	265,000	.0694
Operation, large dipper dredges	54,880	.1061
Repairs, large dipper dredges	54,880	.1092
Depreciation, large dipper dredges	54,880	.0628
Operation, tugs, clapets, and scows	319,880	.0919
Repairs, tugs, clapets, and scows	319,880	.1445
Depreciation, tugs, clapets, and scows	319,880	.0341
Operation, drill barges	32,400	1.3756
Repairs, drill barges	32,400	.1963
Depreciation, drill barges	32,400	.0741
Operation, miscellaneous floating equipment	319,880	.0345
Repairs, miscellaneous floating equipment	319,880	.0020
Depreciation, miscellaneous floating equipment	319,880	.0007
Division expense	319,880	.0669
Total division cost	319,880	.9146
Earth excavated ... per cent	153,565	48.01
Rock excavated ... do	166,315	51.99

TABLE No. 25.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1918.*

TERMINAL FACILITIES—BALBOA.

INNER HARBOR AND RECLAIMING LAND.

	Quantities.	Unit cost.
Dredging inner harbor:	*Cubic yards.*	
Operation, seagoing suction dredges	165,298	$0.0574
Repairs, seagoing suction dredges	165,298	.0687
Depreciation, seagoing suction dredges	165,298	.0169
Operation, small ladder dredges	12,525	.0744
Repairs, small ladder dredges	12,525	.0283
Depreciation, small ladder dredges	12,525	.0030
Operation, 3-yard ladder dredges	155,125	.0761
Repairs, 3-yard ladder dredges	155,125	.0408
Depreciation, 3-yard ladder dredges	155,125	.0273
Operation, large dipper dredges	239,885	.1349
Repairs, large dipper dredges	239,885	.1665
Depreciation, large dipper dredges	239,885	.0867
Operation, pipe-line suction dredges	683,000	.0625
Repairs, pipe-line suction dredges	683,000	.0558
Depreciation, pipe-line suction dredges	683,000	.0050
Operation, tugs, clapets, and scows	407,535	.0688

TABLE No. 25.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1918*—Continued.

	Quantities.	Unit cost.
Dredging inner harbor—Continued.	*Cubic yards.*	
Repairs, tugs, clapets, and scows	407,535	$0.1045
Depreciation, tugs, clapets, and scows	407,535	.0231
Operation, drill barges	3,374	.7848
Repairs, drill barges	3,374	.0849
Depreciation, drill barges	3,374	.0436
Operation, miscellaneous floating equipment	1,255,833	.0036
Repairs, miscellaneous floating equipment	1,255,833	.0019
Depreciation, miscellaneous floating equipment	1,255,833	.0005
Pipe lines	683,000	.0380
Dikes	683,000	.0002
Division expense	1,255,833	.0305
Total division cost	1,255,833	.3244
Earth excavation ... per cent	1,160,068	92.37
Rock excavation ... do	95,765	7.63
Reclaiming land:		
Pipe lines	687,713	.0044
Dikes	687,713	.0003
Operation, relay pumps	687,713	.0250
Repairs, relay pumps	687,713	.0091
Division expense	687,713	.0052
Total division cost	687,713	.0440

TABLE No. 26.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1918.*

ATLANTIC ENTRANCE—OPERATION AND MAINTENANCE.

Item.	Quantities.	Unit cost.
	Cubic yards.	
Operation, pipe-line dredges	19,452	$0.0245
Repairs, pipe-line dredges	19,452	.0129
Depreciation, pipe-line dredges	19,452	.0011
Operation, miscellaneous floating equipment	19,452	.0102
Repairs, miscellaneous floating equipment	19,452	.0093
Depreciation, miscellaneous floating equipment	19,452	.0014
Pipe lines	19,452	.0068
Channel lights	19,452	.0013
Division expense	19,452	.0053
Total division cost	19,452	.0728
Earth excavated ... per cent	19,452	100

GAILLARD CUT—OPERATION AND MAINTENANCE.

Operation, seagoing suction dredges	167,402	$0.1889
Repairs, seagoing suction dredges	167,402	.1073
Depreciation, seagoing suction dredges	167,402	.0268
Operation, small ladder dredges	167,475	.1544
Repairs, small ladder dredges	167,475	.0483
Depreciation, small ladder dredges	167,475	.0082
Operation, large dipper dredges	1,595,300	.0811
Repairs, large dipper dredges	1,595,300	.1145
Depreciation, large dipper dredges	1,595,300	.0373
Operation, pipe-line suction dredges	355,096	.0549
Repairs, pipe-line suction dredges	355,096	.0298
Depreciation, pipe-line suction dredges	355,096	.0052
Operations, tugs, clapets, and scows	1,762,775	.0956
Repairs, tugs, clapets, and scows	1,762,775	.1244
Depreciation, tugs, clapets, and scows	1,762,775	.0590
Operation, drill barges	9,995	.8962
Repairs, drill barges	9,995	.0715
Depreciation, drill barges	9,995	.0415
Operation, hydraulic graders	2,285,273	.0292
Repairs, hydraulic graders	2,285,273	.0028
Depreciation, hydraulic graders	2,285,273	.0040
Operation, miscellaneous floating equipment	2,285,273	.0218
Repairs, miscellaneous floating equipment	2,285,273	.0075

TABLE No. 26.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1918*—Continued.

Item.	Quantities.	Unit cost.
	Cubic yards.	
Depreciation, miscellaneous floating equipment	2,285,273	$0.0030
Drilling	2,285,273	.0328
Blasting	2,285,273	.0188
Pipe lines	355,096	.0081
Dikes	355,096	.0030
Operation, relay pumps	237,397	.0035
Repairs, relay pumps	237,397	.0073
Channel lights	2,285,273	.0017
Ditching	2,285,273	.0001
Sluicing	2,285,273	.0002
Division expense	2,285,273	.0797
Total division cost	2,285,273	.6373
Earth excavation ... per cent	609,728	26.68
Rock excavation ... do	1,675,545	73.32

PACIFIC ENTRANCE—OPERATION AND MAINTENANCE.

Operation, seagoing suction dredges	124,900	$0.0683
Repairs, seagoing suction dredges	124,900	.0537
Depreciation, seagoing suction dredges	124,900	.0160
Operation, small ladder dredges	83,000	.1075
Repairs, small ladder dredges	83,000	.0630
Depreciation, small ladder dredges	83,000	.0059
Operation, 3-yard ladder dredges	271,375	.1110
Repairs, 3-yard ladder dredges	271,375	.1390
Depreciation, 3-yard ladder dredges	271,375	.0469
Operation, pipe-line suction dredges	117,700	.0408
Repairs, pipe-line suction dredges	117,700	.0131
Depreciation, pipe-line suction dredges	117,700	.0020
Operations, tugs, clapets, and scows	354,375	.0883
Repairs, tugs, clapets, and scows	354,375	.1352
Depreciation, tugs, clapets, and scows	354,375	.0317
Operation, drill barges	6,937	1.1677
Repairs, drill barges	6,937	.1706
Depreciation, drill barges	6,937	.0829
Operation, miscellaneous floating equipment	596,975	.0034
Repairs, miscellaneous floating equipment	596,975	.0015
Depreciation, miscellaneous floating equipment	596,975	.0007
Pipe lines	117,700	.0234
Dikes	.....	.....
Division expense	596,975	.0383
Total division cost	596,975	.4404
Earth excavated ... per cent	573,375	96.38
Rock excavated ... do	21,600	3.62

TABLE No. 27.—*Panama Canal—Gamboa gravel production—Detail cost per unit of work, by months, fiscal year 1918.*

Item.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Quantities.....cubic yards..	22,184	24,308	21,259	24,758	23,820	26,064	24,550	17,995	16,430	7,095	4,214	6,837	219,514
Unloading from barges.....	$0.0422	$0.0399	$0.0378	$0.0351	$0.0346	$0.0386	$0.0350	$0.0542	$0.0521	$0.0778	$0.0992	$0.0643	$0.0434
Switching.....	.0237	.0234	.0350	.0386	.0151	.0336	.0408	.0554	.0822	.1690	.2878	.1146	.0482
Storing.....	.0635	.0676	.0512	.0486	.0599	.0568	.0493	.0520	.0600	.....	.....	.....	.0519
Loading from storage.....	.....	.....	.....	.....	.....	.....	.....	.....	.0071	.0453	.0873	.0504	.0053
Repairs to equipment.....	.0648	.0726	.2295	.0405	.0645	.0491	.0948	.0824	.1018	.3601	.3441	.0485	.0989
Dredging and towing.....	.4290	.4169	.2297	.3022	.3178	.2680	.2569	.3087	.4585	.7631	.0723	1.0350	.4740
Plant arbitrary.....	.1000	.1000	.1000	.1000	.1000	.1000	.0941	.1000	.1000	.1000	.1000	.1000	.0993
Division expense.....	.0167	.0206	.0157	.0126	.0154	.0165	.0210	.0260	.0185	.0515	.0693	.0589	.0212
Total division cost.....	.7399	.7410	.6999	.5776	.6073	.5626	.5919	.6787	.8802	1.5668	1.8600	1.4715	.8422
In addition to the above, there was dredged and towed to point of work as follows:													
Quantity.....cubic yards..	3,978	6,273	5,415	5,906	5,322	6,584	8,853	9,555	9,634	6,899	8,284	1,605½	78,308½
Unit cost.....	$0.4056	$0.4293	$0.2143	$0.2929	$0.2929	$0.2827	$0.3906	$0.3090	$0.4584	$0.5463	$0.6802	$0.8973	$0.4272
And placed in storage by dredge through pipes:													
Quantity.....cubic yards..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,192	4,051½	8,243½
Unit cost.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$0.4460	$0.6619	$0.5829

TABLE No. 28.—*Panama Canal—Detail cost of production and distribution of electric current for fiscal year 1918.*

	July.	August.	September.	October.	November.	December.
Power plants:						
Gatun hydroelectric	$2,633.37	$3,389.84	$3,615.77	$3,407.83	$2,668.12	$2,498.33
Miraflores steam	5,484.36	5,520.06	5,916.98	5,446.31	5,776.64	5,337.70
Reserve for depreciation	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Total production cost	16,117.73	16,909.90	17,532.75	16,854.14	16,444.76	15,836.03
Substations:						
Cristobal	895.14	1,029.13	1,377.99	1,472.13	1,722.19	1,121.93
Gatun	1,147.11	1,036.48	1,228.01	1,147.26	1,088.58	1,317.84
Miraflores	1,585.88	1,777.25	1,804.10	1,623.52	2,296.41	2,000.41
Balboa	982.77	839.06	954.78	965.25	1,084.27	1,110.94
Transmission lines:						
Cristobal to Gatun	231.30	141.07	420.96	303.67	235.51	483.35
Miraflores to Balboa	63.67	122.54	202.53	278.76	228.08	103.83
Gatun to Miraflores	2,198.17	1,631.82	1,127.63	1,089.12	1,315.28	1,168.89
Distribution line expense	5,876.51	3,695.48	2,434.39	5,145.71	5,323.98	5,337.69
Cost of current distributed	29,098.28	27,182.73	27,083.14	28,879.56	29,739.06	28,480.91
Kilowatt hours distributed	3,719,228	3,967,825	3,804,402	3,693,237	3,764,549	3,636,596
Cost per kilowatt hour:						
Production	$0.0043	$0.0043	$0.0046	$0.0046	$0.0044	$0.0044
Current distributed	.0078	.0069	.0071	.0078	.0079	.0078

TABLE NO. 28.—*Panama Canal—Detail of cost of production and distribution of electric current for fiscal year 1918*—Continued.

	January.	February.	March.	April.	May.	June.	Total.
Power plants:							
Gatun hydroelectric	$2,762.49	$3,784.66	$2,930.47	$3,823.85	$2,836.22	$3,644.57	$37,995.52
Miraflores steam	5,153.67	4,987.51	7,265.38	7,534.71	10,364.82	9,533.04	78,321.18
Reserve for depreciation	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	96,000.00
Total production cost	15,916.16	16,772.17	18,195.85	19,358.56	21,201.04	21,177.61	212,316.70
Substations:							
Cristobal	1,037.65	1,158.81	1,099.04	1,217.42	1,514.99	1,129.87	14,776.29
Gatun	1,229.38	1,284.58	1,402.52	1,414.60	1,571.88	1,065.05	14,933.29
Miraflores	1,286.90	1,670.25	2,550.98	1,650.52	1,621.99	1,675.97	21,544.18
Balboa	1,055.58	1,080.88	1,149.99	1,169.94	1,183.87	1,228.90	12,806.23
Transmission lines:							
Cristobal to Gatun	893.22	493.88	40.12	469.28	22.59	63.58	3,798.53
Miraflores to Balboa	1,306.02	183.17	215.90	743.48	30.29	20.18	3,498.45
Gatun to Miraflores	1,873.70	3,112.31	2,606.31	930.29	1,665.32	2,328.18	21,047.02
Distribution line expense	4,977.13	2,025.74	3,753.90	2,723.22	2,678.01	815.51	43,156.25
Cost of current distributed	29,575.74	27,781.79	31,014.61	29,677.31	31,489.98	27,873.83	347,876.94
Kilowatt hours distributed	4,002,288	3,578,799	3,899,200	3,657,048	3,874,046	3,617,094	45,214,312
Cost per kilowatt hour:							
Production	$0.0040	$0.0047	$0.0047	$0.0053	$0.0055	$0.0059	$0.0047
Current distributed	.0074	.0077	.0080	.0081	.0081	.0077	.0077

TABLE No. 29.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1918, Ancon-Balboa-Panama system.*

[Quantities exclude water used in city of Panama and north of Pedro Miguel.]

	Quantity, 1,000 gallons.	Operation Gamboa pump station.	Operation Miraflores filtration plant.	Operation Balboa pump station.	Maintenance water mains.	Total.
1917.						
July	118,185	$0.0124	$0.0227	$0.0107	$0.0173	$0.0631
August	121,205	.0141	.0253	.0112	.0286	.0792
September	121,805	.0128	.0263	.0105	.0201	.0697
October	131,815	.0151	.0278	.0131	.0222	.0782
November	125,862	.0142	.0288	.0132	.0262	.0824
December	134,376	.0135	.0204	.0139	.0248	.0726
1918.						
January	146,887	.0135	.0171	.0122	.0316	.0744
February	94,532	.0145	.0214	.0157	.0413	.0929
March	176,703	.0137	.0146	.0111	.0254	.0648
April	142,529	.0148	.0207	.0137	.0073	.0565
May	68,855	.0157	.0259	.0174	.0051	.0641
June	135,858	.0148	.0203	.0126	.0496	.0973
Total	1,518,612	.0141	.0223	.0127	.0263	.0754

TABLE No. 30.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1918, Colon-Cristobal system.*

[Quantities exclude water used in city of Colon.]

	Quantity, 1,000 gallons.	Maintenance Brazos Brook reservoir.	Operation Mount Hope filtration plant.	Operation Mount Hope pump station.	Maintenance water mains.	Total.
1917.						
July	75,600	$0.0212	$0.0129	$0.0147	$0.0532	$0.1020
August	73,333	.0169	.0135	.0154	.0543	.1001
September	71,403	.0101	.0140	.0151	.0320	.0712
October	70,173	.0103	.0172	.0204	.0322	.0801
November	70,510	.0109	.0214	.0171	.0506	.1000
December	67,545	.0106	.0285	.0170	.0456	.1017
1918.						
January	73,128	.0099	.0238	.0200	.0506	.1043
February	63,007	.0134	.0148	.0190	.0325	.0797
March	67,937	.0107	.0179	.0182	.0265	.0733
April	68,654	.0126	.0184	.0183	.0324	.0817
May	75,457	.0097	.0118	.0181	.0484	.0880
June	74,319	.0074	.0119	.0184	.0675	.1052
Total	851,066	.0120	.0171	.0176	.0404	.0871

TABLE No. 31.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1918, Gatun system.*

	Quantity 1,000 gallons.	Maintenance Agua Clara reservoir.	Operation Agua Clara filtration plant.	Operation Agua Clara pump station.	Maintenance water manins.	Total.
1917.						
July	34,798	$0.0351	$0.0207	$0.0345	$0.0071	$0.0974
August	34,309	.0195	.0230	.0426	.0083	.0934
September	31,629	.0199	.0304	.0375	.0099	.0977
October	33,024	.0255	.0313	.0403	.0234	.1205
November	32,601	.0215	.0350	.0399	.0297	.1261
December	33,528	.0202	.0291	.0520	.0131	.1144
1918.						
January	36,408	.0334	.0105	.0353	.0232	.1024
February	36,522	.0316	.0358	.0368	.0073	.1115
March	40,881	.0241	.0238	.0339	.0049	.0867
April	38,887	.0220	.0253	.0386	.0206	.1065
May	39,529	.0178	.0216	.0379	.0150	.0923
June	36,285	.0255	.0146	.0560	.0113	.1074
Total	428,401	.0247	.0249	.0397	.0143	.1036

TABLE No. 32.—*Cost of operating all quarters for employees, fiscal year 1918.*

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Repairs to buildings	$14,021.90	$15,126.95	$19,036.39	$17,465.01	$14,732.58	$14,697.60	$31,535.12	$19,681.85	$19,556.86	$15,372.49	$12,287.94	$9,336.35	$202,851.04
Repairs to furniture	3,882.39	3,743.07	2,626.74	4,926.46	3,794.96	4,374.68	4,809.12	2,533.59	4,027.60	2,156.59	2,202.55	2,787.87	41,865.62
Repairs to stoves	1,149.37	1,251.43	1,080.33	1,491.74	1,100.97	1,614.44	1,521.40	1,783.82	936.06	1,268.02	1,586.80	974.71	15,759.09
Mattress factory	[1] 108.57	5,060.96	206.97	569.51	1,513.46	[1] 474.09	1,601.74	163.56	137.65	778.69	[1] 755.36	880.53	9,575.05
Coal and kindling	10,586.09	7,104.36	7,425.75	7,970.74	7,443.21	10,107.47	9,597.92	8,986.94	9,141.24	7,242.57	9,000.59	8,111.36	102,718.24
Electric lighting	5,094.21	5,594.69	4,568.50	5,669.17	6,639.96	5,905.13	5,799.37	5,126.95	5,321.02	6,066.68	6,225.42	5,442.94	67,454.04
Corral service	3,779.38	3,156.97	2,214.78	2,744.85	2,321.18	2,495.74	2,674.38	2,965.49	3,036.94	3,443.31	3,502.26	3,492.92	35,828.20
Janitor service	4,586.86	6,086.48	4,844.21	5,436.25	5,100.85	5,275.60	5,333.46	5,116.05	5,092.00	5,020.97	5,633.62	5,482.17	63,008.52
Utility service	1,353.40	1,412.01	1,399.03	1,398.69	1,242.75	1,557.77	1,949.63	1,818.82	2,552.94	2,323.30	3,015.97	3,183.65	23,207.96
Disposal of garbage	1,510.41	1,558.77	1,548.08	1,650.13	1,689.00	2,088.06	1,155.27	1,531.60	1,491.65	1,547.97	2,052.27	2,000.56	19,823.77
Care of grounds	2,503.18	2,325.63	3,413.48	3,284.94	2,983.92	2,697.65	2,353.49	2,130.22	4,981.65	2,378.52	3,992.43	4,032.59	37,077.70
Grass cutting	1,764.13	1,499.72	1,739.32	1,604.77	1,689.15	1,430.14	1,297.55	1,204.23	1,191.92	1,184.21	1,696.65	1,773.04	18,074.83
Division expense	2,876.41	3,108.76	2,141.53	5,044.71	3,911.92	3,580.24	3,538.71	3,541.74	3,296.89	4,076.93	3,598.69	3,660.02	42,376.55
Total division cost	52,999.16	57,029.80	52,245.11	59,256.97	54,163.91	55,350.43	73,167.16	56,584.86	60,764.42	52,860.25	54,039.83	51,158.71	679,620.61

[1] Credit.

TABLE No. 33.—*Statement of appropriation receipts and disbursements for fiscal year ended June 30, 1918.*

	Receipts.				Total available.	Expenditures.			Cash balance June 30, 1918.
	Cash balance July 1, 1917.	Appropriations.	Collections.	Transfers between departments.		Disbursements.	Transfers between departments.	Total.	
Canal connecting Atlantic and Pacific Oceans	$517,593.63	.....	.....	.....	$517,593.63	$8,885.46	$20,445.37	$29,330.83	$488,262.80
Panama Canal fund	801,580.14	.....	$8,088.95	.....	809,669.09	26,464.32	380,542.92	407,007.24	402,661.85
Construction and equipment	3,993,434.67	$3,348,190.00	434,992.05	.....	7,776,616.72	763,580.77	2,700,012.44	3,463,593.21	4,313,023.51
Maintenance and operation	888,447.49	9,000,000.00	9,601,405.79	$5,491,249.73	24,981,103.01	22,171,103.55	.....	22,171,103.55	2,809,999.46
Sanitation	774,350.92	150,000.00	331,516.67	.....	1,255,867.59	1,027,008.67	139,593.16	1,166,601.83	89,265.76
Civil government	67,911.59	700,000.00	36,243.16	.....	804,154.75	686,249.75	75,222.28	761,472.03	42,682.72
Increase of compensation	.....	10,006.22	.....	.....	10,006.22	8,560.73	.....	8,560.73	1,445.49
Total	7,043,318.44	13,208,196.22	10,412,246.62	5,491,249.73	36,155,011.01	24,691,853.25	3,315,816.17	28,007,669.42	8,147,341.59

Presenting launch Louise to French Government	159.01				159.01				159.01
Private act Feb. 18, 1913, Oscar F. Lackey	1,500.00				1,500.00				1,500.00
Annual payment to Republic of Panama [1]	250,000.00				250,000.00				250,000.00
Total	251,659.01				251,659.01				251,659.01
Aeronautic station		250,000.00			250,000.00		110,530.21	110,530.21	139,469 79
Armament of fortifications	1,140,799.63	2,788,000.00			3,928,799.63	2,756,825,75		2,756,825.75	1,171,973.88
Armament of fortifications, June 15, 1917	3,855,000.00				3,855,000.00	1,356,467.13		1,356,467.13	2,498,532.87
Army quarters, storehouses, etc	240,864.19				240,864.19	1,594.32	235,596.93	237,191.25	3,672.94
Aviation, seacoast defenses		500,000.00			500,000.00	17,739.00	350,710.38	368,449.38	131,550.62
Electric light and power plants	1,918.30			22.54	1,940.84		1,940.84	1,940.84	
Electric light and power plants, June 15, 1917	55,000.00				55,000.00	55,000.00		55,000.00	
Fire control at fortifications	59,993.01				59,993.01	11,548.88		11,548.88	48,444.13
Land defenses, June 15, 1917	29,500.00				29,500.00	29,500.00		29,500.00	
Maintenance of clearings and trails	8,113.03	20,000.00			28,113.03	28,000.00		28,000.00	113.03
Maintenance, etc., fire-control installations	3,125.00	10,000.00			13,125.00	13,000.00		13,000.00	125.00
Maintenance of searchlights and electric power equipment		7,500.00			7,500.00	7,500.00		7,500.00	
Ordnance depot [2]	166,376.23	94,700.00			261,076.23	188,479.00		188,479.00	72,597.23
Ordnance depot, June 15, 1917	200.00				200.00				200.00
Panama fortifications	111,262.57			52,609.86	163,872.43	64,041.26		64,041.26	99,831.17
Preservation and repair of fortifications		19,400.00			19,400.00	10,000.00		10,000.00	9,400.00
Protecting Panama Canal and structures		450,000.00			450,000.00		279,636.32	279,636.32	170,363.68
Reserve equipment for fortifications	25,000.00				25,000.00	20,000.00		20,000.00	5,000.00
Seacoast batteries	217,789.03	332,000.00			549,789.03	539,015.40		539,015.40	10,773.63
Seacoast batteries, June 15, 1917	5,000.00				5,000.00	5,000.00		5,000.00	
Searchlights for seacoast fortifications	63,661.68				63,661.68	66.21	63,595.47	63,661.68	
Searchlights for seacoast fortifications, June 15, 1917	78,774.00				78,774.00	25,010.00		25,010.00	53,764.00
Submarine base		1,652,625.00			1,652,625.00		1,203,916.23	1,203,916.23	448,708.77
Submarine mines	240,677.43	2,500.00			243,177.43	15,351.37		15,351.37	227,826.06
Submarine mines, June 15, 1917	297,500.00				297,500.00	135,810.39		135,810.39	161,689.61
Submarine mine structures	47,000.00				47,000.00				47,000.00
Total	6,647,554.10	6,126,725.00		52,632.40	12,826,911.50	5,279,948.71	2,245,926.38	7,525,875.09	5,301,036.41
Grand total	13,942,531.55	19,334,921.22	10,412,246.62	5,543,882.13	49,233,581.52	29,971,801.96	5,561,742.55	35,533,544.51	13,700,037.01

[1] The Treasury Department does not include in statement of Panama Canal balances.
[2] Treasury balances show $260 more than stated above. The $260 was canceled by act of June 12, 1917, but still carried in Treasury balance.

TABLE NO. 34.—*Payments made by fiscal officers, fiscal year 1918.*

Month.	By paymaster.							
	Panama Canal payments.				Panama Railroad payments.			Grand total.
	Gold rolls.	Silver rolls.	Vouchers.	Total.	Pay rolls.	Vouchers.	Total.	
1917.								
July	$548,209.42	$476,714.34	$613,199.80	$1,638,123.56	$303,166.09	$507,809.35	$810,975.44	$2,449,099.00
August	544,203.47	475,022.16	480,835.47	1,500,061.10	316,118.84	511,621.86	827,740.70	2,327,801.80
September	533,205.29	465,039.95	581,031.99	1,579,277.23	317,874.79	632,807.54	950,682.33	2,529,959.56
October	499,888.02	427,358.63	553,045.44	1,480,292.09	301,923.83	546,488.12	848,411.95	2,328,704.04
November	525,754.99	481,140.53	600,994.10	1,607,889.62	330,655.36	636,074.63	966,729.99	2,574,619.61
December	512,856.53	446,725.34	652,754.09	1,612,335.96	328,686.81	632,660.89	961,347.70	2,573,683.66
1918.								
January	530,167.57	453,950.99	600,673.95	1,584,792.51	314,254.38	597,071.20	911,325.58	2,496,118.09
February	523,111.25	462,963.18	588,092.38	1,574,166.81	322,188.96	535,107.66	857,296.62	2,431,463.43
March	500,346.71	416,730.15	524,210.88	1,441,287.74	301,558.27	563,250.54	864,808.81	2,306,096.55
April	525,853.36	446,440.70	597,722.11	1,570,016.17	304,006.02	781,108.51	1,085,114.53	2,655,130.70
May	516,353.78	442,197.60	597,353.06	1,555,904.44	319,980.04	553,959.82	873,939.86	2,429,844.30
June	509,664.20	448,342.57	586,512.00	1,544,518.77	343,521.06	971,485.75	1,315,006.81	2,859,525.58
Total	6,269,614.59	5,442,626.14	6,976,425.27	18,688,666.00	3,803,934.45	7,469,445.87	11,273,380.32	29,962,046.32

TABLE NO. 34.—*Payments made by fiscal officers, fiscal year 1918*—Continued.

Month.	By disbursing clerk.	By collector.					
		Total.	Clubhouse funds.	Trust funds.	Postal savings funds.	Money-order funds.	Interest.
1917.							
July	$682,450.99	$220,669.23	$18,686.97	$920.04	.....	$200,550.00	$512.22
August	899,306.89	206,307.82	20,835.86	1,256.31	.....	183,752.38	463.27
September	797,121.17	199,512.17	19,802.53	1,436.59	.....	177,900.00	373.05
October	748,193.03	220,247.06	27,910.23	129.13	$1,260.00	190,128.00	819.70
November	650,854.75	139,420.53	20,203.46	329.81	.....	118,500.00	387.26
December	808,528.90	197,228.24	29,244.82	1,162.54	.....	166,300.00	520.88
1918.							
January	1,013,641.08	159,516.47	25,674.77	739.90	.....	132,600.00	501.80
February	853,205.64	155,260.81	22,962.90	1,469.14	.....	130,400.00	428.77
March	832,713.59	161,467.65	21,749.36	261.87	.....	138,800.00	656.42
April	772,025.37	269,729.53	28,560.25	264.25	.....	238,932.25	1,972.78
May	868,961.24	200,913.39	20,103.70	616.68	.....	179,100.00	1,093.01
June	716,730.16	178,850.19	22,356.59	780.28	.....	154,900.00	813.32
Total	9,643,732.81	2,309,123.09	278,091.44	9,366.54	1,260.00	2,011,862.63	8,542.48

TABLE No. 35.—*Statement of collections repaid to appropriations and to individuals and companies and collections deposited to miscellaneous receipts during the fiscal year ended June 30, 1918.*

Department and classification.	Total fiscal year 1918.
DEPARTMENT OF OPERATION AND MAINTENANCE.	
Paymaster—various individuals and companies	$40.00
Lock operation	56.25
Electrical	112.50
Balboa shops	531.05
Construction and repairs	1,535,228.18
Shopwork	1,810,855.99
Electric work	232,568.69
Electric current	60,884.01
Compressed air	500.00
Train service and use of rolling equipment	3,268.13
Tug service	154,635.41
Service of other floating equipment	66,963.41
Pilotage	34,064.34
Wharfage	21,484.80
Sales of water	62,044.65
Operation and maintenance, Panama waterworks	122,000.00
Repairs and maintenance of Panama pavement	640.97
Handling lines at locks	23,622.10
Steamship inspection	3,240.01
Dredging	1,773.07
Boiler inspection	49.76
Minor services	69,966.87
Dry dockage, Balboa	37,767.16
Dry dockage, Cristobal	8,148.06
Meals furnished	24,116.01
Total, department of operation and maintenance	4,274,561.42
SUPPLY DEPARTMENT.	
Subsistence:	
Commissary books honored by Panama Canal	451,363.98
Meals furnished	22,190.43
Hotel Tivoli	118,737.05
Hotel Aspinwall	1,192.10
Line hotels	24,634.73
Messes	166.28
Minor services	19,209.46
Laborers' meal tickets	101,749.46
Total, subsistence	739,243.49
Quartermaster:	
Material from stock	1,139,810.33
Rock, sand, gravel and screenings	16,638.05
Printing and binding	17,968.67
Corral	52,907.78
Miscellaneous jobs	52,165.65
Rental of gold quarters	2,616.43
Rental of silver quarters	103,156.60
Garage rental	5,817.85
Ancon nursery	4,747.22
Handling fuel oil	30,517.92
Operation of stores	49,500.00
Operation of quarters	77,500.00
Minor services	29,614.39
Fuel oil	747,642.56
Second-hand furniture	3,965.98
Containers in transit	200.00
Cost of making sales	120,011.35
Total, quartermaster	2,454,780.78
Total, supply department	3,194,024.27
CONSTRUCTION AND EQUIPMENT, PANAMA CANAL.	
Cristobal coaling station	300,000.00

Department and classification.	Total fiscal year 1918.
ACCOUNTING DEPARTMENT.	
Lost metal checks	$1,106.55
Cablegrams	3,302.45
Proportion of salaries	143,666.86
Accounting department	16,679.68
Overpayments	776.88
Lost property	772.86
Service of employee obtaining bill of health	575.00
Total, accounting department	166,880.28
CIVIL GOVERNMENT.	
Schools	41.67
Police and prisons	2.10
School tuition	4,364.64
Sale of school books	760.72
Police service	24,648.40
Minor services	4,215.16
Postal service	550.00
Total, civil government	34,582.69
EXECUTIVE DEPARTMENT.	
Proportion of salaries	72,992.25
Photographs and prints	295.58
Motor-car service	4,037.98
Minor services	190.62
Canal Record	68.95
Joint commission expenses	.60
General bureau, official photos, etc.	40.63
Executive, miscellaneous	190.50
Office engineer	.18
Auditor	4,246.56
Total, executive department	82,063.85
MISCELLANEOUS.	
Land rental	14,062.85
Building rental	2,598.63
Land office expense	11,002.30
Equipment rental	436.79
Boathouse revenues	117.50
Total, miscellaneous	28,218.07
HEALTH DEPARTMENT.	
Ancon Hospital:	
Fees	143,115.29
Mess	20,262.73
Burials	3,172.03
Miscellaneous	1,307.14
Colon Hospital:	
Fees	18,456.61
Mess	3,787.39
Miscellaneous	261.20
Pale Seco Leper Asylum	2,699.75
Dispensaries	1,954.75
Quarantine:	
Subsistence	10,849.52
Other charges	9,267.75
Sanitation:	
Panama	8,765.87
Colon	10,419.28
Canal Zone	7,100.48
Street cleaning:	
Panama	10,081.85
Colon	4,698.92
Corozal Hospital:	
Produce	20,915.88
Pasturage	62.00
Burials	227.87
Insane asylum	22,532.43
Sales from medical store	10,533.44
Minor services	234.09
Santo Tomas Hospital	643.21
Overpayment	61.11
Total, health department	311,410.59

TABLE No. 35.—*Statement of collections, etc.*—Continued.

RECAPITULATION.

Department and classification.		Total fiscal year 1918.
Department of operation and maintenance		$4,274,561.42
Supply department:		
Subsistence	$739,243.49	
Quartermaster	2,454,780.78	
		3,194,024.27
Accounting department		166,880.28
Executive department		82,063.85
Total operation and maintenance		7,717,529.82
Total construction and equipment		300,000.00
Total civil government		34,582.69
Total sanitation		311,410.59
Total miscellaneous		28,218.07
Total repay to appropriations		8,391,741.17
Collections for individuals and companies:		
Paymaster, various individuals and companies		20,758.04
E. H. Stafford Manufacturing Co.		4.00
R. W. Gildart		2.50
Alien Property Custodian		162.70
Paymaster, Panama Railroad commissary books		144.03
Total collections for individuals and companies		21,071.27

Department and classification.	Total fiscal year 1918.
Miscellaneous receipts, United States funds:	
Water	$97,622.90
Reserve for losses on obsolete stock	36,433.17
Pay car overages	1.06
Salvaging steamship Moselle	210.50
Overages paid in Washington	20.10
Tolls	6,441,405.24
Licenses and taxes	12,532.38
Court fees and fines	19,668.28
Postal receipts	107,165.85
Miscellaneous, Canal Zone	1,323.50
Sales of French material and equipment	1,282.11
Total, miscellaneous receipts	6,717,665.09
Grand total for year	15,130,477.53
Special deposits on Isthmus	9,030,001.16
Special deposits in United States	4,160,411.71
Total	13,190,412.87

TABLE No. 36.—*Statement of transactions in the collector's special deposit account during the fiscal year ended June 30, 1918.*

IN THE UNITED STATES.

Month.	Deposits.	Panama Canal bills applied.	Payments to individuals and companies.[1]	Refunds.
1917.				
July	$234,904.00	$178,218.03	$67,510.28	$48,583.40
August	369,394.83	248,768.09	87,218.41	46,065.23
September	322,792.75	172,642.21	87,139.64	54,158.24
October	397,142.28	196,511.41	110,536.84	53,505.42
November	341,983.72	148,468.78	106,298.79	115,758.68
December	295,372.56	204,811.88	93,268.68	44,598.84
1918.				
January	399,909.60	142,936.65	106,420.55	47,622.39
February	298,145.20	201,032.34	110,847.69	45,013.62
March	340,700.75	218,330.84	94,601.84	22,897.76
April	350,610.08	160,905.87	67,116.02	24,412.82
May	473,332.78	227,909.57	125,254.55	99,210.80
June	344,837.05	182,535.53	140,048.20	46,637.00
Total	4,169,125.60	2,283,071.20	1,196,261.47	648,464.29

ON THE ISTHMUS.

1917.				
July	$689,614.86	$501,166.70	$242,250.79	$4,628.21
August	702,266.88	448,190.64	226,263.61	1,701.53
September	782,226.25	503,109.73	316,661.61	4,469.53
October	703,511.48	429,998.47	199,502.49	1,928.55
November	773,015.83	493,311.67	243,217.43	5,657.88
December	830,244.39	521,059.84	276,421.96	3,530.04
1918.				
January	737,706.10	517,639.42	267,686.54	2,203.70
February	766,479.81	458,731.84	266,982.01	1,079.14
March	813,016.88	402,097.98	286,768.91	7,456.76
April	791,010.93	522,081.46	301,386.46	5,752.79
May	1,147,024.83	697,941.47	448,484.44	1,924.00
June	954,223.21	526,574.21	439,568.60	2,247.88
Total	9,690,341.45	6,111,903.43	3,515,194.85	42,580.07

[1] Includes the Panama Railroad Co., Central & South American Telegraph Co., and other individuals and companies.

TABLE No. 36.—*Statement of transactions, etc.*—Continued.

RECAPITULATION.

	In the United States.		On the Isthmus.	
On hand July 1, 1917	$195,878.35		$191,839.04	
Deposits during year	4,169,125.60		9,690,341.45	
Panama Canal bills applied		$2,283,071.20		$6,111,903.43
Payments to individuals and companies		1,196,261.47		3,515,194.85
Refunds		648,464.29		42,580.07
On hand June 30, 1918		237,206.99		212,502.14
Total	4,365,003.95	4,365,003.95	9,882,180.49	9,882,180.49

TABLE No. 37.—*Statement of audited pay rolls on Isthmus during fiscal year 1918.*

	Total.	Salaries.	Wages.
Operation and maintenance:			
Executive office—			
Executive	$18,596.67	$18,596.67	
Record	54,820.01	54,168.85	$651.16
Personnel	24,758.70	24,758.70	
Correspondence	42,249.17	42,249.17	
Property	28,350.61	28,350.61	
Statistics	11,639.56	11,639.56	
General	26,990.09	26,990.09	
Timekeeping	83,477.04	83,477.04	
Motor cars	10,505.68	2,940.66	7,565.02
Clubs and playgrounds	24,540.09	24,417.01	123.08
Total, executive office	325,927.62	317,588.36	8,339.26
Engineer of maintenance—			
Lock operation—			
Atlantic	238,762.63	54,351.95	184,410.68
Pacific	355,960.58	87,312.44	268,648.14
Electrical	561,208.41	114,612.01	446,596.40
Dredging	1,270,930.45	303,924.08	967,006.37
Municipal engineering	927,521.15	274,809.25	652,711.90
Office engineer	62,642.40	61,354.88	1,287.52
Meteorology and hydrography	24,785.39	19,893.56	4,891.83
Surveys	27,073.21	19,509.72	7,563.49
Maintenance, Gatun Dam	43,680.20	8,429.22	35,250.98
Total, engineer of maintenance	3,512,564.42	944,197.11	2,568,367.31
Marine division—			
Office	6,034.61	6,034.61	
Port captain—			
Balboa	169,324.07	84,858.31	84,465.76
Cristobal	179,975.31	86,424.81	93,550.50
Lighthouse division	31,366.75	15,273.82	16,092.93
Total, marine division	386,700.74	192,591.55	194,109.19
Mechanical division—			
Balboa	1,940,945.91	237,950.58	1,702,995.33
Paraiso	19,164.44	1,537.56	17,626.88
Cristobal	531,547.02	43,778.50	487,768.52
Total, mechanical division	2,491,657.37	283,266.64	2,208,390.73
Supply department—			
Quartermaster—			
Office	31,291.70	31,291.70	
Storehouses	255,758.08	144,284.62	111,473.46
District Quartermaster	596,771.56	179,972.66	416,798.90
Printing plant	54,215.22	14,084.53	40.130.69
Fuel and plants	22,945.76	4,594 17	18,351 59
Total, quartermaster	960,982.32	374,227.68	586,754.64
Subsistence	132,992.06	49,751.43	83,240.63
Total, quartermaster and subsistence	1,093,974.38	423,979.11	669,995.27

TABLE No. 37.—*Statement of audited pay rolls, etc.*—Continued.

	Total.	Salaries.	Wages.
Operation and maintenance—Continued.			
Supply department—Continued.			
Accounting—			
Auditor	$331,305.50	$330,741.17	$564.33
Paymaster	42,015.77	42,015.77	.....
Collector	32,943.13	32,943.13	.....
Total, accounting	406,264.40	405,700.07	564.33
Building	1,738,522.15	380,300.80	1,358,221.35
Fortifications	291,293.97	103,479.14	187,814.83
Injury and death—			
Old act	773.39	.....	773.39
New act	48,205.13	1,032.75	47,172.38
Special service	6,104.55	5,760.33	344.22
Total, operation and maintenance	10,301,988.12	3,057,895.86	7,244,092.26
Construction and equipment:			
Joint commission	41,849.69	41,849.69	.....
Special attorney and land office	16,304.76	16,304.76	.....
Total, construction and equipment	58,154.45	58,154.45	.....
Civil government:			
Civil affairs	31,397.07	31,397.07	.....
Posts	86,803.24	86,803 24	.....
Police and prisons	222,258.99	222,258.99	.....
Fire protection	63,587.22	63,587 22	.....
Schools	88,211.65	88,211.65	.....
District court	16,448.48	16,448.48	.....
District attorney	7,400.00	7,400.00	.....
Marshal	6,891.34	6,891.34	.....
Magistrate courts	12,136.43	12,136.43	.....
Special service	23,028.29	23,028.29	.....
Total, civil government	558,162.71	558,162.71	.....
Sanitation:			
Office	6,713.66	6,713.66	.....
Medical store	9,563.55	9,086.04	477.51
Ancon hospital	246,159.45	206,937.44	39,222.01
Colon hospital	33,356.99	29,733.79	3,623.20
Santo Tomas hospital	11,704.21	11,704.21	.....
Palo Seco leper asylum	11,234.67	6,220.75	5,013.92
Dispensaries	32,162.51	31,594.55	567.96
Quarantine—			
Office	1,037.00	1,037.00	.....
Balboa	18,002.82	12,549.46	5,453.36
Cristobal	19,311.17	16,336.21	2,974.96
Bocas del Toro	1,600.00	1,600.00	.....
	39,950.99	31,522.67	8,428.32
Corozal farm	16,898.83	5,402.53	11,496.30
Corozal asylum	31,057.61	24,920.92	6,136.69
Health office—			
Panama	89,242.50	32,275.56	56,966.94
Colon	61,797.88	25,648 48	36,149.40
Zone sanitation	88,694.00	18,994.70	69,699.30
Total, sanitation	678,536.85	440,755.30	237,781.55
Fortification	51,882.47	13,538.95	38,343.52
Omitted time prior to Apr. 1, 1914	149.08	.....	149.08
Grand total	11,648,873.68	4,128,507.27	7,520,366.41

TABLE No. 38.—*Statement of accounts receivable registered during the fiscal year ended June 30, 1918.*

Month.	Number of bills registered.	Total.	Against the Panama Railroad.	Against the Republic of Panama.	Against other departments of United States Government.	Against steamship companies.	Against other individuals and companies.	Trust funds.		For various collections, hospitals and messes.	Tolls.	Repay to appropriations.
								For pay roll deductions.	Other collections.			
1917.												
July	1,817	$1,664,481.21	$355,032.47	$12,227.57	$217,354.78	$116,443.62	$113,220.00	$284,212.37	$6,427.69	$5,723.28	$553,839.43	$790,959.33
August	1,779	1,754,400.40	338,741.39	11,339.07	314,141.80	164,074.77	118,369.51	282,263.73	20,772.67	6,289.53	498,407.93	952,762.44
September	1,751	1,498,493.18	295,401.68	11,451.94	194,010.35	91,859.86	39,429.89	283,934.46	175.00	6,756.51	575,473.49	354,700.77
October	1,827	1,623,832.96	290,311.09	14,401.46	389,980.14	94,935.67	36,842.29	272,546.63	2,325.00	6,320.26	516,170.42	824,815.33
November	2,022	1,765,449.05	355,200.52	6,011.76	206,242.80	166,825.68	157,046.27	287,238.53	8,261.68	5,505.49	573,116.32	573,399.36
December	1,801	1,640,727.29	361,645.48	12,019.58	282,894.97	120,302.04	67,224.07	314,444.46	230.00	5,603.88	476,362.81	848,516.98
1918.												
January	1,850	1,846,398.65	345,144.44	13,868.49	423,699.77	161,384.35	46,085.23	363,261.24	664.70	6,811.77	485,478.66	976,223.50
February	1,724	1,665,520.43	241,809.40	11,276.92	337,592.95	162,744.35	110,811.50	322,925.59	.....	4,341.56	474,018.19	933,736.44
March	1,779	1,761,022.04	312,846.04	9,349.34	220,549.51	162,060.31	189,114.44	299,882.19	7.39	5,790.83	561,421.99	899,710.47
April	1,864	1,690,566.59	271,343.73	13,029.40	215,525.43	150,351.98	186,016.05	315,438.57	2,470.59	4,336.86	532,053.98	727,345.87
May	1,993	1,963,195.18	315,549.93	12,420.91	339,062.14	174,755.28	177,758.01	268,382.75	18,584.38	5,348.24	651,333.54	908,692.61
June	1,863	2,013,373.62	258,472.38	12,763,34	332,554.06	340,649.91	138,941.49	365,289.99	.....	3,479.61	561,222.84	1,001,660.84
Total	22,070	20,887,460.60	3,741,498.55	140,159.78	3,473,608.67	1,906,387.82	1,380,858.75	3,659,820.51	59,919.10	66,307.82	6,458,899.60	9,792,522.94
Total for year ended June 30, 1917	16,386	17,007,342.16	5,059,443.81	166,975.70	1,756,670.15	804,899.06	865,088.40	2,628,281.29	37,287.06	56,915.03	5,631,781.66	7,360,126.20

TABLE No. 39.—*Commissary books and coupons and meal tickets.*

BOOKS ISSUED FOR PAY ROLL DEDUCTION.

Month.	$2.50 book.		$5 book.		$15 book.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	
1917–18.							
July	27,459	$68,647.50	33,232	$166,160.00	6,047	$90,705.00	$325,512.50
August	27,517	68,792.50	34,278	171,390.00	6,214	93,210.00	333,392.50
September	25,096	62,740.00	34,010	170,050.00	6,053	90,795.00	323,585.00
October	26,299	65,747.50	35,704	178,520 00	6,308	94,620.00	338,887.50
November	24,594	61,485.00	34,982	174,910.00	6,772	101,580.00	337,975.00
December	26,532	66,330.00	44,242	221,210.00	7,810	117,150.00	404,690.00
January	26,942	67,355.00	36,800	184,000.00	6,927	103,905.00	355,260.00
February	24,195	60,487.50	33,760	168,800.00	6,601	99,015.00	328,302.50
March	24,384	60,960.00	36,665	183,325.00	6,968	104,520.00	348,805.00
April	23,815	59,537.50	38,348	191,740.00	7,144	107,160.00	358,437.50
May	22,445	56,112.50	38,950	194,750.00	6,620	99,300.00	350,162.50
June	19,458	48,645.00	36,250	181,250.00	6,422	96,330.00	326,225.00
Total	298,736	746,840.00	437,221	2,186,105.00	79,886	1,198,290.00	4,131,235.00

BOOKS SOLD FOR CASH.

Month.	$2.50 book.		$5 book.		$15 book.		Surcharge to steamship companies.[1]	Total value.
	Number.	Value.	Number.	Value.	Number.	Value.		
July	4,800	$12,000.00	10,969	$54,845.00	4,553	$68,295.00	395.75	$135,535.75
August	4,508	11,270.00	11,989	59,945.00	4,862	72,930.00	370.25	144,515.25
September	4,367	10,917.50	10,496	52,480.00	4,512	67,680.00	231.25	131,308.75
October	4,523	11,307.50	11,347	56,735.00	4,734	71,010.00	240.00	139,292.50
November	4,119	10,297.50	11,463	57,315.00	5,243	78,645.00	323.75	146,581.25
December	4,680	11,700.00	12,830	64,150.00	5,594	83,910.00	367.50	160,127.50
January	3,197	7,992.50	9,622	48,110.00	4,403	66,045.00	273.75	122,421.25
February	2,872	7,180.00	9,753	48,765.00	4,607	69,105.00	268.75	125,318.75
March	3,328	8,320.00	11,033	55,165.00	5,037	75,555.00	174.38	139,214.38
April	3,342	8,355.00	11,375	56,875 00	5,275	79,125.00	123.75	144,478.75
May	4,154	10,385.00	12,745	63,725.00	5,613	84,195.00	216.25	158,521.25
June	5,419	13,547.50	13,113	65,565.00	5,100	76,500.00	226.25	155,838.75
Total	49,309	123,272.50	136,735	683,675.00	59,533	892,995.00	3,211.63	1,703,154.13

[1] 25 per cent surcharge on sale of coupon books to steamship companies for use in purchasing supplies for vessels, in effect Apr. 1, 1917.

BOOKS ISSUED TO OFFICERS, U. S. ARMY; CONTRACTORS, ETC.

Month.	$2.50 book.		$5 book.		$15 book.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	
July	63	$157.50	398	$1,990.00	764	$11,460.00	$13,607.50
August	56	140.00	404	2,020.00	777	11,655.00	13,815.00
September	75	187.50	372	1,860.00	662	9,930.00	11,977.50
October	114	285.00	474	2,370.00	636	9,540.00	12,195.00
November	47	117.50	379	1,895.00	729	10,935.00	12,947.50
December	77	192.50	479	2,395.00	762	11,430.00	14,017.50
January	114	285.00	357	1,785.00	351	5,265.00	7,335.00
February	91	227.50	29	145.00	.....	.....	372.50
March	184	460.00	150	750.00	4	60.00	1,270.00
April	165	412.50	135	675.00	.....	.....	1,087.50
May	147	367.50	122	610.00	.....	.....	977.50
June	144	360.00	55	275.00	.....	.....	635.00
Total	1,277	3,192.50	3,354	16,770.00	4,685	70,275.00	90,237.50

TABLE No. 39.—*Commissary books and coupons and meal tickets*—Continued.

COUPONS HONORED AT COMMISSARIES, HOTELS, RESTAURANTS, NURSERY, DREDGES, AND CLUBHOUSES DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Clubhouses.	Nursery.	Hotels, restaurants, and dredges.	Commissary.	Total value.
July	$4,296.64	$119.23	$40,138.00	$429,117.74	$473,671.61
August	5,838.56	198.18	38,861.05	445,084.04	489,981.83
September	5,610.68	251.03	36,796.03	424,093.43	466,751.17
October	6,032.28	287.22	38,883.69	445,669.35	490,872.54
November	5,274.13	298.99	36,670.05	452,368.25	494,611.42
December	7,124.58	239.10	38,424.07	539,344.18	585,131.93
January	6,974.94	315.27	39,527.58	430,746.69	477,564.48
February	6,716.30	198.99	34,369.68	408,504.35	449,789.32
March	7,138.42	222.24	37,093.87	451,235.08	495,689.61
April	6,999.64	253.04	34,945.91	457,145.89	499,344.48
May	5,832.27	176.18	36,558.63	466,599.20	509,166.28
June	5,560.30	224.78	37,259.33	439,869.29	482,913.70
Total	73,398.74	2,784.25	449,527.89	5,389,777.49	5,915,488.37

STATEMENT OF MEAL TICKETS ISSUED TO SILVER EMPLOYEES FOR WHICH COLLECTIONS WERE MADE ON PAY ROLLS.

Month.	9-cent.		27-cent.		40-cent.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	
July	37,626	$3,386.34	6,697	$1,808.19	18,152	$7,260.80	$12,455.33
August	25,265	2,273.85	6,421	1,733.67	19,632	7,852.80	11,860.32
September	17,087	1,537.83	6,906	1,864.62	20,956	8,382.40	11,784.85
October	13,972	1,257.48	7,716	2,083.32	23,459	9,383.60	12,724.40
November	11,491	1,149.10	6,689	2,006.70	24,538	9,815.20	12,971.00
December	6,177	617.70	5,518	1,655.40	21,759	8,703.60	10,976.70
January	5,963	596.30	6,329	1,898.70	23,385	9,354.00	11,849.00
February	5,055	505.50	5,597	1,679.10	20,408	8,163.20	10,347.80
March	5,667	566.70	5,862	1,758.60	20,737	8,294.80	10,620.10
April	6,131	613.10	5,556	1,666.80	20,957	8,382.80	10,662.70
May	6,673	667.30	5,551	1,665.30	21,505	8,602.00	10,934.60
June	1,731	173.10	1,959	587.70	12,046	4,818.40	5,579.20
Total	142,838	13,344.30	70,801	20,408.10	247,534	99,013.60	132,766.00

TABLE No. 40.—*Statement of balance of Canal Zone funds with collector, by appropriations, June 30, 1918.*

Miscellaneous and contingent	$1,045.48
Public improvements and schools	2,428.73
Postal receipts, 1915	2,745.90
Postal savings funds	509.00
Money-order funds	870,412.47
Trust funds	6,878.74
Clubhouse funds	25,573.85
Interest	35,467.78
Total	945,061.95

TABLE No. 41.—*Postal Service—Statement of money orders issued and paid by the Canal Zone and Canal Zone orders paid by other administrations, fiscal years 1907 to 1918, inclusive.*

Year	Domestic money orders issued.		Money orders paid by Canal Zone post offices.				Canal Zone money orders paid by—				Cash remitted to United States Post Office Department.
	Number.	Value.	Martinique.	Costa Rica.	United States.	Canal Zone.	Martinique.	Costa Rica.	United States.	Canal Zone.	
1907	84,441	$2,369,031.49	.....	.....	$18,257.90	$208,165.48	.....	.....	$1,581,251.91	$208,165.48	$1,884,000.00
1908	153,457	4,686,684.98	.....	.....	33,378.45	1,017,750.97	.....	.....	2,875,719.61	1,017,750.97	3,055,000.00
1909	180,389	5,166,749.46	.....	.....	52,686.22	1,492,132.76	.....	.....	3,583,419.57	1,492,144.76	3,392,000.00
1910	207,220	5,228,553.60	.....	.....	60,470.77	1,331,568.20	$2,267.60	.....	4,068,650.16	1,331,568.20	3,535,000.00
1911	214,780	5,304,906.60	$345.62	.....	66,696.58	1,337,915.09	6,022.08	.....	3,725,996.12	1,337,915.09	4,422,249.17
1912	227,680	4,915,077.26	375.63	$85.70	60,398.69	1,280,397.88	8,176.95	$1,062.40	3,521,511.95	1,280,397.88	3,580,000.00
1913	238,316	4,883,624.13	605.28	191.95	89,447.95	881,728.73	9,646.65	3,046.10	4,286,948.31	881,728.73	3,468,000.00
1914	198,828	4,029,364.97	268.85	375.38	88,533.43	776,265.68	11,684.18	4,634.53	4,070,694.55	776,265.68	3,401,000.00
1915	150,906	2,873,182.84	226.93	637.45	109,204.82	431,004.25	6,183.64	1,250.55	2,699,533.06	[1] 1,153,684.25	3,053,407.08
1916	147,042	2,417,033.83	3,047.64	445.19	129,302.20	289,011.70	5,979.45	1,172.02	2,102,740.27	[1] 1,392,441.70	2,125,043.89
1917	146,421	2,300,918.71	1,805.49	1,318.12	120,054.75	231,467.61	3,500.97	1,420.12	1,960,097.67	[1] 1,367,582.61	1,676,500.00
1918	143,250	2,138,328.69	1,821.08	507.00	241,461.81	224,057.94	2,446.50	1,767.15	2,021,706.75	[1] 1,665,282.94	1,655,000.00
Total	2,092,730	46,313,456.56	8,496.52	3,560.79	1,069,893.57	9,501,466.29	55,908.02	14,352.87	36,498,269.93	13,904,928.29	35,247,200.14
Deposit orders issued in lieu of postal savings:											
1915	19,652	1,075,570.00	.....	.....	.....	722,680.00	.....	.....	.....	.....	.....
1916	24,054	1,101,190.00	.....	.....	.....	1,103,430.00	.....	.....	.....	.....	.....
1917	27,054	1,481,845.00	.....	.....	.....	1,136,115.00	.....	.....	.....	.....	.....
1918	24,772	1,244,335.00	.....	.....	.....	1,441,225.00	.....	.....	.....	.....	.....
Totals	95,532	4,902,940.00	.....	.....	.....	4,403,450.00	.....	.....	.....	.....	.....
Grand total	2,188,262	51,216,396.56	8,496.52	3,560.79	1,069,893.57	13,904,916.29	55,908.02	14,352.87	36,498,269.93	13,904,928.29	35,247,200.14

[1] Deposit money orders paid by Canal Zone included.

SUMMARY.

Total Canal Zone orders issued	$51,216,396.56
Total Canal Zone orders paid	50,473,459.11
Total Canal Zone orders outstanding unpaid	742,937.45
Due United States by Canal Zone	145,475.45
Overages	13.49
	888,426.39

Money order funds:		
Cash on deposit with collector, Panama Canal		$870,412.47
Cash due from Martinique administration		345.63
Cash due from Costa Rica administration		158.50
Cash due from postmasters	$17,579.22	
Less amount of fees included	69.43	
		17,509.79
		888,426.39

NOTE.—Martinique and Costa Rica list of Canal Zone orders paid during quarter ended June 30, 1918, not included.
United States list of Canal Zone orders paid during June, 1918, included, subject to adjustment on complete audit.

TABLE NO. 42.—*Postal Service—Statement showing the monthly money order business of the Canal Zone Postal Service during the fiscal year ended June 30, 1918.*

Month.	Money orders issued, including deposit money orders.		Interest paid on deposit orders.	Money orders paid by the Canal Zone post offices.				Canal Zone orders paid by—		
	Number.	Amount.		United States.	Martinique.	Costa Rica.	Canal Zone.[1]	Martinique.	Costa Rica.	United States.
1917.										
July	16,326	$341,186.59	$471.95	$11,456.74	$61.16	.....	$160,598.70	$971.05	$508.40	$217,383.30
August	15,783	341,072.93	463.27	14,955.13	.....	$23.50	137,801.43	.....	.....	115,533.19
September	14,524	313,735.33	333.05	14,075.58	604.29	100.00	120,324.60	.....	801.50	130,271.95
October	15,866	347,281.51	859.70	19,641.57	291.27	.....	191,344.78	.....	.....	299,049.88
November	15,707	298,277.28	387.26	15,279.03	179.61	125.00	114,504.76	573.25	.....	242,084.11
December	15,702	280,159.48	515.88	19,505.63	.....	.....	129,473.56	.....	.....	121,950.19
1918.										
January	12,366	253,304.67	501.80	16,385.95	220.00	.....	95,137.43	.....	.....	184,177.53
February	12,662	265,503.79	418.77	15,839.89	351.27	100.00	96,548.00	.....	153.00	129,530.25
March	12,839	254,345.96	612.67	21,453.19	.....	.....	116,614.36	337.70	.....	106,874.71
April	12,189	233,621.38	1,972.28	30,791.12	50.48	66.50	227,421.39	.....	304.25	151,742.16
May	12,712	243,044.81	1,090.76	35,001.27	5.00	92.00	154,393.90	564.50	.....	173,011.53
June	11,346	211,129.96	813.32	27,076.71	58.00	.....	121,120.03	.....	.....	150,097.95
Total	168,022	3,382,663.69	8,440.71	241,461.81	1,821.08	507.00	1,665,282.94	2,446.50	1,767.15	2,021,706.75

[1] Including deposit money orders.

TABLE No. 43.—*Postal Service—Statement of audited revenues, fiscal years 1907 to 1918, inclusive.*

Year.	Receipts.						
	Miscellaneous.	Money-order fees.	Interest on money-order funds.	Stamp sales.	Box rents.	News-paper postage.	Total revenue.
1907	.....	$9,832.65	.....	$54,803.79	.....	.....	$64,636.44
1908	.....	19,309.14	.....	72,708.67	.....	$0.87	92,018.68
1909	.....	21,720.93	.....	74,241.87	.....	85.53	96,048.33
1910	.....	22,980.96	.....	83,765.60	.....	81.50	106,828.06
1911	.....	23,457.98	.....	82,585.21	.....	28.51	106,071.70
1912	.....	22,889.93	.....	87,497.21	.....	144.24	110,531.38
1913	.....	23,366.31	.....	100,599.15	.....	318.84	124,284.30
1914	.....	19,408.44	.....	90,792.63	.....	463.67	110,664.74
1915	.....	13,169.55	.....	75,202.29	$2,973.65	988.50	92,333.99
1916	.....	12,878.29	.....	76,337.08	5,029.50	1,410.39	95,655.26
1917	$1,207.59	12,371.28	$12,884.57	74,474.98	8,100.00	1,703.89	110,742.31
1918	1,344.75	11,918.35	32,940.22	83,939.74	8,147.30	1,825.38	140,115.74
Total	2,552.34	213,303.81	45,824.79	956,948.22	24,250.45	7,051.32	1,249,930.93

TABLE No. 44.—*Postal Service—Statement of postal revenues, fiscal year ended June 30, 1918.*

Month.	Receipts.						
	Money-order fees.	Miscellaneous.	Interest on money-order funds.	Stamp sales.	Box rents.	News-paper postage.	Total revenue.
1917.							
July	$1,168.25	$180.50	$1,590.58	$6,897.10	$630.80	$145.89	$10,613.12
August	1,154.90	104.40	1,579.84	7,105.99	47.25	139.66	10,132.04
September	1,045.40	100.00	1,533.98	6,650.03	1,316.00	132.04	10,777.45
October	1,157.97	100.06	8,062.65	6,979.63	701.25	141.44	17,143.00
November	1,114.57	100.00	1,571.70	7,520.89	39.10	150.52	10,496.78
December	1,103.09	100.00	1,505.74	9,530.39	1,356.25	162.53	13,758 00
1918.							
January	840.39	100.00	1,787.36	6,812.28	674.65	153.10	10,367.78
February	873.99	141.60	1,738.50	6,093.30	24.75	146.88	9,019.02
March	884.73	100.00	1,601.89	6,640.12	1,228.65	169.94	10,625.33
April	850.49	100.00	8,791.56	6,657.68	786.40	168.15	17,354.28
May	913.33	118.19	1,701.95	6,726.36	53.65	146.36	9,659.84
June	787.44	100.00	1,474.47	6,696.48	1,298.55	168.87	10,525.81
Total	11,894.55	1,344.75	32,940.22	84,310.25	8,157.30	1,825.38	140,472.45

TABLE No. 45.—*Postal Service—Statement of postal savings payments and deposit money order transactions (in lieu of Postal Savings System) for fiscal year ended June 30, 1918.*

Month.	Postal savings certificates.		Deposit money orders.		
	Balance July 1, 1917.	Paid.	Balance July 1, 1917.	Issued.	Paid.
1917.					
July	$1,769.00	.....	$696,380.00	$130,355.00	$140,090.00
August	.....	.....	.....	125,710.00	116,535.00
September	.....	.....	.....	121,645.00	102,050.00
October	.....	$1,260.00	.....	129,715.00	171,315.00
November	.....	.....	.....	103,265.00	97,190.00
December	.....	.....	.....	91,410.00	112,550.00
1918.					
January	.....	.....	.....	105,825.00	79,500.00
February	.....	.....	.....	109,025.00	79,585.00
March	.....	.....	.....	98,160.00	100,280.00
April	.....	.....	.....	81,195.00	209,380.00
May	.....	.....	.....	74,980.00	131,850.00
June	.....	.....	.....	73,050.00	100,900.00
Balance unpaid June 30, 1918	.....	509.00	.....	.....	499,490.00
Total	1,769.00	1,769.00	696,380.00	1,244,335.00	1,940,715.00

TABLE No. 46.—*Statement of income bureau of clubs and playgrounds July 1, 1917, to June 30, 1918.*

	Ancon.	La Boca.	Balboa.	Pedro. Miguel.	Paraiso.	Gatun.	Gatun silver.	Cristobal.	Cristobal silver.	Army and Navy.	General secretary.	Total.
Soda fountain	$26,004.82	$15,761.05	$37,055.44	$4,735.69	$4,353.48	$15,435.85	$5,472.72	$21,381.74	$26,848.35	$3,514.49	.....	$160,563.63
Cigars and candy	18,984.16	13,193.73	21,390.04	2,274.31	2,066.00	7,579.17	4,056.42	15,196.49	25,996.41	1,596.04	.....	112,332.77
Salable merchandise	929.29	300.30	12,805.66	330.32	200.85	532.24	.....	1,264.21	.....	87.07	.....	16,449.94
Moving pictures	3,288.00	541.62	5,341.62	2,099.89	1,006.16	7,923.16	992.95	1,948.94	566.56	.....	$544.83	24,253.73
Billiards	2,135.38	709.90	2,424.52	287.90	434.99	712.81	485.58	2,005.46	1,313.07	.....	.....	10,509.61
Bowling	1,250.65	126.95	1,235.65	592.55	494.65	904.52	.....	1,014.25	113.45	.....	.....	5,732.67
Entertainments	573.80	61.75	873.60	255.15	118.65	248.85	8.90	227.95	.....	696.72	.....	3,065.37
Tournaments	267.75	.....	527.70	158.25	24.00	30.00	.....	93.57	.....	.....	.....	1,101.27
Dormitory	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,686.07	.....	1,686.07
Playgrounds	.....	609.45	68.41	.....	.....	.....	.....	.....	792.33	.....	.....	1,470.19
Swimming pool	.....	.....	6,348.00	.....	.....	.....	.....	.....	.....	.....	.....	6,348.00
Pressing club	.....	.....	1,350.89	.....	.....	.....	.....	.....	.....	.....	.....	1,350.89
Tennis clubs	188.00	11.50	103.50	78.75	.....	.....	.....	.....	.....	.....	.....	381.75
Restaurant	.....	.....	.....	.....	.....	8,669.36	3,745.19	.....	.....	.....	.....	12,414.55
Library deposits	51.30	2.50	140.00	7.75	5.00	40.50	1.00	49.70	.....	23.46	.....	321.21
Rentals and interest	174.50	180.00	254.85	96.09	45.00	81.00	127.50	151.46	142.00	.....	261.30	1,513.70
Membership	984.00	82.93	730.00	425.50	175.00	631.30	116.16	599.00	91.38	.....	.....	3,835.27
Activities	1,205.08	.....	408.50	242.40	.56	137.20	130.14	141.30	10.00	95.70	.....	2,370.88
Total	56,036.73	31,581.68	91,058.38	11,584.55	8,924.34	42,925.96	15,136.56	44,074.07	55,873.55	7,699.55	806.13	365,701.50

TABLE NO. 47.—*Statement of expenses, bureau of clubs and playgrounds, July 1, 1917, to June 30, 1918.*

	Ancon.	La Boca.	Balboa.	Pedro Miguel.	Paraiso.	Gatun.	Gatun Silver.	Cristobal.	Cristobal silver.	Army and Navy.	General secretary.	Total.
Soda fountain	$24,395.89	$14,977.65	$31,939.87	$4,375.71	$4,431.22	$13,930.94	$4,909.83	$20,914.18	$25,379.95	$3,233.80	.....	$148,489.04
Cigars and candy	15,488.68	10,768.14	17,471.50	1,930.71	1,605.18	6,124.63	3,277.19	12,694.56	20,884.67	1,624.42	.....	91,869.68
Salable merchandise	600.85	162.97	13,257.97	162.33	160.90	244.43	.....	921.49	.....	89.28	.....	15,600.22
Moving pictures	3,694.24	931.63	5,272.92	2,131.88	1,437 20	8,813.20	1,061.76	2,290.33	1,369.62	.....	$719.03	27,721.81
Billiards	692.65	625.52	1,326.52	57.66	140.98	375.98	137.61	654.09	529.50	.....	.....	4,540.51
Bowling	1,568.41	370.30	1,410.09	252.76	366.12	960.18	.....	1,053.96	159.48	.....	.....	6,141.30
Entertainments	458.93	178.78	732.37	256.64	204.66	797.64	52.00	333.02	21.00	92.77	.....	3,127.81
Tournaments	274.74	1.37	734.72	196.45	32.57	34.02	.....	.....	.....	.....	.....	1,273.87
Dormitory	.....	.....	.....	.....	.....	.....	.....	.....	.....	610.16	.....	610.16
Playgrounds	.....	455.70	42.71	.....	.....	.....	.....	.....	263.10	.....	.....	761.51
Swimming pool	.....	.....	5,782.50	.....	.....	.....	.....	.....	.....	.....	.....	5,782.50
Pressing club	.....	.....	1,226.27	.....	.....	.....	.....	.....	.....	.....	.....	1,226.27
Tennis clubs	27.03	16.25	176.62	29.19	.....	.....	.....	.....	.....	.....	.....	249.09
Restaurant	.....	.....	.....	.....	.....	9,505.43	3,488.58	.....	.....	.....	.....	12,994.01
Office help	1,381.34	412.62	542.55	662.62	438.72	964.60	117.96	1,420.88	381.36	10.70	.....	6,333.35
Maintenance	2,831.90	2,447.36	5,710.90	518.71	306.51	957.80	1,366.98	995.72	2,318.27	563.19	543.57	18,560.97
Books and periodicals	178.65	77.15	314.97	153.20	143.55	337.87	134.65	237.67	161.98	23.20	.....	1,762.89
Equipment	265.54	169.33	282.73	97.47	17.37	93.71	7.89	41.12	243.20	78.94	.....	1,288.30
Refunds	51.00	2.50	42.50	24.50	1.50	37.50	1.00	49.50	.....	.....	1.50	211.50
Activities	1,481.65	38.63	1,043.96	336.64	22.66	631.01	159.55	91.13	168.48	391.20	.....	4,367.91
Total	53,391.50	31,626.90	87,311.73	11,186.47	9,309.14	43,808.94	14,715.00	41,697.65	51,880.61	6,720.66	1,264.10	352,912.70

TABLE NO. 48.—*Summary of income and expenses, bureau of clubs and playgrounds, July 1, 1917, to June 30, 1918.*

	Ancon.	La Boca.	Balboa.	Pedro Miguel.	Paraiso.	Gatun.	Gatun silver.	Cristobal.	Cristobal silver.	Army and Navy.	General secretary.	Total.
Soda-fountain inventory, July 1, 1917	$381.39	$275.00	$424.93	$280.51	$140.35	$151.35	$24.69	$175.86	$80.80	.....	.....	$1,934.88
Cigars and candy inventory, July 1, 1917	479.57	31.41	439.07	95.98	119.31	81.61	58.65	343.81	101.05	.....	.....	1,750.46
Salable merchandise inventory, July 1, 1917	441.06	76.12	1,287.02	214.86	.....	470.81	.....	345.01	.....	.....	.....	2,834.88
Restaurant inventory, July 1, 1917	.....	.....	.....	.....	.....	180.08	21.22	.....	.....	.....	.....	201.30
Total expenditures, fiscal year 1918	53,391.50	31,626.90	87,311.73	11,186.47	9,309.14	43,808.94	14,715.00	41,697.65	51,880.61	$6,720.66	$1,264.10	352,912.70
Earnings, fiscal year 1918	2,573.82	[1] 4.55	8,330.63	286.98	[1] 491.35	[1] 1,118.25	528.75	2,964.92	4,047.33	1,339.73	[1] 457.97	18,000.04
Total	57,267.34	32,004.88	97,793.38	12,064.80	9,077.45	43,574.54	15,348.31	45,527.25	56,109.79	8,060.39	806.13	377,634.26
Soda-fountain inventory, June 30, 1918	564.04	231.06	1,346.19	183.74	101.28	225.32	157.26	699.10	213.44	79.61	.....	3,801.04
Cigars and candy inventory, June 30, 1918	462.32	185.24	971.96	132.64	51.83	140.49	42.97	519.62	22.80	264.25	.....	2,794.12
Salable merchandise inventory, June 30, 1918	204.25	6.90	4,416.85	163.87	.....	240.14	.....	234.46	.....	16.98	.....	5,283.45
Restaurant inventory, June 30, 1918	.....	.....	.....	.....	.....	42.63	11.52	.....	.....	.....	.....	54.15
Total income, fiscal year 1918	56,036.73	31,581.68	91,058.38	11,584.55	8,924.34	42,925.96	15,136.56	44,074.07	55,873.55	7,699.55	806.13	365,701.50
Total	57,267.34	32,004.88	97,793.38	12,064.80	9,077.45	43,574.54	15,348.31	45,527.25	56,109.79	8,060.39	806.13	377,634.26

[1] Loss.

TABLE No. 49.—*Bureau of clubs and playgrounds, balance sheet, June 30, 1918.*

ASSETS.			LIABILITIES.		
Cash on hand:			Surplus:		
Secretaries' balances	$5,035.06		To June 30, 1917	$6,570.32	
Deposited with collector	25,573.85		Profit, current fiscal year	18,000.04	
		$30,608.91			$24,570.36
Inventories:			Accounts payable:		
Soda fountain	3,801.04		Audited vouchers	24,027.87	
Cigars and candy	2,794.12		Panama Railroad Company (swimming pool)	2,000.00	
Salable merchandise	5,283.45		Suspense (undistributed credit)	5.94	
Restaurant	54.15				
		11,932.76			26,033.81
Accounts receivable:					
Registered bills	5,975.63				
Gatun soldiers	457.28				
Balboa Yacht Club	189.50				
Balboa Gun Club	1,440.09				
		8,062.50			
Total		50,604.17	Total		50,604.17

TABLE No. 50.—*Statement of amounts paid under the act of May 30, 1908, to employees as compensation on account of deaths of employees injured in the course of employment and amounts paid under act of Feb. 24, 1909, for injuries lasting 15 days or less; amounts paid under Executive order of Feb. 26, 1913; amounts paid under Executive Order No. 1902, dated Mar. 20, 1914; and amounts paid under act of Sept. 7, 1916, covering period from Aug. 1, 1908, to June 30, 1918.*

Total payments, by fiscal years.	Injuries.	Deaths.	Under act of Feb. 24, 1909.	Total.
Aug. 1, 1908, to June 30, 1909	$32,355.71	$3,682.79	$8,225.16	$44,263.66
July 1, 1909, to June 30, 1910	96,810.33	21,053.22	16,010.30	133,873.85
July 1, 1910, to June 30, 1911	168,416.23	35,248.39	49,957.80	253,622.42
July 1, 1911, to June 30, 1912	166,620.21	37,534.68	55,838.25	259,993.14
July 1, 1912, to June 30, 1913	150,943.79	23,792.02	49,335.91	224,071.72
July 1, 1913, to June 30, 1914	111,240.75	41,015.34	33,704.92	185,961.01
July 1, 1914, to June 30, 1915	17,703.40	14,268.97	.....	31,972.37
July 1, 1915, to June 30, 1916	168.00	1,206.00	.....	1,374.00
July 1, 1916, to June 30, 1917	.....	545.40	.....	545.40
Total	744,258.42	178,346.81	213,072.34	1,135,677.57
Payments under Executive order of Feb. 26, 1913	.....	.....	.....	13,227.62
Payments under Executive order of Mar. 20, 1914:				
Apr. 1, 1914, to June 30, 1914	4,283.82	.....	.....	4,283.82
July 1, 1914, to June 30, 1915	41,871.91	43,017.71	.....	84,889.62
July 1, 1915, to June 30, 1916	32,341.85	33,321.07	.....	65,662.92
July 1, 1916, to June 30, 1917	9,748.10	11,400.95	.....	21,149.05
July 1, 1917, to June 30, 1918	.....	740.18	.....	740.18
Payments under provisions of contracts between Panama Canal and contractors	334.18	.....	.....	334.18
Payments under special acts of Congress	.....	.....	.....	39,418.37
Total	.....	.....	.....	1,365,383.33
Amounts paid to Panama R. R. employees:				
Apr. 1, 1914, to June 30, 1914	770.61	.....	.....	770.61
July 1, 1914, to June 30, 1915	10,275.45	2,300.42	.....	12,575.87
July 1, 1915, to June 30, 1916	9,056.66	3,330.24	.....	12,386.90
July 1, 1916, to June 30, 1917	3,146.70	.....	.....	3,146.70
July 1, 1917, to June 30, 1918	185.98	.....	.....	185.98
Payments made to Panama R. R. Co. for injuries incurred prior to Apr. 1, 1914	.....	.....	.....	614.60
Payments under act of Congress of Sept. 7, 1916:				
Sept. 7, 1916, to June 30, 1917	15,845.04	13,961.57	.....	29,806.61
July 1, 1917, to June 30, 1918	42,396.54	3,848.77	.....	46,245.31
Grand total	.....	.....	.....	1,471,115.91

TABLE No. 51.—*Statement of amounts paid under Executive Order No. 1902, dated Mar. 20, 1914, as compensation to employees injured, and on account of deaths of employees injured, while directly engaged in actual work with The Panama Canal and Panama Railroad Company from July 1, 1917, to June 30, 1918, and statement of amounts paid under act of Sept. 7, 1916, as compensation to employees injured, and on account of deaths of employees injured while in the performance of duty with The Panama Canal and the Panama Railroad Company from July 1, 1917, to June 30, 1918.*

	Payments under act of Sept. 7, 1916.		Payments under Executive order of Mar. 20, 1914.	
	Injury.	Death.	Injury.	Death.
Mechanical	$11,110.25	$308.33		
Supply, quartermaster	934.30			
Supply, subsistence	64.02			
Building	2,798.66	720.71		
Fortifications	743.26			
Health	193.90	690.17		
Dredging	1,530.64			
Municipal engineering	1,239.34	466.22		
Police and fire protection	346.61			
Electrical	302.61			
Locks	4,614.60			
Marine	215.03	1,110.27		$740.18
Superintendent, Panama Railroad	507.10			
Transportation, Panama Railroad	4,032.35		$185.98	
Receiving and forwarding agency	3,390.83	322.79		
Balboa agency	63.42			
Coaling plant	3,978.13			
Engineer of docks	60.41			
Commissary	807.49			
Pasture clearing	5,327.96	230.28		
Plantations	105.41			
Meteorology and hydrography	16.89			
Director of posts	13.33			
	42,396.54	3,848.77	185.98	740.18

TABLE No. 52.—*Claims for injuries received during period from July 1, 1917, to June 30, 1918, Panama Canal and Panama Railroad employees.*

Period of disability.	Monthly rate of pay.				
	Not more than $40.	Not more than $75.	Not more than $200.	More than $200.	Total.
More than 3 to 30 days	1,042	135	143	7	1,327
More than 30 to 90 days	134	17	16	2	169
More than 90 days to 1 year	28	5	3		36
More than 1 year	18	7	1		26
Total	1,222	164	163	9	1,558

TABLE NO. 53.—*Statement of injuries sustained by employees of The Panama Canal and Panama Railroad Company, July 1, 1917, to June 30, 1918, for which compensation was due or claimed under Executive Order No. 1902, dated Mar. 20, 1914, and the employees' compensation act of Sept. 7, 1916.*

	Department or division.																									
	Mechanical.	Supply, quartermaster's.	Supply, subsistence.	Buildings.	Fortifications.	Health.	Dredging.	Municipal engineering.	Police and fire.	Electrical.	Locks.	Meteorology and hydrography.	Marine.	Executive.	Superintendent, Panama Railroad.	Transportation, Panama Railroad.	Receiving and forwarding agency, Colon.	Receiving and forwarding agency, Balboa.	Coaling plant.	Engineer of docks.	Commissary.	Cattle industry.	Surveys.	Accounting.	Mount Hope borrow pit.	Total
Injuries reported	493	130	16	390	85	60	281	235	9	65	155	2	31	3	72	35	564	6	160	12	167	422	2	10	8	3,413
Claims for injuries:																										
Filed	493	130	16	390	85	60	281	235	9	65	155	2	31	3	72	35	564	6	160	12	167	422	2	10	8	3,413
Approved	214	49	13	182	35	27	104	81	6	26	34	1	17	1	37	20	233	3	66	8	88	244	....	2	4	1,495
Disapproved	10	4	....	13	5	6	9	11	....	3	4	....	2	....	1	3	32	.....	3	....	8	19	....	....	....	133
3 days or under; no allowance	268	75	3	173	45	27	165	142	3	36	117	1	12	2	34	11	281	3	91	4	71	150	2	8	4	1,728
Pending	1	2	....	22	....	....	3	1	....	....	....	....	....	....	....	1	18	.....	....	....	....	9	....	....	....	57
Accidental deaths reported	1	1	....	6	....	....	3	4	1	....	....	....	1	....	2	1	6	.....	2	....	2	5	....	....	....	35
Claims for deaths:																										
Filed	1	1	....	6	....	....	3	4	1	....	....	....	1	....	2	1	6	.....	2	....	2	5	....	....	....	35
Approved	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	.....	.....	....	....	....	1	....	....	....	3
Disapproved	....	1	....	3	....	....	1	1	....	....	....	....	....	....	1	....	1	.....	....	....	....	2	....	....	....	10
Pending	....	....	....	3	....	....	2	2	1	....	....	....	1	....	1	1	5	.....	2	....	2	2	....	....	....	22
Total accidents reported	494	131	16	396	85	60	284	239	10	65	155	2	32	3	74	36	570	6	162	12	169	427	2	10	8	3,448

TABLE No. 54.—*Injuries for the period from July 1, 1917, to June 30, 1918, Panama Canal and Panama Railroad employees.*

Nature of injury.	Noncompensative.	Compensated.				Disapproved.							Total noncompensative.	Total compensated.	Total disapproved.	Total paid annual leave.	Pending.	Total.
	New act, less than 3 days.	Over 3 to 30 days.	Over 30 to 90 days.	Over 90 days to 1 year.	Over 1 year.	Disability commenced 6 months after injury.	Evidence insufficient to establish claim.	Not in performance of duty.	Disability not result of injury claimed.	Failed to give notice, as required by act.	Intention to cause injury to self or another.	Disability caused by willful misconduct.						
Loss of thumb			1											1				1
Loss of 1 finger		1	1											2				2
Loss of more than 1 finger		4	1											5				5
Loss of part of thumb or finger		10	6											16		1		17
Loss of great toe			3											3				3
Loss of other toes		3												3				3
Other permanent disability					1									1				1
Fracture of skull		1												1				1
Fracture of thigh			1	3										4				4
Fracture of arm above elbow			2	1										3				3
Fracture of leg		1	6	5				2						12	2			11
Fracture of patella		1												1				4
Fracture of forearm		5	9	1				2			1			15	3		1	19
Fracture of ribs		6	4									1		10	1	2		13
Fracture of foot	1	14	5	2			1						1	21	1		1	24
Fracture of clavicle			2	1				1						3	1			4
Fracture of lower jaw		1												1				1
Fracture of toes	1	3	3										1	6				7
Fracture of fingers	3	7	8				1	2					3	15	3	5	1	27
Abrasions	119	26	2				1					1	119	28	2	5	1	155
Burns	46	40	8									2	46	48	2	3	1	100
Contusions	513	326	27	1			6	8	4				513	354	18	31	23	939
Hernia		14	3			2	1	3	5	1				17	12	1	2	32
Incisions	49	98	5	1			3	3		1			49	104	7	5	5	170
Infections	14	90	23	1			10	3	2	2			14	114	17	4	8	157
Injury to eyes	87	40	5	1	1		1		2				87	47	3	8	3	148
Lacerations	470	270	30	6	1		11	10			1		470	307	22	12	17	828
Multiple injuries	5	43	8	6	1			5	1	1		1	5	58	8	3	2	76
Punctures	178	62	2				5	2					178	64	7	8	3	260
Multiple slight injuries	27	1					1						27	1	1		1	30
Sprains	61	74	2				3	3					61	76	6	10	7	160
Other temporary disability	154	24	4					4	13				154	28	17	6	3	208
Fatal				1	2			8			1	1		3	10		22	35
Total	1,728	1,165	171	30	6	2	44	56	27	5	3	6	1,728	1,372	143	104	101	3,448

TABLE No. 55.—*Injuries for the period from July 1, 1917, to June 30, 1918, Panama Canal and Panama Railroad employees.*

Character of work at time of injury.	Cause of injury.																										
	Animal kicks, bites, falls from, etc.	Blows of hammer or other object.	Caught between two hard bodies.	Collapse of material.	Contact with gear.	Contact with machinery.	Contact with rough edge of surface.	Contact with sharp instruments, splinters, etc.	Derailment of locomotive or other moving object.	Explosions (boilers, pipes, gases, etc.).	Electric current.	Fall from elevation.	Fall into excavation.	Fall on even surface.	Fall from car, etc., or other moving body.	Hot metals, inflammable or corrosive substance.	Lifting, pushing, pulling.	Operating hand car.	Struck by flying object.	Struck by moving body (engine, cars, etc.).	Struck by falling body.	Struck by swinging or loose object.	Stepping on nails or other sharp instruments.	Using hand tools or simple instruments.	Vapors, gases or poisonous causes.	Other causes.	Total.
Aids to navigation								3																		1	4
Farm and plantations		1	1				1	7				2		4	2				1		1		4			6	30
Building construction, repairing, etc	1	9	38	2	2	8	8	51				33	2	23	4	12	11		21	1	66	8	60	6	4	20	390
Commissary, storehouses, etc	4	6	23	5	1	14	15	48		4		16		18	5	5	12		9	8	55	9	14	5	1	18	295
Docks, quays, wharves, etc		1	3			1		1				1		1		1					1	1	1				12
Drilling and blasting					1									1			1		4		1					1	9
Coaling plant		6	11		1	8	5	6		1	2	24	4	8	1	7	1		7	2	48	11	1	1		11	166
Electrical installation and operation		4	3	1			2		3		6	5	1	4	4	4	4	1	4	3	6		4	2		3	64
Excavation, dry, by hand								1													2		1			4	8
Excavation, dry, by machinery												1								1	4						6
Excavation, wet, dredging, sluicing		1	5				3	1				2		3			1				6		6			4	32
Field repairs to equipment, etc		9	20	1	2	14	15	26	3	3		15	5	32		12	6		12	1	24	19	19	4	4	23	269
Fortifications		3	3	1		1	2	7	2			2		8	2		6	2	4		19	3	9			12	86
Hotels, messes, operation of			2					3						2		1	1				3					4	16
Inspection, checking, field	1											1		1	1						1		1				6
Loading and unloading		7	89	9	5	4	18	27				26	3	13	6	5	37		4	24	207	41	10		1	39	575
Locks and spillways	1	5	19	2		10	8	21	1		1	7	6	9		7	6		8	2	17	9	8	2	1	6	156
Municipal improvements	1	10	27	3		2	14	27	5		1	5	4	19		5	5	3	11	4	28	1	27	3		18	223
Office work, courts, etc								7	1						2											2	12
Plants, manufacturing and repair		47	51	6	3	20	15	21	1	6	1	25	7	23	4	23	16		50	6	109	18	9	9	2	19	491
Policing, fire protection, etc	1	1							5	1					2											2	12
Quarters, operation of												2															2
Sanitation, field work of	1	1					3	11				2	1	7		2	5		3	2	7		7			5	57
Tracks, construction and maintenance			8						7			4		1	1		1	1	2		14	1	1			2	43
Transportation, railway		1	10		1	2	1	3	2			4		4	4	1		1	2	1	3	1	3			12	56
Transportation, water														1												6	7
Transportation, other									1						2			7		2	2	1					15
Other character of work		1	1									2														3	7
Pasture and cattle	10	3	1			1	13	215				5	3	19	3	1			5	2	47	36	24			11	399
Total	20	116	315	30	16	85	123	486	31	15	11	184	36	201	43	86	113	15	147	59	671	159	209	32	13	232	3,448

TABLE No. 56.—*Injuries for the period from July 1, 1917, to June 30, 1918, Panama Canal and Panama Railroad employees.*

Cause of injury.	Nature of injury.																															
	Loss of one finger.	Loss of more than one finger.	Loss of part of thumb or finger.	Loss of great toe.	Loss of other toes.	Fracture of skull.	Fracture of thigh.	Fracture of arm above elbow.	Fracture of leg.	Fracture of patella.	Fracture of forearm.	Fracture of ribs.	Fracture of foot.	Fracture of clavicle.	Fracture of lower jaw.	Fracture of toes.	Fracture of fingers.	Abrasions.	Burns.	Contusions.	Hernia.	Incisions.	Infections.	Injury to eyes.	Lacerations.	Multiple injuries.	Multiple slight injuries.	Punctures.	Sprains.	Other temporary disability.	Fatal.	Total.
Animals, kicks, bites, falls from, etc	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	10	...	...	2	...	3	...	...	1	...	2	...	20
Blow of hammer or other object	...	...	...	17	...	...	...	1	...	...	...	1	...	...	...	...	4	13	...	33	...	2	1	...	30	1	...	...	2	11	...	116
Caught between two hard bodies	...	...	5	...	...	...	1	...	...	...	2	...	...	...	...	...	12	22	...	157	...	5	7	...	81	8	3	...	5	7	...	315
Collapse of material	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	1	...	18	...	1	...	...	1	1	1	...	2	3	...	30
Contact with gear	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	7	...	...	...	1	6	...	16
Contact with machinery	...	4	6	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	27	...	6	4	...	25	5	...	...	1	4	1	85
Contact with rough edge or surface	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	15	...	8	11	...	75	1	1	4	1	3	...	123
Contact with sharp instrument, splinters, etc	1	1	3	...	2	...	...	...	...	...	...	...	...	...	...	...	...	5	...	6	...	112	60	11	217	2	...	59	1	6	...	486
Derailment of locomotive or other moving object	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	14	2	...	...	1	3	1	31
Explosions (boilers, gases, pipes, etc.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	2	1	1	...	...	...	1	...	15
Electric current	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	7	...	...	...	...	2	...	...	...	...	...	1	...	11
Fall from elevations	...	...	...	...	...	...	...	...	2	...	7	6	...	1	...	...	1	8	...	69	7	1	1	1	9	14	6	3	22	22	4	184
Fall into excavations	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	10	...	...	1	...	5	...	...	2	2	12	1	36
Fall on even surface	...	...	...	...	...	...	...	...	2	...	2	2	2	2	...	...	1	9	...	61	5	5	4	7	40	2	8	2	19	27	1	201
Fall from cars, etc., or other moving body	...	...	...	1	...	...	...	...	...	...	1	...	2	...	...	...	...	1	...	16	1	2	1	...	3	2	...	...	5	7	1	43
Hot metals, inflammable or corrosive substances	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	67	1	...	...	1	10	3	...	...	...	...	3	...	86
Lifting, pushing, pulling	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	2	...	21	14	1	...	...	12	...	...	...	34	27	...	113
Operating hand car	...	...	1	...	...	...	...	...	1	...	...	...	1	...	...	...	...	1	...	4	...	...	...	...	3	4	...	...	...	...	...	15
Struck by flying object	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	3	2	16	...	1	4	78	32	...	...	5	...	2	2	147
Struck by moving body, engines, cars, etc	...	...	...	...	...	...	2	...	2	...	1	...	1	1	...	1	1	3	...	23	...	...	1	...	10	6	1	...	...	3	3	59

Struck by falling body	...	1	2	1	1	...	1	3	1	...	1	2	12	...	...	4	2	53	...	299	...	9	19	3	166	18	5	8	25	28	7	671
Struck by swinging or loose object	...	...	1	...	...	1	...	1	2	1	2	1	1	...	...	2	1	8	1	71	1	1	6	13	25	5	1	2	3	8	1	159
Stepping on nails or other sharp instruments	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	6	14	...	17	...	3	166	...	1	...	209
Using hand tools or other sharp instruments	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	7	...	6	1	1	12	...	...	2	...	2	...	32
Vapors, gases, or poisonous substances	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	2	2	...	...	...	...	...	1	...	13
Other causes	...	...	...	1	...	...	...	...	1	...	2	1	2	...	...	...	3	15	6	46	4	4	15	20	35	1	2	5	34	23	12	232
Total	1	6	19	20	3	1	5	5	12	1	19	14	24	4	1	7	27	154	102	922	32	170	155	150	826	73	31	259	158	213	34	3,448

TABLE No. 57.—*Receipts, issues, and transfers of stores and purchases charged to divisions during the fiscal year 1917–18.*

Month.	Receipts by—			Issues by—			Purchases direct to divisions.
	Purchase.	Transfer.	Manufacture.	Issues.	Transfers.	Sales.	
July	$748,094.36	$474,129.59	$33,016.98	$688,980.29	$361,628.22	$82,167.30	$264,236.20
August	555,721.16	402,803.85	121,896.23	846,701.48	257,356.61	90,299.05	221,753.41
September	776,651.53	263,932.24	155,625.47	751,667.15	173,433.11	91,401.33	194,193.60
October	536,258.83	429,329.17	86,403.28	863,049.12	231,524.49	88,949.77	176,087.53
November	518,365.07	375,643.64	62,474.04	1,025,537.63	168,922.99	104,738.91	208,038.71
December	843,838.82	378,797.31	44,453.71	662,059.47	279,523.59	105,657.37	169,856.67
January	960,276.27	340,132.23	42,597.38	696,302.46	261,090.62	143,532.18	120,239.05
February	590,239.58	325,185.73	70,653.94	614,613.34	242,485.17	164,590.87	254,433.12
March	665,290.14	335,810.85	39,808.76	736,139.07	182,317.38	135,789.59	168,398.11
April	956,399.64	362,275.37	25,219.93	667,654.69	216,428.84	147,866.81	222,827.22
May	610,470.42	261,603.55	23,218.53	658,545.97	184,231.37	141,865.01	462,230.79
June	631,371.06	269,981.97	47,663.18	561,942.29	179,636.79	187,991.71	141,175.95
Total	8,392,976.88	4,219,625.50	753,031.43	8,773,192.96	2,738,579.18	1,484,849.90	2,603,470.36

Regular stock in storehouses July 1, 1917	$6,048,984.70	Regular stock in storehouses July 1, 1918	$6,747,688.26
Material in hands of divisions July 1, 1917	614,474.39	Material in hands of divisions July 1, 1918	1,077,438.31
Obsolete material credited to assets July 1, 1917	217,110.25	Obsolete material credited to asset accounts July 1, 1918	223,002.93

TABLE No. 58.—*Comparative statement of store balance, July 1, 1917, and July 1, 1918.*

Quartermaster store (by comm.).	July 1, 1917.	July 1, 1918.
Comm.		
1. Air-brake material	$32,070.04	$27,613.59
2. Alcohol	8,063.52	9,320.82
3. Alum and other chemicals for filtering water	58.36	17.55
4. Arms and ammunition	.....	[1] 12.97
5. Asbestos and magnesia and compounds	2.25	1,127.15
6. Asphalt, petroleum residue and mineral tar, pitch and rosin	2,371.59	7,184.00
7. Blocks, chain and tackle	8,411.48	9,675.53
8. Boilers, steam	372.55	1,912.74
9. Bolts, nuts, rivets, and washers	155,659.91	123,405.21
10. Books, educational, library, and reference	.....	[1] 11.72
11. Bricks, building, fire and paving	11,303.99	6,170.69
12. Brooms, mops, dusters, and scrub brushes	5,703.12	13,124.52
13. Building material (not otherwise specified)	36,396.67	22,653.68
14. Buoys	366.40	780.70
15. Cars, hand, push, and inspectors', and velocipedes	2,363.72	1,628.29
16. Castings, rough—brass and copper	46,793.05	47,334.48
17. Castings, rough—iron and steel	104,452.56	87,274.82
18. Cement, Portland (including bags)	48,316.34	40,988.02
19. Chain	15,754.41	21,964.48
20. Cleanings and toilet supplies	10,594.99	29,354.60
21. Construction equipment, accessories and supplies	95,899.91	96,219.91
22. Containers, nonexpendable (except cement bags)	52,377.52	75,412.08
23. Conveying and lifting equipment, accessories and parts	113,189.56	112,099.39
24. Diving outfits and parts	.....	[1] 130.59
25. Drafting supplies	201.70	289.39
26. Drugs, chemicals, vaseline, naphtha, and benzine	65,941.91	68,103.94
27. Educational supplies	.....	[1] 45.35
28. Ejectors, injectors, lubricators, pop valves, blow-off cocks, water gauges and parts	43,933.66	48,026.42
29. Electrical equipment, accessories and parts (ex lock machinery)	256,272.39	283,809.81
31. Electricians' supplies (not otherwise specified)	61.73	1,168.92
32. Engines, steam, and parts	3,379.00	6,443.15
33. Explosives and blasting batteries and parts	60,144.55	24,634.92
34. Farm, plantation, and cattle ranch implements, supplies and parts	892.68	8,466.06
35. Fire preventing and fire-fighting equipment, supplies and parts (not hose)	994.93	2,966.12
36. Fittings, pipe and valve	140,121.29	149,957.38
37. Flags, (railroad excluded)	376.70	1,948.74
38. Floating equipment	.....	[1] 92.99
39. Floating equipment, parts for	707,062.89	821,901.45
40. Forage, feed, and bedding	3,725.62	[1] 609 01
41. Fuel, coal, anthracite	6,239.68	274.63
42. Fuel, coal, bituminous	[1] 37,283.65	5,670.45
43. Fuel, crude oil	107.30	[1] 1,700.99
44. Furnace and foundry supplies (except pig iron)	101,775.48	55,420.42
45. Furniture and equipment (office) and parts	4,735.65	4,548.46
46. Furniture, other than office	27,319.49	16,261.01
47. Gasoline	58,070.08	101,077.15
48. Gauges, steam and vacuum	894.99	1,042.55
49. Glass, window, sash and plate	9,238.75	15,760.37
50. Glue, gelatin, rubber, and asbestos cement	1,998.89	8,502.39
51. Hair, feathers and moss	428.60	2,152.85
52. Hardware (except nails and spikes)	154,151.91	245,016.30
53. Harness, saddlers', and other corral equipment and supplies	5,079.47	6,623.38
54. Hose	37,147.50	79,710.40
56. Instruments, equipment, and supplies, surgical, medical and laboratory	[1] 7,003.43	1,797.36
57. Iron, in pigs	[1] 1,433.59	29,416.11
58. Iron and steel, in bars and sheets (ex galvanized iron roofing)	639,471.81	715,916.26
59. Iron and steel, reinforcing	162,401.48	30,843.78
60. Ladders and scaffolds	312.89	429.64
61. Laundry apparatus, accessories and parts	2.70	[1] 9.42
62. Lawn mowers and rakes (other than hand-operated)	.....	80.79
63. Leather and belting	13,816.36	10,233 46
64. Lime, plaster, and clay	2,634.10	6,838.22
65. Live stock and poultry	.....	1.65
66. Lumber, pine, fir, and redwood	443,767.38	453,853.92
67. Lumber, fancy	59,325.35	65,441.69
69. Metals, in pigs (excepting iron)	3,636.75	10,984.94
70. Metals, in sheets and bars (excepting iron) and steel	78,011.42	117,008.85
71. Meters, current, and parts	3,811.13	4,926.85
72. Meters, water, oil, and air	1,119.23	902.95
73. Nails and spikes	49,569.18	39,803.44
74. Office supplies and stationery	3,825.33	4,198.54
75. Oilcloth and linoleum	359.98	4,756.34
76. Oils, illuminating	[1] 73,511.00	22,366.64
77. Oil, lubricating, and greases, graphite, welding and cutting compounds	34,937.46	36,656.61
78. Packing, calking, and gaskets	38,462.62	55,816.62
79. Packing receptacles (expendable) and other packing supplies	443.18	[1] 18.38
80. Paints and painter's supplies, putty, varnishes, shellacs, linseed oils, dryer, filler, white and red lead, etc	190,842.46	289,583.89

[1] Indicates credit balances caused by credit to storehouses for issues of these articles, the charges for which were not received until after closing of books for current fiscal year.

TABLE No. 58.—*Comparative statement of store balance, July 1, 1917, and July 1, 1918*—Continued.

Quartermaster store (by comm.).	July 1, 1917.	July 1, 1918.
Comm.		
81. Paper, packing	[1] $323.60	$1,355.62
82. Paper, printing	.....	[1] .35
83. Photographic supplies and parts	.....	[1] 16.14
84. Piling	1,212.71	1,608.65
85. Pipe and fitting (vitrified)	6,514.82	8,831.28
86. Piping and tubing (metal)	178,787.90	150,803.80
87. Plumbing material (not otherwise specified)	35,039.41	43,243.60
88. Police equipment (except arms and ammunition)	.....	47.35
89. Polishing and abrading supplies	7,205.04	4,573.18
90. Printing plant equipment and supplies (not including paper)	306.59	458.31
91. Production equipment, accessories, and parts	49,336.74	55,498 24
92. Pumps and parts, including electric	22,603.35	22,888.40
93. Rails	540.78	13,729.76
94. Recreational equipment and parts	663.96	640.12
95. Refrigerating equipment, accessories, and parts	1,109.89	4,851.93
96. Refrigeration supplies	196.64	127.24
ROLLING STOCK, PARTS FOR.		
106. Locomotives	65,625.93	69,095.27
107. Freight and passenger train cars	216,993.33	220,706.72
108. Motor cars, railroad	4,796.42	6,825.51
109. Rope	72,988.12	102,863.09
110. Rubber products (except packing and belting and tires)	457.44	219.15
111. Sashes, doors, blinds, molding, and capping, screening, strips, etc.	12,263.57	17,597.53
112. Scales and parts	562.80	659.05
113. Scientific equipment and parts (except surgical and surveying)	1,419.01	1,124.15
114. Screening, bronze and copper	18,834.91	18,361.27
115. Searchlights and lighthouse equipment and supplies	614.80	3,031.63
116. Signal material (automatic)	10,817.20	12,371.40
117. Stone, sand, gravel, and slate	86.36	[1] 23.65
118. Subsistence equipment	15,291.33	22,686.07
119. Subsistence supplies	400.34	[1] 115.49
120. Surveying instruments and supplies	1,041.11	839.42
121. Tanks	1,450.00	369.07
122. Telegraph and telephone equipment, accessories and parts	13,877.54	26,785.31
123. Tents and parts, flies and tarpaulins	1,393.93	4,761.73
124. Thermometers and barometers	610.87	885.86
125. Ties, cross and switch	2,329.42	15,130.69
126. Tiles, building	5,326.98	14,105.97
127. Tools, miscellaneous	69,758.49	82,954.62
128. Tools, pneumatic and electric	30,706.36	33,359.91
129. Track material (other than rails and ties)	20,570.75	28,545.65
130. Trucks, warehouse, etc	522.40	571.73
131. Tubes, boiler and condenser	40,287.68	65,686.18
132. Vehicles, animal-drawn, accessories and parts	3,093.37	4,530.10
133. Vehicles, motor-drawn bicycles, accessories and parts (railroad motor cars and fire equipment excluded)	30,933.47	42,687.25
134. Waste	12,446.05	11,675.34
135. Water cranes and standpipes	.....	117.50
136. Wearing apparel and sewing supplies	1,236.09	2,277.75
137. Wire and wire cables	130,246.45	140,172.54
138. Wire, covered and coated	110,784.09	180,193.77
139. Woven products and fabrics	11,344.50	129,158.88
140. Steel, structural	107,104.39	3,607.68
141. Lock machinery and parts	164,007.82	1,682.98
143. Obsolete material	50,973.42	42,099.01
144. Fortifications equipment	[1] 54.00	.....
147. Native lumber	.....	6,619.28
148. Concrete blocks for breakwater repairs	.....	40,498.34
149. Oil, Diesel	.....	226.23
Total Quartermaster stores	5,583,674.89	6,257,851.51
Miscellaneous district quartermasters' stores	8,006.07	5,862.31
Fuel-oil store	273,473.73	264,988.99
Medical store	88,717.49	114,635.74
Stationery store	15,539.35	18,972.41
Printing Plant	80,580.17	85,377.30
Total	6,048,984.70	6,747,688.26

[1] Indicates credit balances caused by credit to storehouses for issues of these articles, the charges for which were not received until after closing of books for current fiscal year.

TABLE No. 59.—*Supply department, commissary branch, cost of material and supplies purchased and sold during the year ended June 30, 1918.*

Class.	On hand June 30, 1917.	Purchases.[1]	On hand June 30, 1918.	Sold.
Groceries	$946,811.46	$2,643,679.55	$827,466.66	$2,763,024.35
Hardware	126,118.23	237,236.97	127,129.56	236,225.64
Dry goods	905,564.80	768,349.43	720,879.68	953,034.55
Boots and shoes	265,118.95	270,924.70	214,269.80	321,773.85
Cold storage	167,651.31	1,347,049.31	114,702.98	1,399,997.64
Tobacco	52,574.18	302,223.34	33,603.46	321,194.06
Raw material	244,478.02	2,616,746.53	357,336.33	2,503,888.22
Total	2,708,316.95	8,186,209.83	2,395,388.47	8,499,138.31

[1] Includes cattle, hogs, and poultry in amount of $1,738,854.65.

PERCENTAGE OF SURCHARGE EARNED ON COST.

Class.	Sold.	Earned surcharge.	Percentage earned on cost.
Groceries	$2,763,024.35	$334,020.59	12.09
Hardware	236,225.64	48,581.30	20.57
Dry goods	953,034.55	347,629.65	36.48
Boots and shoes	321,773.85	65,605.47	20.39
Cold storage	1,399,997.64	453,783.45	32.41
Tobacco	321,194.06	163,086.83	50.77
Raw material	2,503,888.22	.....	.....
Total	8,499,138.31	1,412,707.29	23.56

LOCATION OF PURCHASES.

United States	$5,429,445.74
Foreign	201,152.80
Local	571,661.57
Central and South America	1,870,999.17
Panama Canal	112,950.55
Total	8,186,209.83

CLASSIFICATION BY COMMODITIES.

Groceries	$2,643,679.55
Dry goods	768,349.43
Hardware	237,236.97
Boots and shoes	270,924.70
Cold storage	1,347,049.31
Tobacco	302,223.34
Raw material	2,616,746.53
Total	8,186,209.83

TABLE No. 60.—*Supply department, commissary branch, statement showing distribution of sales and selling value for the year ended June 30, 1918.*

	1917	1918	Increase.
To United States Government	$1,477,726.07	$2,332,333.22	$854,607.15
Panama Canal	1,358,107.61	1,216,769.72	141,337.89
Steamships	381,602.46	570,722.95	189,120.49
Panama Railroad	265,931.48	433,679.25	167,747.77
Individuals and companies	183,955.93	285,220.43	101,264.50
Employees, for cash	4,872,467.36	5,389,777.49	517,310.13
Cash sales	9,130.22	11,200.31	2,070.09
Gross revenue from sales	8,548,921.13	10,239,703.37	1,690,782.24
Supplied for equipment:			
Commissaries for expense	174,179.01	167,065.76	7,113.25
General expense	894.32	1,114.18	246.86
Plants for expense	55,748.11	85,727.82	29,979.71
Total	230,821.44	253,934.76	23,113.32
Loss by condemnation, shrinkage, etc	124,520.93	117,837.87	6,683.06
Loss by clerical errors, pilfering, etc	77,479.47	30,684.56	46,794.91
Total	202,000.40	148,522.43	53,477.97
Grand total	8,981,742.97	10,642,160.56	1,660,417.59

APPENDIX H.

REPORT OF THE EXECUTIVE SECRETARY, EXECUTIVE DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE, *September 10, 1918.*

SIR: This report covers the work of the executive department and includes, in addition, a statement of the business transacted by the Canal Zone courts, which, for administrative purposes only, are considered in the executive department.

ORGANIZATION.

The organization has been continued without change from that of the last fiscal year; and the work of the department handled with an average working force as follows, the 1917 report being included for purposes of comparison:

	Gold roll—	
	As of June 30, 1917.	As of June 30, 1918.
General bureau	16	16
Timekeeping bureau	48	42
Personnel bureau	11	12
Record bureau	23	24
Correspondence bureau	22	22
Property bureau	15	15
Bureau of statistics	5	5
Bureau of clubhouses	9	14
Motor cars	3	3
Joint commission	4	4
Special attorney	5	5
Police and fire division	195	174
Division of civil affairs	61	113
Division of schools	56	65
Courts	14	14
Total	487	528

The addition in force is mainly due to the establishment of a censorship bureau under the division of civil affairs, with an increase in the number of customs inspectors. In the division of schools, 13 more teachers were employed than last year. The greatest reduction in force was due to the withdrawing of the special police details at the locks, this work having been taken over by the Army. A large number of authorized positions within the department remain unfilled, largely due to inability to secure the employees; this is particularly true of the classified civil service positions. The department, in common with all others of The Panama Canal, has been handicapped by employees entering the military service.

Special Work.

It had been for some time evident that the work of the bureau of clubs and playgrounds could be improved with a special effort made to determine its most urgent requirements and adjust such points of local inefficiency as might be found to exist. Accordingly, a special representative of this department was delegated to assume charge of all clubs and playgrounds with their allied activities and to report special conditions which needed improving. A summary of this investigation is included in the separate report of bureau of clubs and playgrounds.

Adjustment of the wage scale has required more attention than ever because of the changes in the States. The more important adjustments have been:

Mechanical trades, July 1, September 24, November 16, 1917, and May 1, 1918.
Building trades, July 1, 1917.
Railroad employees, January 1, 1918.
Other employees such as clerks, foremen, draftsmen, etc., July 1, 1917.
Routine adjustments due to changes in the work from time to time during the year.

The work in this connection has been to obtain and compile data of wages in the United States for work comparable with that on the Isthmus, and to coordinate classes of positions in the canal service.

Two general advances in the pay of silver employees were made, effective on October 1, 1917, and May 1, 1918, the hourly rate being increased one cent each time, and the monthly rate $2.50. These increases were the results of recommendations of boards on silver rates of pay appointed by the Governor to investigate and report upon the living conditions of silver employees, who had presented petitions for increases in pay to enable them to meet the increased cost of living. A large amount of data was collected and compiled for these wage adjustments.

During the campaigns to promote the sale of first, second, and third Liberty loans, and the two drives to promote subscriptions to the Red Cross funds, an employee of this department spent most of his time on publicity work, such as preparation of news articles for publication, distribution of advertising matter, and work among the several subcommittees.

Owing to the necessity for withholding information which might be useful to the enemy, much of the statistical matter, dealing with canal navigation and commodities, heretofore published or sent to correspondents, has been withheld. Publication of The Panama Canal Record was continued, but to save labor and paper, it is being conducted strictly as a bulletin for official announcements.

Statistics of birth, disease, and death, have been kept and published. Commencing January, 1918, the publication of monthly reports of the chief health officer was discontinued and quarterly reports are now issued instead. The records of vital statistics that have accumulated since 1904 are being compiled, indexed, and bound into volumes so that they will be easily available and not liable to loss.

Statistics have been kept of the costs of certain standard articles of food sold in the Panama Railroad commissaries, as compared with

the cost of similar products in the United States, based upon the figures compiled by the bureau of labor statistics of the United States Department of Labor. Statements of these costs have been published in The Panama Canal Record from time to time.

A study was made of labor conditions at the Cristobal docks; and after an investigation extending over five weeks a system of classification and registration of the dock laborers was devised which has resulted in (*a*) increasing the average earnings of the dock employees, (*b*) decreasing the number of names appearing on the pay rolls, (*c*) a system of positive identification of employees, and (*d*) insuring an equal chance for employment to registered employees, and preference over unregistered men.

In the latter part of June, 1917, arrangements were made with the State Department for the issuance by the executive office of identification certificates for canal employees and their families, and other civilians residing on the Isthmus, in lieu of regular passports for traveling to the United States. Since that date over 4,000 such certificates have been issued.

With the outbreak of war, admission to the various areas in the Canal Zone was restricted to employees and others having business therein, and a system of permits, with a photograph of the holder, was inaugurated. For the calendar year 1917 approximately 2,000 such permits were issued; and for 1918 to date about 2,500 permits have been issued. Arrangements are being completed for issuing photo-metal checks, similar to those used by munitions plants and navy yards, for all employees of the Government on the Isthmus, and outsiders having business within certain areas. These will take the place of restricted area permits, and provide a positive means of identification for all persons entering restricted areas.

An experienced librarian has been secured from the United States and plans are being made to improve and coordinate all the library facilities on the Isthmus. The Panama Canal library, established for the official use of The Panama Canal in 1914, will be used as the central library, and branches will be established in the various clubhouses.

Working Force.

Statements of the working force have heretofore been published in the annual report of the chief quartermaster; but are now published in this report because the time rolls and personnel work are all done in the executive office. Tables following give details of the force for the fiscal year, and comparison by years since 1906.

TABLE No. 1.—*Force actually at work on June 19, 1918.*

Department or division.	Monthly.	Silver employees' wages specified in United States currency.																	Total.		Grand total.
		Artisans.						Laborers.											Silver.	Gold.	
		Special.	24 cents.	22 cents.	21 cents.	20 cents.	18 cents.	18 cents.	17 cents.	16 cents.	15 cents.	13 cents.	12 cents.	11 cents.	10 cents.	9 cents.	7 cents.	Task.			
Operation and maintenance:																					
Office	39	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	41	29	70
Building division	196	.....	352	.....	467	.....	290	.....	.....	265	354	.....	.....	.....	.....	6	4	3	1,937	249	2,186
Electrical	20	.....	20	.....	60	.....	107	.....	.....	22	74	.....	.....	.....	.....	1	.....	.....	364	159	553
Municipal engineering	347	.....	91	.....	146	.....	115	12	.....	322	482	.....	.....	.....	.....	23	13	23	1,574	71	1,645
Lock operation	439	.....	7	.....	34	.....	19	.....	.....	30	83	.....	.....	.....	.....	2	.....	.....	614	121	735
Dredging	834	.....	19	1	55	10	63	.....	.....	252	21	.....	.....	.....	.....	1	.....	.....	1,256	130	1,386
Mechanical	145	33	66	.....	203	.....	506	.....	.....	390	138	.....	.....	.....	.....	2	1	.....	1,484	641	2,125
Marine	250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	283	95	378
Fortifications	72	2	42	.....	47	2	26	.....	.....	119	9	.....	.....	.....	.....	1	2	16	338	34	372
Total	2,402	36	597	1	1,012	12	1,127	12	.....	1,400	1,161	.....	.....	.....	.....	36	20	75	7,891	1,559	9,450
Supply department:																					
Quartermaster	828	21	88	.....	68	.....	59	3	.....	115	558	.....	.....	.....	.....	3	3	3	1,749	102	1,851
Subsistence	380	.....	2	.....	1	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	386	19	405
Commissary	1,089	.....	5	.....	8	5	14	.....	8	4	80	1	16	213	61	.....	.....	.....	1,504	194	1,698
Cattle industry—Plantations	259	171	17	.....	1	.....	4	.....	.....	3	100	.....	.....	.....	.....	1	1	.....	557	30	587
Accounting	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	201	214
Health	424	51	5	.....	7	10	5	.....	.....	31	378	.....	.....	.....	.....	.....	1	.....	912	196	1,108
Executive	136	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	137	464	601
Panama Railroad:																					
Superintendent and coaling stations	387	.....	111	6	45	.....	.....	645	.....	25	273	.....	.....	.....	.....	13	9	.....	1,514	131	1,645
Transportation	225	.....	.....	.....	.....	2	.....	.....	.....	3	9	.....	.....	.....	.....	.....	.....	.....	239	145	384
Receiving and forwarding agent	92	38	21	28	.....	10	.....	45	.....	415	606	.....	.....	.....	.....	.....	.....	.....	1,255	67	1,322
Grand total	6,235	317	847	35	1,142	39	1,209	705	8	1,999	3,165	1	16	213	61	53	34	78	16,157	3,108	19,265

TABLE No. 2.—*Force reports by months, fiscal year 1917–18.*

Year and month.	The Panama Canal.		Panama R. R. Co.		Grand total.
	Gold.	Silver.	Gold.	Silver.	
1917.					
July	3,186	17,152	369	4,276	24,983
August	3,092	16,407	369	3,396	23,274
September	3,071	16,182	364	3,789	23,406
October	3,117	16,113	359	4,236	23,825
November	3,152	15,643	360	2,197	21,352
December	3,151	16,176	360	2,900	22,587
1918.					
January	3,108	16,271	355	3,431	23,165
February	3,128	15,597	362	2,925	22,012
March	3,117	15,258	360	2,392	21,127
April	2,963	14,270	356	2,900	20,939
May	2,824	13,513	335	2,655	19,327
June	2,765	13,149	343	3,008	19,265

TABLE No. 3.—*High and low force records, December, 1906, to June 30, 1918, by fiscal years.*

	The Panama Canal.			Panama R. R.	Total Panama Canal and Panama R. R.
	Gold.	Silver.	Total.	Gold and silver.	
1906.					
December	3,881	15,604	19,485	4,416	23,901
1907.					
October	4,992	20,836	25,828	6,139	31,967
January	4,033	16,987	21,020	4,796	25,816
1908.					
April	4,950	21,168	26,118	7,052	33,170
November	4,161	19,803	23,964	5,863	29,827
1909.					
October	4,376	23,411	27,787	7,618	35,495
January	4,295	20,583	24,878	6,393	31,271
1910.					
March	4,553	26,284	30,837	7,829	38,676
December	4,705	24,383	29,098	6,044	35,142
1911.					
December	4,420	25,439	29,859	7,967	37,826
June	4,292	21,795	26,087	6,603	32,690
1912.					
January	4,332	25,818	30,150	8,024	38,174
August	4,122	24,860	28,982	5,855	34,837
1913.					
August	4,087	30,918	35,005	4,957	39,962
December	3,744	23,209	26,953	5,195	32,148
1914.					
January	3,944	23,824	27,768	5,502	33,270
June	3,790	21,499	25,289	4,343	29,632
1915.					
July	4,198	22,846	27,044	5,314	32,358
February	3,088	17,023	20,111	2,978	23,089
1916.					
July	3,208	17,982	21,190	5,349	26,539
September	3,129	17,160	20,289	2,447	22,736
1917.					
January	3,552	17,989	21,541	4,453	25,994
June	3,229	16,381	19,610	3,368	22,978
1918.					
July	3,186	17,152	21,338	4,645	24,983
June	2,763	12,798	15,561	3,067	18,628

NOTE.—Figures do not include contractor's forces. If taken into consideration, the greatest working force ever reported was 44,733, on Mar. 26, 1913.

Bureau of Clubs and Playgrounds.

The activities of this bureau were continued without material change. Clubs for gold employees were maintained at Cristobal, Gatun, Paraiso, Pedro Miguel, Ancon, and Balboa; and for silver employees at Cristobal, Gatun, and La Boca, with substantially an unchanged personnel. Athletic activities have been carried on as well as possible with the facilities at command.

The stadium erected at the athletic field at Balboa last year has amply demonstrated its utility. Attendance at the ball games has been the largest in the history of baseball on the Isthmus. The field and stadium have been used by all the leagues, and other organizations identified with baseball; likewise for various patriotic demonstrations and Army maneuvers. At nearly all the ball games and other events here the Army and Navy have contributed greatly in spectators, participants, and with music furnished by regimental bands. The club houses have been the chief means of harmonizing civilian and military life on the Isthmus.

Various social organizations which have had their inception in the clubhouses and have utilized them as their centers have continued this practice, not a few of them having this year utilized their efforts in support of war activities connected with the Red Cross and similar movements.

Entertainments have been given by local companies and by a few professional entertainers who chanced to be en route to other places. Moving-picture exhibitions are held in all of the clubhouses several times a week, at Balboa and Gatun every night, at Cristobal, Ancon, and Pedro Miguel four times a week, and the service has been increased both in quality and number of films. All entertainments are open to the men of the Army and Navy, and in consequence the halls have frequently been inadequate for the crowds that wish to attend. The moving pictures have been used freely in arousing patriotic spirit, and in promoting Red Cross and liberty loan subscriptions.

The clubhouses are the social centers of the peculiar life of the Canal Zone, in which the ordinary political and social activities of American communities can not flourish. During construction days they were indispensable, although mainly designed for the use of the male members of the community. Changed conditions make it necessary to adapt them now to the use of men and women of the canal force and to the thousands of men in the military forces on the Isthmus. There is no substitute for the clubhouse.

To meet the increased demand for schools adequate commissaries, etc., suitable structures have been provided. It is imperative that our clubhouses receive similar consideration. Since their construction practically the only physical changes made in the clubhouses have been the remodeling and enlargement of the old building at Ancon, and the reconstruction with slight architectural changes of the Balboa clubhouse. The buildings are old, of wood construction, inadequate in size, arrangement, and equipment for the handling of the number of people now dependent upon them. An order barring the military from both the cities of Colon and Panama has resulted in the clubhouses both at those points and along the line being greatly overtaxed and their inability to render either to the civil or

the military patrons the attention due them. The clubhouses have been in a large measure self-sustaining; they could, with suitable buildings and equipment, be made still more so. The estimate for 1919–20 includes the specific improvements thought necessary for immediate consideration.

Table No. 48 of the auditor's report presents a summary of the financial transactions of the clubhouses for the fiscal year.

Division of Civil Affairs.

BUREAU OF POSTS.

The number of post offices in operation (16) remained unchanged during the year. Of this number 14 are money-order offices.

Total receipts for the year were $142,741.41, an increase of $31,588.40 over the previous year's business. The excess of disbursements over receipts was $22,128.36, as compared with $46,753.02 for the last year. Increase in disbursements is largely due to added cost of transportation of mail and greater purchase of postage stamps. The increase of these two items, directly due to increased business, was $5,241.04. The 40 per cent subsidy to the Panaman Government on sales of postage stamps amounted to $34,007.76. Total revenues from the postal service, including box rents, payments from the Panama Railroad Company, from the Panaman Government for transportation of its mail between Panama and Colon, and from the United States Post Office Department for handling United States transit mails were $145,231.81, as compared with $110,741.41 for the preceding year.

There were 167,504 money orders issued during the year, amounting to $3,372,973.55, on which fees amounting to $11,918.35 were collected. A decrease of 5,971 orders exists in comparison with last year's business, with a decrease of $409,790.16 in the amount issued, and $452.93 in the fees collected. Many of these were deposit money orders on which no fee was collected. June 30 there was on deposit $1,097.15 in the form of unpaid money orders drawn on Canal Zone post offices in favor of remitters.

Deposit money orders issued during the year totaled $1,244,335; payments on deposit money orders for the same period aggregated $1,441,225, leaving a balance of $499,490 on deposit June 30. Old postal savings accounts previously turned over to the auditor for direct payment have been reduced to an unpaid balance June 30 of $509. Deposits have been considerably reduced during the year, due to subscriptions by depositors to liberty bonds and war savings stamps. On June 30, 1917, these deposits amounted to $1,053,246.10, and on June 30, 1918, to $501,096.15. Interest on deposit money orders amounting to $8,440.71 was paid during the fiscal year, as compared with $1,813.93 for the previous year.

The registry division of the post offices did a largely increased business this year as compared with last. A total of 266,867 parcels and letters were handled, 130,894 being dispatched and 135,973 received. Ancon and Cristobal, as exchange offices, handled 181,810 "registers," an increase of approximately 200 per cent over last year, this increase being largely due to the rerouting of mail through the Cristobal office intercepted on account of censorship.

Fifteen thousand six hundred and twenty-nine parcels of mail matter containing materials imported to the Isthmus by employees of the United States Government were received, as compared with 13,938 for the previous year. Customs duties in the amount of $15,-461.77 were collected by the Republic of Panama on mail parcels received for nonemployees and on dutiable articles received by employees. Similar duties for the preceding year amounted to $10,633.96.

The office of the director of posts issued 1,308 duplicates of lost or stolen money orders, investigated 136 cases of losses and nondelivery of registered mail, undertook special investigations for the United States Post Office Department of mail in transit through the Canal Zone, made 18 inspections of post offices, and issued 72 numbered circulars of instructions to postmasters.

Numerous arrests were made during the year for misuse of the mails, including the misuse of canceled postage stamps, false personation in attempt to cash money orders, fraudulent use of the mails in violation of section 1707, Postal Laws and Regulations, sending obscene matter through the mails. Six arrests were made for rifling mail aboard United Fruit Co.'s steamers while in port at Cristobal. Five convictions were assured. Three convictions resulted from the prosecution of cases tried during the year on arrests made the previous year for similar offenses. Four violations of the Postal Laws and Regulations occurred by sending lottery matter through the mails. Six cases were reported of misuse of the official business penalty envelope, which practice is prevalent and difficult to stop unless drastic action is taken.

During the latter part of June a change was effected in the handling of mail for ships in transit. Previously all mail for such ships had been delivered by the boarding officer of the customs service. At present such mail is gathered from the different steamship agencies, consulates, and the Colon and Panama post offices, forwarded to Gatun and Pedro Miguel post offices, and from these points delivered to the boarding inspectors or pilots on the ships as they are passing through the locks. An improved service is made possible in this manner; reports are received three times daily of the movements of the ships, and by the concentration of mail at one place there is little possibility of its missing connection with the ships.

On account of the censoring of mail, the bureau of posts during December, 1917, took charge of the handling of mails entering and dispatched from the Canal Zone. Three countries of Central America and all countries of the west coast of South America maintain postal agencies in the city of Panama; and although the mail is consigned to the respective agencies, their handling of it is symbolical only. The actual work is done by this bureau and all mail recorded on transit waybills. During the period ended June 30 approximately 11,000 sacks were handled, affording a much better service than previously existed, and much preferable to steamship lines conveying the mail to destination. It is considered a logical solution to establish one agency on the Isthmus, under the direction of this bureau for the receipt and dispatch of all mail coming into the Canal Zone.

BUREAU OF CUSTOMS.

There has been a large increase in shipping at canal ports during the fiscal year. The total number of vessels entered was 4,447, the total number cleared, 4,443; as compared with 3,718 entered and 3,721 cleared the previous year. This increase in shipping has resulted in a considerable amount of extra work, further supplemented by the war restrictions prevailing. It has been possible to handle the business with the addition of but one inspector to the regular force.

Only 447 prohibited aliens arrived on the Isthmus during the year, 255 at Balboa and 192 at Cristobal. Of this number, 223 were admitted to the Republic of Panama by authority of that Government; the others proceeded to their ultimate destination or were returned to the port of embarkation. The Governor's circular 714–1, issued April 25, 1917, charges this bureau with the exclusion of Chinese under the President's Executive order of February 6, 1917. In compliance with this regulation it is customary to check the number of Chinese members of crews before a ship leaves a Canal Zone port, and 207 crews were so checked during the year.

Seven arrests were made during the year for attempted smuggling, resulting in six convictions and one acquittal. It is thought that attempts to smuggle opium through the Canal Zone into the Republic of Panama have been reduced to a minimum; as only two arrests were made for this offense this year, in spite of constant vigilance on the part of this bureau. A considerable quantity of opium was discovered among some incoming freight; but the name of the consignee was fictitious and the consignment was not called for. All confiscated drugs are delivered to the health department.

Under the provisions by which employees of the United States Government are allowed the free entry of goods imported by freight or express for their own use, this bureau, for the executive secretary, approved 1,381 requests for the free entry of such shipments, as compared with 2,533 for the previous year.

The work of household inspection of goods belonging to either Panama Canal employees or Army officers returning to the States has been exceptionally heavy this year; due to the large number of transfers of Army officers to the States as well as those employees of The Panama Canal who have resigned and returned to their homes, or entered the naval or military service. Certification by this bureau of invoices covering shipments from the Canal Zone to the States was in excess of last year in the amount of such invoices; collections for this service having been $1,167.50 covering 1,288 invoices as against 1,169 last year. Merchandise arriving at either of the canal ports for delivery within the Republic of Panama is released to the Panaman officials upon receipt of necessary papers showing the payment of duty on such merchandise. Permits for 5,690 such releases were granted at Cristobal during the year, and 10 releases at Balboa, where the greater part of such cargo is forwarded by railroad to Panama, at which point it is taken in charge by the Panaman customs officials.

SHIPPING COMMISSIONER.

The assistant chief of the division of civil affairs, acting as shipping commissioner, with the chief customs inspectors as deputy

shipping commissioners, have in addition to their other duties, charge of signing on and discharging of American seamen, the settlement of disputes between the masters and members of such crews regarding wages, advances, fines, and general treatment. Frequent changes of routing, due to war conditions involving the changing of shipping articles have created a good deal of additional work. There were 2,638 seamen shipped on American vessels, and 2,549 discharged, as compared with 3,745 shipped and 3,430 discharged the previous year. The decrease is principally due to a change in policy of the United Fruit Co. at Cristobal, which formerly carried considerable numbers of laborers between Cristobal and their loading ports at Bocas del Toro and Port Limon. As these men were not passengers, it was necessary to sign them on as members of crews. The Fruit Co. has discontinued this practice and now obtains its laborers at the ports where cargo is shipped.

Seamen's wages were received for deposit at the port of Balboa during the year amounting to $5,293.31, of which all but $320.91 was disbursed. At Cristobal $13,300.55 were received and a balance of $1,009.23 remained on hand June 30.

ADMINISTRATION OF ESTATES.

A slight increase occurred this year as compared with last, in the number of estates referred to this bureau for settlement. There were 199 estates of deceased and insane employees of The Panama Canal and Panama Railroad Company administered, and 35 in the course of settlement, June 30. Of the 199 estates settled, 112 were delivered to the consular or diplomatic representatives in the Republic of Panama or the United States, of the countries of which the deceased or insane persons was a citizen or subject; 60 estates were settled direct with the heirs; 5 settled with administrators or guardians; 2 were repaid to persons who had recovered their sanity; and the net proceeds of 20 estates were used to settle claims against them. No estates were escheated during the year. The amount involved in the settlement of the 199 estates was $13,562.07, of which $12,533.16 belonged to the estates of deceased employees and $1,028.91 to the estates of insane persons.

Licenses and Taxes.

Two thousand eight hundred and seventy-three licenses were issued for motor vehicles and bicycles, as well as permits for hunting and the keeping and carrying of firearms and the peddling of foodstuffs. Of this number, 1,470 were for motor vehicles, as compared with 3,323 and 1,862, respectively, for last year. Seven thousand three hundred and fifty-nine dollars and fifteen cents were collected for license fees, as compared with $9,480.80 in the previous year.

Police and Fire Division.

Detailed statements of the work of the police and fire organizations and of the penal work of The Panama Canal will be found in tables Nos. 4 to 7, inclusive.

POLICE SECTION.

On July 8, 1917, Mr. Guy Johannes was appointed chief, police and fire division, vice Capt. H. D. Mitchell, United States Army, relieved from duty with The Panama Canal. With this exception, there has been but slight change in the general organization of this division during the fiscal year. A considerable amount of extra work has been handled by the police force, incident to the war, and in connection with the protection of The Panama Canal and the general interests of the United States on the Isthmus.

During the year 52 first-class policemen and 16 colored policemen were appointed, and 51 first-class policemen and 2 colored policemen left the service.

No new buildings were constructed, and new penitentiary buildings are urgently required to replace the present frame structures.

Arrests numbered 4,426, of which 4,125 were of males and 301 of females; a decrease of 455 as compared with the previous year. Three thousand nine hundred twenty-two arrests were made without warrants and 504 with warrants.

A monthly average of 85.83 prisoners served sentences in the common jails during the year; and all those physically able were employed in the construction and repair of roads, others being employed on janitor and miscellaneous work at police or fire stations. The total value of such labor amounted to $14,199.80, figured at 10 cents an hour during the first three months, 13 cents an hour for the subsequent seven months, and 15 cents an hour for the balance of the year.

Two homicides and six suicides occurred during the year. Of the homicides, William St. Clair, brown, native of St. Lucia, died on the Cristobal-Mount Hope Road as a result of having been struck by an automobile driven by Harvey Worthington, white, Jamaican, on December 14, 1917. Worthington was tried on the charge of manslaughter in district court and dismissed on January 3, 1918. Luis Filled Cano, white, coal handler, native of Spain, died in Colon Hospital on December 26, 1917, as a result of having been stabbed by Pedro Arias, another white Spaniard. Arias was arrested on the charge of murder, but was declared insane and committed to Corozal Hospital. Two of the six suicides committed were by white Americans, two by Jamaicans, one by a Martiniquan, one by a brown, Peruvian, all males.

Two arrests were made for the offense of transporting or trafficking in opium within the Canal Zone during the year. One man was arrested for attempting to smuggle seven bottles of cocaine into the Canal Zone. He was charged with (1) violation of the opium act; (2) violation of customs regulations, and was dismissed on the first charge, found guilty on the second, and fined $100, from which he appealed to the United States District Court, New Orleans. On December 29, 1917, a Chinaman was arrested for violation of the opium act, found guilty, and sentenced to pay a fine of $50.

A continuous patrol of the harbors of Balboa and Cristobal was maintained principally for the enforcement of the navigation laws and prevention of smuggling and irregular traffic, also to assist in the enforcement of military regulations. A police launch was main-

tained at Gamboa for patrol of the Chagres River and the canal in the vicinity of Gamboa. Another launch was maintained at Gatun for patrol and inspection of Gatun Lake and the 100 foot contour area. Two new launches, the *El Vigia* at Gamboa, and the *Paja* at Gatun, especially built for lake patrol service by the mechanical division, were placed in service on November 7 and December 6, 1917, respectively. The launch *Goodwill* was returned to the marine division on September 11, 1917, and the launch *La Zona II* was transferred from Cristobal to Balboa at the same time. The launch *Barbacoas II* was transferred from Gatun to Cristobal to replace *La Zona II.*

The motorcycle patrol service for the enforcement of automobile and other vehicular regulations, and for special emergency police service; also a police guard service, in connection with military guards at the locks, were maintained. The detail of police at the locks has been reduced to a minimum, this work having been practically taken over by the Army.

In connection with regular patrols of the interior sections of the Canal Zone, 25 arrests were made during the year for trespass on Zone lands, and 24 convictions were secured. A number of settlers were found close to the boundary lines in disputed territory, which cases were referred to the special attorney and some ejectments made after due notification.

Eighty-four persons were deported from the Canal Zone during the year. Of these 47 were convicts who had completed terms of imprisonment, and 37 were persons who had been convicted of misdemeanor charges or were deemed undesirable persons to be permitted to remain on the Canal Zone.

Plain clothes officers made 278 arrests on misdemeanor and felony charges. Investigations were conducted of 656 cases which did not require arrest, and many cases in which the defendants could not be found.

A house-to-house canvas of the population of the Canal Zone was taken by the police force between June 20 and 30, 1918. This enumeration consisted of an accurate count of the entire civilian population for the information of local officials, giving number of males, females, and children, and whether employees of The Panama Canal or Panama Railroad; but no detail data, which would have required too much extra work for the police. A copy of this report appears as table No. 4.

Seventy-two convicts were received at the penitentiary during the year. Their aggregate sentences amounted to 48 3-12 years. Fifty-two convicts completed imprisonment and were discharged, as compared with 54 discharged the previous year. The convicts discharged this year had earned two years, four months and 28½ days "good time." Discharged convicts were deported in all cases permissible by law. At the close of the year 54 convicts remained in custody, as compared with 35 at the close of the previous year.

Most of the convicts were employed on construction of the new Paraiso-Gamboa Road; a few on a small farm adjacent to the penitentiary, and for the maintenance of the buildings and grounds, manufacture and repair of prison clothing and other maintenance labor. The total value of labor thus performed during the year at standard rates of pay amounted to $11,652.34, of which $10,248.28

represents work on the roads, $1,086.42 work on the farm, and $317.64 work inside the prison. The cost of subsisting and guarding the convicts was $20,113.77, of which $4,900.35 was expended for subsistence of convicts, $1,319.32 for subsistence of guards, $8,902.38 for salaries of officers and guards at the penitentiary, and $4,991.72 for salaries of officers and guards employed to guard convicts on road work.

Four convicts were pardoned, and parts of sentences were remitted in seven cases by the Governor. Two convicts escaped from the penitentiary on June 23, 1918. One was recaptured on date of escape, and one was at large at the close of the year, but was recaptured on July 4.

Investigations were made by the coroner in 52 cases of death. Of these, 20 were due to accidental drowning and 21 to accidental traumatism.

FIRE SECTION.

The organization of the fire force remained without change. On July 1, 1917, and in accordance with Governor's Circular No. 669–7, increases in pay were granted members of the fire force, as follows: Captains, from $145 to $164; lieutenants, from $125 to $144; firemen, from $100 on appointment and $112.50 after one year's service, to $110 on appointment and $130 after one year's service. The pay of the motor-car inspector and the first inspector was also increased from $152.50 to $175, and from $225 to $250, respectively. Seventeen members of the fire force were appointed and 21 separated from the service during the year.

A new motor combination pumping engine and hose wagon was installed at Balboa fire station on January 30, 1918. This has a pumping capacity of 750 gallons per minute at 120 pounds pressure, taking suction at 16-foot lift capacity for carrying 1,200 feet of fire hose, and is furnished with all necessary auxiliary equipment. This, with a converted hose car installed at Gatun fire station during the year, completes the substitution of horse-drawn apparatus in the department, the horses having been transferred to the quartermaster's department.

A 40-gallon hand chemical cart was built by members of the fire force from old material on hand, and was installed at the supply department chicken farm, Summit, Canal Zone, where the water pressure is low. Periodical inspections of Government buildings, docks, storehouses, yards, etc., and inspection of, and necessary additions and changes made to, extinguishers, hose, and minor apparatus were maintained through the year.

Sixty-nine fires and five false alarms were reported during the year. Of these, 39 fires occurred in property of The Panama Canal, 11 in Panama Railroad property, 3 in United States Army property, 6 in private property, and 10 were fires in dry grass, rubbish, etc. Total fire losses amounted to $259,351.60, of which $230,000 represents loss due to a fire in the Panama Railroad steamship *Panama*. The fire in this vessel started at sea, probably from spontaneous combustion, and was extinguished by the fire department after her arrival at Cristobal.

Table No. 7 accompanying this report details the work performed by this department for the fiscal year.

Division of Schools.

The opening of the school year was delayed somewhat by the late arrival of furniture for the equipment of the new buildings at Ancon, Balboa, Pedro Miguel, Gatun, and Cristobal. Regular sessions were begun October 8. The schools at other than these places opened October 1, with the exception of the La Boca school, where an epidemic of measles and whooping cough prevented regular sessions until October 8. The time lost for the week at the various schools was later made up on Saturdays. The average daily attendance for the school year was 1,963.2; 1,322.9 in the white schools, and 640.3 in the colored schools; compared with 1,709.2; 1,212.6 and 495.6, respectively, for the previous year.

The total number of white teachers employed was 65, an increase of 13 over last year. The services of 10 teachers were terminated during the year, and on June 30, 62 teachers were employed. Thirteen additional teachers resigned on June 30. Fifteen colored teachers were employed, one more than during the preceding year.

The following new positions were authorized for the school year: Supervisor of upper grades, $2,400 a year (recreated); instructor of apprentices, $2,100 a year; teacher of science and mathematics, 2 at $159.50 a month; teacher of Spanish and French, $104.50 a month; director of music, $175 a month; manual training teacher, $159.50 a month; teacher, high school, $132 a month effective October 22, 1917; teacher, grade, $104.50 per month (7; 1 abolished and 1 high school position at $132 created October 22, 1917).

The entrance salary for grade teachers was increased from $95 to $104.50 a month, effective at the opening of the school year; high-school teachers from $120 to $132; and science and mathematic teachers from $145 to $159.50. The eleventh and twelfth grades were added to the Cristobal high school, and the eighth grade to the Pedro Miguel white school.

Results of physical examinations of the pupils in the white schools are shown in table No. 8 appended. Colored pupils were also examined and the necessary treatment recommended.

With the new concrete buildings in service, the old buildings have been disposed of for different purposes. Seventeen buildings were used for school purposes during the year, 11 for white schools, including concrete house No. 759-B, at Balboa, for household arts work, 3 rooms in the old Washington House at Colon Beach, and an Army building at Empire, and 6 for colored schools, including an Army building at Empire. A 1-room addition to the Paraiso colored school was constructed during the summer vacation. The Paraiso white school was closed on January 21, and the pupils transferred to the Pedro Miguel white school.

Manual training and household arts classes were maintained at Cristobal, for both Cristobal and Gatun pupils; and at Balboa for Balboa, Ancon, and Pedro Miguel pupils. The manual arts department was operated during the year with one female and two male instructors. Mechanical and architectural drawing instruction was instituted at the Cristobal high school, and an increase in the time of attendance of the Balboa high school woodworking boys from three to five times a week was permitted. Previously it has been the custom to offer industrial instruction after the regular school hours.

This has proved generally unsatisfactory; and at the beginning of the school year this custom was changed at Balboa to permit the students attending the industrial classes during the morning session. The results of this change have been sufficiently satisfactory to warrant the same change being made at Cristobal. Much of the work of both the industrial training and household arts classes has been contributed to the junior Red Cross movement. With the addition of other instructors and much needed apparatus contemplated for the next year, it is thought that the work of both the manual training and household arts classes will be greatly improved both in the number of pupils in attendance and the quality and quantity of work accomplished.

It is noteworthy that while the apprentice department has been subjected to three changes of instructors during the year, its efficiency has been promoted rather than impaired, largely due to the fact that it has been possible to secure the full time of an instructor for it. An excellent course of instruction is being developed and is serving 40 ambitious and appreciative boys. Two centers are in operation, one in the office building of the shops at Balboa, the other in a warehouse near the Cristobal shops. Each boy receives instruction for a period of four hours once each week.

Teachers in the colored schools have manifested a gratifying interest in both the manual training and industrial arts classes. It is hoped that it will be possible to assist the colored pupils in both branches by supplying the schools with the necessary apparatus and instruction; for perhaps in no better way could they be aided in peparation for their life work.

Physical training and athletics were continued in the white schools under the direction of a physical instructor. Arrangements were also made, in connection with the fire department, for the holding of fire drills in the schools. These drills have been a decided success. Night schools at the Balboa high school were started on February 19, the following subjects being taught: Shorthand, typewriting, bookkeeping, algebra, geometry, English and Spanish. Tuition was $4 a month for each pupil, and salaries of teachers $4 a night. Junior Red Cross work was carried on extensively in the white schools, an auxiliary being organized in each school, and did excellent work, raising $640 to be used for materials. Lessons in community and national life (prepared by the United States Bureau of Education and used in all grades above the third, including the high school), and thrift and war savings problems were incorporated in the work of the schools in such subjects as arithmetic, reading, history, English, geography, and current events. It was the aim to correlate these problems with the different subjects in the schools, the nature of which has inspired the pupils to better results.

At the eighth annual commencement exercises held June 21 there were 28 graduates. Up to the present time 89 pupils have been graduated from the high school.

The Courts.

In the district courts 194 cases were pending at the beginning of the year; 930 cases were filed, 900 cases were settled, and 224 cases pending at the close of the fiscal year. Seventy-four of the 194 cases

pending at the beginning of the year were civil causes, 94 probate, and 26 criminal. Of those settled, 116 were civil, 333 probate, and 481 criminal. There were 139 sessions of court. Marriage licenses issued totaled 790, and 17 deeds were recorded. Collections totaled $6,248.20, consisting of civil costs, fines, forfeitures, and various fees.

The Balboa magistrate's court had seven cases pending at the beginning of the fiscal year, and the same number at the close of the year. A total of 1,863 cases were filed: 1,793 criminal and 70 civil. Of the criminal cases, 1,330 convictions were secured, 126 were acquitted, 314 committed to the district court, and 23 were dismissed. Total collections of fines, fees, and costs amounted to $8,086.15.

The magistrate's court at Cristobal had two cases pending from last year, with three at the close of the year. There were 1,938 cases filed; 1,913 criminal and 25 civil. Of the criminal cases, 1,374 convictions were secured, 263 acquitted, 26 suspended, 39 dismissed, and 209 committed to the district court. All civil cases before the court were settled. Total collections of fines, fees, and costs amounted to $5,667.03.

SPECIAL ATTORNEY AND DISTRICT ATTORNEY.

The reports of the special attorney and the district attorney are printed as appendices of the Governor's report.

UNITED STATES MARSHAL FOR THE CANAL ZONE

The office of the United States marshal for the Canal Zone received 659 writs of process in civil cases, 602 of which were served, 57 were not served, as the persons concerned could not be found. The marshal or his deputy attended 139 sessions of the district courts at Balboa and Cristobal. Witnesses attending court were paid $65.10 during the year. Collections of revenues from the service of court papers in civil cases amounted to $402.40, which were deposited with the collector. Trust funds to the amount of $7,740.69 were handled by the marshal or his deputy.

Relations with Panama.

Negotiations by correspondence or personal conference between the executive secretary of The Panama Canal and the secretary of foreign relations of the Republic of Panama included the following subjects in addition to routine matters:

Installation of buoys to mark the restricted area in the Bay of Panama for the guidance of navigators, etc.

Purchases at Canal Zone commissaries by unauthorized persons.

Exportation of coin and bar silver of the Republic of Panama.

New schedule of coach and automobile tariff in the districts of Panama and Colon and the Canal Zone.

Desirability of not advertising departure of vessels in newspapers in connection with the closing of mails.

Discontinuance of discharge of cargo at Balboa consigned to Panama by the South American Steamship Co.

Preservation of neutrality of the Canal Zone and the Republic of Panama and treatment of vessels in the service of the Entente powers

arriving and departing from Canal Zone ports and passing through the canal.

Extradition from the Republic of Panama to the Canal Zone of the former vice president of the Continental Banking & Trust Co.

Collection of customs duty on dutiable merchandise arriving at Canal Zone post offices.

Police protection at Colon Beach.

Delay in receiving money to the credit of a deceased employee in a bank in the city of Panama by the Administrator of Estates.

Permits for the construction of wooden houses on Colon Beach for the United Fruit Co.

Permission granted to Arraijan farmers to cross canal at Balboa without restriction as to time.

Laying of underground cable from the Canal Zone to Santo Tomas Hospital, the American consulate, and the American legation in the city of Panama for the purpose of furnishing them with electric current.

Preliminary survey for the extension of the Chiriqui Railroad in the Province of Chiriqui.

Handling of transit cargo at Cristobal without filing of bond to cover customs duty with the Panaman Government.

Construction of sanitariums for tuberculosis patients in the Republic of Panama.

Construction of a slaughterhouse at Colon.

Exemption of payment of taxes for Panama Railroad Company stables in cities of Panama and Colon.

The newly reclaimed area of land belonging to the Panama Railroad Company on the shore of Panama Bay adjoining the old American pier.

Furnishing of free medicine by the Santo Tomas Hospital to outpatients prescribed for by the Red Cross clinics.

Refund of fine imposed on chauffeur of the mail car of the Ancon post office for a collision for which he was not responsible by the police in the city of Panama.

Release of parcels post packages addressed to an interned alien without payment of customs duties.

Regulations to prevent the introduction of tuberculosis among domestic animals in the Canal Zone.

Indebtedness of the Republic of Panam to The Panama Canal.

Escape of prohibited aliens in transit through the Canal Zone.

Violations of the defensive area act by Panamans in entering the restricted areas at the entrances of the canal.

Alleged sales of second-hand furniture by employees and officials of The Panama Canal and members of the military forces on the Isthmus to residents of the Republic of Panama on which no customs duty was collected at the time of importation.

Conservation of products native to Panama.

Refusal to allow settlement and cultivation of strip of land between the water lever of Gatun Lake and the 100-foot contour line.

Construction of a telegraph line by the Republic of Panama between Colon and Porto Bello, which is to pass through the Canal Zone.

Anchorage of dynamite lighter in Panama Bay, and proposed construction of an explosive magazine for the Republic of Panama.

Advisability of permitting removal of sand from the beach between Punta Paitilla and the sea wall in the city of Panama.

Receiving and filing bills of health from the incoming vessels at the port of Bocas del Toro.

Outbreak of smallpox at Bocas del Toro and failure of Republic of Panama to provide necessary funds, etc., for subsisting and caring for quarantined persons.

Installation of a fire alarm system in the city of Colon.

Release and failure of Republic of Panama to prosecute certain persons arrested for gambling, and control of the gambling situation in the city of Colon.

Proposed sanitary improvements in Las Sabanas and Pueblo Nuevo districts.

Importation of fuel oil into the Canal Zone to be sold to seagoing vessels without the payment of consular fees to the Republic of Panama.

Clandestine landing of passengers from small vessels arriving at Panama from Colombia and Ecuador before reporting to the quarantine authorities for inspection and entry.

Censorship of mail.

Construction of highways in the Republic of Panama.

Counterfeiting in the city of Panama.

Legislation.

The various acts of Congress and Executive orders affecting The Panama Canal and the Canal Zone appears as an appendix to the Governor's report.

Respectfully submitted.

C. A. McIlvaine,
Executive Secretary.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

Table No. 1.—*Postal service.*

RECEIPTS.

	1917	1918
Interest on deposit money-order funds	$12,884.57	$32,940.22
Sales of postage stamps and other stamped paper	74,474.08	83,939.74
Second-class mail	1,703.89	1,825.38
Money-order fees	12,371.28	11,918.35
Panama Railroad mail	1,200.00	1,200.00
Handling mail between Panama and Colon for Republic of Panama	350.00	600.00
Handling United States transit mail, and credit from other departments of the Government	2,552.00	4,516.07
Box rents	8,100.00	8,147.30
Miscellaneous receipts	7.59	144.75
Total	113,643.41	145,231.81

TABLE No. 1.—*Postal service*—Continued.

DISBURSEMENTS.

	1917	1918
Salaries	$83,121.23	$84,572.15
Transportation of mails	25,606.49	27,636.68
Purchase of stamps	30,796.91	34,007.76
Interest on paid deposit money orders	1,813.93	8,440.71
Corral service	1,157.33	478.34
Telephone service	.....	789.78
Stationery, printing, etc	2,842.83	3,598.86
Repairs to buildings	240.38	2,685.02
Motor and other vehicle supplies	.....	776.91
Equipment:		
Furniture and fixtures	317.75	79.73
Lock boxes (including building division charge for setting up)	6,485.77	.....
Automobile delivery truck	3,906.42	1,093.67
Electric light and electrical repairs	705.07	752.05
Miscellaneous	3,402.32	2,448.51
Total	160,396.43	167,360.17

Excess of disbursements over receipts, 1917	$46,753.02
Excess of disbursements over receipts, 1918	22,128.36

TOTAL CASH TRANSACTIONS OF CANAL ZONE POSTAL SYSTEM FOR FISCAL YEAR ENDED JUNE 30, 1918.

Total amount of money orders issued	$3,372,973.55
Total fees on money orders issued	11,918.35
Total amount of money orders paid and repaid	1,909,128.31
Interest received on deposit money-order funds	32,940.22
Interest paid on deposit money orders	8,440.71
Total amount of postal receipts	145,231.81
Total amount of postal savings certificates and deposit money orders paid	1,442,485.00
Grand total cash transactions	6,923,117.95

LETTERS AND PARCELS REGISTERED, AND PARCELS INSURED, BY OFFICES, DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Name of post office.	Domestic letters registered	Domestic parcels registered.	Domestic parcels insured.	Foreign letters registered.	Foreign parcels registered.	Official registered free.	Distribution registered free.	Total.
Ancon	6,687	662	371	6,487	1,222	3,858	663	19,950
Balboa	2,233	423	220	1,141	105	3,290	1,437	8,849
Balboa Heights	1,174	121	100	171	18	40,999	68	42,651
Corozal	776	85	89	129	7	983	.....	2,069
Cristobal	8,498	784	479	9,786	589	11,860	.....	31,996
Culebra	942	93	87	121	3	505	.....	1,751
Empire	551	306	90	244	36	562	154	1,943
Fort Amador	719	247	117	5	1	313	.....	1,402
Fort Randolph	83	14	49	2	.....	58	46	252
Fort Sherman	488	158	134	19	1	222	198	1,220
Gamboa	1,875	20	4	110	2	.....	.....	2,011
Gatun	1,002	185	107	209	25	3,595	.....	5,123
Las Cascadas	2,539	646	362	187	5	777	203	4,719
Monte Lirio	82	5	.....	37	1	55	.....	180
Paraiso	247	37	15	271	39	2,543	109	3,261
Pedro Miguel	581	87	71	266	14	2,351	147	3,517
Total	28,477	3,873	2,295	19,185	2,068	71,971	3,025	130,894

TABLE No. 1.—*Postal service*—Continued.

NUMBER OF INSURED AND C. O. D. PARCEL-POST PARCELS AND REGISTERED ARTICLES DELIVERED, BY OFFICES, DURING FISCAL YEAR ENDED JUNE 30, 1918.

Name of post office.	Number of insured and C. O. D. parcels.	Number of registered articles.	Total.	Name of post office.	Number of insured and C. O. D. parcels.	Number of registered articles.	Total.
Ancon	4,654	15,071	19,725	Fort Sherman	1,008	651	1,659
Balboa	3,499	9,256	12,755	Gamboa	10	2,597	2,607
Balboa Heights	1,585	24,049	25,634	Gatun	935	7,845	8,780
Corozal	2,230	2,009	4,239	Las Cascadas	1,897	3,363	5,260
Cristobal	4,739	29,691	34,430	Monte Lirio	.....	681	681
Culebra	1,669	1,746	3,415	Paraiso	344	3,159	3,503
Empire	1,711	2,401	4,112	Pedro Miguel	658	5,068	5,726
Fort Amador	1,483	1,316	2,799				
Fort Randolph	12	636	648	Total	26,434	109,539	135,973

NUMBER OF MAIL PARCELS ON WHICH DUTY HAS BEEN PAID TO THE GOVERNMENT OF PANAMA, AND THE AMOUNT OF DUTY AS SHOWN BY RECEIPTS ON FILE, BY OFFICES, DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Name of post office.	Number of parcels.	Amount of duty.	Name of post office.	Number of parcels.	Amount of duty.
Ancon	4,546	$9,311.93	Fort Sherman	.....	.....
Balboa	107	77.24	Gamboa	.....	.....
Balboa Heights	12	13.04	Gatun	13	$12.07
Corozal	2	1.65	Las Cascadas	51	13.51
Cristobal	3,376	5,806.59	Monte Lirio	.....	.....
Culebra	51	54.54	Paraiso	26	44.58
Empire	71	61.01	Pedro Miguel	20	63.90
Fort Amador	2	.69			
Fort Randolph	1	1.02	Total	8,278	15,461.77

TABLE No. 2.—*Statement of vessels entered and cleared and of seamen shipped and discharged at Balboa and Cristobal fiscal year 1918.*

	Vessels entered.			Vessels cleared.			Seamen shipped.			Seamen discharged.		
	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.
1917.												
July	186	194	380	185	197	382	32	215	247	105	324	429
August	168	169	337	168	173	341	28	254	282	26	239	265
September	180	200	380	179	198	377	6	103	109	17	87	104
October	160	204	364	163	199	362	28	178	206	39	146	185
November	193	210	403	192	212	404	31	229	260	61	198	259
December	163	181	344	161	184	345	26	183	209	23	182	205
1918.												
January	164	169	333	164	170	334	10	66	76	39	42	81
February	162	177	339	164	168	332	11	171	182	2	195	197
March	183	197	380	180	196	376	29	105	134	14	80	94
April	178	198	376	179	202	381	48	151	199	49	140	189
May	203	231	434	200	227	427	46	284	330	69	269	338
June	182	195	377	187	195	382	71	333	404	15	188	203
Total	2,122	2,325	4,447	2,122	2,321	4,443	366	2,272	2,638	459	2,090	2,549

TABLE No. 3.—*Statement showing number of estates received and settled, and amount of funds handled, during fiscal year ended June 30, 1918.*

	Number received.	Number settled.	Amount of funds collected.	Value of estates settled.
Balance of unsettled estates on hand on July 1, 1917, and amount collected in same	22	.....	$7,310.31	.....
1917.				
July	24	14	1,107.76	$1,224.00
August	17	24	1,754.73	2,429.90
September	32	27	1,336.95	1,657.77
October	17	21	382.69	276.59
November	17	14	1,764.93	413.52
December	19	20	229.06	1,372.21
1918.				
January	20	15	1,601.07	891.19
February	16	21	239.76	2,174.83
March	13	14	1,086.56	167.40
April	16	16	909.08	400.76
May	8	8	610.29	1,477.90
June	13	5	592.95	1,076.00
Total estates and cash handled	234	199	18,926.14	13,562.07

Number of unsettled estates on hand June 30, 1918	35
Amount collected in unsettled estates on hand June 30, 1918	$5,364.07

TABLE No. 4.—*Police section.*

POLICE FORCE AS ON JUNE 30, 1918.

Official title.	Authorized force.	Actual force.	Official title.	Authorized force.	Actual force.
Police inspector	1	1	First-class policemen	119	114
Captains	3	3	Policemen (colored)	30	46
Lieutenants	5	5			
Sergeants	12	12	Total	170	181

DISTRIBUTION OF POLICE FORCE, BY STATIONS AND SUBSTATIONS.

Stations and substations.	Actual force— On July 1, 1917.	Actual force— On June 30, 1918.
Headquarters	3	2
Detective force	7	5
Balboa central station	37	51
Ancon	14	15
Pedro Miguel	30	28
Cristobal central station	46	48
Gatun	14	13
Monte Lirio	1	2
Gamboa	1	2
Penitentiary	13	15
Total	166	181

Average actual force available for general duty	87.33
Average number on special duty per month	75.25
Average number sick per month	2.08
Average number on leave per month	6.75
Number of white American officers appointed during year	52
Number of colored officers appointed during year	16
Total	68

TABLE No. 4.—*Police section*—Continued.

Number of separations of white American officers during year	51
Number of separations of colored officers during the year	2
Total	53
Eight white officers were fined during the year	$105.00
One colored officer was fined during the year	$3.00
Total	$108.00

NUMBER OF ARRESTS, BY FISCAL YEARS, MADE ON CANAL ZONE SINCE ORGANIZATION.

Period.	Number of arrests.	Period.	Number of arrests.
June 2, 1904, to June 30, 1905	2,130	July 1, 1912, to June 30, 1913	6,827
July 1, 1905, to June 30, 1906	3,748	July 1, 1913, to June 30, 1914	4,911
July 1, 1906, to June 30, 1907	5,831	July 1, 1914, to June 30, 1915	5,157
July 1, 1907, to June 30, 1908	6,075	July 1, 1915, to June 30, 1916	4,480
July 1, 1908, to June 30, 1909	6,275	July 1, 1916, to June 30, 1917	4,881
July 1, 1909, to June 30, 1910	6,947	July 1, 1917, to June 30, 1918	4,426
July 1, 1910, to June 30, 1911	5,959		
July 1, 1911, to June 30, 1912	7,055	Total	74,702

NUMBER OF ARRESTS, BY MONTHS, MADE DURING FISCAL YEAR ENDED JUNE 30, 1918.

Months.	Males.	Females.	Total.	With warrant.	Without warrant.
1917.					
July	423	19	442	59	383
August	474	15	489	50	439
September	341	22	363	43	320
October	375	19	394	39	355
November	344	25	369	39	330
December	338	22	360	35	325
1918.					
January	318	25	343	31	312
February	314	30	344	50	294
March	303	31	334	44	290
April	273	16	289	33	256
May	301	25	326	56	270
June	321	52	373	25	373
Total	4,125	301	4,426	504	3,922

ARRESTED, BY STATIONS, FISCAL YEAR ENDED JUNE 30, 1918.

Station.	Substation.	Number of arrests.
Balboa central station		1,445
	Ancon	286
	Pedro Miguel	404
Cristobal central station		1,991
	Gatun	256
	Monte Lirio	6
	Gamboa	38
Total		4,426

TABLE No. 4.—*Police section*—Continued.

STATEMENT OF DISPOSITIONS OF PERSONS ARRESTED FISCAL YEAR ENDED JUNE 30, 1918.

Dispositions.	Number.	Per cent.
Tried in courts:		
Convicted	3,005	83.42
Dismissed	557	15.46
Continued on June 30, 1918	40	1.12
	3,602	100.00
Otherwise disposed of on proper authority	824	.....
Total persons arrested	4,426	.....

CHARGES AGAINST PERSONS ARRESTED DURING FISCAL YEAR ENDED JUNE 30, 1918.

Offenses.	Male.	Female.	Total.
Alien enemies held pending internment	36	1	37
Alien enemies held for investigation	5	.....	5
Alien enemies held for deportation	4	.....	4
Alien enemies held for military authorities	12	.....	12
Alien enemies interned, on parole	3	.....	3
Alien enemy suspects held while in transit across the Canal Zone	146	.....	146
Alien enemies held while in transit across the Canal Zone	32	2	34
Aiding the commission of a felony	1	.....	1
Aiding and abetting a misdemeanor	1	.....	1
Abduction	1	.....	1
Adultery	1	.....	1
Alighting from moving train	58	.....	58
Assault	11	5	16
Assault and battery	150	17	167
Assault with deadly weapon	20	.....	20
Attempted assault with deadly weapon	1	.....	1
Attempt to commit larceny	9	.....	9
Attempt to defraud	11	1	12
Battery	70	17	87
Boarding moving train	26	.....	26
Bringing liquor into Canal Zone	18	.....	18
Bringing stolen property into Canal Zone	11	3	14
Burglary	18	.....	18
Carrying concealed weapons	15	1	16
Carrying firearms without a permit	5	.....	5
Civil order of arrest	1	.....	1
Conspiracy	3	.....	3
Contempt of court	35	9	44
Crime against nature	1	.....	1
Cruelty to animals	27	.....	27
Deportation	3	.....	3
Desertion from U. S. Army	4	.....	4
Desertion from British Army	2	.....	2
Desertion from merchant vessel	8	.....	8
Disorderly conduct	661	120	781
Disturbing the peace	21	11	32
Embezzlement	15	.....	15
Escaping from custody	2	.....	2
Exhibiting obscene pictures and literature	1	1	2
False representation	1	.....	1
False personation	3	.....	3
Fighting	111	17	128
Forgery	18	.....	18
Fraud	11	.....	11
Fugitive from justice	12	.....	12
Gambling	44	.....	44
Grand larceny	76	2	78
Held for investigation	14	.....	14
Held for immigration authorities	38	.....	38
Held for Panama authorities	9	1	10
Held for Italian consul	1	.....	1
Held for British consul	5	.....	5
Held for Peruvian consul	1	.....	1
Held on order from military authorities	1	.....	1
Held for deportation	11	1	12
Indecent exposure	2	.....	2
Interfering with an officer	.....	1	1
Intoxication	117	.....	117
Intoxication and disorderly	77	3	80
Insanity	19	1	20

TABLE No. 4.—*Police section*—Continued.

CHARGES AGAINST PERSONS ARRESTED DURING FISCAL YEAR ENDED JUNE 30, 1918—Continued.

Offenses.	Male.	Female.	Total.
Lewd and lascivious cohabitation	8	8	16
Loitering	372	29	401
Malicious mischief	84	2	86
Manslaughter	1	.....	1
Material witness	3	.....	3
Murder	1	.....	1
Mutiny	21	.....	21
Nonsupport	13	.....	13
Obscene and indecent language	2	.....	2
Obtaining money under false pretenses	2	.....	2
Perjury	1	.....	1
Petit larceny	387	2	389
Prohibited aliens in transit	125	19	144
Rape	1	.....	1
Receiving stolen property	1	.....	1
Repatriation cases	1	.....	1
Returning to Canal Zone after deportation	7	.....	7
Riding on platform of train	1	.....	1
Robbery	3	.....	3
Seduction	3	.....	3
Straggler from United States Army	1	.....	1
Straggler from British Army	3	.....	3
Threat	1	.....	1
Trespass	68	.....	68
Trespass on train	14	.....	14
Unauthorized riding on labor train	72	.....	72
Unlawful entry into Canal Zone	.....	3	3
Vagrancy	72	5	77
Violation of:			
Bicycle regulations	8	.....	8
Building regulations	1	.....	1
Chauffeurs' regulations	22	1	23
Customs regulations	7	.....	7
Defensive sea area act	21	.....	21
Dog regulations	1	.....	1
Immgration regulations	227	.....	227
Impounding regulations	2	1	3
Espionage act	6	.....	6
License regulations	18	5	23
Liquor regulations	26	3	29
Motor-vehicle regulations	281	4	285
Navigation regulations	136	.....	136
National-defense act (sec. 125)	23	.....	23
Hunting regulations	3	.....	3
Oplum act	2	.....	2
Postal regulations	13	.....	13
Quarantine regulations	8	.....	8
Sanitary regulations	91	.....	91
Trading wlth enemy act	14	7	21
Traffic regulations	9	.....	9
Vehicle tariff regulations	64	4	68
White-slave act	1	.....	1
Total	4,272	307	4,579

NATIONALITY OF PERSONS ARRESTED DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Nationality.	Number.	Nationality.	Number.
Africa	3	France	10
Argentina	4	French West Indies—	
Assyria	1	Guadeloupe	29
Austria	30	Martinique	116
Bohemia	2	Germany	84
Belgium	7	Great Britain and possessions:	
Bolivia	14	Australia	7
Brazil	7	British Guiana	28
Chile	71	British Honduras	1
China	122	Canada	5
Colombia	217	England	35
Costa Rica	36	India	30
Cuba	18	Ireland	15
Denmark	15	Newfoundland	1
Ecuador	47	New Zealand	1
Egypt	2	Scotland	13

TABLE No. 4.—*Police section*—Continued.

NATIONALITY OF PERSONS ARRESTED DURING THE FISCAL YEAR ENDED JUNE 30, 1918—Continued.

Nationality.	Number.	Nationality.	Number.
Great Britain and possessions—Contd.		Honduras	4
British West Indies—		Italy	14
Antigua	43	Japan	6
Bahamas	3	Mexico	32
Barbados	733	Nicaragua	12
Bermuda	1	Norway	28
Cayman	2	Panama	526
Dominica	4	Peru	129
Fortune Island	20	Portugal	4
Grenada	49	Russia	35
Inagua	2	Finland	6
Jamaica	851	Poland	1
Montserrat	21	Santo Domingo	1
Nassau	16	San Salvador	6
Tortola Island	1	Serbia	1
Nevis Island	5	Spain	109
St. Kitts	8	Sweden	32
St. Lucia	68	Switzerland	12
St. Martin	1	Turkey	9
St. Vincent	30	United States	446
Trinidad	64	Porto Rico	23
Turks Island	4	Philippines	5
Greece	25	Virgin Islands	6
Guatemala	5	Uruguay	1
Haiti	12	Venezuela	8
Holland	25		
Curaçao	6	Total (4,125 males, 301 females)	4,426

OCCUPATION OF PERSONS ARRESTED DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Occupation.	Number.	Occupation.	Number.
Agents	4	Hatters	2
Army officers	1	Hostlers	1
Artists	1	Interpreters	1
Attendants	4	Inspectors	5
Bakers	14	Ironworkers	2
Barbers	7	Janitors	13
Bartenders	6	Jewelers	1
Blacksmiths	6	Journalists	2
Boatmen	11	Laborers	1,480
Boiler makers	8	Laundresses	4
Bootblacks	5	Laundrymen	3
Brakemen	4	Lawyers	2
Bricklayers	1	Magicians	1
Butchers	7	Machinists	41
Capitalists	1	Managers	4
Carpenters	70	Merchants	111
Cartmen	13	Messengers	23
Charcoal burners	4	Miners	3
Chauffeurs	342	Ministers	2
Checkers	10	Molders	1
Chemists	2	Musicians	3
Clerks	69	Newsboys	24
Coachmen	61	No occupation	351
Collectors	1	Nurses	2
Conductors	3	Oilers	51
Consuls	1	Opticians	2
Contractors	5	Operators	32
Cooks	40	Painters	24
Coppersmiths	2	Peddlers	40
Cranemen	2	Physical directors	1
Domestics	238	Physicians	4
Dishwashers	3	Pilots	1
Dentists	5	Pipe fitters	6
Draftsmen	3	Plasterers	3
Distillers	1	Policemen	8
Dredgemen	2	Postmasters	1
Dressmakers	4	Prisoners	3
Drill men	1	Prostitutes	18
Electricians	20	Quartermasters	18
Engineers	30	Riggers	5
Farmers	101	Riveters	1
Firemen	179	Sailmakers	1
Fishermen	42	Sailors and seamen	375
Flagmen	3	Salesmen	29
Foremen	35	Saddlers	1

TABLE No. 4.—*Police section*—Continued.

OCCUPATION OF PERSONS ARRESTED DURING THE FISCAL YEAR ENDED JUNE 30, 1918—Continued.

Occupation.	Number.	Occupation.	Number.
Saloon keepers	4	Teachers	3
Ship's officers	41	Teamsters	11
Shoemakers	6	Timekeepers	5
Ship fitters	2	Traders	5
Shipwrights	1	Waiters	64
Soldiers	66	Watchmen	48
Stevedores	1	Water tenders	7
Stewards	22	Welders	1
Storemen	3	Wheelwrights	1
Students	40	Winch men	5
Switch tenders	1		
Tailors	11	Total	4,426

NUMBER OF PRISONERS IN CUSTODY IN COMMON JAILS AT THE CLOSE OF EACH MONTH DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Number of prisoners.	Month.	Number of prisoners.
1917.		1918.	
July	115	January	73
August	130	February	66
September	69	March	78
October	85	April	74
November	69	May	81
December	74	June	116
		Average number in jail during year.	85.83

VALUE OF LABOR PERFORMED BY COMMON JAIL PRISONERS CONFINED DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Number of hours.				Rate per hour.	Amount.
	Road work.	Janitor work.	Miscellaneous.	Total hours.		
1917.					*Cents.*	
July	6,016	5,505	705	12,226	10	$1,222.60
August	6,984	5,004	1,700	13,688	10	1,368.80
September	3,022	4,279	1,406	8,707	10	870.70
October	4,159	4,238	1,284	9,681	13	1,258.53
November	2,510	4,387	1,127	8,024	13	1,043.12
December	3,137	4,275	1,454	8,866	13	1,152.58
1918.						
January	3,685	4,387	1,133	9,205	13	1,196.65
February	1,808	3,634	1,126	6,568	13	853.84
March	2,336	4,047	1,628	8,011	13	1,041.43
April	3,030	3,407	1,538	7,975	13	1,036.75
May	4,307	3,821	1,536	9,664	15	1,449.60
June	5,180	4,422	1,766	11,368	15	1,705.20
Total	46,174	51,406	16,403	113,983	.....	14,199.80

TABLE No. 4.—*Police section*—Continued.

HOUSE-TO-HOUSE CANVASS OF THE CIVIL POPULATION OF THE CANAL ZONE, TAKEN BETWEEN JUNE 20 AND 30, 1918, BY THE POLICE AND FIRE DIVISION.

BALBOA DISTRICT.

Location.	Americans.		All others.		Americans.		All others.		Total.
	Total men.	Employees.	Total men.	Employees.	Women.	Children.	Women.	Children.	
Ancon	568	567	75	75	350	393	99	.....	1,485
Ancon Hospital—									
Staff	44	44	185	185	72	.....	28	.....	329
Patients (civilians only)	14	11	191	171	16	12	41	16	290
Tivoli Hotel	25	19	73	70	6	3	17	.....	124
Rural (on east side of canal between boundary line and Cardenas River)	.....	.....	4	4	.....	.....	.....	.....	4
Balboa Heights	31	30	.....	.....	33	36	42	.....	142
Balboa	996	990	76	73	686	907	146	41	2,852
Petrolia	3	1	2	.....	2	2	1	2	12
La Boca	49	49	817	814	50	65	466	850	2,297
Quarantine station	6	6	17	17	.....	.....	1	.....	24
Floating equipment	1	1	.....	.....	.....	.....	.....	.....	1
Palo Seco—									
Staff	1	1	14	14	1	.....	16	.....	32
Patients	.....	.....	44	.....	.....	.....	18	8	70
Venado plantation	.....	.....	2	2	.....	.....	1	1	4
Rural (on west side of canal between Pacific shore and Arraijan Trail)	.....	.....	3	.....	.....	.....	4	7	14
Corozal	6	6	8	8	4	3	1	.....	22
Corozal Asylum—									
Staff	9	9	83	83	4	.....	13	.....	199
Patients	11	.....	208	.....	2	.....	152	.....	303
Pedro Miguel	226	226	17	15	158	158	17	.....	573
Miraflores pasture camp	1	1	11	9	1	.....	9	7	76
Red Tank	.....	.....	656	656	.....	.....	385	622	1,623
Rural (on west side of canal between Cardenas River and Chagres River)	.....	.....	2	2	.....	.....	1	.....	6
Paraiso	32	32	668	646	26	36	281	449	1,492
Paraiso pasture camp	.....	.....	2	2	.....	.....	.....	.....	2
Floating equipment	2	2	34	34	.....	.....	.....	.....	36
Summit	4	4	90	90	4	.....	23	28	148
Summit pasture camp	.....	.....	48	48	.....	.....	.....	.....	49
Summit plantation	.....	.....	8	8	.....	.....	1	2	11
Las Cascadas plantation	1	1	9	8	1	2	3	.....	16
La Pita	.....	.....	4	4	.....	.....	.....	.....	4
Limon plantation	.....	.....	25	20	.....	.....	.....	.....	25
Gamboa (South of Chagres River)	4	4	142	141	2	.....	51	68	267
Gamboa Stockade—Officers	5	5	6	6	.....	.....	.....	.....	11
Juan Mina plantation	1	1	20	20	.....	.....	1	1	23
Culebra	5	4	3	3	3	2	.....	.....	13
Golden Green	.....	.....	101	10	.....	.....	90	153	344
Empire	9	8	152	25	5	4	107	158	435
Lirio Camp	.....	.....	69	69	.....	.....	71	120	260
Cerro Camp	.....	.....	32	32	.....	.....	10	15	57
Camacho	.....	.....	17	8	.....	.....	8	11	36
Mandingo pasture camp	1	1	29	29	.....	.....	.....	.....	30
Rural (on west side of canal between Arraijan Trail and Gatun Lake)	.....	.....	3	3	.....	.....	1	1	5
Las Cascadas	3	3	.....	.....	.....	.....	.....	.....	3
Martinique Camp	.....	.....	131	111	.....	.....	61	97	289
Bas Obispo pasture camp	.....	.....	1	1	.....	.....	.....	.....	1
Total employees	.....	2,026	.....	3,516	.....	.....	.....	.....	.....
Total persons	2,058	.....	4,082	.....	1,426	1,623	2,166	2,657	14,012

CRISTOBAL DISTRICT.

Gamboa (north of Chagres River)	13	10	4	2	4	3	3	.....	27
Floating equipment	7	7	67	67	.....	.....	.....	.....	74
Juan Mina Camp	1	1	37	37	.....	.....	1	1	40
Limon Camp	1	1	73	73	.....	.....	.....	.....	74
Rural (on east side of canal between Chagres River and Rio Frijolito)	2	2	111	111	.....	.....	.....	.....	113
Darien	.....	.....	6	6	.....	.....	.....	.....	6
Frijoles	1	1	26	26	.....	.....	7	13	47
Frijoles plantation	.....	.....	21	21	.....	.....	3	1	25

TABLE No. 4.—*Police section*—Continued.

CRISTOBAL DISTRICT—Continued.

HOUSE-TO-HOUSE CANVASS OF THE CIVIL POPULATION OF THE CANAL ZONE—Contd.

Location.	Americans.		All others.		Americans.		All others.		Total.
	Total men.	Employees.	Total men.	Employees.	Women.	Children.	Women.	Children.	
Monte Lirio	5	5	33	33	2	2	17	15	74
Monte Lirio pasture camp			2	2			1		3
Gatun	161	159	176	135	141	187	187	242	1,094
Labor camps			162	162					162
New Gatun			432	431			247	304	983
Bracho plantation			4	4			1	2	7
Rural (on east side of canal between northshore of Gatun Lake and Caribbean Sea)	3	3	54	54	1		12	18	88
Mount Hope	12	12	7		7	17	2	2	47
Manajual pasture camp	1	1	6	6	1	3	4	7	22
Puerto Escondido plantation			2	2					2
Mount Hope pasture camp	1	1	14	14			6	8	29
Cristobal	599	598	35	33	194	205	6	2	1,041
Folks River Camp			365	365			362	763	1,490
Camp Bierd			1,853	1,853			33	65	1,951
Sweetwater plantation			6	6			2	2	10
Fortification Camp			115	115					115
Total employees		801		3,558					
Total persons	807		3,611		350	417	894	1,445	7,524
PRISONERS.									
Balboa			21				6		27
Ancon	1		11						12
Pedro Miguel	2		44						46
Gamboa			2						2
Gamboa Penitentiary	4		46						50
Gatun			3				6		9
Cristobal	2		22				1		25
Total persons	9		149				13		171
RECAPITULATION.									
Balboa district	2,058	2,026	4,082	3,516	1,426	1,623	2,166	2,657	14,012
Cristobal district	807	801	3,611	3,558	350	417	894	1,445	7,524
Prisoners	9		149				13		171
Total employees		2,827		7,074					
Total persons	2,874		7,842		1,776	2,040	3,073	4,102	21,707

TABLE No. 5.—*Warden section.*

CONVICTS RECEIVED AT PENITENTIARY DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Number received.	Aggregate sentences.		Month.	Number received.	Aggregate sentences.	
1917.		*Years.*	*Months.*	1918.		*Years.*	*Months.*
July	14	7	11	January	3	1	10
August	5	3	7	February	8	5	10
September	5	4		March	7	3	
October	2	1	9	April	5	2	5
November	7	7		May	5	3	10
December	9	6	5	June	2		8
				Total	72	48	3

TABLE No. 5.—*Warden section*—Continued.

CONVICTS DISCHARGED FROM PENITENTIARY DURING FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Number discharged	Aggregate sentences served.			Good time earned.		
		Years.	*Months.*	*Days.*	*Years.*	*Months.*	*Days.*
1917.							
July	5	3	6	30	.....	3	20
August	2	2	.....	.....	.....	1	2
September	5	22	5	.....	.....	.....	19
October	4	1	11	.....	.....	1	17.5
November	3	1	8	.....	.....	1	18
December	3	1	10	.....	.....	1	23
1918.							
January	5	18	4	60	.....	1	15
February	4	4	2	.....	.....	5	20
March	5	2	.....	30	.....	2	8
April	5	4	.....	.....	.....	3	20
May	5	2	3	.....	.....	.....	20.5
June	6	5	8	.....	.....	4	25.5
Total	52	70	1	.....	2	4	28.5
Escaped	1	.....	.....	.....	.....	.....	.....

Number of convicts in penitentiary July 1, 1917 35
Number received during fiscal year ended June 30, 1918 72
Number discharged during fiscal year 52
Escaped from custody during fiscal year 1
Number of convicts in confinement on June 30, 1918 54

Four convicts were pardoned by the Governor during the fiscal year.
Seven convicts received remission of sentence during the year amounting to 272 days.

CRIMES COMMITTED BY CONVICTS CONFINED IN PENITENTIARY ON JUNE 30, 1918, AND THEIR AGGREGATE SENTENCES.

Crime.	Number.	Years.	Months.
Assault with deadly weapon	5	4	10
Assault with intent to commit rape	1	2	.....
Attempted crime against nature	1	1	.....
Attempt to publish and pass an instrument in writing	1	.....	4
Bringing stolen property into Canal Zone	1	1	.....
Burglary, first degree	7	17	.....
Burglary, first degree, and grand larceny	1	1	3
Burglary, second degree	1	.....	9
Embezzlement	2	.....	10
Embezzlement and forgery	1	1	3
Forgery	1	1	.....
Forgery, grand larceny, and violation of postal regulations	1	2	.....
Grand larceny	15	8	10
Grand larceny and burglary	1	1	.....
Grand larceny and returning to Canal Zone after deportation	1	.....	7
Manslaughter	2	10	.....
Mayhem	1	3	6
Murder, first degree	2	(1)	.....
Murder, second degree	4	76	.....
Mutiny	1	1	.....
Rape	1	7	.....
Robbery	1	1	8
Violation of postal laws	2	2	.....
	54	144	10

[1] Life.

TABLE No. 5.—*Warden section*—Continued.

NATIONALITY OF THE CONVICTS CONFINED IN THE PENITENTIARY ON JUNE 30, 1918.

Native of—	Number.	Native of—	Number.
Chile	1	French West Indies:	
Colombia	3	Martinique	1
Costa Rica	1	Guadeloupe	1
Ecuador	1	Guatemala	1
British Guiana	2	Panama	11
British West Indies:		Peru	2
Barbados	5	Salvador	1
Bermuda	1	Spain	1
Fortune Island	1	United States	5
Grenada	1		
Jamaica	12	Total	54
St. Lucia	1		
St. Kitts	1		
Trinidad	1		

SENTENCES OF CONVICTS CONFINED IN PENITENTIARY ON JUNE 30, 1918.

Range of sentences.	Black.	White.	White Americans.	Total.
Life imprisonment	2			2
Ten years and over	4			4
Five years and over	5			5
Four years and over				
Three years and over	1			1
Two years and over	3			3
One year and over	17	1	3	21
Less than one year	6	1		7
Less than six months	11			11
Total	49	2	3	54

VALUE OF LABOR PERFORMED BY CONVICTS EMPLOYED ON PUBLIC IMPROVEMENTS, AND VALUE OF LABOR OF CONVICTS ASSIGNED TO INSIDE LABOR AT THE PENITENTIARY DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Description of outside work.	Value of labor performed.			
		Road work.	Farm work.	Inside work.	Total.
1917.					
July	Empire-Gamboa Road	$627.36	$64.32	$15.36	
August	do	674.52	24.96	43.20	
September	do	668.28	28.80	24.00	
October	do	711.00	29.12	10.08	
November	do	677.74	26.88	59.36	
December	do	893.76	116.48	50.82	
1918.					
January	do	1,018.08	125.44	49.52	
February	do	994.00	94.08	36.40	
March	do	1,125.60	130.48	3.92	
April	Pedro Miguel-Gamboa Road	1,144.64	204.96	9.38	
May	do	858.00	163.05	10.80	
June	do	855.30	77.85	4.80	
Total		10,248.28	1,086.42	317.64	$11,652.34

The inside labor consisted of miscallaneous repairs to horse equipment for police and fire stations, repairing uniforms of Zone prisoners and repairing mail sacks for the Canal Zone postal service; but did not include labor performed in maintaining small penitentiary farms.

TABLE No. 5.—*Warden section*—Continued.

COST OF SUBSISTENCE, GUARDING, AND CLOTHING CONVICTS CONFINED IN THE PENITENTIARY DURING FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Subsistence.		Salaries of officers and guards.		Total.
	Convicts.	Guards.	Penitentiary.	Road work.	
1917.					
July	$351.42	$92.77	$737.00	$382.50	$1,563.69
August	352.98	90.75	746.00	388.03	1,577.76
September	422.67	108.60	662.19	404.25	1,597.71
October	410.38	111.60	734.00	433.50	1,689.48
November	415.38	108.00	723.76	433.50	1,680.64
December	495.39	111.60	634.08	432.08	1,673.15
1918.					
January	434.72	112.80	636.00	441.16	1,624.68
February	352.73	109.20	660.88	477.58	1,600.39
March	460.88	123.00	997.50	438.58	2,019.96
April	410.11	117.30	733.97	440.50	1,701.88
May	408.56	119.70	891.50	366.67	1,786.43
June	385.13	114.00	745.50	353.37	1,598.00
Total	4,900.35	1,319.32	8,902.38	4,991.72	20,113.77

CONVICTS AND COMMON JAIL PRISONERS DEPORTED DURING FISCAL YEAR ENDED JUNE 30, 1918.

Deported to—	Convicts.	Zone prisoners.	Total.	Deported to—	Convicts.	Zone prisoners.	Total.
Chile	2	1	3	French West Indies:			
Colombia	5	3	8	Martinique	2	1	3
British West Indies:				Netherlands West Indies:			
Barbados	8	9	17	Curacao	1	.....	1
Antigua	1	.....	1	Panama	8	4	12
Bahamas	2	.....	2	Peru	2	.....	2
Fortune Island	1	.....	1	Mexico	2	.....	2
Jamaica	9	3	12	United States	1	11	12
St. Kitts	.....	1	1	Spain	.....	2	2
St. Lucia	1	.....	1				
St. Vincent	1	2	3				
Trinidad	1	.....	1	Total	47	37	84

TABLE No. 6.—*Coroner section.*

DEATH, BY MONTHS, INVESTIGATED BY CORONER DURING FISCAL YEAR ENDED JUNE 30, 1918.

Month.	Number.	Month.	Number.
1917.		1918.	
July	3	January	9
August	2	February	7
September	4	March	2
October	3	April	5
November	6	May	4
December	5	June	2

Total deaths, 52.

CAUSES OF DEATHS INVESTIGATED BY THE CORONER DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Causes.	Number.	Causes.	Number.
1917.		1917.	
Accidental electrocution	1	Natural causes	3
Accidental drowning	20	Suicide	5
Accident or suicide	1		
Accidental traumatism	20	Total	52
Murder	2		

TABLE No. 7.—*Fire section.*

FIRE PERSONNEL AS ON JUNE 30, 1918.

Designation.	June 30, 1918.		Designation.	June 30, 1918.	
	Authorized.	Actual.		Authorized.	Actual.
Fire inspector	1	1	Operators (fire apparatus)	5	4
Captains	2	2	Firemen	29	24
Lieutenants	6	6			
Motor inspector	1	1	Total	44	38

DISTRIBUTION OF FIRE PERSONNEL, BY STATIONS, JUNE 30, 1918.

Stations.	Paid force.	Volunteers.	Total.	Stations.	Paid force.	Volunteers.	Total.
Headquarters	1	.....	1	Cristobal central station	12	.....	12
Balboa central station	11	.....	11	Gatun substation	3	20	23
Ancon substation	8	.....	8	Camboa	.....	11	11
Corozal	.....	11	11	Monte Lirio	.....	2	2
Pedro Miguel substation	2	40	42	Frijoles	.....	2	2
Paraiso substation	1	23	24	Total	38	109	147

Number of members of fire force appointed during year 17
Number of separations 21

STATEMENT OF DAMAGE RESULTING FROM FIRES DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	The Panama Canal.	Panama Railroad.	United States Army.	Private property in the Canal Zone.	Total.
1917.					
July	$840.00	$400.00	.....	.....	$1,240.00
August	15.00	.10	.....	.....	15.10
September	355.00	.....	$9,250.00	$550.00	10,155.00
October	133.00	.....	.....	200.00	333.00
November	20.00	.....	.....	3.00	23.00
December	558.00	.....	.....	150.00	708.00
1918.					
January	2,024.00	.....	.....	230,000.00	232,024.00
February	252.00	.....	.....	200.00	452.00
March	.....	10.00	.....	.....	10.00
April	21.50	.....	13,900.00	.....	13,921.50
May	10.00	.....	.....	250.00	260.00
June	210.00	.....	.....	.....	210.00
Total	4,438.50	410.10	23,150.00	231,353.00	259,351.60

STATEMENT OF PROPERTY INVOLVED IN FIRES DURING THE FISCAL YEAR ENDED JUNE 30, 1918.

Month.	The Panama Canal.	Panama Railroad.	United States Army.	Private property in the Canal Zone.	Total.
1917.					
July	$387,400.00	$1,500.00	$8,000.00	$1,000.00	$397,900.00
August	200.00	62,158.38	.....	.....	62,358.38
September	276,854.00	.....	13,800.00	600.00	291,254.00
October	409,900.00	.....	.....	16,000.00	425,900.00
November	5,325.00	2,500.00	.....	.....	7,825.00
December	44,554.00	120.00	.....	1,000.00	45,674.00
1918.					
January	131,675.00	1,000,000.00	.....	2,501,000.00	3,632,675.00
February	26,500.00	.....	.....	1,000.00	27,500.00
March	25,500.00	674,220.00	.....	548,000.00	1,247,620.00
April	3,940.00	370.00	14,000.00	.....	18,310.00
May	2,375.00	.....	.....	1,500.00	3,875.00
June	5,000.00	.....	.....	.....	5,000.00
Total	1,319,223.00	1,740,868.38	35,800.00	3,070,100.00	6,165,991.38

TABLE No. 8.—*School section.*

MONTHLY ENROLLMENT AND AVERAGE DAILY ATTENDANCE.

	White schools.			Colored schools.		
	Monthly enrollment.		Average daily attendance.	Monthly enrollment.		Average daily attendance.
	Gross.	Net.		Gross	Net.	
1917.						
October	1,557	1,527	1,452.6	801	798	671.5
November	1,715	1,575	1,422.1	845	837	623.8
December	1,794	1,609	1,437.1	876	862	631.0
1918.						
January	1,943	1,688	1,396.1	941	923	659.1
February	2,026	1,696	1,399.0	983	959	682.0
March	2,077	1,719	1,433.0	993	968	663.3
April	2,122	1,734	1,436.7	1,023	995	637.3
May	2,168	1,756	1,373.3	1,037	1,007	610.2
June	2,193	1,764	1,351.5	1,040	1,010	636.3

ENROLLMENT BY THE YEAR—BY SCHOOLS.

	Gross.	Net.
WHITE SCHOOLS.		
Balboa High	169	164
Cristobal High	37	33
Ancon, grades	368	308
Balboa, grades	826	595
Pedro Miguel, grades	148	119
Paraiso, grades	26	26
Empire, grades	88	72
Gatum, grades	111	99
Cristobal, grades	420	348
Total	2,193	1,764
COLORED SCHOOLS.		
La Boca	277	265
Pedro Miguel	189	184
Paraiso	138	138
Empire	160	155
Gatun	141	135
Cristobal	135	133
Total	1,040	1,010
Total white	2,193	1,764
Total colored	1,040	1,010
Grand total	3,233	1,774

ENROLLMENT BY GRADES (NET).

	White schools.	Colored schools.	Total.
Grade 1	282	340	622
Grade 2	271	240	511
Grade 3	202	206	408
Grade 4	217	93	310
Grade 5	171	74	245
Grade 6	193	41	234
Grade 7	123	15	138
Grade 8	108	1	109
Grade 9	69	.....	69
Grade 10	61	.....	61
Grade 11	32	.....	32
Grade 12	35	.....	35
Total	1,764	1,010	2,774

TABLE No. 8.—*School section*—Continued.

NUMBER OF TEACHERS EMPLOYED IN SCHOOLS.

	White schools.	Colored schools.	Total.
1917.			
October	64	15	79
November	65	15	80
December	62	15	77
1918.			
January	64	15	79
February	65	15	80
March	65	15	80
April	64	15	79
May	63	15	78
June	62	15	77

REPORT OF ANNUAL PHYSICAL EXAMINATION OF CHILDREN OF WHITE SCHOOLS (GRADE) DURING OCTOBER, 1917.

Total number of pupils examined		1,303
Number found needing treatment		679
Percentage of those examined needing treatment		52
Number with teeth as only defect		341
Number with defects other than those of teeth only		338
Defects found:		
Vision	77	
Hearing	11	
Nasal breathing	32	
Hypertrophied tonsils	167	
Pulmonary disease	5	
Bronchitis	3	
Chorea or other nervous disorders	4	
Orthopedic defects	3	
Malnutrition	2	
Defective teeth	441	
Contagious diseases	5	
Enlarged cervical glands	27	
Cardiac disease	13	
		790
Total number of cases treated		164
Number of pupils vaccinated		89

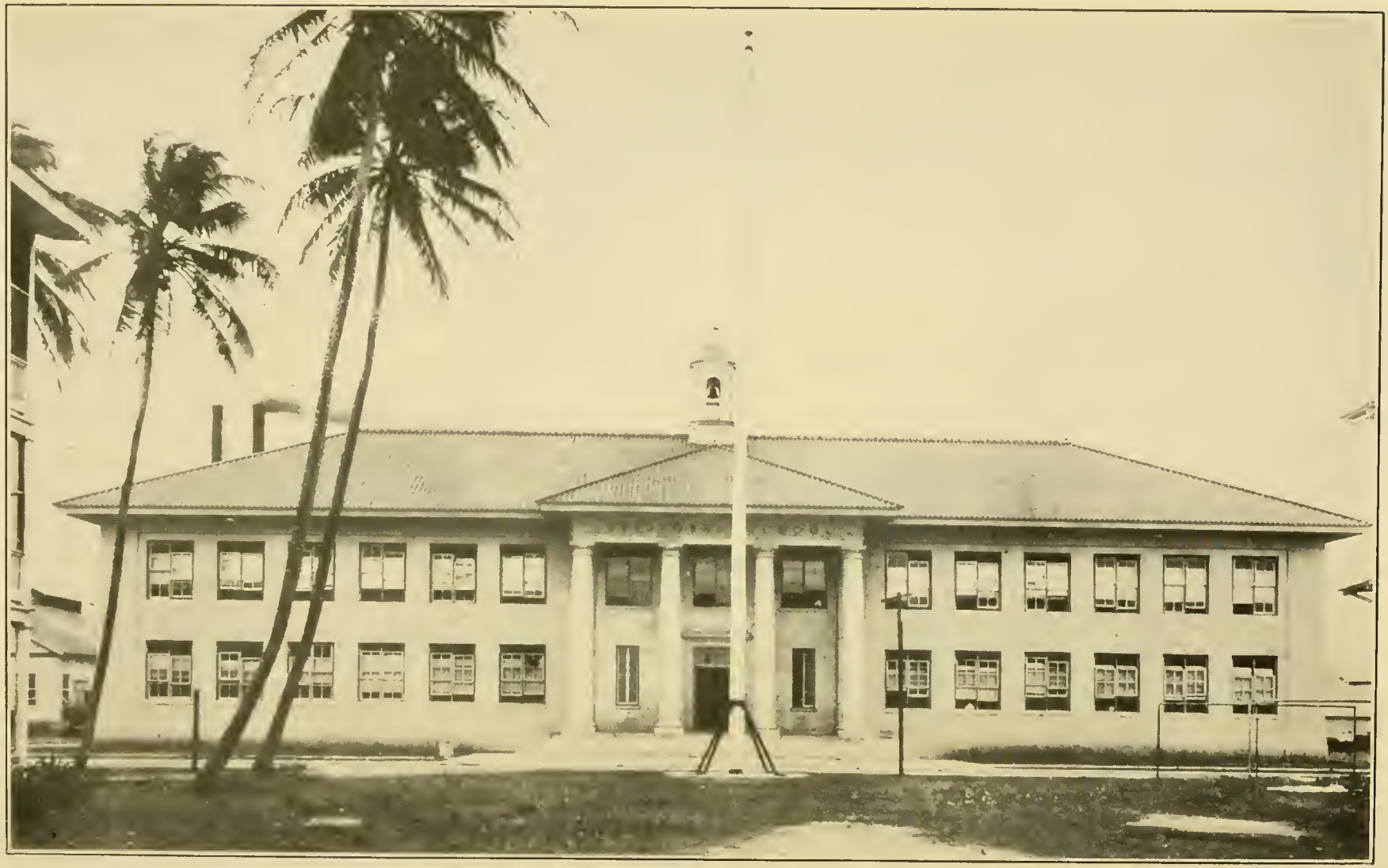
EPITOME OF MORE IMPORTANT STATISTICS FOR THE YEARS ENDING JUNE 30, 1915, 1916, AND 1917.

	1915	1916	1917	1918
Number of school buildings	15	16	19	17
Buildings erected and converted	4	1	3	.....
Additional rooms constructed (additions to existing buildings)	2	4	1	1
Number of employees in division	65	60	70	81
Number of supervisory force	1	1	2	3
Total expenditures (approximate)	$109,000	$70,188.56	$87,000	[1] $140,000
Estimated value of school property	$120,000	$110,000.00	$100,000	$550,000
Net enrollment:				
White schools	1,146	1,366	1,518	1,764
Colored schools	1,430	785	855	1,010
White and colored	2,576	2,149	2,373	2,774
Per capita expense of maintenance (approximate), based on net enrollment	$42.31	$32.66	$36.66	$50.83
Total days of attendance	283,988.5	258,244	295,697	350,619
White schools	157,537.0	183,206	209,782	239,527.5
Colored schools	126,451.5	75,038	85,915	111,091.5
Average daily attendance	1,762.2	1,501.4	1,709.2	1,963.2
White schools	1,006.3	1,065.1	1,212.6	1,322.9
Colored schools	755.9	436.3	496.6	640.3
Absence of teachers on account of sickness ..... days	217	161.5	234.5	312.5
Average monthly wages of teachers:				
White	$98.78	$98.84	$109.52	$125.58
Colored	$59.75	$60.56	$65.00	$67.67
Tuition collected	$1,184.00	$2,562.32	$3,510.19	$4,364.64

Holidays: Panama Independence Day, Nov. 3; Afternoon Liberty Day, Oct. 24; Thanksgiving Day and Friday following, Nov. 29 and 30; Christmas holidays, Dec. 22 to Jan. 6, inclusive; Washington's Birthday, Feb. 22; Easter holidays, Mar. 25 to 29, inclusive; Memorial Day, May 30.

[1] Increase due to increase in salaries, number of positions authorized, cost of supplies, and number of pupils.

ANCON, CANAL ZONE, PUBLIC SCHOOL. FLAG RAISING. MARCH, 1918.



CRISTOBAL SCHOOLHOUSE. MAY, 1918.

APPENDIX I.

REPORT OF THE DISTRICT ATTORNEY FOR THE CANAL ZONE.

ANCON, CANAL ZONE, *July 1, 1918.*

SIR: There is attached herewith a tabulated statement of all criminal prosecutions in the district court of the Canal Zone for the fiscal year ended June 30, 1918.

There was a total of 592 cases disposed of in the district court, 131 of which were appealed from the magistrates' courts. Of the entire number disposed of 409 resulted in convictions.

Six defendants requested trial by jury, and of these two were convicted and four were acquitted.

There have been no appeals in criminal cases to the Circuit Court of Appeals for the Fifth Circuit in New Orleans.

At the end of the fiscal year no criminal cases were pending in the district court for the division of Cristobal. In the division of Balboa four cases of minor importance were pending at the end of the fiscal year. In addition to these, there was still pending in the division of Balboa the case of the Canal Zone *v.* E. F. Bataille, arising out of the failure of the Continental Banking & Trust Co., which was referred to at length in my last annual report.

The Governor of New Jersey refused to honor the first requisition, but subsequently, having been authorized by you, I went to the United States and in person presented a second request. Warrants of extradition were granted by the Governors of New Jersey and of New York, but Bataille fled from his home and it was impossible to effect his arrest at that time. These warrants of arrest have been lodged with the Department of Justice at Washington, and request made that Bataille be apprehended. On account of the death of the Government's main witness, it is doubtful if a conviction could now be obtained in case Bataille should be apprehended and brought back here for trial.

It will be noted that during this fiscal year there was a considerable increase in the number of cases disposed of and a very large increase in the number of appeals from the magistrates' courts.

There have been no suits against the Governor of The Panama Canal for injuries to vessels while passing through the locks, as provided for under the Panama Canal act.

An important civil case referred to in my last annual report, that of Judge William H. Jackson, of the district court of the Canal Zone, against the auditor of The Panama Canal, has been disposed of by the decision of the Supreme Court of the United States. In this case the mandamus was upheld and it was decided that the auditor of The Panama Canal had no power to withhold any part of the salary of the district judge.

While several important issues were raised in the case, these were not passed upon by the Supreme Court, that court having limited itself to the decision of the point above stated.

In the case of The Panama Canal *v.* the Schooner *Blanche Pendleton*, Libel in Admiralty, for the sum of $1,413, an order of sale was obtained and the wreck of the schooner was sold for enough to cover the amount of the libel. However, shortly afterwards and before a confirmation of the sale could be obtained, all that remained of the schooner was completely wrecked and destroyed by a storm.

The judge of the district court held that under these circumstances the purchaser could not be required to carry out his purchase nor to pay the money into court.

The libelee had filed a counterclaim for large damages, but The Panama Canal has been allowed to withdraw its libel without prejudice, and the counter claim has been dismissed, so that this case is in the condition as if no libel had ever been filed.

The claim of The Panama Canal in this libel was largely for services rendered by tugs which were then in the service of The Panama Canal, which attempted to pull the vessel from the beach where she was stranded. The loss to the owners, Pendleton Bros., of New York, on account of the storm and stranding of the schooner was a very great one.

Although they filed in this case a counterclaim for large damages, the counterclaim has no merit, legal or otherwise; but on account of this exceedingly heavy loss and because of the fact that a very large part of the claim of The Panama Canal is for service of tugs of The Panama Canal, I recommend that no further steps be taken to recover the $1,413 from Pendleton Bros.

There is still pending the case of Humber, administrator of McGregor, deceased, *v.* H. A. A. Smith, auditor, et al., for mandamus to compel the payment of an award by the Joint Land Commission. The special attorney of The Panama Canal, who represents the Government before the Joint Land Commission, has protested against the payment of this award to the Secretary of State of the United States on the ground that the Joint Land Commission exceeded its jurisdiction with regard to this award. On account of this protest the judge of the district court of the Canal Zone has ruled that no further steps can be taken in the case in the district court until this protest has finally been resolved by the Secretary of State.

There was also still pending the mandamus case of R. P. Dixon, guardian of Francisco Ayala, an insane person, *v.* H. A. A. Smith, auditor of The Panama Canal, et al. In this case the court dismissed the mandamus as to the defendants, Frank Feuille, Acting Governor of The Panama Canal, and John H. McLean, paymaster of The Panama Canal, but retained the same as to the auditor.

In this case different guardians had been appointed by the district court of the Canal Zone and by the circuit court of Panama where the insane person resided. But in this case steps have been taken looking to an amicable adjustment of the controversy, to be effected by both guardians giving to the auditor of The Panama Canal their receipt for the amount of the award. It is believed that settlement in this manner will be effected and the interests of The Panama Canal protected.

A considerable part of the increase in the number of prosecutions for this fiscal year has been due to violations of the defensive sea areas established around the terminal ports of the Canal Zone. Almost without exception these offenses were unintentional, and for the most part committed by ignorant fishermen.

There have been a few prosecutions under the espionage act, so called. These prosecutions have all resulted in convictions, with one exception. The exception referred to was a prosecution against two defendants for failure to declare and obtain a license for the exportation of certain gold coin from the Canal Zone. The district court held that inasmuch as the coin in question had not formed a part of any gold upon the Canal Zone, but was simply gold in the possession of the defendants who were in transit from Ecuador to Colombia, that there had been no violation of the law.

This ruling of the district judge was referred by the Governor of The Panama Canal to the Secretary of Treasury, and by the district attorney of the Canal Zone to the Department of Justice at Washington; and both of these authorities were of the opinion that the district judge was in error. In a subsequent prosecution in a case somewhat similar the district judge has announced that the court hereafter would be guided by the opinion of the Secretary of Treasury and of the Department of Justice.

Respectfully,

CHARLES R. WILLIAMS,
District Attorney.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—*Criminal prosecutions, 1917–1918.*

	Number.	Guilty.	Bail forfeited.	Not guilty	Disposed of otherwise.	
Adultery	1	1	....	....		
Assault	1	1	....	....		
Assault and battery on high seas	1	1	....	....		
Assault and battery	5	2	....	1	1 withdrawn: 1 nol-pros.	
Assault by means and force likely to produce great bodily harm.	1	1	....	....		1 violation automobile regulations.
Assault with deadly weapon	14	5	....	5		
	....	4	....	....		4 assault and battery.
Assault with intent to kill	2	2	....	....		
Attempt to defraud	3	1	....	2		
Automobile regulations, violation of.	22	17	....	5		
Battery	14	7	....	6	1 withdrawn	
Bringing stolen property into Canal Zone.	7	5	....	2		
Burglary	18	10	....	4	2 nol-pros	
	....	1	....	....		1 loitering.
	....	1	....	....		1 disorderly conduct.
Buying Government property from a soldier.	1	1	....	....		
Carrying concealed weapons	4	2	....	2		
Conspiracy	2	....	....	2		
Criminal trespass	2	....	....	....	2 dismissed	
Cruelty to animals	2	....	....	1	1 withdrawn	
Customs regulations, violation of	8	7	....	1		
Defensive area act, violation of	136	106	18	12		
Deportation, returning to Canal Zone.	7	4	....	3		
Disorderly conduct	43	29	....	10	3 withdrawn 1 dismissed	
Disturbing the peace	1	1	....	....		

TABLE No. 1.—*Criminal prosecutions, 1917–1918*—Continued.

	Number.	Guilty.	Bail forfeited.	Not guilty.	Disposed of otherwise.	
Drunk and disorderly	1	....	....	....	1 withdrawn	
Embezzlement	14	5	....	6	3 nol-pros	
Espionage act, violation of	6	3	....	2	1 dismissed	
False personation	7	....	....	4	3 nol-pros	
Fighting	2	2	....	....	....	
Forgery	21	5	7	2	5 nol-pros 2 dismissed.	
Fraud	2	....	....	2	....	
Grand larceny	81	42	....	18	3 nol-pros	
	....	15	....	....	3 dismissed	15 petit larceny.
Infamous crime against nature	1	1	....	....	....	1 guilty attempt.
Injuring a public jail	1	....	....	....	1 dismissed	
Lewd and lascivious cohabitation	1	1	....	....	....	
Liquor regulations, violation of	22	20	....	2	....	
Loitering	13	11	....	2	....	
Malicious mischief to railroad	2	....	....	2	....	
Manslaughter	1	....	....	1	....	
Murder	1	....	....	....	....	1 asylum insane.
Mutiny	4	4	....	....	....	
National defense act, violation of	21	20	....	1	....	
Navigation rules, violation of	18	17	1	....	....	
Nonsupport	2	....	....	1	1 dismissed	
Obtaining money or property by false pretenses, etc.	2	....	....	....	2 dismissed	
Opium act, violation of	2	1	....	1	....	
Perjury	1	....	....	1	....	
Petit larceny	17	7	....	8	1 dismissed; 1 nol-pros	
Postal laws, violation of	15	12	....	1	1 dismissed; 1 nol-pros	
Quarantine regulations, violation of.	4	4	....	....	....	
Rape	1	....	....	1	....	
Receiving stolen property	1	1	....	....	....	
Robbery	2	1	....	1	....	1 grand larceny.
Seduction	1	1	....	....	....	
Street car regulations, violation of	1	1	....	....	....	
Trading-with-the-enemy act, violation of.	19	18	....	1	....	
Trespass	3	3	....	....	....	
Unauthorized riding on train	2	2	....	....	....	
Unlawfully entering Canal Zone	2	2	....	....	....	
Vagrancy	2	1	....	1	....	
White slave act, violation of	1	....	....	1	....	
Total	592	409	26	115	41	1 to asylum.

One application for writ of habeas corpus denied.

APPENDIX J.

REPORT OF SPECIAL ATTORNEY.

ANCON, CANAL ZONE, *August 1, 1918.*

SIR: I have the honor to submit herewith my annual report as special attorney for The Panama Canal for the fiscal year ended June 30, 1918, and I am including in this report the affairs of the counsel for the Panama Railroad Company on the Isthmus for the fiscal year. The report also includes a statement of the business transacted by the land office of The Panama Canal, and the real-estate transactions of the Panama Railroad Company.

The organization of this office for the fiscal year just ended consisted of the special attorney, who is also the counsel on the Isthmus for the Panama Railroad Company, the assistant to the special attorney and counsel, whose salary is paid from Panama Railroad funds, and who also is the land agent of The Panama Canal, and as such has charge of the land matters of the canal and the Panama Railroad, two land inspectors, two clerks on the gold roll, one clerk and a messenger on the silver roll.

LAND CLAIMS.

There were 37 claims settled by the land office during the fiscal year 1917–18, some of which were for improvements only. They aggregated the sum of $80,113.90.

This makes a total of 4,418 claims settled and paid by the land office since the work of clearing the Canal Zone commenced under the President's depopulation order of December 5, 1912, aggregating the sum of $1,072,137.20. These settlements were made direct with the claimants, and no awards made by the Joint Commission or the umpire are included in the foregoing statement.

The law department was authorized to adjust and settle claims under the Executive order of August 6, 1908. Since that date the law department, and afterwards the office of the special attorney, have settled directly with the claimants and paid 5,480 claims for damages for land and improvements claimed by private parties and taken over by the Government for canal and railroad purposes, aggregating the sum of $1,321,040.50.

The Joint Commission disposed of 10 claims in 8 awards during the past fiscal year, 5 awards being for improvements and 5 for land. The aggregate sum involved in these awards was $125,190.

The umpire for the Joint Commission, appointed by the Government of the United States and the Government of Panama, under the provisions of Article XV of the Panama Canal treaty of November 18, 1903, disposed of 9 claims by 4 awards during the fiscal year. The 9 claims aggregate in amount the sum of $118,061.38.

The total number of awards made by the Joint Commission and umpire, since the promulgation of the President's depopulation order of December 5, 1912, to the end of the fiscal year, was 869, covered by 176 awards, aggregating the sum of $1,090,754.02.

The awards of the various Joint Commissions and umpires appointed under Articles XI and XV of the Panama Canal treaty prior to the President's depopulation order of December 5, 1912, amounted to 21, covered by 21 awards, aggregating the sum of $304,588. This gives a grand total of 890 claims settled and paid for under awards made by all of the commissions and umpires appointed under the treaty, making a total of $1,395,242.02 paid out under awards of the commissions and umpires.

Hence the aggregate amount paid by the United States for lands and improvements through the law department and special attorney's office, and by virtue of awards of the Joint Commission and the umpires, to the end of the fiscal year, is $2,716,382.52, covering 6,270 claims.

During the past fiscal year the Joint Commission dismissed the following claims: Nineteen, because the same had been adjusted by direct settlement between the Government and the claimant; 4, because of the nonappearance of the claimants; 1, for lack of sufficient evidence to support the claim; 1, for the want of jurisdiction in the commission to try the claim; and 4, because the improvements claimed were situated on lands held under revocable leases, either from the French Canal Companies, or its successor, the United States, making a total of 29 claims dismissed.

During the fiscal year 2 claims were certified to the umpire by the Joint Commission. At the end of the fiscal year 1916–17 there were 9 claims before the umpire for his consideration, and he disposed of 9 claims by awards. He had 2 claims before him for his consideration at the end of the fiscal year, both of which are in the class known as land claims. There were no dismissals by the umpire during the fiscal year just ended.

There were 139 claims, involving the sum of $8,005,408.90, appearing on the Joint Commission docket on June 30, 1918; but 48 of these claims are based on Panama Railroad leases, and have been withdrawn from the jurisdiction of the Joint Commission by section 2 of the appropriation act of Congress for sundry civil expenses of the Government, approved July 1, 1916. These claims aggregate the sum of $226,790.55. In addition, there are 9 claims for improvements on lands admittedly owned by the United States and held under revocable lease from the Government, which will be dismissed for want of jurisdiction, in accordance with previous rulings of the commission. They aggregate the sum of $24,264.50.

Therefore there remain 82 claims for adjudication and settlement by the Joint Commission, involving the sum of $7,754,353.85.

A total of 3,596 claims have been filed with the Joint Commission since February, 1913. Of this number 3,478 have been disposed of by the Joint Commission and the umpire.

During the fiscal year 1913–14 the commission dismissed 602 claims and made awards in 629 claims, making a total of claims disposed of 1,231. A considerable majority of the 602 claims dismissed by the

commission were disposed of because the Government had made direct settlement with the claimants.

During the year 1914–15 the commission dismissed 377 claims, a large majority of which were disposed of on account of payment having been made to the claimants by the Government, and awards were made in 85 claims, making a total of 462 claims disposed of during the year.

During the fiscal year 1915–16 the commission dismissed 872 claims and made awards in 27 claims, besides which awards in 17 claims were made by the umpire, making a total of 916 claims. Most of the 872 claims were dismissed by the commission upon the Government's plea of payment.

During the fiscal year 1916–17 the commission dismissed 727 claims and made awards in 85 claims, while the umpire dismissed 2 claims and made awards in 7 claims, making a total of 821 claims. Again, a large majority of the claims dismissed during the year were disposed of upon the Government's plea of payment.

During the fiscal year 1917–18 the commission made awards in 10 claims and dismissed 29 claims, while the umpire made awards in 9 claims, making a total of 48 claims.

According to the figures just given there remained 118 claims of all classes undisposed of before the commission and umpire at the end of the fiscal year. As a matter of fact, there were 139 claims still pending on the commission's docket and before the umpire. This discrepancy of 21 claims can be explained by the fact that in many instances, especially in the early Gorgona trials, a part of the claim would be awarded, another part would be certified to the umpire; and in other instances awards were made for the improvements only, leaving the part of the claim for the land undisposed of. This will explain the seeming discrepancy.

Owing to the death of Mr. Nicholas Cornet and the resignation of Mr. Clement L. Bouve, who was commissioned in the Army of the United States, two vacancies occurred in the membership of the Joint Commission. The vacancies were filled by the President of the United States by the appointment of Judge Burt New, of Indiana, and Judge George A. Connolly, of California, which appointments were made by Executive order of October 3, 1917. The two new commissioners arrived on the Isthmus soon after their appointment, and have been sitting at the sessions of the Joint Commission since their arrival.

PANAMA CANAL LAND LICENSES IN EFFECT WITHIN THE CANAL ZONE AT THE END OF THE FISCAL YEAR.

On June 30, 1918, there were 51 lot licenses in effect in the Canal Zone, which had been issued by the land agent on behalf of The Panama Canal. Of this number 7 licenses were issued during the fiscal year 1917–18. The licenses were granted to various parties to erect oil tanks, steamship office buildings, churches, lodge halls, and residences for the employees of steamship companies and oil companies. The rents collected on these licenses for the fiscal year aggregated the sum of $15,042.02. No rental, however, is collected on lots occupied by churches and used for religious purposes.

PANAMA RAILROAD MATTERS.

I am submitting herewith a statement of leases and licenses from the Panama Railroad Company to various parties, in effect on July 1, 1918, as shown by the land office records:

Statement of Panama Railroad leases and licenses in effect July 1, 1918.

Location.	Leases.		Lots.		Rental.	
	July 1, 1917.	July 1, 1918.	July 1, 1917.	July 1, 1918.	July 1, 1917.	July 1, 1918.
Colon	817	825	830½	833	$83,907.24	$83,090.28
Fox River, R. P	54	52	54	54	2,580.00	2,642.00
Stable lots (Colon)	9	9	12	12	576.00	576.00
Las Esplanadas	105	103	121	122	3,986.00	3,987.00
Guachapali	153	153	194	194	8,154.00	8,378.93
Santa Cruz	88	88	106½	106½	3,977.28	3,977.28
Panama Yard	18	17	30½	29½	5,130.00	4,314.00
Juan Ponce	1	1	1	1	60.00	60.00
Total for leases	1,245	1,248	1,349½	1,352	108,370.52	107,025.49

Location.	Licenses and permissions.		Lots.		Rental.	
	July 1, 1917.	July 1, 1918.	July 1, 1917.	July 1, 1918.	July 1, 1917.	July 1, 1918.
Miscellaneous (Colon)	6	8	.....	.....	$165.00	$246.00
Buildings, rooms, and stores, Colon-Cristobal	15	23	.....	.....	18,367.68	21,633.00
Cristobal	6	6	6	8	1,801.00	1,505.52
News Agency	1	1	.....	.....	1,560.00	1,560.00
Huerta-Sandoval	2	2	2	2	360.00	360.00
Miscellaneous (Panama)	1	1	1	1	1.00	1.00
Javillo Fill	.....	1	.....	1	.....	60.00
Room in P. R. R. Station, Balboa Heights	.....	1	.....	.....	.....	120.00
Total for licenses and permissions	31	43	9	12	22,254.68	25,485.52
Grand total for all leases, licenses and permissions	1,276	1,291	1,358½	1,365	130,625.20	132,511.01

The foregoing statement relates to the leasing of lots by the Panama Railroad Company in the cities of Panama and Colon, as well as a few lots remaining within the Canal Zone under license to various individuals and companies.

A slight discrepancy is shown in the amount of approximate rental bills issued during the fiscal year for the city of Colon as compared with the approximate rental bills issued for the fiscal year 1916–17, which can be accounted for by the fact that during the year just ended one lease on a lot adjoining DeLesseps reservation, Colon, was cancelled at the request of the military authorities, and the building thereon was acquired for account of the Army. The reduction referred to can be further accounted for by the incidental cancellation and transfer of leases in the ordinary course of business during the past year.

A slight increase is shown in this report in the amount of approximated rentals on lots leased in the Fox River district, Colon, as compared with the fiscal year 1916–17, which is accounted for by the fact that certain leases calling for merely nominal rental rate on lots in that district were canceled and new leases substituted therefor calling for a higher rate of rental.

An increase of approximately 17 per cent is shown for the fiscal year 1917–18 in the amount of rentals collected for buildings, office rooms, and storerooms in Colon and Cristobal. All of the rooms in the Masonic Temple Building, Cristobal, except that used by the land agent as an office, and all of the rooms in the Panama Railroad Building in Colon, have been occupied during the entire year by lessees of the railroad company.

The Masonic Temple property has been taken over by The Panama Canal, constructively at least, along with other privately owned real estate in the Canal Zone, by virtue of the President's depopulation order of December 5, 1912, but nevertheless the railroad company has continued to collect the rentals from the lessees occupying the Masonic Temple Building.

In the Guachapali district, city of Panama, some ground was added to a lot held under a lease, whereupon an increased rental was put into effect on that particular lot. In another case in the same district a lodge organization was being charged only a nominal rental for the ground held under lease by them. Contrary to the provisions of the contract, the lodge sublet a part of the lot so held by them, whereupon the rental thereof was increased to the full commercial rate. These two changes account for the approximate rental increase for the year 1917–18.

In the Panama Railroad yard one short term lease on a lot was canceled, which accounts for the discrepancy in that item, as compared with the report of the preceding fiscal year.

The total number of leases, licenses, and permits issued by the railroad company on lots in the cities of Panama and Colon, and in Cristobal, including licenses for the use of lots in Cristobal, issued by The Panama Canal in effect July 1, 1918, was 1,291, covering 1,365 lots, for which bills were issued in the amount of $132,511.01, as shown by the records of the land office, which figures are $1,885.81 more than those shown by the corresponding item in the report for the fiscal year 1916–17.

The total amount of money actually collected on account of the items in the preceding paragraph during the fiscal year just ended, as indicated by figures submitted to this office by the auditor, is $131,530.48, which represents an increase of $276.67 over the actual collections on account of the same items for the year 1916–17.

The monthly reports of the land office to the New York office of the Panama Railroad Company show that 22 new leases were issued during the fiscal year 1917–18, which leases covered 22½ lots, all in the cities of Panama and Colon. The majority of the new leases covered by this item were renewals of old leases.

No fires, which affected property situated on Panama Railroad lots of sufficient importance to warrant any mention here, occurred during the fiscal year.

As indicated in last year's report a part of Manzanillo Island was filled and placed in municipal order by The Panama Canal, and the land thus created was used as a site for quarters for Panama Canal and Panama Railroad employees. This district is situated in the northeast part of Manzanillo Island and is known as new Cristobal. The houses there erected are of the usual cottage and four-family type, and their number during the fiscal year 1917–18 has been increased to the total of 54.

During the fiscal year just passed a fill was completed which covers approximately all of Blocks 55 and 66, and the west half of block 64, Manzanillo Island. This area was placed in municipal order and was used as a site for the proposed new Panama Railroad stables, the proposed new incinerator, and the slaughterhouse for the Municipality of Colon, which is now in the process of erection. As an incident of filling this area, a part of block 54, not fronting upon Broadway, will become available for building purposes with slightly more municipal work having to be done.

It is proposed to condemn the present stables situated in the neighborhood of Ninth Street, Colon, approximately in the area designated blocks 27 and 30. The leases held by various persons on stable lots in this vicinity have, as a matter of fact, already been canceled.

PANAMA RAILROAD LITIGATION.

The following Panama Railroad cases were disposed of either by judgment or compromise settlement during the fiscal year 1917–18:

DISTRICT COURT, DIVISION OF BALBOA.

Mildred Garcia v. *Panama Railroad Company, civil docket No. 198:* This was a suit for damages in the sum of $2,500 for personal injuries. Complaint was filed on November 27, 1917. Trial was had on January 5, 1918, resulting in a judgment in favor of the Panama Railroad Company.

Ruben Guevada v. *Panama Railroad Company, civil docket No. 204:* This was a personal injury suit in which the plaintiff demanded the sum of $25,000. It was filed on December 12, 1917, and a compromise was effected with the plaintiff for the sum of $1,000, and the suit was dismissed on February 7, 1918.

DISTRICT COURT, DIVISION OF CRISTOBAL.

Alexander (or J) McKey v. *Panama Railroad Company, civil docket No. 172*: This was a suit for $1,500 for personal injuries, filed on July 14, 1917. The claim was adjusted and payment made by the railroad company to the plaintiff of $350, and the suit was dismissed.

Bruno Caicedo v. *Panama Railroad Company, civil docket No. 177:* This was a suit for the sum of $7,500 on account of personal injuries, resulting in the death of Ramon Caicedo, son of plaintiff. Suit was filed on July 14, 1917. A demurrer filed by counsel for the Panama Railroad Company was sustained and an order entered to dismiss the case within 15 days, unless an amended complaint was filed. On November 26, 1917, the plaintiff filed a motion requesting a reconsideration of the court's order of dismissal. On May 9, 1918, the plaintiff's motion was overruled and the demurrer was made final and the case dismissed.

Abraham Thorpe v. *Panama Railroad Company, civil docket No. 200:* This was a suit for damages in the sum of $1,000 on account of personal injuries. Complaint was filed January 11, 1918. Settlement was effected with the plaintiff by the payment to him of $500 by the railroad company, and the suit was dismissed.

MAGISTRATE'S COURT, DIVISION OF BALBOA.

James Asendo v. *Panama Railroad Company, docket No. 336:* Suit for damages on account of escape of a horse from defendant's stables. Complaint was filed October 20, 1917. Trial was had on October 26, 1917, resulting in a judgment for the railroad company.

Francisco Arias, P., v. *Panama Railroad Company, civil docket No. 344:* Suit for damages in the sum of $250 on account of loss of baggage. Complaint was filed November 24, 1917. Case was tried December 5, 1917, and judgment rendered in favor of plaintiff for $100 and costs.

James Valentine v. *Panama Railroad Company, civil docket No. 351:* Suit for damages in the sum of $75, on account of loss of freight. Suit was in-

stituted on February 1, 1918, a trial was had February 5, 1918, and judgment was rendered in favor of the railroad company.

MAGISTRATE'S COURT, DIVISION OF CRISTOBAL.

James Roberts v. *Panama Railroad Company, civil docket No. 365:* Suit was instituted against the railroad company in which the sum of $300 damages was claimed, upon a charge of false arrest and malicious prosecution against the company. Trial was had October 6, 1917, which resulted in a judgment in favor of the railroad company.

Mary Moore v. *Panama Railroad Company, civil docket No. 377:* Being a suit for damages in the sum of $300, on account of breach of contract to carry baggage. Case was filed November 2, 1917. Judgment was obtained against the railroad company on December 15, 1917, for the sum of $71.15.

B. Rosenberg & Sons v. *Panama Railroad Company, civil docket No. 343:* Suit was instituted on February 19, 1917, for damages in the sum of $288.70, on account of injury to a shipment of tobacco. The defendant company filed a motion for security of costs. Thereupon the plaintiff dismissed his case.

The following Panama Railroad cases were pending at the end of the fiscal year 1917–18:

DISTRICT COURT, DIVISION OF BALBOA.

N. K. Ovalle and R. J. Calvo v. *Panama Railroad Company, civil docket No. 239:* This suit was filed June 11, 1918, and the plaintiffs seek damages in the sum of $2,000 on account of loss of and damage to a shipment of freight.

Joseph Liscomb v. *Panama Railroad Company, civil docket No. 237:* This suit was filed on May 25, 1918, and the plaintiff is demanding damages in the sum of $5,500, on account of a breach of contract of carriage. The defendant company has filed a plea to the jurisdiction, which had not been acted upon by the court at the end of the fiscal year.

Evelina Robert v. *Panama Railroad Company, civil docket No. 219:* This suit was instituted on February 21, 1918, for the sum of $20,000, on account of personal injuries. The case was not tried during the past fiscal year, but was tried on the 26th of July, 1918, and the plaintiff recovered a judgment of $2,500 against the Panama Railroad Company. A motion for a new trial is to be presented in due course by counsel for the railroad company.

The injuries complained of by the plaintiff in this case resulted from a collision with one of the delivery wagons of one of the commissaries. The contention of counsel for the Panama Railroad Company was that the Panama Railroad Company is not liable for the reason, among others, that the commissaries are being operated by The Panama Canal and not the Panama Railroad Company.

George S. Robb v. *Panama Railroad Company, civil docket, No. 234:* This suit was instituted on May 16, 1918, and the plaintiff sought to obtain damages in the sum of $451.25, on account of the demolition of an automobile by one of the Panama Railroad engines. The case was not disposed of during the last fiscal year, but on the 12th of July, 1918, the case was tried and a judgment obtained in behalf of the Panama Railroad Company.

DISTRICT COURT, DIVISION OF CRISTOBAL.

The Muller Company, Sucrs., a Corporation, v. *Panama Railroad Company, civil docket No. 188:* This is a suit instituted November 6, 1917, wherein the plaintiffs claim damages in the sum of $497.46, on account of the loss of goods by carrier. Answer has been filed by the railroad company and the case will be tried and disposed of in the near future.

James Daley v. *Panama Railroad Company, civil docket No. 70:* This suit was filed on January 30, 1915. The plaintiff claims damages for $440.80, on account of an alleged breach of contract for the furnishing of ties for the railroad company. The case has been delayed due to the absence of witnesses.

T. A. Green v. *Panama Railroad Company, civil docket No. 197:* This case was filed on July 3, 1915, and the plaintiff seeks damages in the sum of $1,000 on account of injuries to a horse, resulting in its death. The plaintiff died since the filing of the suit, and the trial of the cause was delayed awaiting the

appointment of an administrator to represent the plaintiff's interest. The regularity of the administrator's appointment is questioned by one of the interested parties, and this has resulted in delaying a final disposition of the case.

B. Barnett v. *Panama Railroad Company, civil docket No. 181:* This is a suit for damages in the sum of $659, on account of an alleged breach of contract. It was filed August 15, 1917. Answer has been filed by the Panama Railroad Company, and it is expected that the suit will be disposed of in the very near future.

Mateo Ugalde v. *Panama Railroad Company, civil docket No. 235:* This suit was filed May 24, 1918, and the plaintiff seeks damages in the sum of $7,500 for personal injuries. Plea to the court's jurisdiction was filed by the defendant company on June 11, 1918, and had not been acted upon by the court at the end of the fiscal year.

John Payne v. *Panama Railroad Company, civil docket No. 167:* This suit was filed April 12, 1917, for the sum of $2,000 damages on account of personal injuries. Motion for security of costs was filed by the defendant company, and the plaintiff ordered to secure the costs, which was not done; and motion was made by counsel for the railroad for the dismissal of the case. The motion has not yet been acted upon by the court.

Arnold Valencia v. *Panama Railroad Company, civil docket No. 168:* This is a suit for damages in the sum of $2,000, on account of failure to transport baggage. It was filed on April 18, 1917. Answer has been filed by the railroad company and the case has been continued from time to time by the plaintiff.

Panama Railroad Company v. *Eufracio C. de Villalobos and Porfirio Melendez:* This suit was instituted by the Panama Railroad Company for recovery of lands. Petition was filed March 1, 1912. After the suit was filed an adjustment of the issues between the railroad company and Porfirio Melendez was had. The land involved in the suit was taken over by the United States by virtue of the President's depopulation order of December 5, 1912. The fact that the land was taken over by the United States was called to the court's attention and the railroad company asked for a dismissal of the case without prejudice. The railroad company's motion was opposed by counsel for Villalobos, and was thereupon denied by the court.

Hugh Rance v. *Panama Railroad Company, civil docket No. 199:* This is was filed January 11, 1918, and damages in the sum of $5,000 are claimed on account of personal injuries. Demurrer to complaint was filed on behalf of the Panama Railroad Company and argued on April 25, 1918. The matter was taken under advisement by the court and an order was entered on July 5, 1918, overruling the defendant's demurrer.

Pedro C. Cerezo v. *Eusebio Diaz et al., Panama Railroad Company, intervenors:* This is an action brought to establish title to real property. Petition was filed on June 24, 1909. No action was taken in this case prior to the President's depopulation order of December 5, 1912, and no action can be taken on it by the court at this time, except to dismiss the case, inasmuch as the land involved in the controversy has been taken over by the United States. Our efforts to have the case dismissed have not been successful owing to the plaintiff's objection.

Panama Railroad Company v. *A. S. Mendez et al.:* This is a suit brought for the recovery of land. Petition was filed March 6, 1912. Some time after the President's depopulation order of December 5, 1912, the Panama Railroad Company asked for the dismissal of this case without prejudice, upon the ground that the United States had taken over the property, and that the defendants had filed their claims before the Joint Commission for damages on account of the Government having taken over the land. The motion was denied by the court. The claim of A. S. Mendez and others was tried by the Joint Commission and was dismissed for the want of merit in the claim by the commission under ruling made on the 2d day of July, 1918. The ruling of the commission will be brought to the attention of the district court and the railroad company's motion to dismiss will be renewed.

Tomas Reina v. *Beatrice Bracho et al. and the Panama Railroad Company, civil docket No. 139:* This was a suit for the partition of lands known as Rio Indio and Mindi. It was filed May 29, 1916, sometime after the land had been taken over by the United States under the depopulation order of the President of December 5, 1912. A suggestion was filed by the district attorney on behalf of the United States that the lands had passed to the United States, and pleas

in bar were filed by several of the defendants, including the Panama Railroad Company. The pleas were sustained and the case was dismissed on April 24, 1918, and notice of appeal has been given by the plaintiff.

The following Panama Railroad Company suits were pending on writ of error from the Supreme Court of the United States and the United States Circuit Court of Appeals at New Orleans at the end of the fiscal year 1918:

Theodore Bosse v. *Panama Railroad Company, civil docket No. 119:* This was a suit for $10,000 damages on account of personal injuries. It was filed July 12, 1916, in the Balboa division of the district court. A trial was had which resulted in a judgment against the Panama Railroad Company in the sum of $2,500, and the company obtained a writ of error from the United States Circuit Court of Appeals at New Orleans. A judgment was rendered by that court, sustaining the trial court, on February 6, 1917; and thereafter a writ of error was perfected in the Supreme Court of the United States by the railroad company and the case is now pending in that court.

Joseph T. Toppin v. *Panama Railroad Company, civil docket No. 96:* Suit for damages for personal injuries in the sum of $15,000. The complaint was filed in the Cristobal division of the district court on July 3, 1915. The plaintiff obtained a judgment against the Panama Railroad Company on July 14, 1917, in the sum of $10,000. A writ of error was perfected by the Panama Railroad Company in the United States Circuit Court of Appeals at New Orleans. A judgment was rendered against the railroad company by the appellate court on April 17, 1918. Thereafter a writ of error was perfected by the railroad company from the Supreme Court of the United States, and the case is now pending in that court.

Mrs. T. T. Curran, and T. T. Curran, her husband, v. *Panama Railroad Company, civil docket No. 168:* The plaintiffs in this case instituted a suit against the Panama Railroad Company on May 24, 1917, in the Balboa division of the district court, demanding damages in the sum of $25,000, on account of personal injuries sustained by Mrs. Curran. The plaintiffs recovered a judgment against the Panama Railroad Company on December 5, 1917, for the sum of $12,020.83. A writ of error was perfected by the Panama Railroad Company from the Circuit Court of Appeals at New Orleans, where the case is now pending.

A railroad wreck occurred on the 20th day of May, 1918, in which some of the passenger cars of the company were demolished and others seriously damaged, at a place near the Gamboa stockade. A considerable number of people were injured, and several deaths occurred as a result of the wreck. No suits were filed against the railroad company arising out of the wreck during the last fiscal year, but several have been filed since July 1, and it is anticipated that other cases will be filed in the near future.

Up to the time the decision in the Fitzpatrick case was rendered by the Supreme Court of the Canal Zone in 1913, practically no personal injury cases against the Panama Railroad Company had been filed, except a few based on the Federal employees liability act; and that condition existed from 1855, when the railroad was completed across the Isthmus until the ruling in the Fitzpatrick case was made.

The ruling of the Supreme Court of the Canal Zone in the Fitzpatrick case was a departure from the jurisprudence of the Canal Zone, which is the same as that of Colombia, as recognized and enforced in the Canal Zone, prior to that date. The effect of the ruling was to apply principles of common law as understood and interpreted by the courts of the United States rather than the laws and jurisprudence of Colombia. As a result of the departure from the principles of Colombia law, a great number of personal injury cases have been filed against the railroad company. The ruling of the

Supreme Court of the Canal Zone has been sustained by the United States Circuit Court of Appeals in New Orleans, which court has in several instances held that the principles of common law are applicable in the Canal Zone.

The case of Theodore Bosse *v.* The Panama Railroad Co., and the case of Joseph T. Toppin *v.* The Panama Railroad Co., now pending in the Supreme Court of the United States, present the issue clearly for the determination of that court whether or not the courts of the Canal Zone are to follow common-law principles or the laws and jurisprudence of Colombia. Hence, the two cases are of extreme importance, inasmuch as a ruling favorable to the railroad will be far reaching in its effect and of considerable benefit to the company.

During the last fiscal year this office has rendered services of an advisory character to the Governor and the various department heads, and in some instances to the commanding officer of the military forces; and also to the American Minister in Panama.

The various activities of our Government on the Isthmus, not connected directly with the canal, but due to the present war, have presented numerous legal questions which have been submitted to this office for an opinion thereon, thus increasing the advisory work of the office over that done at any time since the change of the canal organization from a construction system to that of operation.

LEGISLATION.

No congressional legislation limited in its scope to the Canal Zone has been enacted by Congress, although the Canal Zone and The Panama Canal are included in several acts of Congress enacted during the last fiscal year.

The President of the United States has issued several Executive orders affecting The Panama Canal and the Canal Zone. This office did not intervent in the drafting of any of those orders, except the following:

An Executive order was issued on January 12, 1918, entitled: "Regulations Establishing Maximum Rates of Fare and Governing Transportation of Passengers for Hire in the Canal Zone." This Executive order took the place of preexisting legislation on the subject of passenger tariffs to be charged by owners of automobiles and other vehicles in the Canal Zone. The order prescribes a punishment for a violation of any of its provisions, in conformity with section 5 of the act of Congress, approved the 21st day of August, 1916, entitled: "An act extending certain privileges of canal employees to other officials on the Canal Zone, etc.," by virtue of which act the executive order in question was issued.

On May 28, 1918, the President issued an Executive order relating to the anchorage and movement of vessels in Canal Zone waters. The Executive order was issued by the President under the authority granted to him by section 1, title 2 of the act of Congress, approved June 15, 1917, commonly known as the "Espionage act." By the terms of the order the Governor of The Panama Canal is authorized to exercise, within the territorial waters of the Canal Zone, all of the powers mentioned in said section 1, title 2 of the said act of Congress to the same extent as is conferred therein on the Secretary

of the Treasury with regard to the territorial waters of the United States; and all acts done by the Governor of The Panama Canal, or under his authority pursuant to said section of said act prior to the promulgation of the Executive order are ratified and confirmed by the same.

The order was issued by reason of the national emergency which exists on account of the present war, and under its authority the Governor may make, subject to the approval of the President, rules and regulations governing the anchorage and movement of any vessel, foreign and domestic, in the territorial waters of the Canal Zone, and may inspect such vessels at any time, place guards thereon, and, if necessary in his opinion to secure such vessels from damage or injury, or to prevent damage or injury to any harbor or waters of the Canal Zone, or to secure the observance of the rights and obligations of the Canal Zone, may take, by and with the consent of the President, for such purposes, full possession and control of such vessels and remove therefrom the officers and crews thereof and all other persons not specially authorized by him to go or remain on board thereof. The Executive order was superseded by the Executive order of July 9, 1918, which does not differ substantially from the order of May 28, 1918.

The Governor of The Panama Canal has established rules and regulations under the authority granted to him by the Executive order of the President above mentioned, but those regulations were not approved by the President until the 9th of July, 1918.

Respectfully,

FRANK FEUILLE,
Special Attorney.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

APPENDIX K.

REPORT OF THE CHIEF HEALTH OFFICER, HEALTH DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE, *July 1, 1918.*

SIR: I have the honor to submit the following report of the operations of the health department for the fiscal year ended June 30, 1918:

ORGANIZATION.

The organization of the department has almost completely changed during the year.

Col. D. C. Howard was relieved from duty as chief health officer October 4, 1917, for duty in charge of the sanitary division of the office of the Surgeon General of the Army. His successor, Col. A. E. Truby, was transferred to the same division on February 28, 1918, when he was succeeded by the undersigned.

Upon Col. Truby's appointment as chief health officer, Maj. R. L. Loughran became superintendent of Ancon Hospital.

Capt. Henry Hanson was appointed assistant chief health officer February 1, 1918.

At Colon Hospital Capt. R. L. Bowen succeeded Capt. T. J. Leary as superintendent on October 3, 1917.

Capt. J. L. Byrd succeeded Capt. Charles E. McBrayer as health officer of Cristobal-Colon on August 15, 1917. Capt. McBrayer became health officer of Panama on July 8, 1917, relieving Capt. H. P. Carter. Capt. M. E. Heck succeeded Capt. McBrayer as health officer of Panama on August 29, 1917, and was succeeded by Capt. Henry Goldthwaite on May 1, 1918.

Maj. William A. Duncan, chief of X-ray clinic, Ancon Hospital, was relieved by Capt. L. R. Cornman on May 21, 1917, and he by Lieut. C. M. King on May 17, 1918.

Maj. Thomas D. Woodson was ordered to duty with the Army from the superintendency of Corozal Hospital on September 2, 1917, and Dr. Louis Wender became superintendent.

Capt. W. E. Hall, chief of the eye and ear clinic, Ancon Hospital, was relieved on November 30, 1917, by Capt. G. C. Marshall, and owing to the rapidly increasing demands of this clinic, Lieut. A. F. Ryan was appointed an assistant on June 27, 1918.

In addition to the changes noted almost half of the physicians on duty with the canal have been ordered to active duty with the Army, and have been relieved in part by officers from the Reserve. For the first time since American occupation of the Zone, there is now no officer of the regular Medical Corps of the Army on duty with the canal. The officers of the Medical Reserve Corps who have been drawn from civil life in the States, with the unanimous desire on their part

for service in France, have nevertheless cheerfully accepted and have faithfully performed the arduous duties assigned them.

In the positions in the department occupied by other than physicians, similar constant changes have taken place. Many of our nurses, most of our sanitary inspectors and clerks, have applied for and received active duty with the Army. The very character of the personnel of the department as of the entire canal organization, built up by years of successful administration while the great work was in progress, preeminently qualified them for even greater responsibility and opportunity for the country now in its need.

In addition to these almost daily changes in personnel, the horizontal increase in the cost of everything used in the department has contsantly increased its administrative difficulties.

Vital Statistics.

EMPLOYEES.

The average number of employees on the rolls of The Panama Canal, the Panama Railroad, and contractors doing work for The Panama Canal for the year was 28,938, as compared with 33,998 for the fiscal year ended June 30, 1917.

The total admission rate to hospitals and quarters was 381.33,[1] as compared with 310.40 for 1917. The total admission rate to hospitals only for the year was 176.55, as compared with 141.86 for 1917, and for disease alone 142.89, as compared with 105.62 for 1917.

The total death rate for 1918 was 7.95, as compared with 5.79 for 1917, and the death rate for disease was 6.74, as against 4.44 for 1917. The noneffective rate for 1918 was 10.42, compared with 8.81 for 1917.

The total admission rate for malaria was 20, as compared with 13.47 for 1917, and 34 for 1916; the constantly noneffective rate, hospitals and quarters, was 0.72, as against 0.49 for 1917 and 0.87 for 1916. The death rate for malaria was 0.03, as compared with 0.09 for 1917 and 0.15 for 1916.

The admission rate for typhoid fever was 0.28, as against 0.41 for 1917; the death rate for 1917 was 0.03; there were no deaths from typhoid fever in 1918.

The death rate from tuberculosis (various organs) was 1.27, as compared with 1.14 for 1917. The death rate for pneumonia was 0.79, as against 0.71 for 1917.

The five diseases causing the highest number of hospital admissions, with their rates, were as follows:

	Number of admissions.		Rate per 1,000.	
	1916–17	1917–18	1916–17	1917–18
Venereal disease	533	563	15.67	19.45
Malaria	419	579	12.32	20.00
Influenza	151	269	4.44	9.29
Tuberculosis	126	67	3.71	2.31
Diseases of the eyes and annexa	110	86	3.24	2.97

[1] All rates are based on the annual rate per 1,000 employees.

The five diseases causing the highest number of deaths, with their rates, were as follows:

	Number of deaths.		Rate per 1,000.	
	1916–17	1917–18	1916–17	1917–18
Tuberculosis (various organs)	39	37	1.14	1.27
Lobar pneumonia	24	23	.71	.79
Chronic nephritis	16	22	.47	.76
Organic diseases of the heart	9	23	.26	.79
Apoplexy	7	4	.21	.13

EFFECTS OF RACE.

For disease only, the admission rate to hospitals and the death rate for white employees was 272.16 and 4.73, as compared with 118.16 and 7.12 for black employees. The noneffective rate for disease and injuries for white employees was 16.62, as compared with 9.23 for black employees.

The admission rate for malaria was 22.38 for white employees and 19.56 for black employees.

CANAL ZONE.

The average civil population of the Canal Zone for the year was 24,032, as compared with 31,048 for last year. The military population is not included in any of the statistics of this report. From this civil population 286 deaths occurred during the year, 255 of which were from disease, giving a rate of 10.61 for disease alone, as compared with 8.95 for 1917.

The death rate from tuberculosis was 1.79, as compared with 1.16 for the year 1917. Deaths from tuberculosis this year were 15 per cent of all deaths.

The birth rate for the year was 31.07. The infant mortality rate, based on the number of births reported for the year, was 9 for white and 160 for black children, with a general average of 116. Of the total births reported, 6 per cent were stillbirths.

Of the total deaths reported, 43 per cent occurred among children under 5 years of age.

PANAMA CITY.

The average population of the city for the year was 61,369, as compared with 60,778 for the preceding year. From this population, 1,523 deaths occurred during the year, of which 1,484 were from disease, giving a rate of 24.18 for disease alone, as compared with 27.97 for the preceding year. Tuberculosis gave a death rate of 4.53 as compared with 5.20 for 1917; this was 18 per cent of the total deaths, as compared with 18 per cent for last year.

The principal causes of death as compared with last year were as follows:

	1916–17	1917–18
Tuberculosis (various organs)	316	278
Pneumonia	248	123
Diarrhea and enteritis	271	247

There were 2,635 births reported for the year, giving a rate of 45.08. The infant mortality rate, based on the above number of births, was 233.53. Of the total births reported, 7 per cent were stillbirths.

Of the total deaths recorded, 49 per cent occurred among children under 5 years of age.

COLON.

The average population of the city for the year was 26,078, as compared with 24,693 for the preceding year. From this population, 678 deaths occurred during the year, of which 651 were from disease, giving a rate of 24.96 for disease alone, as compared with 24.54 for the preceding year.

The principal causes of death as compared with last year were:

	1916–17	1917–18
Pneumonia	104	89
Tuberculosis (various organs)	100	117
Diarrhea and enteritis	56	64

There were 872 births reported for the year, giving a rate of 35.01. The infant mortality rate, based on the number of births, was 267.39. Of the total births reported, 8 per cent were stillbirths.

Of the total deaths, 45 per cent occurred among children under 5 years of age.

Special Remarks.

Aside from the routine sanitation of this important segment of the continent, which will always require constant and unremitting labor by a health department having approximately the present personnel and equipment, the occurrence of cerebrospinal meningitis on the Japanese steamer *Anyo Maru*, enroute from Yokahama to Callao, Peru, presented a novel and interesting problem in epidemiology. Between Yokahama and San Francisco there were several cases of this disease. After leaving Balboa, which was a port of call, there was a recrudescence, and the Peruvian authorities refused to receive the vessel. At the request of its owners, she was cabled permission to return to Balboa, and upon arrival on May 28, 1918, 585 passengers and 16 of the crew were disembarked. There had been 16 deaths on the ship, the last occurring just after arrival at Balboa. Four acute cases were evacuated from the ship and three others developed within a few days. Large spinal and intravenous injections of Flexner's serum, frequently repeated, promptly relieved these cases, all of which recovered without paralyses or other sequalae. Careful examination and reexamination showed that the remainder of the crew were not carriers, and, after carefully spraying all parts of the ship with larvacide so it would have to be scrubbed out by hand and so cleaned, the ship was allowed to continue to its destination. Up to July 1, 4,193 cultures had been made from throat swabs from 602 individuals, and 103 carriers were detected. These were isolated, irrigated frequently with Dakin's solution and sprayed with dichloramin-T, and have gradually cleared up.

Following this experience, ships having cases of cerebrospinal meningitis aboard will have their sick evacuated here, all passengers and crew examined and carriers detained until clear. Very large and frequently repeated intravenous injections of Flexner's serum after clinical diagnosis, even before spinal cultures are positive, are of curative value in the meningo-caemic and rapidly fatal type of the disease which confronted us. Most of the cases that had died had been ill less than 30 hours.

It is a pleasure to commend the chief quarantine officer, Dr. M. C. Guthrie, Dr. M. J. Hoey, quarantine officer at Balboa, and Lieut. J. W. Sherrill and R. E. Houke, M. R. C., who volunteered to care for the cases and carriers, and Maj. Oscar Teague, chief of the board of health laboratory, and his associates, whose effective and untiring work showed in the management of this epidemic how this serious disease may be controlled with minimum loss of life.

VENERAL DISEASES.

Since the American occupation our statistics show a fairly constant admission rate to hospitals and quarters of 12½ per cent from venereal diseases. At first malaria and venereal diseases and more recently tuberculosis and venereal diseases have alternated as the most common cause of sickness in the monthly reports. Since 1904, there have been 27,633 cases actually treated in the Canal Zone by American physicians, most of them being in employees and their families and from the military. When it is understood that such employees are heavily penalized as "fault" cases, and, as a result, many of them secure treatment by private physicians, even these figures are small. Many of those infected are hopelessly diseased, paralytics, tabetics, insane, blind, terribly penalized by easily preventable diseases.

This problem has given us our greatest concern. For some years past this matter has been the subject of conferences between this office and the military forces on the Zone, and the Government of the Republic of Panama. The fact that the cities of Panama and Colon are within the exclusive sanitary jurisdiction of the United States and the police jurisdiction of Panama, seriously complicated the matter. The alarming increase of these diseases amongst our soldiers and the utter neglect of the matter by the Panaman authorities forced the general commanding the department to issue a general order which in effect was a quarantine against the terminal cities on account of venereal diseases, the widespread illicit sale of habit-forming drugs and alcohol abuse, and an incidental protest against the graft and incompetence that always accompanies these evils. Realizing that (1) land quarantines against disease are temporarily effective, but gradually are evaded so as to defeat their purpose; (2) the undesirability of an indefinite quarantine along an international boundary line between us and a friendly power; and (3) that the cities of Panama and Colon can have no other health authority than his office, the chief health officer, at the suggestion of the Republic of Panama, prepared a decree for the solution of the problem which retains their police supervision and our sanitary responsibility, in accordance with the principles of the suggestions of his predecessors. This decree was issued by the Chief Executive of Panama, and will be effective July 15, 1918.

The plan—to be operated, it is to be constantly remembered, in a smaller foreign, friendly country, consequently with its approval—differs from that in the States and in the Canal Zone, in that it frankly recognizes the existence and evil of prostitution, seeks to minimize these as long as they exist, will surely—though gradually—eradicate venereal disease, and will by its rigid enforcement and resulting increased knowledge awaken a public conscience that will exact higher social standards, so that the higher one we have set for our own people may seem desirable to these allies and friends of ours. In fact, I am confident that frank recognition and rigid control will demonstrate that vice does not pay, and that economic conditions will rapidly cause a demand for its suppression from these people themselves.

Every woman in the segregated districts and the clandestines will be examined. All those infected will be treated in the Santo Tomas Hospital at the expense of the Republic of Panama. Every man applying for admission to the segregated district is examined by a physician and if diseased required to submit to treatment in or out of the hospital, at the discretion of the health officer. Ten per cent of the men so far examined have been found infected and are now being treated, the indigent at public expense.

Under this decree: (1) Any house owner renting to prostitutes outside the segregated districts is fined by the health officer, thus putting the burden of law enforcement on the house owners, so that all clandestines must come to the restricted district, whence we send them to the hospital as often as reinfected; (2) no one but qualified physicians can treat venereal diseases; druggists are forbidden to have in their possession patent medicines or other remedies for them, except such as are prescribed by physicians; (3) physicians are required to report all cases treated by them as in the plan approved in the States.

There are three ways of handling this matter:

First. Request the abrogation of this decree and the issuance of a police decree enforceable in the courts of Panama making all vice criminal. Such a decree would be even more negligible as a factor in disease prevention here than in the States.

Second. To carry on as at present, increasing the personnel of the health department so this new activity will not endanger its routine work. This would require 12 additional physicians, 4 of whom should be trained gynecologists or genito-urinary surgeons, and half or two-thirds of whom might well be experienced women physicians. Maintenance of patients would continue at the expense of Panama. Three additional sanitary inspectors are needed. About $2,000 a month should be paid to Santo Tomas Hospital to help meet the expense of additional nurses and orderlies. An expert supervisor of a reform farm and an assistant should be furnished by the United States. This program would cost between $50,000 and $75,000 a year, and would rapidly reduce venereal diseases.

Third. To increase the personnel of the health department of the two cities so the decree may be enforced spasmodically and as opportunity offers, as in the States, in the meanwhile educating the public and hastening as far as possible the elimination of these diseases by the public themselves. The actual expenditure of money by the

health department under such a plan would be about $3,000 a month, but it will take a hundred years and tens of thousands times the money to accomplish the results that can be secured here within less than as many months.

MEAT INSPECTION.

The inspection of meat and meat products has made rapidly increasing demands on the department. The Zone has not only supplied its own necessities for meat, but has been able to supply considerable quantities for our Army. A microscopic examination of a smear from the spleen of every animal slaughtered is made for anthrax. All meat shipped to our forces is under the eye of an inspector until in the refrigerator aboard ship. Meat for local consumption receives the same rigid inspection, and the people of the Canal Zone have at all times had an ample supply of excellent beef from healthy cattle.

The following figures give an idea of the amount of work done by our veterinarians and meat inspectors during the year:

Ante-mortem inspections:	
Cattle	20,261
Hogs	10,009
Calves	309
Sheep	44
Post-mortem inspections:	
Cattle	20,463
Hogs	10,109
Calves	311
Sheep	44
Quarantine inspections:	
Cattle	27,868
Calves	468
Hogs	16,209
Splenic smeers examined	61,866

Ancon Hospital.

PERMANENT BUILDINGS.

The administration-clinics building was occupied in December; the new kitchen-mess halls building in March; the new power plant was placed in operation in June. Passageways to sections A and B were completed and put into service in March.

The new nurses' home and new isolation building are practically ready for occupancy. Work was started on new section C in January, on new section D in March, and on new garage in June.

BUILDINGS EVACUATED.

Building 265, section C, was evacuated of stores and patients in August and site prepared for erection of nurses' home.

In August, due to increased number of contagious cases, so much of building 246 as had been moved onto fill below section A was reconnected with water, light, and sewer, and patients received therein. This building is at present occupied by chronic patients only.

Buildings 234 and 236, which housed the superintendent and his office staff, the pharmacy, medical clinic, eye, and ear clinic, X-ray

clinic, and library; and building 238, steward's quarters, were evacuated and razed, and the site prepared for erection of new section "C."

Building 224, ward 15, was also evacuated and turned over to the building division for use as field office and storerooms.

Wards 5 and 6, building 237, were evacuated by building division and, together with buildings 240–242 (operating room and surgical clinic), were razed and work on permanent ground improvements begun.

In March, building 222, used for foreign male patients; building 224, gold and silver mess halls; building 226, steward's office and storeroom; and building 228, kitchen, were evacuated (except boiler room of kitchen evacuated in June) by hospital forces, razed, and construction on new section begun on this site.

GROUNDS.

Permanent roads and ground improvements were commenced, the grading and terraces around administration-clinics building completed, and considerable progress made in grading and laying of sidewalks. Permanent roads around new kitchen-mess halls building were completed and grading and sodding completed.

Permanent road was also finished in front of board of health laboratory and Ancon dispensary and work commenced on the main road between these two points.

ADMINISTRATION-CLINICS BUILDING.

This well-planned, reinforced-concrete structure stands well back from the main stairway entrance to Ancon Hospital, and by its location and size dominates the entire group of buildings which now house Ancon Hospital. At the front approach to the building is by means of broad sidewalks, while at the rear covered passageways radiate to other sections of the hospital, making it possible for patients and personnel to go back and forth as may be necessary without detriment or inconvenience, irrespective of weather conditions.

The building is occupied as follows: First floor—chief of medical clinic, eye and ear clinic, X-ray clinic, admitting office, and general waiting room. Second floor—superintendent and office force, library, and files. Third floor—surgical clinic. Basement—pharmacy, linen room, and storerooms. Access to the several floors is by means of an electric elevator and by broad stairways in each front corner of the building.

The service needs of the patients and personnel are fully answered in the design of this building, which should be ample for the requirements of the hospital indefinitely. The equipment installed is modern and complete and, so far as possible, of material which does not deteriorate in this climate.

ADMINISTRATION.

The superintendent and office force since January have been located in their permanent quarters in the administration-clinics building, occupying the entire second floor.

In the north wing is located the superintendent's private office and anteroom, the library, reading and board room, two sets of bachelor quarters, stationery storeroom, and janitor's closet. The entire central section is occupied by the clerical force, the public and working portions being separated by an openwork grill.

The south wing contains the chaplain's office, clerical staff's lockers and toilets, and a spacious fireproof filing room where case histories of patients—now over 210,000 in number—formerly filed in open wood shelving are now housed in dustproof steel filing cases.

SURGICAL CLINICS.

In February the surgical clinic moved from building 240 into its permanent quarters in the administration-clinics building, occupying the entire third floor, when new furniture and surgical equipment costing nearly $5,000 was installed.

In the north wing are located four operating rooms in a line, each with built-in instrument cabinets, lighted by day with a large skylights and by night by shadowless electric-light fixtures. The operating rooms open into a wide corridor on the opposite side of which are located the sterilized linen storeroom, electric autoclave rooms, surgeons' scrub-up room, and a room containing electrically operated apparatus for hot and cold sterile water, distilled water, saline solution sterilizer, instrument sterilizers, and sinks.

The central portion of the third floor has on the north side the anesthesia room, soiled linen room with chute to basement, elevator, and stairs. In the center at the front are the surgeons' lounging room, lockers, toilets, and baths; at the rear, waiting room for clinic cases, public toilets, and quarters for colored attendant.

On the south side are located stairway, nurses' office, men's (clinic) examining room, and office of the chief of surgical clinic.

The south wing contains clinic laboratory, women's (clinic) examining room, and emergency sterilizing room—for steam apparatus—and on opposite side the nurses' rest room, two emergency examining or operating rooms, and linen storeroom.

During the year 1,525 major operations and 2,692 minor operations were performed. There were 3,892 cases visited the out-patient department, for whom 643 prescriptions were written. Three hundred and forty-six obstetrical cases were delivered.

MEDICAL CLINIC.

This clinic is now located in its permanent quarters in the south corner of first floor of the administration-clinics building, and contains an office for chief of clinic, women's examining room, dressing room, and men's examining room, in which is also located the clinic laboratory.

There were 3,312 cases treated in the out-patient department, for whom 2,499 prescriptions were written.

EYE AND EAR CLINIC.

This clinic is now installed in its permanent quarters in the south wing, first floor, administration-clinics building. It has an office and general examining room, refracting tunnel and dark room, operating

room, rest room, and waiting rooms for both white and colored patients.

The following new apparatus was placed in service: Ophthalmometer, perimeter, phoro-optometer, refraction cabinet, operating table, electric cautery, aviation examining chair (Barany).

There were 6,099 cases visited the out-patient department, for whom 1,228 prescriptions were written. One thousand and ninety-six refractions were made, and 976 operations performed. Also, a large number of candidates for aviation section and Medical Officers Reserve Corps were examined, and cases visited at Palo Seco Leper Asylum and Corozal Hospital for Insane.

X-RAY CLINIC.

In January this clinic was moved to its permanent quarters and is now located in the north wing, first floor, administration clinics building. The rooms occupied are office for chief of clinic, X-ray and therapeutic room, transformer and machinery room, developing room, file room, supply storeroom, and white and colored patients' waiting rooms.

The following new equipment was installed: High-tension transformer; horizontal-vertical fluoroscope; localizing devices; Coolidge and gas tubes for radiographic, fluoroscopic, and treatment work.

There were 2,669 cases handled, and 4,870 plates and 458 dental films taken.

STEWARD'S DEPARTMENT.

The new kitchen-mess halls building, which was occupied in March, is a reinforced concrete structure of two stories, with basement under part of south end of structure. New kitchen and dining room equipment installed at a cost of $10,000.

In the basement are located the bake shop, refrigerating machinery room, elevator machinery room, diet dispatch room, locker room, and toilets for kitchen help.

On the first floor are the refrigerating boxes—three small compartments for eggs, milk, vegetables, and one large box for meats, etc., and a freezing room—butcher shop, storeroom, diet kitchen, scullery, dining rooms for colored attendants, patients, and personnel, male and female.

On the second floor also there are dining rooms for doctors and nurses, and white convalescent patients, with service room common to both, food being handled on three electric dumb waiters.

Electric heating has supplanted ranges burning coal and charcoal. The ovens of bakery are designed to burn fuel oil, which is also used under boilers of power plant.

There were 182,797 rations served to patients, and 60,022 to personnel of hospital, at a net cost of $76,884.89. The bread baked, 264,459 pounds, cost $14,782.97. There were 186,655 pounds of wheat flour used; 7,948 pounds of corn meal; 2,284 pounds of rice; and 1,568 pounds rye.

LINEN ROOM.

In February three rooms, one a large storage room, were set aside in basement as linen rooms. The work was placed in charge of a

qualified nurse with three colored seamstresses and two male attendants. Preparation of linen for hospital purposes has been concentrated in the hospital linen room, thereby effecting great economy and efficiency in handling linen supplies.

All linen is received direct from Ancon laundry and redistributed, all articles receiving a rigid inspection before being sent out, and necessary repairs made at once. Surveyed sheets, table linen from messes and hotels, etc., are utilized whenever obtainable for making bandages, vulvar pads, etc., instead of using new gauze.

The following table will show the results obtained by conservation and the use of reclaimed gauze and muslin:

Calender year.	Amount used.						Cost of surgical supplies.	Total treatment days.	Cost per treatment day.
	New.				Reclaimed.				
	Cotton, pounds.	Gauze, yards.	Bandages, dozen.	Adhesive plaster, spools.	Gauze, yards.	Bandages, dozen.			
1915	2,759	66,438	2,372	1,770	.....	.....	$4,746.19	174,767	$0.02716
1916	3,230	84,913	1,871	1,545	.....	.....	4,491.74	164,013	.02737
1917	3,803	78,417	1,571	1,408	535	.....	5,279.59	176,333	.02941
1918 (6 months)	248	3,990	226	393	5,934	372	502.87	80,064	.00628

MAINTENANCE AND REPAIRS, BUILDINGS AND EQUIPMENT.

The usual routine repairs to buildings and equipment were performed by the hospital artisans.

MOTOR TRANSPORTATION.

All transportation was mechanically overhauled and new bodies made for trucks 501 and 502. Touring car No. 109 was remodeled into an ambulance, now No. 307. Ambulance No. 305 was refitted into hearse body, rebuilt from surveyed horse-drawn equipment. Hearse No. 301 was refitted into an ambulance. Ambulance No. 303 was transferred to the district physician, Pedro Miguel.

Below is given statement of expenses of motor transportation for the year:

	Truck 501.	Ambulance 307.[1]	Truck 502.	Ambulance 305.	Hearse 301.	Ambulance 303.	Touring car 115.	Total.
Capital expense	$1,735.64	$529.68	$2,669.28	$1,412.74	$632.50	$850.00	$452.81	$8,282.65
Gross running expense	$2,510.90	$1,175.40	$3,692.44	$1,986.97	$947.96	$1,474.47	$614.92	[2]$12,403.06
Mileage	4,146	6,498	5,983	2,836	2,800	5,730	3,632	31,627
Saving under animal transportation current fiscal year	$348.76	$551.12	$684.47	[3]$648.84	$289.32	$401.95	$66.07	$1,692.85

[1] Ambulance 307 changed from touring car 109 Nov. 1, 1917.
[2] Includes $1,342.76 charged off for depreciation, and $1,477.13 credits earned.
[3] Loss.

Statistics regarding patients.

	Fiscal year 1917–18.	Calendar years—					
		1917	1916	1915	1914	1913	1912
Number of patient days	313,680	311,451	270,294	268,945	338,901	423,251	415,000
Net per capita cost per patient	$0.6830	$0.7172	$0.6482	$0.5651	$0.773	$0.771	$0.376
Chronic patients:							
Number treated	61	63	52	58	55	.....	.....
Number days treatment	10,078	9,836	9,174	9,801	3,409	.....	.....
Average number of patients per day	27	27	25	26	28	.....	.....
Per capita cost	$0.257	$0.252	$0.240	$0.2503	$0.327	.....	.....
Military patients:							
Number admitted	2,544	2,469	1,937	1,771	1,458	394	.....
Number days treatment	32,791	33,494	28,519	24,643	19,506	5,850	.....
Average number constantly sick	89.83	91.76	78.13	67.51	53.40	16.00	.....
Gauze used:							
Yards	34,183	80,725	87,585	105,825	132,744	182,699	.....
Cost	$1,353.00	$2,821.39	$2,159.78	$2,685.22	$3,612.22	$4,169.80	.....
Bandages used:							
Dozens	772	1,560	1,871	2,311	2,077	2,416	.....
Cost	$537.92	$945.79	$900.61	$1,115.59	$1,062.75	$1,401.25	.....

Movement of patients nonresident of Canal Zone.

	Fiscal year 1918.			Calendar year 1917.		
	Ancon Hospital.	Corozal Hospital.	Total.	Ancon Hospital.	Corozal Hospital.	Total.
Number treated	358	62	420	274	76	350
Number days treatment	5,345	21,625	26,970	5,101	21,396	26,497
Died	6	6	12	7	3	10

STATISTICAL SUMMARY.

Cases admitted to Ancon Hospital (proper) during the year	10,865
Cases admitted to Corozal Hospital during the year	185
Chronic patients admitted to chronic ward during the year	38
Crippled employees admitted to Corozal Farm during the year	50
Total admissions, Ancon and Corozal Hospitals	11,138
Major surgical operations	1,525
Minor surgical operations	2,692
Eye and ear operations	976
Total number of operations	5,193
Refractions	1,096
Deaths during the year in Ancon Hospital	348
Deaths during the year in Corozal Hospital	48
Total visits to out-patient departments	13,303
Prescriptions written by out-patient departments	4,370
Number treated by dispensary (district physician, Ancon)	113,389
Physicians on duty, hospital and dispensary	28
Average number of nurses on pay roll, hospital and dispensary	68
Average number of attendants, hospital and dispensary	103
Average number of maids, hospital	26

COROZAL HOSPITAL.

Buildings.

During the year the following changes were made in the various buildings:

The old Ancon admitting office was re-erected on the farm, and as soon as all necessary arrangements are made it will be turned over to the farm manager for an office and living quarters for his foreman.

The fire exits in the hospital buildings were altered with the permission of the fire department. As they had existed, especially the doors, they were useless as fire exits; with the present arrangement they can be opened easily during an emergency.

The ice box from Ancon hospital kitchen was taken apart and is at present being erected here. This will greatly facilitate our handling cold-storage products, since the supply department commissary has been abolished at Corozal.

Hospital Department.

The population of the hospital has continued to show an increase. At the close of the fiscal year there were 374 patients, as compared with 350 patients a year ago. This makes the wards very crowded, especially on the male side where there is an excess of about 50 patients, and necessitates our placing some cots in the corridors, as well as placing dangerous and disturbing patients in rooms with other patients, when they should be secluded by themselves. The floors in all the wards have been waxed, making them cleaner and more tidy. Flowers and plants have been placed in the wards where the convalescent and better class of patients are kept; this makes the wards more attractive and homelike for the patients who are unfortunate enough to suffer with a mental disorder. Every effort is being made to care for the patients in a scientific and up-to-date method. Aside from receiving active medication for the forms of mental disorders which require it, various other therapeutic measures are given in the forms of amusements, ergo-therapy (occupational treatment), hydrotherapy, and psychotherapy.

Amusements.—The amusements consists of moving pictures, phonograph concerts, church services, band concerts, and walks in the vicinity of the hospital.

Occupational treatment.—This method of treatment occupies an important rôle in the reeducation of patients, as well as a therapeutic means of relieving them from their morbid feelings and fancies. Most of the modern hospitals have realized the importance of this form of treatment and have built industrial halls where special instructors are engaged to teach the patients some useful and congenial form of occupation which they can follow after their discharge from the hospital. This form of treatment has been in effect at this hospital for over a year, but has been somewhat limited owing to insufficient help, as well as to the lack of proper facilities. The allowance for help has recently been increased, broader plans have been approved, which has given employment to a great many more patients, with profit to the hospital and patients alike.

At present about 50 per cent of the female, and 33 per cent of the male, patients are engaged in some congenial and fitting occupation. The women are engaged in sewing, embroidering, rug, mop, and Panama hat making. In the near future we intend to make slippers, baskets, brooms, and brushes. Some of the patients left in the ward help with the light work and others are used in the laundry and sewing room, where practically all the washing and sewing for the hospital is done.

The male patients are mostly fitted only for common laboring and agriculture, and the latter has therefore been found the most interesting work for them. Several gangs have been organized under the supervision of male attendants, and given plots of land to cultivate, in the vicinity of the hospital. This has proved a great success. Last year we had under cultivation about 1,200 hills of yams, an acre of yucca, a small patch of corn, pineapples, and a small garden. At present we have over 3,500 hills of yams, 6 acres of yucca, 2 acres of bananas, 2 acres of corn, 2 acres of papaya, 1 acre of pineapples, and a large truck garden. Most of the work has been accomplished in the last five months.

In the absence of a hydrotherapeutic room we have been carrying on this form of treatment in the wards, which is a more or less cumbersome and unsatisfactory way of administering this kind of treatment.

Owing to the limited class of patients of high intellectual capacity, the form of psychotherapy has not been carried out in many cases, but several patients have been treated with success at the neurological clinic which was established by the superintendent of Corozal Hospital this year, and held at Ancon Hospital, with the permission of the chief health officer and superintendent, Ancon Hospital.

The grounds in the vicinity of the hospital have been made more attractive by laying out of a number of flower beds, from which the fresh flowers for the wards are obtained.

Farm Department.

Dairy.—Great difficulty has been experienced in supplying milk to the numerous applicants. As many as 200 quarts of milk were sold daily for sick adults and children, exclusive of the milk supplied our hospitals. There were no increases in the herd aside from the heifer calves raised at the farm; some of them turned out to be good producers; the cost of raising them has been reduced by feeding an artificial meal, and it is hoped that in the near future it will not be too expensive to raise all good heifers. The tuberculin test has been applied regularly. Our milk continues up to the highest standard, not only in cleanliness, but also in quality. The last fat content was 5.6 per cent. The bacterial count seldom shows a count of over 100.

Piggery.—Our stock of old hogs has been sold to the supply department, having been previously vaccinated against hog cholera. Eighty-eight immunized hogs were purchased from the cattle industry and fattened on garbage from the hospital and neighboring Army post.

Poultry.—We have had no success with chickens, due to the fact that feed is very expensive, and steps have been taken to sell all the flock. Practically all the white leghorns have been sold. About 300 Rhode Island reds were hatched during the early part of the year.

Garden.—Several cripples have been deported and at one time our force was rather depleted, but new admissions have now filled their places. In building the new road to Pedro Miguel, it was necessary for the municipal engineering division to use a large portion of our garden, which necessitated the breaking of new land. With the reduction of overhead expense and a different plan for raising crops, it is hoped that in the near future this garden will show a profit.

General.

The continued increase in number of patients makes it necessary that another ward be erected, as the hospital is filled to its capacity at the present time, using all available means to lodge the patients safely. A hydrotherapeutic room should be constructed, where this method of treatment can be properly carried out. An industrial building where the patients could be taken and taught various occupations and where adequate machinery could be installed for the making of baskets, brooms, brushes, slippers, mops, etc., would facilitate the handling of patients and enable us to find employment for many more.

Many cripples have had their claims settled, and then deported to their native homes, but just as many new cripples have been admitted, so that there are as many on the farm as previously. The present number of disabled employees is 53.

Colon Hospital.

BUILDINGS.

The completion of the nurses' home has enabled us to vacate old quarters in which they were quartered during the erection of the new building. This old building has since been utilized as a place of detention for alien enemies rounded up in the vicinity of the Isthmus.

Old ward A has been repaired, painted, and converted into an isolation ward.

The garage has been in use for some time and is occupied by the machines of the health officer, quarantine officer, and Colon Hospital. Quarters for the chauffeurs are provided above the garage.

The new morgue is very satisfactory and with the installation of the new table fills a much-needed want. The completion of the new morgue enabled us to tear down the old morgue and chapel, which were situated just behind the east wing of the hospital, and were both insanitary and unsightly. The excavation at the site of the old morgue and chapel has been filled in and leveled off.

During the past six months a great deal has been done toward improving the grounds. Shrubs and plants were obtained from Ancon Hospital, and royal palms from Corozal. The railroad tracks running through the grounds have been taken up, thereby eliminating a great deal of the dirt and noise about the hospital.

The X-ray machine formerly in use at Ancon Hospital was transferred to Colon Hospital. The addition of a Coolidge and gas tube will enable this hospital to do a great deal of the emergency work now sent to Ancon Hospital.

In connection with the garage a gasoline tank and electric air pump have been installed. These are both satisfactory and are used by the three divisions using the garage.

The orderlies' quarters, which were formerly located in the hospital, have been converted into a ward for colored women, the orderlies being transferred to the four-family dwelling in the rear of the hospital.

PERSONNEL.

The increase in gold employees has been two internes and three nurses. The internes have since been called to the colors, and have gone to the States.

The increase in silver employees has been one artisan, four maids, and one attendant. Two of the four maids are merely temporary to relieve the congestion during the time we are taking care of the women of the Colon restricted area.

Every effort has been made to conserve our supplies as much as possible. The work of Mr. R. C. Wilson, the druggist, is to be especially commended. A great many unnecessary drugs and prescriptions have been done away with, and by making his own tinctures, etc., much money has been saved.

Palo Seco Leper Asylum.

The average number of patients constantly cared for during the year was 68. There were 70 patients on June 30, 1918, as compared with 65 patients on the same date last year.

Santo Tomas Hospital.

The average number of patients constantly sick was 440.5, as compared with 440 for last year. The number of days relief furnished was 160,714, as compared with 160,781 for the preceding year.

District Dispensaries.

There were 6,525 employees treated in quarters. The total number treated, employees and nonemployees, was 552,864.

The dispensary at Paraiso was closed on May 14, 1918, and the dispensary at Gamboa will be closed within a few weeks. This leaves dispensaries at Balboa, Pedro Miguel, and Gatun, and at Ancon and Colon Hospitals. The new concrete dispensary at Gatun was completed and occupied during the latter part of the year.

Sanitation.

CANAL ZONE.

The antimalaria activities have constituted the most important features of Zone sanitation, and are properly considered the most important problem confronting the health department. A review of the malaria incidence on the Canal Zone very quickly brings one face to face with a condition which, for want of a better term, may

be designated as the "malaria potential" of the Isthmus. One has only to look back to the year 1906, when there were 21,739 cases of malaria among 26,547 employees, or a rate of 821 per 1,000, and compare that with the rate for the past three years, and then be reminded that this portion of history can repeat itself if permitted to do so. Compare this with the rate for the population within the regular sanitated areas of the Canal Zone for this fiscal year—from an average population of 10,200 employees there were 69 cases of malaria, giving a rate of 6.77—and the results are very gratifying indeed. On the other hand, when a departure is made from the regular sanitated areas, as is the case with men engaged in jungle clearing, on pastures and plantations, it soon appears what the "malaria potential" is. A tabulation of the total number of employees admitted for malaria during the year 1918 will best illustrate this. The grand total of employees admitted was 622, divided as follows:

Employees residing in city of Panama	22
Employees residing in city of Colon	64
Employees residing in Cristobal	81
Employees residing within sanitary districts of the Canal Zone	69
Employees engaged in pasture clearing, jungle clearing, and outlying plantation work, outside sanitated districts	386

The miscellaneous population of employees engaged in this outlying work is approximately 3,000, but on account of its shifting nature no definite figures have been obtained in this office. For the purpose of this report, however, this figure is sufficiently accurate, as it is merely desired to illustrate what happens when there is no effective sanitary work. We have here a rate of 128 per 1,000 as compared with 6.77 per 1,000 in the regularly sanitated areas.

PANAMA CITY.

Malaria.—A material reduction in the number of cases of malaria from the city of Panama occurred; a comparison of malaria cases reported for the last four fiscal years shows:

	1918	1917	1916	1915
Six months ending December 31	87	126	195	1,163
Six months ending June 30	21	100	109	419
Total for the year	108	226	304	1,582

There were no cases of malaria reported from the city during March, 1918. This is the only month in which no case of malaria has been reported from the city of Panama since the United States took over its sanitation.

Approximately 7,500 feet of additional drains were constructed during the year and all of the old drains maintained. During the last year a large quantity of underbrush adjacent to the Tumba Muerta River was cleared away, thereby destroying many mosquito breeding places. The Government property on the beach in front of the Government oil house was plowed, harrowed, and leveled off and new ditches cut which will make a considerable reduction in the

quantity of oil used in this vicinity. Most of the new antimalaria work was at Bella Vista and within its immediate vicinity; some was done in the Savanas, which accounts for the reduction in the number of malaria cases reported from these two neighborhoods.

Vaccinations.—During the months of July and August, 1917, 1,247 school children were vaccinated. No general vaccination has been done for several years, but it is contemplated to take up this work again at an early date, and 6,000 points have been ordered to start it.

Schools.—A survey is being made of all schools within the city; many are much overcrowded.

Food and dairy inspection.—It was impossible to carry on this work during the first half of the past year on account of there being no food and dairy inspector attached to this office. During the last six months this work has been again taken up and careful inspections of all hotels, restaurants, and dairies are being made. No food vendors are permitted on the street without a permit from this office. The dairy inspection has shown a marked improvement in the bacterial count in milk, and it is hoped for still greater improvements during the next year. The total food and dairy inspections made during the year were as follows: dairies, 346; bottling works, 65; bakeries, 299; hotels, 107; barber shops, 76; miscellaneous, 1,027.

Veterinary work.—All cattle and hogs shipped through Panama City have been inspected by our veterinarian, and all live stock shipped into Panama has been inspected and tuberculin test given. All hides and skins for export were inspected and disinfected. In addition to this work, the killing of cattle at the slaughterhouse and the sanitation of the Panama market have been placed in charge of the veterinarian. The receipts from hide and skin disinfection during the year were $707.24, and from live stock inspection, $3,148.85.

Stables.—The comparatively few stables left in the city of Panama were found to be in a filthy condition, not even excepting those of the Panama Railroad. It has been found almost impossible to eliminate all of the stables within the city of Panama, but this office is now having installed concrete bins for the purpose of taking care of all the manure, and the stables are being kept thoroughly clean. As stables are the principal source of fly-breeding, it is to be hoped that another season will see the complete elimination of flies within the city, owing to stringent enforcement of the regulations governing this subject.

General sanitation.—The city is divided into four districts, as formerly, each district being in charge of an inspector. Routine house-to-house inspections are made and premises cleaned where necessary. The premises are also quarantined by the inspectors during the course of infectious diseases and later disinfected or fumigated. An attempt is being made to educate the people to keep their premises clean and a great improvement is noted in this connection.

Plans are now being made, and cards have been ordered, to place a house card in each building in Panama. These cards are to show the fact of a weekly inspection and to carry the date, initials of inspector, conditions found and corrections ordered. These cards should be effective in making the city of Panama as clean as is possible owing to its physical characteristics. It is also planned to place

the grass cutting and ditching under one man for the entire city, and allow the regular inspectors to do nothing but actual inspection work.

There were 2,238,881 square yards of pools oiled during the year, as compared with 3,273,744 the previous year, showing a marked reduction in the area of stagnant water in the various districts. To accomplish this, 7,491 lineal yards of new ditches were constructed. The following materials were used: Crude oil, 37,331 gallons, larvacide, 5,216 gallons; kerosene, 2,018 gallons; as compared with 43,475 gallons of crude oil; 5,704 gallons of larvacide, and 1,627 gallons of kerosene for the previous fiscal year. There were 75,988 water containers treated, 2,241 mosquito-breeding places destroyed, 2,666 fly-breeding places treated, 15,259 rats destroyed, 768.73 acres of vegetation removed, and 3,680 nuisance notices served. There were 277 fines imposed, as compared with 159 for the previous fiscal year.

Disposal of manure.—Concrete bins at the old garbage dump have been abandoned as it was found that they bred flies in enormous quantities. All manure is being burned at the incinerator and will be so disposed of hereafter until other methods are devised.

Building inspection.—There were 1,265 building permits issued during the year, mostly for changes or repairs to old buildings. In most cases, this means additional windows being cut in the houses to permit more light and ventilation, as an antituberculosis measure. A total of 67,746 buildings were inspected, 60 new plans approved, 193 buildings condemned, and 20 demolished.

Garbage collection and street cleaning.—Street cleaning work has been carried on as in the past except that two motor trucks have been put in use and four wagons, one cart and one riding horse retired. It is contemplated to put on two more trucks and retire all the horse drawn vehicles with possibly one exception which will be used for hauling that cannot be so advantageously done with the truck. A total of 100,890 cubic yards of garbage were removed, and 600,000 square yards of street kept clean during the year.

Incinerator.—The new garbage incinerator was put in operation about January 15, 1918, and since then all garbage, street sweepings, etc., from Balboa, Fort Amador, La Boca, Panama, and Ancon, have been burned there. The two units of the incinerator are not sufficient to burn the garbage as it is delivered by wagon and truck, as the garbage collection is done in a period of about eight hours each day. This has caused crowding and delay. The incinerator is far from being entirely smokeless as was anticipated, but work is being done in the hope of remedying or ameliorating this condition. The third unit must be installed in order that all garbage may be taken care of as it arrives. A total of 8,268 tons of garbage, 660 tons of rubbish, and 613 tons of street sweepings, were burned during the period the incinerator was in operation.

Tuberculosis.—On November 15, 1917, a circular letter was sent out to several owners of tenement houses, calling their attention to the high death rate from tuberculosis, explaining to them that from investigations made by the Health Office it was found that practically all of the tuberculosis cases were in dark and poorly ventilated rooms, and requesting them to arrange to call at this office in order that the necessary improvements might be pointed out to them. Only

a very few complied with this request, so a second letter was sent out giving them three days to comply. The second letter brought better results, and a third circular letter was then sent out covering briefly the points covered by the first two. In the third letter a fixed date was given as to when arrangements must be made for the improvements, or buildings would be condemned; 70 per cent of those addressed complied.

Of 534 buildings repaired, it was necessary to condemn 157 and order the occupants to vacate within 10 days. It is interesting to note that most of the buildings condemned were owned by people able to make repairs. The smaller property owners complied immediately where circumstances permitted, or arranged to do the work at some early date. As a result of this antituberculosis work we have had installed approximately 4,000 windows and eliminated 30 rooms, and are continuing this work.

COLON.

General sanitation.—It is believed that the city of Colon enjoys as good sanitary conditions as any tropical city in the world. It has been designed and built within recent years and therefore has some advantages over the city of Panama. The economic condition which is probably the most important factor influencing the communicable disease incidence, is practically the same in Panama as in Colon, and is very bad in both cities.

The Colon district is more affected by swamp conditions than any other on the Zone, and with the prospective rapid growth of the Atlantic terminal and its auxiliaries with large permanent forces, makes it desirable to plan for extensive reclamation projects well in advance of that growth. The extensive swamps adjacent to the Army and Navy establishments should be eliminated by filling them at once, for they are known to be the largest and most extensive Anopheles breeding areas on the Isthmus. One large swamp near the Army aviation field which was supplying Colon and Cristobal with many flights of mosquitoes, has been drained at the expense of the health department during the fiscal year.

Malaria.—In general the malarial incidence has been lower than ever before. Many weeks there were no cases recorded, and in the beginning of the present rainy season the rate has been exceptionally low. The number of cases reported during the year was 148, as compared with 158 for last year. The number of mosquito breeding places destroyed was 1,236. The extensive filling, grading, ditching, and draining of the many areas around Mount Hope have contributed to the lowering of the mosquito incidence in this district, and with the elimination of the Coco Solo and Margarita swamps it is possible to exclude all mosquitoes from Colon and Cristobal, for it is a well known fact that many flights of mosquitoes come into Colon and Cristobal from these swamps.

All persons suffering with malaria and not sent to hospital were compelled to use mosquito nets, for a period of two weeks in which they were undergoing treatment. During the recent spread of influenza in Colon and Cristobal several malarial carriers were incidentally discovered among the influenza patients.

The large swamp between "G" Street, Colon, and New Cristobal, which in the past has been a source of many aedes taeniorhynchus mosquitoes, has been thoroughly drained by a network of tidewater drains, and it is hoped that this will materially decrease the incidence of this pestiferous insect in Colon. Extensive reclamation by clearing and ditching has been carried on in the swampy area south of the coaling plant and many Anopheles breeding areas were eliminated therefrom.

In the large swamps south of Mount Hope there were installed many tide-water drains, and the mosquito and malarial incidence in Mount Hope has been greatly reduced. During the first month of the rainy season the Anopheles catch in the Army barracks at Mount Hope was as high as 300 per day, as compared with 40 and 50 as the highest mosquito catch during June of this year.

It has been proven that the amount of crude oil can be reduced 30 to 50 per cent by the use of cotton swabs instead of the spray and still be just as effective.

Tuberculosis.—The tuberculosis incidence shows a decided increase over the previous fiscal year. There were 115 cases reported during the present year, as compared with 67 reported last year. The increase is partly due to the rigid enforcement of the regulations which compel physicians and others to report all positive as well as suspicious cases of tuberculosis. Several fines were imposed for failure to comply with regulations. The economic conditions have compelled many of the poorer people to club together and rent apartments and rooms in order to secure sleeping space, and they usually get the cheapest rooms, which are poorly ventilated and dark. During the recent antituberculosis campaign many of these dark rooms were demolished, some were lighted and ventilated by remodeling the buildings, and at present only a very few dark and ill-ventilated living rooms remain in the city. Our building regulations should be revised so that more space between adjoining buildings used for living quarters would be provided.

A sanitarium for the isolation and treatment of all tubercular cases should be built as soon as possible. It is thought that the erection of a series of wards located a good distance from the city would answer the purpose very well. A farm could be run in connection with the institution and eventually it would become almost self-supporting.

Other communicable diseases reported during the year were measles, 149; whooping cough, 26; chicken-pox, 22; diphtheria, 25; pneumonia, 11; typhoid fever, 7; pellagra, 2; mumps, 17; tetanus, 1; dysentery, 1; scarlet fever, 1; ophthalmia, 1. No diseases have assumed epidemic proportions during the year.

Building operations.—Many permanent concrete buildings were built and several are under construction. The burned district has practically all been replaced by modern concrete structures. The new Colon abattoir, which is now under construction in the Folks River section, will do away with the old, antique, and dilapidated structure now in use near New Cristobal. The supply department is building a large modern refrigerating plant and abattoir at Mount Hope. Many of the rat-infested structures now in use at Cristobal will be condemned and demolished on the completion of this new plant.

Almost all the wooden tenement houses in Colon have been altered or remodeled during the year in compliance with the building regulations, which require a certain amount of light and ventilation for each living room. The permanent closing of transoms has been prohibited.

The Panama Railroad stables, as well as all private stables in Colon, were recently condemned for sanitary reasons, and a plan is under way for the construction of modern stables near the quartermaster's corral on the Mount Hope road. It is hoped that this will be carried out in order to demolish the fly-breeding stables now in use.

The number of building plans approved was 35. There were 521 permits to repair issued during the year.

Flies.—During the advent of the rainy season an increase in flies was noted. An antifly campaign was very successful and only a few flies are noted at present. The use of the metal-top garbage-can cover with the concrete base has made it possible to eliminate all fly-breeding around garbage cans. The municipal dump furnishes the largest area for fly-breeding in Colon, and despite the fact that every known antifly breeding measure is used diligently, many flies breed there. A better method for garbage disposal should be installed at once. It is proposed that a plan be worked out whereby all manure can be turned over to the supply department for use on their plantations.

Rats.—There has been a decrease in the number of rats caught during the year, due to the rat-proofing of all buildings and the demolition of many rodent-infested structures. The storing of building and other material likely to furnish harborage for rats at a height of 3 feet from the ground has been a factor in the reduction of rodents. The cold-storage plant and old dock No. 11 at Cristobal are the principal rat-breeding and harboring areas at present.

Permanent work.—The installation of ditches and the filling in of swampy areas have progressed favorably during the year, as shown by the following figures:

Linear yards of ditches installed	94,112
Linear yards of concrete ditches installed	5,152
Linear yards of ditches in district which are maintained	119,365
Cubic yards of fills made	17,114

Personnel.—The force of the Colon health office consists of the health officer, clerk, stenographer, and messenger; seven sanitary inspectors, of whom four are district inspectors, one has charge of street cleaning and garbage collection, one is building inspector, and one a food inspector; and four veterinarians and meat inspectors, one of whom is supervising veterinarian and meat inspector for the Canal Zone.

There have been several changes in the personnel of this office during the past year, the most important being the loss of three of our oldest and best sanitary inspectors, which has somewhat decreased the efficiency of the department.

Remarks.—Isolation wards should be built at Colon Hospital to take care of all communicable diseases occurring in Colon. The method of transferring these cases to Ancon Hospital has proven to be impractical and very unsatisfactory. The danger of secondary cases occurring as a result of contact in the hospital car must also be borne in mind.

The swampy area between G street, Colon, and New Cristobal, should be filled. Owing to its location, this area, if filled, would be the most valuable property in Colon and at the same time a more or less constant mosquito breeding area would be eliminated.

Old dock No. 11, Cristobal, has long since been considered the worst nuisance in Cristobal. It is a prolific breeding place for rats and flies, and owing to its dilapidated condition it is absolutely impossible to control this breeding. This structure should be demolished without unnecessary delay.

The large swamps between Mount Hope and Gatun are prolific *anopheles* breeding areas, and malaria is reported among the cattle industry force located near Brazos Brook. It is hoped that the cattle industry will institute some antimalarial measures in order to cope with the situation.

Garbage utilization.—Many cities in the United States and elsewhere have installed garbage utilization plants, whereby each ingredient is utilized for some purpose. The dump in Colon destroys many tons of valuable fertilizer every month, and the supply department could easily dispose of this on their plantations, which would undoubtedly prove very profitable to them.

Quarantine Division.

In the early part of the fiscal year the quarantine situation with reference to the west coast of South America had remained about the same. Bubonic plague was generally reported, as it has been for years, from Valparaiso, Chile, north to practically the border of Colombia, with an increase of this disease in certain Peruvian communities, and an unusual prevalence in the small ports of Ecuador north of Guayaquil. About the latter part of the fiscal year conditions were such in the port of Bahia that northbound vessels calling at Zone ports omitted this port from their itinerary.

Yellow fever conditions have remained unimproved in Guayaquil and vicinity, and during the latter part of this year the number of cases has materially increased and extended later in the season than usual, due to continued rains.

On the Atlantic side quarantine conditions have shown no material change. Plague has been reported in the vicinity of Caracas, Venezuela, at the small town of Charallave, which appears to be a charcoal depot with practically no communication with seaports.

In February, three cases of smallpox arrived at Bocas del Toro, Panama, from the islands of San Andres and Old Providence. All precautions were taken against the introduction of the infection, such as vaccination, fumigation, etc. Smallpox was also reported at Bluefields, Nicaragua. During the latter part of the year smallpox has been reported as epidemic at Cartagena, Colombia, and recent reports indicate that sanitary conditions in this port are extremely bad.

In September, 1917, two cases of leprosy arrived at Cristobal; one from Colombia, and one from Bocas del Toro.

Due to war conditions, passenger traffic has decreased materially, though the number of ships received has held up remarkably well, the bulk of the traffic being tramp steamers and nitrate carriers in trade with the west coast of South America.

With the exception of the two cases of leprosy above noted, no diseases of a maritime quarantinable nature arrived at or occurred on the Isthmus during the year.

Respectfully submitted.

A. T. McCormack,
Chief Health Officer.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

INDEX OF STATISTICAL TABLES SUBMITTED WITH REPORT OF THE CHIEF HEALTH OFFICER.

Table I.—Admissions, Deaths, and Noneffective Rates for Employees.

ABSOLUTE NUMBERS.

Color.	Average number of employees.	Admissions to hospitals.			Deaths.			Noneffective from sickness.	
		Total.	Disease.	External causes.	Total.	Disease.	External causes.	Days. treated.	Constantly noneffective.
Year 1917-18:									
White	4,648	1,437	1,265	172	28	22	6	28,172	77.27
Colored	24,290	3,672	2,870	802	202	173	29	81,819	224.22
Total	28,938	5,109	4,135	974	230	195	35	109,991	301.49
Year 1916-17:									
White	4,682	1,529	1,293	236	29	18	11	30,389	83.26
Colored	29,316	3,294	2,298	996	168	133	35	78,929	216.24
Total	33,998	4,823	3,591	1,232	197	151	46	109,318	299.50

TABLE I.—ADMISSIONS, DEATHS, ETC.—Continued.

PROPORTIONAL NUMBERS.

Color.	Average number of employees.	Admission to hospital.			Deaths.			Noneffective from sickness.	
		Total.	Disease.	External causes.	Total.	Disease.	External causes.	Days treated.	Constantly noneffective.
Year 1917-18:									
White	4,648	309.17	272.16	37.01	6.02	4.73	1.29	.....	16.62
Colored	24,290	151.17	118.16	33.02	8.32	7.12	1.19	.....	9.23
Total	28,938	176.55	142.89	33.66	7.95	6.74	1.21	.....	10.42
Year 1916-17:									
White	4,682	326.57	276.16	50.41	6.19	3.84	2.35	.....	17.78
Colored	29,316	112.36	78.39	33.97	5.73	4.54	1.19	.....	7.78
Total	33,998	141.86	105.62	36.24	5.79	4.44	1.35	.....	8.81

TABLE I-A.—DEATHS IN THE CANAL ZONE AND THE CITIES OF PANAMA AND COLON.

	Average population.	Deaths.			Annual average per 1,000.		
		Total.	Disease.	External cause.	Total.	Disease.	External cause.
Year 1917-18:							
Panama	61,369	1,523	1,484	39	24.82	24.18	0.64
Colon	26,078	678	651	27	26.00	24.96	1.04
Canal Zone	24,038	286	255	31	11.88	10.59	1.29
Total	111,565	2,487	2,390	97	22.21	21.43	.87
Year 1916-17:							
Panama	60,778	1,766	1,700	66	29.06	27.97	1.09
Colon	24,693	639	606	33	25.88	24.54	1.34
Canal Zone	31,048	328	278	50	10.56	8.95	1.61
Total	116,519	2,733	2,584	149	23.46	22.18	1.28

TABLE II.—CAUSES OF DEATHS OF INFANTS, BY SEX, COLOR, AGE, AND PLACE OF RESIDENCE.

Cause of death.	Sex.		Color.		−1 week.	+1 week −1 month.	Age by months.											Place of residence.			
	Male.	Female.	White.	Black.			1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	Panama.	Colon.	Canal Zone.	Total.
General diseases.																					
Malarial fever																					
Malaria, pernicious	1			1													1			1	1
Malaria fever, estivo-autumnal		3	1	2				1					1		1			1	2		3
Whooping cough	1	1		2										1		1				2	2
Diphtheria		1		1											1			1			1
Tuberculosis, meningitis	5	1	2	4				1	1		2					1	1	6			6
Tuberculosis, pulmonary	4	4	1	7		1	2		1						1	1	2	6	2		8
Tuberculosis, abdominal	1	1		2										1			1		2		2
Tuberculosis, miliary	2	6		8				1	1	2			1		1	1	1	5	1	2	8
Tuberculosis, disseminated	2	4		6					1			1	1	2	1			3	2	1	6
Tuberculosis of other organs		1		1			1											1			1
Syphilis, hereditary	6	3	1	8	3	2		1	1		2							7	1	1	9
Syphilis, period not stated	1			1	1														1		1
Dysentery		1		1													1			1	1
Anemia	1			1									1						1		1
Pyemia	1			1											1					1	1
Septicemia	1	2	2	1		1		1		1								3			3
Diseases of the nervous system and of the organs of special sense.																					
Meningitis, acute	1	1	2					1									1	2			2
Meningitis, cerebro-spinal	1		1							1								1			1
Meningitis, simple	2			2					1	1								2			2
Organic heart disease	1	3		4							1	2			1			1	3		4
Epilepsy		1		1												1		1			1
Convulsions of infants	9	3	2	10	7	1	1			1			1	1				10		2	12
Diseases of the eyes and their annexa		1		1	1														1		1
Chorea		1		1					1										1		1
Cerebral hemorrhage	1	1		2	1									1				2			2
Diseases of the circulatory system.																					
Acute endocarditis	2	1	2	1				1	1							1		2	1		3
Diseases of the respiratory system.																					
Bronchitis, acute	26	24	2	48	7	3	3	5	10	1	7	3	1	5	1	2	2	27	20	3	50
Bronchitis, chronic	11	11	1	21				4	1	1	2	1	3	5	3	1	1		21	1	22
Pneumonia, broncho	45	35	8	72		2	7	15	8	9	6	5	5	7	6	7	3	48	26	6	80

Pneumonia, unqualified	4	2	1	5			1			1		2			1	1		6			6
Pneumonia, lobar	5	8		13					1		3	2	1	2	2		2	7	4	2	13
Pleurisy	1			1												1			1		1
Empyema		1	1					1										1			1
Diseases of the digestive system.																					
Ulcerative stomatitis		1		1							1							1			1
Gastritis, acute	6	8	5	9	1	1	4		2	2	1		1	2				13	1		14
Acute intestinal congestion		1		1											1				1		1
Acute indigestion	1	5		6				1	1	2		1					1	2	1	3	6
Duodenal ulcer		1		1							1								1		1
Diarrhea and enteritis	127	111	31	207	4	12	34	36	26	19	13	17	16	17	12	18	14	175	52	11	238
Colitis	29	32	1	60	1	5	5	8	8	7	8	3	5	2	4	2	3	58	1	2	61
Intestinal obstruction	4			4			2	1							1			4			4
Intestinal hemorrhage		1	1		1													1			1
Other diseases of the liver	3	4		7			2	1				1	1	1			1	7			7
Nonvenereal diseases of the genito-urinary system and annexa.																					
Nephritis, chronic	1			1												1			1		1
Nephritis, acute	10	2	3	9			2	2	1	3						2	2	8	1	3	12
Pyelo-nephrosis	3			3					1			2								3	3
Acute pyonephritis	1			1												1		1			1
Acute cystitis		1		1													1		1		1
Pyelitis	1			1							1									1	1
Other diseases of the kidney and annexa	1	1		2								1				1		1	1		2
Diseases of the skin and of the cellular tissue.																					
Other diseases of the skin and annexa	1			1												1		1			1
Malformations.																					
Congenital malformation	7	2	1	8	2	3	1	1		1					1			5	3	1	9
Diseases of early infancy.																					
Premature birth	31	31	6	56	54	4	2	1				1						32	24	6	62
Malnutrition	43	28	1	70	6	2	7	11	7	7	5	7	5	6	4	3	1	42	11	18	71
Congenital debility, icterus, sclerema	5	4	3	6	8		1											7		2	9
Congenital debility	15	11	1	25	19	2	3	1	1									22	1	3	26
Atrophy of infants	1	1		2									1	1					2		2
Other causes peculiar to early infancy	21	13	6	28	31	2	1											25	8	1	34
External causes.																					
Traumatism by fall		1		1				1											1		1
Other external causes		1		1			1													1	1
Ill-defined diseases																					
Undetermined	6	6	4	8	3			1	2		1			2	2		1	7	4	1	12
Total	452	387	90	749	150	41	80	97	77	59	54	49	44	56	45	47	40	555	205	79	83

TABLE III.—DEATHS BY NATIONALITY.

Nations.	Employees.	Nonemployees.	Total.	Nations.	Employees.	Nonemployees.	Total.
Antigua	3	27	30	Las Tablas		1	1
Antilles		1	1	Martinique	11	68	79
Austria		1	1	Mexico	1	8	9
Barbados	53	343	396	Montserrat	1	16	17
Bermuda	1	2	3	Nassau	1	2	3
Bolivia		1	1	Nevis	1	2	3
Canada		2	2	Nicaragua		2	2
China		44	44	Panama	14	678	692
Colombia	10	136	146	Persia		1	1
Costa Rica		5	5	Peru	2	11	13
Cuba	1	7	8	Porto Rico		4	4
Curaçao		4	4	Sierra Leone	1		1
Demerara		10	10	St. Kitts	1	5	6
Dominica		4	4	St. Lucia	6	40	46
Ecuador		10	10	St. Thomas	2	9	11
England		4	4	St. Vincent	2	14	16
Fortune Island	2	1	3	Salvador		2	2
France		4	4	Santo Domingo		1	1
Germany		1	1	Santa Isabel		1	1
Grand Cayman Island		1	1	San Miguel		1	1
Greece		9	9	Scotland		1	1
Grenada	7	32	39	Spain	6	23	29
Guadeloupe	6	17	23	Switzerland		4	4
Guiana, British		2	2	Syria		1	1
Haiti	1	3	4	Trinidad	2	29	31
Honduras, Spanish		1	1	Turks Island		1	1
Holland		3	3	United States	20	50	70
Inagua	1		1	Venezuela		12	12
India	4	3	7	Virgin Islands		1	1
Italy		12	12	Unknown		6	6
Jamaica	72	590	662				
Japan		1	1	Total	233	2,283	2,516

TABLE IV.—CAUSES OF DEATHS OF EMPLOYEES, ARRANGED WITH REFERENCE TO AGE, COLOR, AND LENGTH OF RESIDENCE ON THE ISTHMUS.

Cause of death.	Color.		Age in years.											Length of residence on Isthmus (in years).												Total.
	W.	B.	15–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–65	66–80	Unknown.	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–10	10–12	12–15	+15	Unknown.	
Aneurism	1	5						1	3		2							1				2	1	2			6
Apoplexy	1	6		1				1	4		1			1				2					1	2	1		7
Arteriosclerosis	1	1							1		1											1		1			2
Brain, abscess of		1			1									1													1
Brain, softening of	1							1																1			1
Cancer		1					1																	1			1
Diabetes		1											1			1											1
Dysentery	1	1					1					1										1				1	2
Endocarditis		3			1	1			1								1					2					3
Epithelioma of esophagus		1									1														1		1
Gangrene of testicle and cord		1					1																			1	1
Gastro-enteritis, chronic		1			1																1						1
Heart, organic diseases of	3	27		1	4	6	5	4	5	2	3			2		2	1	3	1	1		4	7	1	4	4	30
Influenza		1					1																	1			1
Intestinal obstruction		2				1			1										1		1						2
Intestines, cancer of	1						1													1							1
Intestines, other diseases of		1	1																						1		1
Ill defined		1								1															1		1
Liver, abscess of		3			1	1	1											1						2			3
Liver, cirrhosis of		4					1		1	1	1										1	1			2		4
Lungs, gangrene of		1									1														1		1
Meningitis, pneumococcus	1	2	1		1		1										1					1			1		3
Meningitis, streptococcus	1							1										1									1
Malaria, estivo-autumnal		1				1															1						1
Nephritis, acute	1	3		1		1		1		1								1					1	1		1	4
Nephritis, chronic	4	19			2	5	7	1	3		4	1						1	1			4	9	3	1	4	23
Peritonitis, acute		1		1														1									1
Pachymeningitis, syphilitic		1					1																	1			1
Pleurisy		1								1																1	1
Pneumonia, broncho		2		1	1																	2					2
Pneumonia, lobar		30	2	4	7	2	6	4	1	2	2					1	2	4	2	1	1	3	5	2	4	5	30
Prostate gland, hypertrophy of		1									1														1		1
Pott's disease		1						1														1					1
Pulmonary odema		1				1																			1		1
Pyalemia		1							1															1			1
Pyelitis		1					1																			1	1
Rigg's disease		1					1							1													1
Rheumatism, acute articular		1				1																				1	1
Spleen, abscess of		1				1													1								1
Stomach, carcinoma of	1											1								1							1
Scarconiatosis, general	1								1															1			1

TABLE IV.—CAUSES OF DEATHS OF EMPLOYEES, ARRANGED WITH REFERENCE TO AGE, COLOR, AND LENGTH OF RESIDENCE ON THE ISTHMUS—Con.

Cause of death.	Color.		Age in years.											Length of residence on Isthmus (in years).												Total.
	W.	B.	15–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55	56–65	66–80	Unknown.	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–10	10–12	12–15	+15	Unknown.	
Septicemia	1	4	1	2				2						2								2	1				5
Syphilis		2				1		1										1					1				2
Tuberculosis	2	9	1	2	5	1	1			1				1		1			1	1		1	1	1	1	2	11
Tuberculosis of lungs	1	16		6	1	4	4		1	1				2			1	1	2	1	1	2	3	2	1	1	17
Tuberculosis disseminated		8		3	2	1	2										2		2	2		1		1			8
Tuberculosis, acute miliary		1			1												1										1
Tetanus		1					1														1						1
Urethra, stricture of		1		1																					1		1
Undetermined		1	1													1											1
External causes.																											
Fracture, base of skull	1			1														1									1
Drowning, accidental	3	9	1			4	3	3	1					1			1									10	12
Traumatism, dynamite		1						1														1					1
Traumatism, by fall		3		2			1											2			1						3
Traumatism, railroad		4	1	1	1	1								1					1			1		1			4
Traumatism, by vehicles		1					1																	1			1
Traumatism, by machines	1								1						1												1
Traumatism, by cutting or piercing instruments	1	1					1	1														1	1				2
Poisoning		1			1																					1	1
Suicide, by firearms		1			1											1										1	1
Other external violence		8	1		4	1	1	1							1		1	1	1	1	1				1	2	8
Total	28	202	10	27	35	34	44	24	25	10	17	3	1	12	2	7	10	21	13	9	10	31	31	26	23	35	230

TABLE V.—DEATH RATES AMONG AMERICANS ON THE ISTHMUS.

	Annual average per 1,000.
White employees from the United States:	
Disease	3.14
External causes	.84
Total	3.98
White women and children from the United States:	
Disease	2.60
External causes	.69
Total	3.29
White employees and their families from the United States:	
Disease	2.84
External causes	.76
Total	3.60

TABLE VI.—CONSOLIDATED HOSPITAL REPORT.

	Remaining July 1, 1917.		Admitted.		Died.		Discharged.		Transferred.		Remaining June 30, 1918.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
ANCON HOSPITAL.												
Employees	42	164	1,060	2,972	20	114	1,047	2,824	9	50	37	169
Panama pay patients	.....	1	.....	2	.....	.....	.....	.....	.....	3	.....	.....
Other pay patients	156	66	4,333	1,505	40	157	4,258	1,339	38	26	174	64
Charity patients	11	26	592	401	5	22	583	365	5	24	22	30
Total	209	257	5,985	4,880	65	293	5,888	4,528	52	103	233	263
COROZAL HOSPITAL.												
Employees	.....	8	7	12	1	3	3	8	.....	1	1	8
Panama pay patients	50	201	16	60	3	27	9	23	.....	2	52	201
Other pay patients	9	3	40	17	1	7	34	9	.....	.....	7	3
Charity patients	9	70	6	27	.....	6	4	20	.....	.....	10	75
Total	68	282	69	116	5	43	50	60	.....	3	70	287
Corozal farm: Employees	9	55	7	43	.....	.....	.....	.....	1	.....	10	49
Chronic ward:												
Charity patients	.....	23	.....	40	.....	.....	.....	.....	.....	25	.....	24
Hospital	18	.....	116	.....	2	.....	105	.....	2	.....	25	.....
Nonresidents: Asylum	59	.....	1	.....	2	.....	1	.....	.....	.....	57	.....
COLON HOSPITAL.												
Employees	8	21	280	693	4	38	251	462	30	197	7	21
Panama pay patients	1	.....	27	106	4	13	11	39	13	53	1	.....
Other pay patients	15	5	773	311	16	24	615	229	134	49	20	5
Charity patients	3	.....	78	45	.....	5	66	26	13	13	2	1
Total	27	26	1,158	1,155	24	80	943	756	190	312	30	27
PALO SECO LEPER ASYLUM.												
Employees	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Panama pay patients	2	36	.....	8	.....	3	1	.....	.....	.....	2	35
Charity patients	1	26	.....	5	.....	2	.....	1	.....	1	1	27
Total	3	62	.....	13	.....	5	1	1	.....	1	3	62
GRAND TOTALS.												
Employees	59	248	1,354	3,720	25	155	1,301	3,294	40	248	55	247
Panama pay patients	53	238	43	176	7	43	21	62	13	58	55	236
Other pay patients	180	74	5,146	1,833	57	188	4,907	1,577	172	75	201	72
Charity patients	24	145	676	518	5	35	653	412	18	63	35	157
Total	316	705	7,219	6,247	94	421	6,882	5,345	243	444	346	712

TABLE VII.—CONSOLIDATED REPORT OF EMPLOYEES TREATED IN QUARTERS.

	Remaining July 1, 1917.		Admitted.		Died.		Discharged.		Transferred.		Remaining June 30, 1918.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
Ancon	1	.....	985	3	.....	.....	978	3	5	.....	4	.....
Balboa	8	.....	1,843	127	.....	.....	1,752	58	94	63	18	1
Pedro Miguel	1	.....	160	12	.....	.....	149	8	11	4	1	.....
Paraiso	1	.....	55	109	.....	.....	46	87	10	20	.....	.....
Gamboa	.....	.....	4	6	.....	.....	3	5	.....	1	.....	.....
Gatun	.....	2	123	68	.....	.....	116	63	6	5	3	4
Colon	7	37	935	2,038	.....	.....	940	2,030	.....	.....	12	107
Total	18	39	4,105	2,363	.....	.....	3,984	2,254	126	93	38	112

Paraiso dispensary closed, effective May 14, 1918.

TABLE VII-A.—CONSOLIDATED REPORT OF DAYS LOST IN QUARTERS.

Stations.	White.	Colored.	Total.
Ancon	2,113	3	2,116
Balboa	4,325	392	4,717
Pedro Miguel	328	42	370
Paraiso	158	257	415
Gamboa	7	15	22
Gatun	393	391	784
Colon	2,294	11,223	13,517
Total	9,618	12,323	21,941

TABLE VIII.—CONSOLIDATED HOSPITAL AND EMPLOYEES TREATED IN QUARTERS.

REPORT.

	Remaining July 1, 1917.		Admitted.		Died.		Discharged.		Transferred.		Remaining June 30, 1918.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
Hospitals	316	705	7,219	6,247	94	421	6,882	5,345	243	444	346	712
Quarters	18	39	4,105	2,363	.....	.....	3,984	2,254	126	93	38	112
Total	334	744	11,324	8,610	94	421	10,866	7,599	369	537	384	824

	White.	Colored.	Total.
Total admissions to hospitals, excluding Corozal farm and chronic ward	7,212	6,164	13,376
Total admissions of employees to quarters	4,105	2,363	6,468
Total	11,317	8,527	19,844
Less number of patients transferred from quarters to hospitals, and between hospitals, whose admissions are duplicated in above figures	369	537	906
Net admissions to hospitals and quarters	10,948	7,990	18,938
Total admissions of employees to quarters	4,105	2,363	6,468
Total admissions of employees to hospitals	1,354	3,720	5,074
Total admissions of employees	5,459	6,083	11,542
Less number transferred between hospitals, etc	166	341	507
Net admissions of employees to hospitals and quarters	5,293	5,742	11,035
Annual average per 1,000—admissions of employees	1,138.77	236.39	381.33

TABLE VIII-A.—CONSOLIDATED DISPENSARY REPORT OF ALL CASES TREATED BUT NOT EXCUSED.

Stations.	Employees.			Nonemployees.			Total.		
	White.	Colored.	Total.	White.	Colored.	Total.	White.	Colored.	Total.
Ancon	14,825	49,834	64,677	13,721	35,009	48,730	28,546	84,843	113,389
Balboa	44,457	43,968	88,425	47,450	22,719	70,169	91,907	66,687	158,594
Pedro Miguel	16,104	21,959	38,045	14,113	9,791	23,904	30,217	31,750	61,967
Paraiso	7,327	22,180	29,507	6,185	8,656	14,841	13,512	30,836	44,348
Gamboa	1,023	4,441	5,464	606	4,177	4,783	1,629	8,618	10,247
Gatun	3,090	13,220	16,310	6,538	9,616	16,154	9,628	22,836	32,464
Colon	19,671	71,775	91,446	14,917	25,492	40,409	34,588	97,267	131,855
Total	106,497	227,377	333,874	103,530	115,460	218,990	210,027	342,837	552,864

Paraiso dispensary closed, effective May 14, 1918.

TABLE IX.—AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK IN HOSPITALS AND QUARTERS.

HOSPITALS.

	White.	Colored.	Total.
Ancon Hospital	44.02	171.07	215.09
Colon Hospital	6.28	17.76	24.04
Palo Seco Leper Asylum	.....	.....	.....
Total	50.30	188.83	239.13

QUARTERS.

Ancon	5.79	0.82	6.61
Balboa	11.85	1.07	12.92
Pedro Miguel	.90	.12	1.02
Paraiso	.43	.70	1.13
Gamboa	.19	.41	.60
Gatun	1.08	1.07	2.15
Colon	6.28	30.75	37.03
Total	26.52	34.94	61.46

TABLE IX-A.—AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK.

	White.	Colored.	Total.
Hospitals	50.30	188.83	239.13
Quarters	26.52	34.94	61.46
Total	76.82	223.77	300.59

TABLE IX-B.—AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK PER 1,000.

	White.	Colored.	Total.
Hospitals	10.82	7.77	8.26
Quarters	5.70	1.44	2.12
Total	16.52	9.21	10.38

TABLE X.—AVERAGE NUMBER OF DAYS' STAY IN HOSPITALS OR QUARTERS FOR EACH ADMISSION OF SICK EMPLOYEES.

HOSPITALS.

	White.	Colored.	Total.
Ancon Hospital	13.63	21.40	19.23
Colon Hospital	8.06	8.98	8.65

QUARTERS.

Ancon	2.15	1.00	2.14
Balboa	2.35	3.08	2.39
Pedro Miguel	2.05	3.50	2.15
Paraiso	2.87	2.36	2.53
Gamboa	1.75	2.50	2.20
Gatun	3.19	5.75	4.10
Colon	2.45	5.51	4.55

Paraiso dispensary closed, effective May 14, 1918.

TABLE XI.—SURGICAL OPERATIONS PERFORMED IN HOSPITALS.

	Ancon hospital.		Colon hospital.		Total.	
	Number.	Died.	Number.	Died.	Number.	Died.
Amputations:						
Arm			1	1	1	1
Forearm	2				2	
Hand			3		3	
Thigh	2		1	1	3	1
Leg	1		2		3	
Digits, single	4		1		5	
Digits, multiple	8		6		14	
Operations on bones:						
Craniectomy, decompression	2	2	5	3	7	5
Loosening of periosteum, left tibia			1		1	
Resection of knee	1				1	
Resection of elbow	1				1	
Ostiectomy	9		4		13	
Wiring of fractures, simple	17		1		18	
Plating of fractures, simple	5				5	
Wiring of fractures, compound	4		1		5	
Plating of fractures, compound	1				1	
Ostiectomy with fæcia transplant			1		1	
Laminactomy	4	2	1		5	2
Excision of maxilla	1		1		2	
Excision of coccyx			1		1	
Bone transplantation	3				3	
Adenectomy:						
Cervical	16		2		18	
Axillary	1				1	
Inguinal, single	221		19		240	
Inguinal, double	65		9		74	
Femoral	23				23	
Ventral	6				6	
Hallux valgus, bilateral, radical cure			1			1
Bone splinting	3				3	
Herniotomy:						
Inguinal, single	128		54		182	
Inguinal, double	44		19		63	
Ventral	17		7		24	
Strangulated	4	1	5	1	9	2
Femoral	2				2	
Genitourinary tract:						
Nephrectomy	5				5	
Nephrotomy	5				5	
Nephropexy	1				1	
Perinephritic abscess, drainage of	2				2	
Cystotomy	1		3	1	4	1
Urethrotomy	2				2	
Urethrotomy, internal	25	1			25	1
Urethrotomy, external	13		1		14	
Prostatectomy	2	1			2	1
Hydrocele, single, radical cure	38		11		49	
Hydrocele, double, radical cure	7		2		9	

TABLE XI.—SURGICAL OPERATIONS PERFORMED IN HOSPITALS—Continued.

	Ancon hospital.		Colon hospital.		Total.	
	Number.	Died.	Number.	Died.	Number.	Died.
Genitourinary tract—Continued.						
Orchidoctomy	7		1	1	8	1
Epididymotomy	59				59	
Amputation of scrotum	46				46	
Amputation of penis	1				1	
Curettage uteri	156	1	19		175	1
Perineoplasty	24		14		38	
Trachelorrhaphy	11		6		17	
Vaginal puncture	1	1			1	1
Varicocele, radical cure	19		9		28	
Undescended testicle, double			1		1	
Obstetrical:						
Cæsarian section, abdominal	5	1	4	2	9	3
Cæsarian section, vaginal	1				1	
Accouchement force	3				3	
High forceps	4		3		7	
Low forceps	15		2		17	
Version	9				9	
Perineorrhaphy	13		2		15	
Breech extraction			3		3	
Six-month precipitate			1		1	
Thorax:						
Thoracotomy	10	2	1		11	2
Excision breast			2		2	
Excision of breast and axilla	2		1		3	
Pneumothoracotomy	1	1			1	1
Rectum:						
Hemorrhoids, radical cure	149		29		178	
Ischiorectal abscess with general septicemia			1	1	1	1
Fistula in anus, excision of	32		4		36	
Prolapsus rectum, radical excision			1		1	
General:						
Thyroidectomy	9				9	
Aneurismorrhaphy			1	1	1	1
Varicose veins, excision of	22		3		25	
Tenorrhaphy	10				10	
Excision of surface neoplasms	30		3		33	
Plastic operation for severe injuries	9		13	1	22	1
Plastic operation for effects of disease	12		11	1	23	1
Plastic operation for tattoo	1				1	
Plastic operation for congenital defects	11		1		12	
Skin graft	4		2		6	
Tracheotomy			1	1	1	1
Nerve stretching	5				5	
Gunshot wounds of soft parts, operation for	2		2		4	
Extensive injury to soft parts, operation for	5		2		7	
Stab wounds to soft parts, operation for			2		2	
Laparotomy:						
For tuberculous peritonitis	3		2		5	
For intestinal obstruction	9	5	1	1	10	6
Exploratory	9	1	7	1	16	2
Gastro-enterestomy	7		3		10	
Appendectomy	119		70		189	
Appendectomy with local peritonitis	19		11		30	
Appendectomy with general peritonitis	2	2	5	2	7	4
Cholocystostomy	4				4	
Cholocystotomy	3		1		4	
Cholecystectomy	3				3	
Abscess of liver, laparo-hepatotomy for	5				5	
Abscess of liver, thoraco-hepatotomy for	4	1			4	1
Panhysterectomy			4	1	4	1
Supravaginal hysterectomy	53	11	9	1	62	12
Hysteromyomectomy	33	1	8		41	1
Myomectomy	3		1		4	
General peritonitis	4	2	1		5	2
Entro enterostomy	1		1		2	
Salpingectomy, single	4		4		8	
Salpingectomy, double	6		8	2	14	2
Salpingo-oophocectomy	28		3		31	
Ovarian cystectomy	16		15		31	
Oophorectomy	3		10		13	
Suspensic-uteri	65		38		103	
Platic operation for chronic pelvic persitonitis	1				1	

TABLE XI.—SURGICAL OPERATIONS PERFORMED IN HOSPITALS—Continued.

	Ancon hospital.		Colon hospital.		Total.	
	Number.	Died.	Number.	Died.	Number.	Died.
Laparotomy—Continued.						
For ectopic gestation	5	1	4		9	1
For oesophageal stricture	1	1			1	1
Trachectomy	1				1	
Celostomy	3				3	
Sigmoidepexy			1		1	
Entorectomy	2	1	1	1	3	2
Enterorrhaphy	1				1	
Plastic operation for chronic peritonitis	1				1	
Gunshot wound of abdomen	1		3	1	4	1
Stab wound of abdomen	2	1	1		3	1
Release, intestinal adhesions	2				2	
Rupture of bowel and general peritonitis			1	1	1	1
Amputation, cervix	1				1	
Haomstoperitoneum			1	1	1	1
Excision of semilunar cartilage knee joint	3				3	
Mayo bunion, unilateral	2				2	
Mayo bunion, bilateral	11				11	
Major operations, various other	23		4		27	
Minor operations, various other	2,608	3	99		2,707	3
Total	4,455	43	625	27	5,080	70

TABLE XII.—OPERATIONS AND WORK PERFORMED IN EYE, EAR, NOSE, AND THROAT CLINICS.

Operations.	Number.	Operations.	Number.
Adenoidectomy	234	Nasal polypus, removal	13
Adenoidectomy and tonsillectomy	10	Nasal septum, submucous resection of	138
Cataract extraction	17	Tonsillectomy	335
Chalazion excision	14	Turbinectomy	45
Evisceration	2	Scleral trephine	2
Iridectomy	9	Ectropion, upper lid	1
Mastoidectomy	8	Chalazine, excision	12
Pterygium, excision	4	Scarification, eyelid	2
Pterygium, transplantation	27	Minor operations, various	71
Needling of eye	13		
Uvlectomy	1	Total	977
Paracentesis	13	Refractions	1,096
Paracentesis of ear	6		

TABLE XIII.—CONSOLIDATED WARD LABORATORY REPORT, ANCON AND COLON HOSPITALS.

	Number.		Number.
Blood examinations	9,590	Stool examinations—Continued.	
Differential counts	556	Strongyloides	324
Estivo-autumnal	686	Ascaris lumbricoides	119
Tertian	191	Cercomonas intestinalis	15
Filaria	24	Entameba (hystolytica and tetragena)	51
Hemoglobin estimations	3,080	Guaiac tests	295
Leucocyte counts	1,288	Tricocephalus dispar	288
Red blood counts	111	Balantidium coli	10
White blood counts	203	Bilharzia	3
Quartan	25	Taenia saginata	10
Mixed	2	Oxyuris vermicularis	16
Undetermined (for malaria)	2	Urine examinations	25,265
Stool examinations	8,336	Albumen	5,996
Ameba	110	Casts	4,458
Pus and blood	659	Entamœba hystolytica	1
Blood	33	Epithelia	9,689
Pus	105	Pus and blood	11,806
Red blood cells	5	Blood	104
Uncinaria	1,205	Mucus	2
Ciliated monads	177		

TABLE XIII.—CONSOLIDATED WARD LABORATORY REPORT, ANCON AND COLON HOSPITALS—Continued.

	Number.		Number.
Urine examinations—Continued.		Sputum examinations	3,938
Pus	447	Positive for tubercle bacilli	418
Bile	222	Positive for pneumococcus	2
Oxyuris vermicularis	1	Positive for Frenkles cocci	1
Oxilate of lime	9	Positive for strepococci	1
Ciliated monads	106	Smear examinations	787
Guaiac tests	547	Urethral and vaginal	484
Hemin crystals	197	Spinal fluid	194
Indican	2,550	Eye	16
Sugar	5,630	Chest	6
Red blood cells	54	Positive for gonococci	20
Phosphates	53	Pleuric	1
Urates	6		
Alkine	6		

TABLE XIV—SANTO TOMAS HOSPITAL.

	Remaining July 1, 1917.	Admitted.	Died.	Discharged.	Remaining June 30, 1918.
Pay patients	24	1,183	32	1,144	31
Charity patients	408	8,816	884	7,954	386
Total	432	9,999	916	9,098	417

Average number of days' treatment per patient	10
Average number of patients constantly sick	440.50
Number of days relief furnished patients	160,714
Cost of subsistence per patient per day	$0.55

SURGICAL OPERATIONS.

	Number.		Number.
Amputations:		General:	
Arm	3	Thyroidectomy	3
Forearm	1	Varicose veins, excision of	1
Leg	5	Excision of tongue	1
Foot	1	Skin graft	83
Digits, multiple	9	Nephrectomy	1
Operations on bones:		Nephropexy	1
Resection of ankle	2	Supravaginal hysterectomy	10
Wiring of fractures, simple	1	Laparotomy:	
Adenectomy:		For intestinal obstruction	2
Cervical	14	Exploratory	3
Axillary	1	Gastroenterostomy	1
Inguinal, single	144	Appendectomy	123
Inguinal, double	8	Appendectomy with general peritonitis	1
Ventral	3	Gastrotomy	1
Herniotomy:		Colostomy	3
Inguinal, single	90	Cholocystotomy	3
Inguinal, double	17	Cholocystectomy	8
Ventral	12	Abscess of liver, laparo-hepatotomy for	2
Femoral	2	Abscess of liver, thoraco-hepatotomy for	2
Combined	1	Panhysterectomy	18
Strangulated	5	Supravaginal hysterectomy	13
Genitourinary tract:		Hysteromyomectomy	7
Urethrotomy, internal	33	Salpingectomy, single	23
Urethrotomy, external	33	Salpingectomy, duble	28
Prostatectomy	1	Salpingo-oophorectomy	52
Hydrocele, single, radical cure	21	Ovarian cystectomy	2
Hydrocele, double, radical cure	10	Oophorectomy	19
Orchidectomy	12	Suspensia-uteri	72
Cystotomy, suprapubic	1	Abscess of abdomen	1
Amputation of penis	4	Splenectomy	2
Curettage uteri	126	Rupture of spleen	1
Vaginal section	26	Major operations, various	41
Excision of breast	2	Minor operations, various	929
Circumcision	183		
Trachelorrhaphy	1	Total	2,303
Perineorrhaphy	1		
Rectum:			
Hemorrhoids, radical cure	62		
Fistula in anus, excision of	10		
Resection of	1		

TABLE XV.—REPORT OF BOARD OF HEALTH LABORATORY.

	Number.
Bacteriological examinations:	
Blood examinations, for malaria	7
Blood cultures	362
Agglutination reactions	12
Throat cultures	1,216
Water	12
Glands	3
Sputum	231
Stools	533
Urine	275
Fluids, various	72
Bile	1
Pus examinations, various	10
Leper suspects	22
Cultures from autopsies	14
Smears, various	62
Brains of dogs, for rabies	4
Heads of dogs, for "Negri bodies"	2
Milk from Corozal dairy	142
Milk from Panama and Colon	43
Milk from supply department	123
Milk from Ancon Hospital kitchen	5
Milk counts, various	95
Inguinal gland culture	1
Miscellaneous examinations	49
Pathological examinations:	
Tissues prepared	1,954
Autopsies, human	283
Autopsies, animal	141
Examination for yaws	1
Examination for oriental sore	1
Blood films, various	8
Animal inoculations	3
Animal blood films	113
Tissues reported, surgical	174
Placental films	85
Dogs under observation	1
Foetus examined	3
Rats examined—	
Mus muculus	13,080
Mus norvegicus	3,260
Mus rattus	2,402
Mus alexandrinus	172
Miscellaneous examinations	3

	Number.
General:	
Wasserman reactions	12,138
Agglutination reactions	15
Antityphoid vaccinations	63
Smallpox vaccinations	22
Antogenous vaccines prepared	20
Blood smears examined for malaria	194
Blood smears examined for filaria	891
Animals examined	68
Spleens of cattle examined for anthrax	36
Tissue and hide	3
Water	1
Blood films of cows	4
Smallpox vaccine points manufactured	2,130
Toxicological examinations	1
Thermometers calibrated	22
Anthrax therum tested	1
Dark field examinations	7
Miscellaneous	3
Chemical examinations:	
Urine	242
Gastric contents	8
Mother's milk	24
Milk from Corozal dairy	33
Milk from Panama dairies	38
Milk from supply department	79
Milk from Balboa dispensary	1
Milk from Ancon Hospital kitchen	5
Milk, condensed and evaporated	21
Water	4
Spinal fluids	584
Gasoline	2
Miscellaneous	73
Undertaker's department:	
Cremations	211
Embalmed	79
Buried at Corozal	162
Bodies shipped to the United States	42
Bodies shipped to Panama	35
Bodies shipped to Colon	15
Bodies shipped to Gatun	5
Bodies shipped to Paraiso	1

On May 31, and during the month of June, 1918, nasopharyngeal cultures for meningococcus were made from passengers and crew of Japanese S. S. *Anyo Maru*, at Balboa quarantine station, as follows:

Number of cultures made	4,193
Number of individuals examined	602
Number of cultures positive	157
Number of individuals positive	103

TABLE XVI.—*Quarantine service.*

PORTS OF BALBOA-PANAMA AND COLON-CRISTOBAL.

	Number.
Vessels inspected and passed	2,798
Vessels passed on medical officer's certificate	10
Vessels transiting canal in quarantine	98
Vessels held in quarantine	103
Total number of vessels entered	3,009
Supplemental inspection of vessels at docks	989
Total number of inspections of vessels	3,998
Bills of health issued	2,436
Bills of health viséed	1,833
Vessels fumigated on arrival	174
Vessels fumigated prior to departure	15
Persons vaccinated at port of arrival because of compulsory vaccination law	2,591
Persons vaccinated at port of departure or en route	13,187
Total number of persons vaccinated	15,778
Persons held at detention stations to complete period of incubation of yellow fever or bubonic plague	4,175
Persons held on board vessels to complete period of incubation of yellow fever or bubonic plague	20,754
Total number of persons held in quarantine	24,929
Persons arriving from coast towns on small craft	19,364
Persons departing for coast towns on small craft	17,232
Crew inspected	146,322
Passengers inspected	47,326
Persons passed on medical officer's certificate	20,529
Total number of persons inspected and passed	193,648
Supplementary inspection of passengers and crew	17,336
Immigrants rejected and deported	403

TABLE XVII.—*Personnel report.*

[Number of employees (on June 30, each year).]

	Gold.		Silver.		Total.	
	1917	1918	1917	1918	1917	1918
Chief health office	3	4	.....	.....	3	4
Medical storehouse	4	4	4	4	8	8
Quarantine service	13	11	35	61	48	72
Health office, Panama	12	17	136	148	148	165
Health office, Colon	10	14	169	148	179	162
Ancon Hospital	112	129	214	228	326	357
Colon Hospital	17	19	26	32	43	51
Santo Tomas Hospital	7	9	.....	.....	7	9
Palo Seco Leper Asylum	2	2	21	40	23	42
Zone sanitation	5	6	132	193	137	199
Corozal Hospital	16	16	110	104	126	120
Line dispensaries	14	11	9	9	23	20
Total	215	242	856	967	1,071	1,209

APPENDIX L.

REPORT OF THE GENERAL PURCHASING OFFICER AND CHIEF OF THE WASHINGTON OFFICE.

THE PANAMA CANAL,
Washington, D. C., July 12, 1918.

SIR: I have the honor to submit the following report on the work of this office during the fiscal year ended June 30, 1918:

At the beginning of the year Lieut. Col. Earl I. Brown, Corps of Engineers, United States Army, was on duty as general purchasing officer and chief of the Washington office of The Panama Canal and continued as such until he was relieved, on August 24, 1917, for the purpose of assuming command of a regiment of Engineers in the National Army. Col. Brown was succeeded by Maj. Benedict Crowell, Ordnance Officers' Reserve Corps, who was subsequently transferred to the Engineer Officers' Reserve Corps. He remained in charge of the office until November 11, 1917, when he resigned to accept an appointment as Assistant Secretary of War. The undersigned immediately became acting general purchasing officer and acting chief of office, and continued as such until he received a permanent appointment on December 1, 1917. On December 3 Mr. E. D. Anderson was made chief clerk of the purchasing department, vice the undersigned. There has been no other important change in the organization during the year, but the separations from the force during this period have been unusually heavy, due mainly to the employees securing more lucrative positions elsewhere.

The abnormal labor conditions in the United States increased still more over preceding years the difficulties experienced in filling requisitions from the Isthmus, especially skilled mechanics for marine repair work, due to the activities in the various manufacturing plants and shipyards. Sixty per cent of those tendered employment failed to accept, as against 54 per cent during the fiscal year 1917, and 48 per cent during the fiscal year 1916. One thousand and ninety-four persons were tendered employment in the grades above that of laborer, of which number 432 accepted and were appointed, covering 65 different positions. Three thousand and fifteen persons, including new appointees, those returning from leave of absence, and members of employees' families were provided with transportation from the United States to the Isthmus; and in response to inquiries and applications for employment during this period, and in the issuance of appointments, 15,121 letters were written, 3,909 telegrams sent, and 21,071 circulars mailed.

The work of the correspondence and record division has continued along the lines indicated in the preceding annual report, with the addition, due to war conditions, of a considerable amount of correspondence, both by mail and cable, on matters relating to the War

Trade Board and its various bureaus, the Shipping Board, Fuel Administration, Alien Property Custodian, and various other new Government establishments.

The work of the assistant auditor's office has continued along the same general lines as indicated in the preceding annual report. The following statements show the volume of the transactions in his office, which include the work of the disbursing clerk:

Claim statement.

On hand July 1, 1917	357
Received from July 1, 1917, to June 30, 1918	16,024
To be accounted for	16,381
Passed for payment from July 1, 1917, to June 30, 1918	15,999
On hand June 30, 1918	382

There was a decrease of 2,190 claims received, and a decrease of 2,322 claims examined and passed for payment from the preceding year.

Financial statement of receipts and disbursements.

July 1, 1917, to June 30, 1918.

Disbursing clerk's balance July 1, 1917		$247,281.25
Receipts:		
From United States Treasury	$10,946,737.43	
Miscellaneous collections	335,040.15	
		11,281,777.58
To be accounted for		11,529,058.83
Disbursements:		
Vouchered expenditures	9,643,732.81	
Repayments to appropriations	620,888.27	
Refundments and disbursements on collections	38,253.82	
Collections deposited to appropriations miscellaneous receipts	254,843.01	
		10,557,717.91
		971,340.92
Disbursing clerk's balance June 30, 1918:		
General account as disbursing clerk	880,133.41	
Special deposit account	91,207.51	
		971,340.92

During the fiscal year 13,474 vouchers for payment, amounting to $9,643,732.81; 232 collection vouchers, amounting to $335,040.15 (not including $118 income tax), and 3,075 settlements by transfers of appropriation, aggregating $1,892,490.47 were given an administrative examination. This was a decrease from the last preceding fiscal year of 2,190 disbursement vouchers prepared and examined. There was a decrease of disbursements made amounting to $1,209,549.87 as between the present and the preceding fiscal year, and a decrease of $173,217.54 in miscellaneous collections made. There was an increase of 1,726 transfer settlements, said increase in number aggregating $1,227,172.57 over the preceding fiscal year. During the past year the assistant auditor reported on claims submitted to the Auditor for the War Department in reply to his inquiries, and transmitted to him for direct settlement 49 claims.

During the fiscal year 104 contracts were prepared, amounting to $3,521,474.53, a decrease of 65 in number and of $1,575,514.93 in amount as between the present and the past fiscal year. Many cases involving questions of law were referred to the assistant auditor for examination and report during the year.

The assistant auditor, as the legal officer in the United States of The Panama Canal, has, by direction of the chief of office, continued to render assistance to the Department of Justice in connection with the preparation for trial, and at the trial, in the courts, of all cases in connection with contracts made by The Panama Canal. The following is a statement of the work performed in connection with cases in the various United States courts and the Court of Claims:

Two suits in the United States District Court for the Southern District of New York, entitled A. J. Rennolds & Bro. *v.* United States, one under Washington order 52140 and one under Washington order 52411, were pending on appeal at my last report. These appeals have been dismissed and the amount of the judgments on the counter claims of The Panama Canal, $10,671.09, have been collected.

The motion for a rehearing and a reargument in the case of the United States *v.* D'Olier Engineering Co., referred to in my report for the fiscal year ending June 30, 1917, was denied. This case has been ultimately decided against the United States.

In the case of the United States *v.* The Norfolk Creosoting Co. under Washington order 62879, referred to in my report for the previous fiscal year, suit was brought in the District Court of the Eastern District of Virginia. This suit was settled and $4,641.99 collected.

Cases referred to in the report for the fiscal year ended June 30, 1917, are still pending as follows: Patrick Corr & Sons *v.* United States, under annual contract 1033, in the Court of Claims; Walter S. Dickey *v.* United States, under various Washington orders, in the Court of Claims; Pelton Water Wheel Co. *v.* United States, Washington orders 29725, 29725–A, and 29725–B, for $4,176.09, liquidated damages, and for $1,051.43 as compensation for alleged extra work.

Two new cases have arisen since the last report. Toberman, Mackey & Co. brought suit in the Court of Claims, No. 33854, for $3,261.80 under Washington order 67474. Report on this case was prepared and sent to the Department of Justice on February 21, 1918. J. Edward Ogden brought suit in the District Court of the United States for the Southern District of New York for $1,468.89, April 30, 1918, for extra compensation under Washington order 60890. There are no other cases pending before the courts upon which reports have not been made except the last mentioned. There are now some defaulting contractors against which it is probable suits will be brought during the next fiscal year.

The case of H. A. A. Smith, auditor of The Panama Canal, *v.* William H. Jackson, No. 457, in the Supreme Court of the United States, October term, 1918, was briefed and argued before the Supreme Court. The case was decided against The Panama Canal.

It will become necessary during the next fiscal year for this office to assist the Department of Justice in the several cases now pending in the Court of Claims and in the United States courts. This office is frequently called into consultation by attorneys representing

the Government, and every possible assistance will be rendered as the needs arise.

The work of the purchasing department has been conducted in general in the same manner as heretofore. War conditions, however, which have existed during the whole of the past fiscal year, have introduced new and perplexing questions which have required in some instances a change in the methods of purchase, and the new problems which have been introduced by the present emergency have required the expenditure of a large amount of extra work and time by the office force. As is well known the industries and manufacturing facilities of the country are given over primarily to the winning of the war, which emergency necessarily interferes very materially with the smooth procuring of material as heretofore under the usual routine methods in vogue under the prewar period.

Owing to shortage in the principal raw materials, congestion in manufacturing facilities, lack of transportation facilities, and the numerous governmental restrictions and regulations established on account of the war, such as the necessity of procuring certain materials through allocation by the War Industries Board, the priority system, railroad embargoes, fuel restrictions, fixing of prices for the principal raw materials, etc., it is impossible in a great many instances to obtain bids through competition and otherwise complying with the usual conditions prescribed in our circulars and informal inquiries inviting proposals for materials. For instance numerous bidders change the specifications and place of delivery, will not guarantee time of delivery, introduce conditions as to prices bid, priority, transportation conditions, and also relative to waiver of liquidated damages, and make numerous stipulations peculiar to each particular case. Many bids are, however, still submitted in accordance with our requirements and such bids are, of course, given preference.

These new problems have to be met and decided and of course require a great amount of extra correspondence and time. Often no bids or unsatisfactory bids are received in response to our printed circular or mimeographed invitations, and this circumstance requires the issuing of circular letters, which occasions extra work as well as delay in procuring the material. Advances in prices, especially in connection with open-market and circular-letter inquiries, also have to be investigated. In many instances the bidder will not reduce the price, giving reasons therefor, and in some instances the prices are reduced and consequently a saving to the Government is effected which is well worth the extra expenditure in time and labor.

It was recently necessary to make certain changes in our methods of purchase in view of requests made by the War Industries Board relative to the manner of procuring certain materials in which a shortage exists or is imminent, these materials being enumerated in the "clearance list" issued by the War Industries Board. It is thought that these changes may be best explained by quoting the following correspondence which is self-explanatory:

LETTER TO THIS OFFICE FROM MR. BARUCH, CHAIRMAN, WAR INDUSTRIES BOARD, DATED MAY 10, 1918.

It has been deemed advisable to reorganize the clearance committee of the War Industries Board, and I inclose, herewith, a memorandum of the method of procedure that has been agreed upon that the committee should follow.

This memorandum has been drawn up after consultation and with the approval of most of the Government departments at interest.

If this meets with your approval, will you not be good enough to issue an order to your proper department heads instructing them that the procedure outlined herewith is to be followed in detail by them?

It must be understood that nothing in the memorandum inclosed will in any way conflict with the operations of the requirements division, as assented to by the departments in interest.

The first meeting of the reorganized clearance committee will be held next Monday, May 13, at 9.45 a. m., in Room 716, Council of National Defense Building, at which time I trust it will be convenient for you to have your representative appear.

MEMORANDUM OF MAY 6 RELATIVE TO THE REORGANIZATION OF THE CLEARANCE COMMITTEE, WHICH IS REFERRED TO IN THE LETTER ABOVE SET FORTH.

The requirements division is considering and dealing with future requirements and programs, and does not deal with the immediate schedule of commodities which the departments are ready to purchase. If such immediate needs of one commodity are to be submitted through the requirements division to the commodity sections, it is believed that the other departments and commodity sections, particularly where one transaction involves several or collateral commodities, will not be able to get a sufficient perspective, unless the matters are considered by a committee on which they are represented and which can deal with such matters as definite schedules ready to purchase. Further, many concerns make different products, and frequently one department will object to overloading a concern with orders for one product which must necessarily interfere with the filling of its orders on another product.

These, together with other reasons, make necessary the reorganization of the clearance committee to make it more effective.

The following is a proposed outline of functions and procedure:

1. The clearance committee, as reorganized, will form a part of the requirements division, and will carry out the policies laid down by that division.

2. The clearance committee shall consist of a chairman and a secretary appointed by the chairman of the War Industries Board; of representatives of the Army, Navy, Marine Corps, and Emergency Fleet Corporation; of the Interior and Post Office Departments; of The Panama Canal; the National Red Cross; Y. M. C. A.; (allied) Purchasing Commission; of representatives of the principal commodity sections of the War Industries Board; and such other members as may be designated.

3. The representatives of the various Government departments shall submit to the committee all their current and prospective purchases for commodities, which are on the clearance list, as announced and supplemented from time to time by the War Industries Board; (That is, such of their requirements as they are then ready to purchase.) Such needs will be discussed by the committee and will be cleared, provided the section head at interest is represented and no objection develops, or will be referred to the appropriate commodity sections for recommendations thereon, and in special cases to the requirements division for instruction. The commodity section will report to the secretary of the clearance committee its action or recommendations thereon and the secretary will report to the department interested. Instructions are to be issued to all Government departments that no inquiry shall be sent out or order of this class negotiated until after clearance.

4. The chiefs of commodity sections, in such matters as are referred to them, will act in the manner prescribed by the requirements division.

5. The clearance committee shall also have such additional duties as shall be assigned to it from time to time by the chairman of the War Industries Board and the requirements division.

6. Each representative of a Government department on the clearance committee shall consult with the various members of his department and members of the commodity sections and in general keep informed of all of the proposed and actual purchasing activities of his department.

7. The operations of the committee will assist in keeping the sections in close touch with the operations of the departments and the representatives of the departments in close touch with the conditions in the industries, and the clearance committee will recommend to the War Industries Board such modifi-

cations of the clearance list as developments may prove necessary or desirable.

8. The secretary of the clearance committee will submit daily a detailed listed report to the chairman of the requirements division, showing commodities cleared the previous day. This report shall be made up so as to show the department concerned, division thereof, commodity, quantity, and estimated value if possible, and whether referred to commodity section or cleared.

LETTER FROM THE PRESIDENT TO CHAIRMAN OF THE WAR INDUSTRIES BOARD, DATED MARCH 4, 1918.

THE WHITE HOUSE,
Washington, March 4, 1918.

MY DEAR MR. BARUCH: I am writing to ask if you will not accept appointment as chairman of the War Industries Board, and I am going to take the liberty at the same time of outlining the functions, the constitution and action of the board as I think they should now be established.

The functions of the board should be:

(1) The creation of new facilities and the disclosing, if necessary, the opening up of new or additional sources of supply.

(2) The conversion of existing facilities, where necessary, to new uses.

(3) The studious conservation of resources and facilities by scientific, commercial, and industrial economies.

(4) Advice to the several purchasing agencies of the Government with regard to the prices to be paid.

(5) The determination, wherever necessary, of priorities of production and of delivery and of the proportions of any given article to be made immediately accessible to the several purchasing agencies when the supply of that article is insufficient, either temporarily or permanently.

(6) The making of purchases for the allies.

The board should be constituted as at present and should retain, so far as necessary and so far as consistent with the character and purposes of the reorganization, its present advisory agencies; but the ultimate decision of all questions, except the determination of prices, should rest always with the chairman, the other members acting in a cooperative and advisory capacity. The further organization of advice I will indicate below.

In the determination of priorities of production, when it is not possible to have the full supply of any article that is needed produced at once, the chairman should be assisted, and so far as practicable, guided by the present priorities organization or its equivalent.

In the determination of priorities of delivery, when they must be determined, he should be assisted when necessary, in addition to the present advisory priorities organization, by the advice and cooperation of a committee constituted for the purpose and consisting of official representatives of the Food Administration, the Fuel Administration, the Railway Administration, the Shipping Board, and the War Trade Board, in order that when a priority of delivery has been determined there may be common, consistent, and concerted action to carry it into effect.

In the determination of prices the chairman should be governed by the advice of a committee consisting, besides himself, of the members of the board immediately charged with the study of raw materials and of manufactured products, of the labor member of the board, of the chairman of the Federal Trade Commission, the chairman of the Tariff Commission, and the Fuel Administrator.

The chairman should be constantly and systematically informed of all contracts, purchases, and deliveries, in order that he may have always before him a schematized analysis of the progress of business in the several supply divisions of the Government in all departments.

The duties of the chairman are:

(1) To act for the joint and several benefit of all the supply departments of the Government.

(2) To let alone what is being successfully done and interfere as little as possible with the present normal processes of purchase and delivery in the several departments.

(3) To guide and assist wherever the need for guidance or assistance may be revealed; for example, in the allocation of contracts, in obtaining access to materials in any way preempted, or in the disclosure of sources of supply.

(4) To determine what is to be done when there is any competitive or other conflict of interest between departments in the matter of supplies; for example, when there is not a sufficient immediate supply for all and there must be a decision as to priority of need or delivery, or when there is competition for the same source of manufacture or supply, or when contracts have not been placed in such a way as to get advantage of the full productive capacity of the country.

(5) To see that contracts and deliveries are followed up where such assistance as is indicated under (3) and (4) above has proved to be necessary.

(6) To anticipate the prospective needs of the several supply departments of the Government and their feasible adjustment to the industry of the country as far in advance as possible, in order that as definite an outlook and opportunity for planning as possible may be afforded the business men of the country.

In brief, he should act as the general eye of all supply departments in the field of industry.

Cordially and sincerely, yours,

WOODROW WILSON.

MR. BERNARD M. BARUCH, *Washington, D. C.*

STATEMENT SHOWING ORGANIZATION AND FUNCTIONS OF REQUIREMENTS DIVISION OF WAR INDUSTRIES BOARD.

In order that the responsibilities which the President has laid upon the chairman of the War Industries Board, as outlined in his letter of March 4, 1918, may be discharged, there has been created a "requirements division" of the said board, to which each supply division of each department of this Government and the Allied Purchasing Commission shall furnish "as far in advance as possible" statements with as much detail as practicable of their "prospective needs" of raw materials and finished products. The President has decreed that the chairman is to be constantly and systematically informed of all contracts and purchases in order that he may have always before him a schematized analysis of the progress of business in the several divisions of the Government in all the departments, and in order that this may be accomplished, the statements above mentioned will include not only those commodities, materials or products of which a present or threatened shortage exists, but also those of which the supply is ample, and will also include not only commodities, materials and products required by several different departments or nations, but also those required by one department only.

In the procurement of materials and finished products in which no shortage exists and where no allocation seems necessary or desirable, the requirements division will so advise the department presenting the requirements, which will thereupon proceed with the purchase in pursuance with their established practices.

SECTION 1. *Notice of requirements.*—The statements above mentioned will from time to time, and as far in advance as possible of the date required, be presented to the requirements division by the member or members thereof representing the department in which the requirements originate, or by the representative of the Allied Purchasing Commission. Where the requirements are novel or unusual either with respect to the amount of the proposed expenditure, quantities involved or location proposed, or where the requirements division for any reason deems it desirable that the project be considered in conference between the head of the department in which it originates and the chairman of the War Industries Board, the matter shall be immediately called to the attention of the chairman of the War Industries Board, and also submitted to the board at its next meeting; without, however, delaying conference to and consideration by the appropriate commodity section.

SECTION 2. *Commodity sections.*—The chairman of the War Industries Board shall utilize existing sections and where necessary create additional sections to handle raw materials and finished products, of which there is an actual or threatened shortage, or the price and production of which should be controlled, in order that the United States Government, its allies and the civilian population may be protected as far as possible. These sections shall be designated "commodity sections," and each shall be in charge of an executive officer to be designated "chief" of such section.

Each section chief shall create and maintain such organization and keep such records as may be prescribed by the authority appointing him.

SECTION 3. *Members of commodity sections.*—Each commodity section shall be composed of the section chief and representatives (hereinafter called members) of each of the supply departments of the Government interested in the commodity in question. Each member shall be named by his department head. Since each member will have regular duties to perform in connection with the supply department which he represents, he need give to the commodity section to which he is attached only so much time as may be necessary to perform the duties herein prescribed, and will not be charged with the executive conduct of the business of the section, but will have access to all data and information collected by the section, and will in turn supply the section with all information he may have or can procure pertaining to the commodity in question.

SECTION 4. *Duties of commodity sections.*—Upon receipt from the requirements division of statements embodying the requirements of any department of this Government or of its allies, it shall be the duty of the chief of the section to carefully study and consider same, and procure from all available sources information and data which will be helpful in the allocation of such requirements. Meetings of each commodity section shall be called by the chief thereof at such times as will interfere as little as possible with the other duties of the members. At such meetings the requirements referred to the section shall be considered and wherever possible the allocation of material or facilities to meet such requirements shall be determined. In the event any member is dissatisfied with the decision reached, he may at his election file a protest with the section chief and also with the head of his division or department. The latter may at his election, appeal to the chairman of the War Industries Board, whose decision after giving all interested parties an opportunity to be heard, shall be final, subject only to modification by agreement between the chairman of War Industries Board and the respective Secretaries of War and the Navy, and the chairman of the Shipping Board, to the extent of their respective interests. A record of each meeting will be preserved in the office of the chief of the section, the decisions reached at meetings will be reduced to writing in a succinct form and a copy thereof will be transmitted to (1) the chairman of the requirements division; (2) to each member of the section; (3) to the Director of Army purchases; (4) to the Paymaster General of the Navy; (5) to the vice president and general manager of the Emergency Fleet Corporation; (6) to the Priorities Commissioner, and (7) to such other official or officials as may be from time to time designated by the chairman of the War Industries Board.

Each commodity section will also from time to time consider the necessity for expansion of existing sources of production or the creation of new facilities and the disclosing, if necessary the opening up, of additional sources of supply and the conversion of existing facilities to new uses.

Each section chief will be charged with the responsibility of collecting from the several departments of the Government, from the manufacturers and producers and from the committees representing them, and especially from the War Service Committee, or committees created under the supervision of the Chamber of Commerce of the United States, and from any and all other reliable and available sources information concerning the production of the particular commodity or commodities with which his section has to deal, including available supplies, new sources of supply, methods for increasing production, etc. These data and information will at all times be available to the several interested departments, the price committee, the priorities committee and any other agency that may be designated by the chairman of the War Industries Board.

Each commodity section shall consider market conditions pertaining to the materials or commodities over which he has jurisdiction, and shall where deemed advisable, recommend purchase plans to the several purchasing departments. In cases where it becomes necessary to control an industry in whole or in part by means of allotments, the appropriate section will determine the allotments of materials, commodities, and facilities to the several departments of this Government and to its allies, and also the extent to which manufacturers and others, whether serving the civilian population or engaged in the manufacture of war supplies, shall be rationed.

SECTION 5. *Special commodity sections.*—Where the requirements deal with a commodity listed, where a shortage exists or where an allocation seems desirable, but for which no regular section has been established, such requirements will be considered by a special section created for such purpose by the

requirements division, which shall perform the same functions as are performed by the regular commodity section.

SECTION 6. *Priorities.*—When a commodity section comes to make its final report on the allocation of any specific requirement the chief of such section shall notify a member of the priorities committee, to be designated for such purpose by the priorities commissioner, who shall, with the section chief and the member, consider and tentatively determine the priority rating which such requirements shall take when orders therefor shall have been placed. Such tentative rating shall be observed by the priorities committee in connection with all applications for priority on orders covering such requirements unless the priorities committee should (because of conditions changing in the time intervening between the time of the fixing of the tentative rating and the application for priorities, or other good cause) conclude such rating to be improper; in which event the section chief and each member of the section fixing the tentative rating shall be notified, and have an opportunity to be heard before such rating shall be changed. In the event a change is made, the section chief or any member may appeal from such decision in the manner prescribed by that portion of the organization plan of the War Industries Board governing priorities.

SECTION 7. *Inspection and production.*—It shall be no part of the task of the War Industries Board to make inspection of products for which orders have been placed to keep in touch with production or follow up delays, which duties devolve upon the several governmental supply departments. Each supply department, however, will promptly and fully advise the requirements division whenever serious delays in deliveries or shortages in requirements occur, or are threatened.

SECTION 8. *Membership.*—The requirements division shall be composed of Mr. Alex. Legge, chairman; Mr. James Inglis, executive secretary; Mr. Edwin B. Parker, priorities; Mr. George N. Peek, finished products; Mr. J. Leonard Replogle, iron, steel, and steel products; Mr. L. L. Summers, chemicals and explosives; Mr. Pope Yeatman, nonferrous metals; Mr. J. A. Carr, representing Allied Purchasing Commission; one or more representatives of the War Department; one or more representatives of the Navy Department; a representative of the Marine Corps; one or more representatives of the United States Shipping Board; Emergency Fleet Corporation, and a representative of the Railroad Administration.

The chairman of the War Industries Board shall from time to time agree with the Secretary of War, the Secretary of the Navy, and the chairman of the Shipping Board, respectively, as to the number of representatives from their respective departments; and when the number shall have been determined, such representatives shall be selected by the Secretary of War, the Secretary of the Navy and the chairman of the Shipping Board, respectively.

The Fuel Administrator, the Food Administrator, and the American Red Cross shall each designate a representative who shall attend meetings of the requirements division whenever they are prepared to present plans or projects under consideration, the consummation of which will require materials, supplies, facilities, electrical power, fuel or transportation affecting the industries of the United States.

SECTION 9. *Meetings.*—Meetings of the members of this division shall be held in the office of its chairman at 9 a. m. each day, at which all advices of requirements received since the preceding meeting and all other matters affecting requirements in which the members of the division as a whole shall be interested, will be considered, after which the statements of requirements shall be segregated as far as need be and referred by the executive secretary to the appropriate commodity section.

MEMORANDUM OF THIS OFFICE TO THE SECRETARY OF WAR DATED MAY 14, 1918.

The Panama Canal has just been requested by Mr. Bernard M. Baruch, chairman of the War Industries Board, to conform to the procedure prescribed by that board in connection with purchases of material on the clearance list, as announced and supplemented from time to time by that board. This list, as you are probably aware, comprises items in which a shortage exists, or is probable, and the action desired only relates to orders in quantity. The list covers a number of items for which The Panama Canal is often in the market in quantity. I also understand the request is based on the letter from the Presi-

dent to Mr. Baruch dated March 4 (copy attached), outlining the functions, constitution, and actions of the board as he considered they should be established.

I feel that The Panama Canal should fall in with the suggestion received from the War Industries Board, especially in view of the emergency created by the present war and the undoubted shortage which exists in the supply of materials comprised in the clearance list. Furthermore, I believe this action will be in the interests of The Panama Canal as it will probably facilitate the securing of material at Government prices and will obviate interference, so far as the canal requirements are concerned, with the securing of material needed for war purposes. Inasmuch, however, as The Panama Canal is not a bureau of the War Department, and as certain laws and regulations now in force require advertising before purchases can be made, except in cases of emergency, and inasmuch as the conditions brought about by the present war have undoubtedly created an emergency which justifies disregarding in certain cases the requirements relative to advertising, I submit herewith the draft of an Executive order for your signature, if approved by you, providing that, by direction of the President, The Panama Canal is authorized to make purchases without advertising for bids for the material and supplies to be procured which are on the clearance list of the War Industries Board, with a proviso, however, that such material and supplies as are not on the clearance list shall be purchased in the usual way and under the usual requirements as to advertising now applicable to The Panama Canal. If this order is signed by you this office will then be in a position to cooperate, to the fullest extent, with the War Industries Board in connection with the procuring of material on the clearance list, and in such cases where it is not necessary to secure material through the War Industries Board it will pursue the usual course now followed.

EXECUTIVE ORDER, SIGNED BY THE SECRETARY OF WAR, DATED MAY 18, 1918.

By direction of the President it is hereby declared that on account of the war with Germany an emergency exists within the meaning of section 3709 of the Revised Statutes and amendments thereto and other statutes as to purchases to be made for the Government by The Panama Canal.

It is therefore ordered that, in view of such emergency and the necessity of cooperating with the War Industries Board in the manner outlined by the President in his letter to Mr. Bernard M. Baruch of March 4, 1918, The Panama Canal is hereby authorized to make purchases without advertising for bids for the material and supplies to be procured which are on the clearance list as announced and supplemented from time to time by the War Industries Board: *Provided, however*, That such material and supplies as are not on the clearance list issued from time to time by the War Industries Board shall be purchased by The Panama Canal in the usual way and under the usual requirements now applicable to The Panama Canal.

The Panama Canal shall use every effort to procure material and supplies at the lowest price obtainable, taking into consideration the necessity of cooperating with and being governed by the advice of the War Industries Board as to prices, priorities, and deliveries of material.

This order is issued for the purpose of enabling The Panama Canal to legally cooperate with and coordinate its purchases with the operations of the War Industries Board and to meet the emergency created by the War with Germany, so far as it affects purchases to be made by The Panama Canal.

The undersigned has been designated as the representative of The Panama Canal on the clearance committee and the requirements division of the War Industries Board, with the understanding that Mr. E. D. Anderson, chief clerk of the purchasing department, shall be recognized as the representative of the canal whenever the undersigned is unable to be present at meetings at which it may be desirable for the canal to be represented.

The following extracts from a pamphlet issued by the War Industries Board under date of February 25, 1918, show articles on the clearance list at that time:

1. There is presented herewith a list of items which should not be ordered without first consulting with the clearance committee of the War Industries

Board and having clearance granted thereon (the only exceptions being the items marked with an asterisk (*) and outlined under the price plan below).

2. Clearance is necessary either because of a shortage which exists or is probable on certain items, or because prices have been arranged on others, and the allocation of the various items is necessary through a central agency to obtain adequate production or to receive the benefit of such prices as have been arranged or fixed.

3. In the letting of general contracts where subcontractors are required to furnish any of these items, the subcontractors' requirements should also be brought to the committee's attention by the departments interested in the same manner as the department's requirements.

4. The above action does not apply to contracts already awarded.

5. The above action only relates to orders in quantity, which point, when question arises, should be determined by the department representative on the committee.

6. The list of items mentioned will be modified as occasion arises.

7. The list is as follows:

Acids.
Chemicals.
Gasoline.
Oil, meaning fuel oil or lubricating oil; also castor oil.
Nonferrous metals, consisting of—
- * Aluminum.
- Antimony.
- * Copper.
- Tin.
- *Lead.
- Nickel.
- Platinum.
- Zinc.

Lumber, meaning—
- Basswood, 2½ inches and thicker.
- Clear spruce, 2 inches and thicker.
- Clear fir, 2 inches and thicker.
- Clear cypress, 2 inches and thicker.
- White oak, 1½ inches and thicker.
- Mahogany.
- Yellow pine timbers.
- Fir timbers.
- Yellow pine piling.
- White oak railroad ties.
- Walnut.
- *Portland cement.
- *Iron ore.
- *Coke.
- *Scrap.

Cotton and cotton goods, including—
- Numbered duck.
- Single and double filling duck.
- Twills and drills.
- Denims, Osnaburgs, or any articles manufactured therefrom.
- Cotton thread, meaning the highest quality.

Knit goods.
Leather and leather goods.
Linen and linen thread.
Rubber goods, meaning footwear, wearing apparel and hospital supplies.
Wool and woolen goods.
Cannon, meaning the forging and machining necessary therefor.
Machine guns and accessories thereof.
Small arms.
Explosives and components thereof.
Silk noils and silk cartridge cloth.
Forgings for guns, projectiles, or shafts.
Optical glass and instruments.
Mica.
Needles.

Cranes.
Items of railway transportation.
Machine tools, large.
Motor trucks, gasoline.
Electrical equipment, meaning motors, generators, and transformers.
* Iron and steel products, meaning—
- Bands.
- Billets.
- Blooms.
- Boiler tubes.
- Cold rolled steel.
- Hoops.
- Ingots.
- Merchant bars.
- Pig iron.
- Pipe.
- Plates.
- Rails and accessories.
- Rods.
- Seamless tubing.
- Shapes.
- Sheets.
- Sheet bars.
- Sheet steel.
- Skelp.
- Slabs.
- Tin plate.
- Wire and wire products.
- Wire rope.

It is not deemed necessary to reproduce here the special conditions contained in the pamphlet relative to the articles in the above list marked with an asterisk, especially as some of the conditions are not applicable to purchases for The Panama Canal on account of existing canal contracts or because the quantities of such articles required by the canal are not sufficiently large to make it desirable or advisable to comply with the conditions. Furthermore, some of the conditions have been changed. Some additional articles have been and will be from time to time added to the clearance list and this office will constantly keep in touch with the War Industries Board so as to keep advised of current changes in the list and special conditions applicable to any particular article.

In accordance with the Executive order of May 18, it is now necessary for this office to refer items in quantity appearing on the clearance list to the War Industries Board for their determination as to the method of purchase and this procedure is being followed by the office at the present time. No rule has been laid down as to what "in quantity" means, and of course it is necessary for this office to use its own judgment as to whether the quantity called for is considered sufficient for reference to the War Industries Board. When the items are referred to the clearance committee of the War Industries Board that committee either "clears" the items or "allocates" to certain firms the furnishing of the articles. When the article is cleared it means that this office is permitted to purchase the item under the usual methods. When the article is allocated to a certain manufacturer, of course it is necessary for this office to write to the particular manufacturer requesting a confirming quotation and other information such as place and time of delivery. Most purchases under the system of allocation are made f. o. b. cars at factory. It is evident that this means additional burdens will be placed on this office in

connection with the shipment of material from place of manufacture, the securing of ocean transportation to the Isthmus, etc. Under this method it is also necessary that material be accepted subject to final inspection in the United States. It is thought, however, that this method of purchase will have its compensating advantages in that the material desired will be secured at Government prices at the factory in cases where Government prices for raw materials have been fixed. I think it goes without saying that the methods required in connection with securing material through the War Industries Board will undoubtedly increase correspondence and general office work considerably.

Since we entered the war our correspondence has greatly increased on account of the many questions constantly arising after the placing of orders, due to the priority system of the War Industries Board as well as the fuel situation, railroad embargoes, etc.

All of the above-mentioned new conditions which have been introduced have, it will be plainly seen, required a large amount of extra work and correspondence on the part of the office force during the last fiscal year. It would be very difficult to state specifically the relative increase in the work due to war conditions, as compared with the prewar period, but when the nature of our work and its scope is considered in connection with the industrial and shipping conditions as affected by the Governmental needs and regulations, as briefly outlined above, it is believed that a fair idea can be gained as to the increase in the duties of the office force.

As heretofore the principal purchases have been made by the Washington office, although offices in charge of assistant purchasing agents have been continued at New York, New Orleans and San Francisco. These offices, as stated in previous reports, also act as receiving and forwarding agencies for such materials as have been purchased for forwarding to the Isthmus through their respective ports. A small force of employees has been continued in the Medical Supply Depot, United States Army, New York City, for the purpose of assisting the officer in charge in making purchases of medical and hospital supplies for the Isthmus, most of which supplies have been purchased through that depot.

The same system as heretofore has been continued relative to the preliminary inspection of materials purchased, and a corps of inspectors under the supervision of the inspecting engineer, located at Washington, has been maintained. The work of inspection has been facilitated as heretofore by assistance rendered by the field officers of the Corps of Engineers, United States Army, and by the Bureau of Standards, the Bureau of Mines, Bureau of Chemistry, and the Medical Department, Ordnance Department, the Signal Corps, and the Quartermaster Corps of the United States Army.

The number of orders issued during the past fiscal year was 6,608; a decrease of 2,300, as compared with the fiscal year 1917, the number of orders issued during that fiscal year being 8,908. While there was a decrease of 25.82 per cent in orders placed during the fiscal year 1918, the number compares favorably with the fiscal years 1913, 1914, and 1915, and exceeds the number issued in any one fiscal year from 1904 to 1912, it being noted that during the fiscal year ending June 30, 1917, the largest number of orders in any one year was

issued. While the number of orders, which ordinarily is the criterion of the volume of work performed, decreased, it is undoubtedly a fact that this was more than offset by the increase in work and added responsibilities caused by the new conditions introduced on account of the present war.

The number of orders issued during each fiscal year from 1904 to 1918 is as follows: 1904, 8; 1905, 1,585; 1906, 2,563; 1907, 4,187; 1908, 4,523; 1909, 5,458; 1910, 5,765; 1911, 4,363; 1912, 5,960; 1913, 7,087; 1914, 7,426; 1915, 8,066; 1916, 8,856; 1917, 8,908; 1918, 6,608.

Below is a summary of orders placed through the Washington office of The Panama Canal during each month in the fiscal years 1917 and 1918:

Month.	1916–17	1917–18	Month.	1916–17	1917–18
July	719	622	February	841	416
August	741	760	March	792	488
September	737	677	April	734	558
October	671	586	May	705	518
November	823	600	June	714	469
December	754	465			
January	677	449	Total	8,908	6,608

The total value of orders placed by the Washington office in the last fiscal year was $8,019,608.90, as compared with $10,405,157.27 in the fiscal year 1917, making a grand total of purchases since the year 1904 of $136,582,840.43.

There is submitted with this report a table showing increases in salaries authorized over organization of July 1, 1916, and increases of numbers of persons employed over number allowed in 1918 Book of Estimates in the Washington office of the Panama Canal, as required by the act of Congress approved June 12, 1917.

Very respectfully,

A. L. Flint,
General Purchasing Officer, Chief of Office.

Col. Chester Harding, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

Table showing increases in salaries authorized over organization of July 1, 1916, and increases of numbers of persons employed over number allowed in 1918 Book of Estimates in the Washington office of The Panama Canal, as required by the act of Congress approved June 12, 1917.

Designation.	Increase in pay.		Increase in numbers.	
	Rate authorized in organization July 1, 1916.	Increased to—	Number authorized in 1918 Book of Estimates.[1]	Increased to—
Purchasing department.				
Chief clerk	$3,600	$4,000	.....	.....
Inspecting engineer	3,600	4,000	.....	.....
Clerk	2,000	2,250	.....	.....
Do	1,800	2,100	.....	.....
Clerks (2)	1,800	2,000	.....	.....
Do	1,600	1,800	.....	.....
Clerk	1,400	1,600	.....	.....

[1] Including those reported in preceding annual report.

Table showing increases in salaries authorized over organization of July 1, 1916, etc.—Continued.

Designation.	Increase in pay.		Increase in numbers.	
	Rate authorized in organization July 1, 1916.	Increased to—	Number authorized in 1918 Book of Estimates.	Increased to—
Purchasing department—Continued.				
Clerks (2)	$1,200	$1,400	.....	.....
Do	1,000	1,200	.....	.....
Clerk, $1,200	.....	.....	11	12
Packer, messenger, messenger (assistant), and messenger (boy), $900 to $300	.....	.....	9	10
Administrative department.				
Assistant to the chief of office	3,000	3,300	.....	.....
Clerk	1,800	2,100	.....	.....
Do	1,200	1,400	.....	.....
Telegrapher	1,400	1,500	.....	.....
Messenger	720	780	.....	.....
Watchmen-firemen (3)	720	840	.....	.....
Skilled laborer	720	840	.....	.....
Elevator conductor	720	840	.....	.....
Laborers (2)	600	720	.....	.....
Accounting department.				
Chief clerk and law clerk	2,500	2,750	.....	.....
Clerks (2)	1,600	1,700	.....	.....
Clerk	1,400	1,600	.....	.....
Do	1,400	1,500	.....	.....
Do	1,200	1,300	.....	.....
Do	1,000	1,200	.....	.....
Do	900	1,000	.....	.....
Inspection force.				
Chief inspector	2,400	2,750	.....	.....
Inspector	2,100	2,220	.....	.....
Do	1,980	2,040	.....	.....
Inspectors (2)	1,800	1,920	.....	.....
Do	1,680	1,800	.....	.....
Inspector	1,500	1,680	.....	.....
Do	1,500	1,620	.....	.....
Do	1,200	1,500	.....	.....
Inspectors (2)	1,200	1,350	.....	.....

NOTE.—Owing to conditions existing at the beginning and during the year, due to the demand for experienced men of all classes, caused by the war, and also due to advances in salaries made by the various departments of the Government and commercial establishments, it became absolutely necessary, in order to retain men with proper qualifications, to readjust salaries and reorganize the force under the Washington office. While certain increases were made as indicated herein, decreases were also made in the organization, the net result being that the total amount allotted for salaries in the Washington office was not exceeded.

APPENDIX M.

ACTS OF CONGRESS AND EXECUTIVE ORDERS RELATING TO THE PANAMA CANAL AND TO THE CANAL ZONE.

INDEX.

ACTS OF CONGRESS AND EXECUTIVE ORDERS RELATING TO THE PANAMA CANAL AND TO THE CANAL ZONE.

AN ACT Making appropriations to supply urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes, namely:

* * * * * * *

DEPARTMENT OF STATE.

* * * * * * *

FOREIGN INTERCOURSE.

* * * * * * *

Relief and protection of American seamen: For relief and protection of American seamen in foreign countries, and in the Panama Canal Zone, and shipwrecked American seamen in the Territory of Alaska, in the Hawaiian Islands, Porto Rico, and the Philippine Islands, $60,000.

* * * * * * *

MILITARY ESTABLISHMENT.

* * * * * * *

MEDICAL DEPARTMENT.

Hospital care, Canal Zone garrisons: For paying the Panama Canal such reasonable charges, exclusive of subsistence, as may be approved by the Secretary of War for caring in its hospitals for officers, enlisted men, military prisoners, and civilian employees of the Army admitted thereto upon the request of proper military authority: *Provided*, That the subsistence of the said patients, except commissioned officers, shall be paid to said hospitals out of the appropriation for subsistence of the Army at the rates provided therein for commutation of rations for enlisted patients in general hospitals, $20,000.

* * * * * * *

PANAMA CANAL.

CONSTRUCTION.

For continuing the construction and equipment of the Panama Canal, to be expended under the direction of the governor: For completing dock numbered six at Cristobal, $593,190, to continue available until expended; and the limit of cost fixed by the sundry civil appropriation Act approved July first, nineteen hundred and sixteen, is increased from $1,500,000 to $2,093,190.

FORTIFICATIONS, PANAMA CANAL.

For protection, preservation, and repair of fortifications, for which there may be no special appropriation available, and for maintaining channels for access to torpedo wharves, $9,400.

* * * * * * *

Approved, March 28, 1918.

AN ACT Making appropriations for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and nineteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, severally appropriated, in full compensation for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and nineteen, out of any money in the Treasury not otherwise appropriated, for the objects hereinafter expressed, namely:

* * * * * * *

PAYMENT TO THE GOVERNMENT OF PANAMA.

To enable the Secretary of State to pay to the Government of Panama the seventh annual payment due on February twenty-sixth, nineteen hundred and nineteen, from the Government of the United States to the Government of Panama under article fourteen of the treaty of November eighteenth, nineteen hundred and three, $250,000.

* * * * * * *

RELIEF AND PROTECTION OF AMERICAN SEAMEN.

Relief and protection of American seamen in foreign countries, and in the Panama Canal Zone, and shipwrecked American seamen in the Territory of Alaska, in the Hawaiian Islands, Porto Rico, and the Philippine Islands, $80,000.

* * * * * * *

Approved, April 15, 1918.

AN ACT To punish the willful injury or destruction of war material, or of war premises or utilities used in connection with war material, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the words "war material," as used herein, shall include arms, armament, ammunition, livestock, stores of clothing, food, foodstuffs, or fuel; and shall also include supplies, munitions, and all other articles of whatever description, and any part or ingredient thereof, intended for, adapted to, or suitable for the use of the United States, or any associate nation, in connection with the conduct of the war.

The words "war premises," as used herein, shall include all buildings, grounds, mines, or other places wherein such war material is being produced, manufactured, repaired, stored, mined, extracted, distributed, loaded, unloaded, or transported, together with all machinery and appliances therein contained;

and all forts, arsenals, navy yards, camps, prisons, or other military or naval stations of the United States, or any associate nation.

The words "war utilities," as used herein, shall include all railroads, railways, electric lines, roads of whatever description, rairoad or railway fixture, canal, lock, dam, wharf, pier, dock, bridge, building, structure, engine, machine, mechanical contrivance, car, vehicle, boat, or aircraft, or any other means of transportation whatsoever, whereon or whereby such war material or any troops of the United States, or of any associate nation, are being or may be transported either within the limits of the United States or upon the high seas; and all dams, reservoirs, aqueducts, water and gas mains and pipes, structures and buildings, whereby or in connection with which water or gas is being furnished, or may be furnished, to any war premises or to the military or naval forces of the United States, or any associate nation, and all electric light and power, steam or pneumatic power, telephone and telegraph plants, poles, wires, and fixtures and wireless stations, and the buildings connected with the maintenance and operation thereof used to supply water, light, heat, power, or facilities of communication to any war premises or to the military or naval forces of the United States, or any associate nation.

The words "United States" shall include the Canal Zone and all territory and waters, continental and insular, subject to the jurisdiction of the United States.

The words "associate nation," as used in this Act, shall be deemed to mean any nation at war with any nation with which the United States is at war.

SEC. 2. That when the United States is at war, whoever, with intent to injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, or whoever, with reason to believe that his act may injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, shall willfully injure or destroy, or shall attempt to so injure or destroy, any war material, war premises, or war utilities, as herein defined, shall, upon conviction thereof, be fined not more than $10,000 or imprisoned not more than thirty years, or both.

SEC. 3. That when the United States is at war, whoever, with intent to injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, or whoever, with reason to believe that his act may injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, shall willfully make or cause to be made in a defective manner, or attempt to make or cause to be made in a defective manner, any war material, as herein defined, or any tool, implement, machine, utensil, or receptacle used or employed in making, producing, manufacturing, or repairing any such war material, as herein defined, shall, upon conviction thereof, be fined not more than $10,000 or imprisoned not more than thirty years, or both.

Approved, April 20, 1918.

AN ACT To amend the naturalization laws and to repeal certain sections of the Revised Statutes of the United States and other laws relating to naturalization, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section four of the Act entitled "An Act to establish a Bureau of Immigration and Naturalization and to provide a uniform rule for the naturalization of aliens throughout the United States," approved June twenty-ninth, nineteen hundred and six, be, and is hereby, amended by adding seven new subdivisions as follows:

"Seventh. * * * or any alien, or any Porto Rican not a citizen of the United States, of the age of twenty-one years and upward, who has enlisted or entered or may hereafter enlist in or enter the armies of the United States, either the Regular or the Volunteer Forces, or the National Army, the National Guard or Naval Militia of any State, Territory, or the District of Columbia, or the State militia in Federal service, or in the United States Navy or Marine Corps, or in the United States Coast Guard, or who has served for three years on board of any vessel of the United States Government, or for three years on board of merchant or fishing vessels of the United States of more than twenty tons burden, and while still in the service on a reenlistment or reappointment, or within six months after an honorable discharge or separation therefrom, or while on furlough to the Army Reserve or Regular Army Reserve after

honorable service, may, on presentation of the required declaration of intention petition for naturalization without proof of the required five years' residence within the United States if upon examination by the representative of the Bureau of Naturalization, in accordance with the requirements of this subdivision it is shown that such residence can not be establishd; any alien serving in the military or naval service of the United States during the time this country is engaged in the present war may file his petition for naturalization without making the preliminary declaration of intention and without proof of the required five years' residence within the United States; any alien declarant who has served in the United States Army or Navy, or the Philippine Constabulary, and has been honorably discharged therefrom and has been accepted for service in either the military or naval service of the United States on the condition that he becomes a citizen of the United States, may file his petition for naturalization upon proof of continuous residence within the United States for the three years immediately preceding his petition, by two witnesses, citizens of the United States, and in these cases only residence in the Philippine Islands and the Panama Canal Zone by aliens may be considered residence within the United States, and the place of such military service shall be construed as the place of residence required to be established for purposes of naturalization; and any alien, or any person owing permanent allegiance to the United States embraced within this subdivision, may file his petition for naturalization in the most convenient court without proof of residence within its jurisdiction, notwithstanding the limitation upon the jurisdiction of the courts specified in section three of the Act of June twenty-ninth, nineteen hundred and six, provided he appears with his two witnesses before the appropriate representative of the Bureau of Naturalization and passes the preliminary examination hereby required before filing his petition for naturalization in the office of the clerk of the court, and in each case the record of this examination shall be offered in evidence by the representative of the Government from the Bureau of Naturalization and made a part of the record at the original and any subsequent hearings; and, except as otherwise herein provided, the honorable discharge certificate of such alien, or person owing permanent allegiance to the United States, or the certificate of service showing good conduct, signed by a duly authorized officer, or by the masters of said vessels, shall be deemed prima facie evidence to satisfy all of the requirements of residence within the United States and within the State, Territory, or the District of Columbia, and good moral character required by law, when supported by the affidavits of two witnesses, citizens of the United States, identifying the applicant as the person named in the certificate or honorable discharge, and in those cases only where the alien is actually in the military or naval service of the United States, the certificate of arrival shall not be filed with the petition for naturalization in the manner prescribed; and any petition for naturalization filed under the provisions of this subdivision may be heard immediately, notwithstanding the law prohibits the hearing of a petition for naturalization during thirty days preceding any election in the jurisdiction of the court. Any alien, who, at the time of the passage of this Act, is in the military service of the United States, who may not be within the jurisdiction of any court authorized to naturalize aliens, may file his petition for naturalization without appearing in person in the office of the clerk of the court and shall not be required to take the prescribed oath of allegiance in open court. The petition shall be verified by the affidavits of at least two credible witnesses who are citizens of the United States, and who shall prove in their affidavits the portion of the residence that they have personally known the applicant to have resided within the United States. The time of military service may be established by the affidavits of at least two other citizens of the United States, which, together with the oath of allegiance, may be taken in accordance with the terms of section seventeen hundred and fifty of the Revised Statutes of the United States after notice from and under regulations of the Bureau of Naturalization. Such affidavits and oath of allegiance shall be admitted in evidence in any original or appellate naturalization proceeding without proof of the genuineness of the seal or signature or of the official character of the officer before whom the affidavits and oath of allegiance were taken, and shall be filed by the representative of the Government from the Bureau of Naturalization at the hearing as provided by section eleven of the Act of June twenty-nine, nineteen hundred and six. Members of the Naturalization Bureau and Service may be designated by the Secretary of Labor to administer oaths relating to the administration of the naturall-

zation law; and the requirement of section ten of notice to take depositions to the United States attorneys is repealed, and the duty they perform under section fifteen of the Act of June twenty-ninth, nineteen hundred and six (Thirty-fourth Statutes at Large, part one, page five hundred and ninety-six), may also be performed by the Commissioner or Deputy Commissioner of Naturalization: *Provided*, That it shall not be lawful to make a declaration of intention before the clerk of any court on election day or during the period of 30 days preceding the day of holding any election in the jurisdiction of the court: *Provided further*, That service by aliens upon vessels other than of American registry, whether continuous or broken, shall not be considered as residence for naturalization purposes within the jurisdiction of the United States, and such aliens can not secure residence for naturalization purposes during service upon vessels of foreign registry.

During the time when the United States is at war no clerk of a United States court shall charge or collect a naturalization fee from an alien in the military service of the United States for filing his petition or issuing the certificate of naturalization upon admission to citizenship, and no clerk of any State court shall charge or collect any fee for this service unless the laws of the State require such charge to be made, in which case nothing more than the portion of the fee required to be paid to the State shall be charged or collected. A full accounting for all of these transactions shall be made to the Bureau of Naturalization in the manner provided by section thirteen of the Act of June twenty-ninth, nineteen hundred and six.

"Eighth. That every seaman, being an alien, shall, after his declaration of intention to become a citizen of the United States, and after he shall have served three years upon such merchant or fishing vessels of the United States, be deemed a citizen of the United States for the purpose of serving on board any such merchant or fishing vessel of the United States, anything to the contrary in any Act of Congress notwithstanding; but such seaman shall, for all purposes of protection as an American citizen, be deemed such after the filing of his declaration of intention to become such citizen: *Provided*, That nothing contained in this Act shall be taken or construed to repeal or modify any portion of the Act approved March fourth, nineteen hundred and fifteen (Thirty-eighth Statutes at Large, part one, page eleven hundred and sixty-four, chapter one hundred and fifty-three), being an Act to promote the welfare of American seamen.

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"Thirteenth. That any person who is serving in the military or naval forces of the United States at the termination of the existing war, and any person who before the termination of the existing war may have been honorably discharged from the military or naval services of the United Statese on account of disability incurred in line of duty, shall, if he applies to the proper court for admission as a citizen of the United States, be relieved from the necessity of proving that immediately preceding the date of his application he has resided continuously within the United States the time required by law of other aliens, or within the State, Territory, or the District of Columbia for the year immediately preceding the date of his petition for naturalization, but his petition for naturalization shall be supported by the affidavits of two credible witnesses, citizens of the United States, identifying the petitioner as the person named in the certificate of honorable discharge, which said certificate may be accepted as evidence of good moral character required by law, and he shall comply with the other requirements of the naturalization law."

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Approved, May 9, 1918.

AN ACT To amend section three, title one, of the Act entitled "An Act to punish acts of interference with the foreign relations, the neutrality, and the foreign commerce of the United States, to punish espionage, and better to enforce the criminal laws of the United States, and for other purposes," approved June fifteenth, nineteen hundred and seventeen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section three of title one of the Act entitled "An Act to punish acts of interference with the foreign relations, the neutrality, and the foreign commerce of the United States, to punish espionage, and better to enforce the criminal laws of the United States, and for

other purposes," approved June fifteenth, nineteen hundred and seventeen, be, and the same is hereby, amended so as to read as follows:

"SEC. 3. Whoever, when the United States is at war, shall willfully make or convey false reports or false statements with intent to interfere with the operation or success of the military or naval forces of the United States, or to promote the success of its enemies, or shall willfully make or convey false reports or false statements, or say or do anything except by way of bona fide and not disloyal advice to an investor or investors, with intent to obstruct the sale by the United States of bonds or other securities of the United States or the making of loans by or to the United States, and whoever, when the United States is at war, shall willfully cause, or attempt to cause, or incite or attempt to incite, insubordination, disloyalty, mutiny, or refusal of duty, in the military or naval forces of the United States, or shall willfully obstruct or attempt to obstruct the recruiting or enlistment service of the United States, and whoever, when the United States is at war, shall willfully utter, print, write, or publish any disloyal, profane, scurrilous, or abusive language about the form of government of the United States, or the Constitution of the United States, or the military or naval forces of the United States, or the flag of the United States, or the uniform of the Army or Navy of the United States, or any language intended to bring reform of government of the United States, or the Constitution of the United States, or the military or naval forces of the United States, or the flag of the United States, or the uniform of the Army or Navy of the United States into contempt, scorn, contumely, or disrepute, or shall willfully utter, print, write, or publish any language intended to incite, provoke, or encourage resistance to the United States, or to promote the cause of its enemies, or shall willfully display the flag of any foreign enemy, or shall willfully by utterance, writing, printing, publication, or language spoken, urge, incite, or advocate any curtailment of production in this country of any thing or things, product or products, necessary or essential to the prosecution of the war in which the United States may be engaged, with intent by such curtailment to cripple or hinder the United States in the prosecution of the war, and whoever shall willfully advocate, teach, defend, or suggest the doing of any of the acts or things in this section enumerated, and whoever shall by word or act support or favor the cause of any country with which the United States is at war or by word or act oppose the cause of the United States therein, shall be punished by a fine of not more than $10,000 or imprisonment for not more than twenty years, or both: *Provided*, That any employee or official of the United States Government who commits any disloyal act or utters any unpatriotic or disloyal language, or who, in an abusive and violent manner criticizes the Army or Navy or the flag of the United States shall be at once dismissed from the service. Any such employee shall be dismissed by the head of the department in which the employee may be engaged, and any such official shall be dismissed by the authority having power to appoint a successor to the dismissed official."

SEC. 2. That section one of Title XII and all other provisions of the Act entitled "An Act to punish acts of interference with the foreign relations, the neutrality, and the foreign commerce of the United States, to punish espionage, and better to enforce the criminal laws of the United States, and for other purposes," approved June fifeenth, nineteen hundred and seventeen, which apply to section three of Title I thereof shall apply with equal force and effect to said section three as amended.

Title XII of the said Act of June fifteenth, nineteen hundred and seventeen, be, and the same is hereby, amended by adding thereto the following section:

"SEC. 4. When the United States is at war, the Postmaster General may, upon evidence satisfactory to him that any person or concern is using the mails in violation of any of the provisions of this Act, instruct the postmaster at any post office at which mail is received addressed to such person or concern to return to the postmaster at the office at which they were originally mailed all letters or other matter so addressed, with the words 'Mail to this address undeliverable under Espionage Act' plainly written or stamped upon the outside thereof, and all such letters or other matter so returned to such postmasters shall be by them returned to the senders thereof under such regulations as the Postmaster General may prescribe."

Approved, May 16, 1918.

AN ACT To prevent in time of war departure from or entry into the United States contrary to the public safety.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That when the United States is at war, if the President shall find that the public safety requires that restrictions and prohibitions in addition to those provided otherwise than by this Act be imposed upon the departure of persons from and their entry into the United States, and shall make public proclamation thereof, it shall, until otherwise ordered by the President or Congress, be unlawful—

(*a*) For any alien to depart from or enter or attempt to depart from or enter the United States except under such reasonable rules, regulations, and orders, and subject to such limitations and exceptions as the President shall prescribe;

(*b*) For any person to transport or attempt to transport from or into the United States another person with knowledge or reasonable cause to believe that the departure or entry of such other person is forbidden by this Act;

(*c*) For any person knowingly to make any false statement in an application for permission to depart from or enter the United States with intent to induce or secure the granting of such permission either for himself or for another;

(*d*) For any person knowingly to furnish or attempt to furnish or assist in furnishing to another a permit or evidence of permission to depart or enter not issued and designed for such other person's use;

(*e*) For any person knowingly to use or attempt to use any permit or evidence of permission to depart or enter not issued and designed for his use;

(*f*) For any person to forge, counterfeit, mutilate, or alter, or cause or procure to be forged, counterfeited, mutilated, or altered, any permit or evidence of permission to depart from or enter the United States;

(*g*) For any person knowingly to use or attempt to use or furnish to another for use any false, forged, counterfeited, mutilated, or altered permit, or evidence of permission, or any permit or evidence of permission which, though originally valid, has become or been made void or invalid.

SEC. 2. That after such proclamation as is provided for by the preceding section has been made and published and while said proclamation is in force, it shall, except as otherwise provided by the President, and subject to such limitations and exceptions as the President may authorize and prescribe, be unlawful for any citizen of the United States to depart from or enter or attempt to depart from or enter the United States unless he bears a valid passport.

SEC. 3. That any person who shall willfully violate any of the provisions of this Act, or of any order or proclamation of the President promulgated, or of any permit, rule, or regulation issued thereunder, shall, upon conviction, be fined not more than $10,000, or, if a natural person, imprisoned for not more than twenty years, or both; and the officer, director, or agent of any corporation who knowingly participates in such violation shall be punished by like fine or imprisonment, or both; and any vehicle or any vessel, together with its or her appurtenances, equipment, tackle, apparel, and furniture, concerned in any such violation, shall be forfeited to the United States.

SEC. 4. That the term "United States" as used in this Act includes the Canal Zone and all territory and waters, continental or insular, subject to the jurisdiction of the United States.

The word "person" as used herein shall be deemed to mean any individual, partnership, association, company, or other unincorporated body of individuals, or corporation, or body politic.

Approved, May 22, 1918.

AN ACT Making appropriations to supply additional urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, on account of war expenses and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply additional urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, on account of war expenses and for other purposes, namely:

* * * * * * *

PANAMA CANAL.

For sanitation, quarantine, hospitals, and medical aid and support of the insane and of lepers, and aid and support of indigent persons legally within the

Canal Zone, including expenses of their deportation when practicable, and including additional compensation to any officer of the United States Public Health Service detailed with the Panama Canal as chief quarantine officer, $150,000, to continue available until expended.

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Approved, June 4, 1918.

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and nineteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the fiscal year ending June thirtieth, nineteen hundred and nineteen, namely:

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WAR DEPARTMENT.

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QUARTERMASTER CORPS.

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Disposition of remains of officers, soldiers, civilian employees, and so forth: For interment, or of preparation and transportation to their homes or to such national cemeteries as may be designated by proper authority, in the discretion of the Secretary of War, of the remains of officers, cadets, United States Military Academy, including acting assistant surgeons and enlisted men in active service; interment, or of preparation and transportation to their homes, of the remains of civil employees of the Army in the employ of the War Department who die abroad, in Alaska, in the Canal Zone, or on Army transports, * * * $250,000: *Provided*, That during the continuance of the present war the above provisions shall be applicable in the cases of officers and enlisted men on the retired list of the Army who have died or may hereafter die while on active duty by proper assignment.

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DEPARTMENT OF THE INTERIOR.

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SAINT ELIZABETHS HOSPITAL.

For support, clothing, and treatment in Saint Elizabeths Hospital of the insane from the Army, Navy, Marine Corps, Coast Guard, inmates of the National Home for Disabled Volunteer Soldiers, persons charged with or convicted of crimes against the United States who are insane, all persons who have become insane since their entry into the military and naval service of the United States, civilians in the quartermaster's service of the Army, persons transferred from the Canal Zone, who have been admitted to the hospital and who are indigent, * * * $426,750;

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DEPARTMENT OF COMMERCE.

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COAST AND GEODETIC SURVEY.

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Field expenses: For surveys and necessary resurveys of the Atlantic and Gulf coasts of the United States, including the coasts of outlying islands under the judisdiction of the United States: *Provided*, That not more than $45,000 of this amount shall be expended on the coasts of said outlying islands, and the Atlantic entrance to the Panama Canal, $101,500;

* * * * * * *

THE PANAMA CANAL.

For every expenditure requisite for and incident to the maintenance and operation, sanitation, and civil government of the Panama Canal and Canal Zone, including the following: Compensation of all officials and employees, including $1,000 additional compensation to the Auditor for the War Department for extra services in auditing accounts for the Panama Canal; foreign and domestic newspapers and periodicals; law books not exceeding $500; textbooks and books of reference; printing and binding, including printing of annual reports; rents and personal services in the District of Columbia; purchase or exchange of typewriting, adding, and other machines; purchase or exchange, maintenance, repair, and operation of motor-propelled and horse-drawn passenger-carrying vehicles; claims for damages to vessels passing through the locks of the Panama Canal, as authorized by the Panama Canal Act; claims for losses of or damages to property arising from the conduct of authorized business operations; claims for damages to property arising from the maintenance and operation, sanitation, and civil government of the Panama Canal; acquisition of land and land under water, as authorized in the Panama Canal Act; expenses occurred in assembling, assorting, storing, repairing, and selling material, machinery, and equipment heretofore or hereafter purchased or acquired for the construction of the Panama Canal which are unserviceable or no longer needed, to be reimbursed from the proceeds of such sales; expenses incident to conducting hearings and examining estimates for appropriations on the Isthmus; expenses incident to any emergency arising because of calamity by flood, fire, pestilence, or like character not foreseen or otherwise provided for herein; per diem allowance in lieu of subsistence, when prescribed by the Governor of the Panama Canal, to persons engaged in field work or traveling on official business, pursuant to section thirteen of the sundry civil appropriation Act approved August first, nineteen hundred and fourteen; and for such other expenses not in the United States as the Governor of the Panama Canal may deem necessary best to promote the maintenance and operation, sanitation and civil government of the Panama Canal, all to be expended under the direction of the Governor of the Panama Canal and accounted for as follows:

For maintenance and operation of the Panama Canal, salary of the governor, $10,000; purchase, inspection, delivery, handling, and storing of material, supplies, and equipment for issue to all departments of the Panama Canal, the Panama Railroad, other branches of the United States Government, and for authorized sales, payment in lump sums of not exceeding the amounts authorized by the injury compensation Act approved September seventh, nineteen hundred and sixteen, to alien cripples who are now a charge upon the Panama Canal by reason of injuries sustained while employed in the construction of the Panama Canal, $9,000,000, together with all moneys arising from the conduct of business operations authorized by the Panama Canal Act;

For sanitation, quarantine, hospitals, and medical aid and support of the insane and of lepers, and aid and support of indigent persons legally within the Canal Zone, including expenses of their deportation when practicable, and including additional compensation to any officer of the United States Public Health Service detailed with the Panama Canal as chief quarantine officer, $900,000;

For civil government of the Panama Canal and Canal Zone, salaries of district judge $6,000, district attorney $5,000, marshal $5,000, and for gratuities and necessary clothing for indigent discharged prisoners, $750,000;

In all, $10,650,000, to be immediately available and to continue available until expended.

Except in cases of emergency, or conditions arising subsequent to and unforeseen at the time of submitting the annual estimates to Congress, and except for those employed in connection with the construction of permanent quarters, offices, and other necessary buildings, 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, and except for the permanent operating organization under which the compensation of the various positions is limited by section four of the Panama Canal Act, there shall not be employed at any time during the fiscal year nineteen hundred and nineteen under any of the foregoing appropriations for the Panama Canal, any greater number of persons than are specified in the notes submitted, respectively, in connection with the estimates for each of said appropriations in the annual Book of Estimates for said year, nor shall

there be paid to any such person during that fiscal year any greater rate of compensation than was authorized to be paid to persons occupying the same or like positions on the first day of July, nineteen hundred and seventeen; and all employments made or compensation increased because of emergencies or conditions so arising shall be specifically set forth, with the reasons therefor, by the governor in his report for the fiscal year nineteen hundred and nineteen.

In addition to the foregoing sums there is appropriated, for the fiscal year nineteen hundred and nineteen for expenditure and reinvestment under the several heads of appropriation aforesaid without being covered into the Treasury of the United States, all moneys received by the Panama Canal from services rendered or materials and supplies furnished to the United States, the Panama Railroad Company, the Canal Zone government, or to their employees, respectively, or to the Panama Government, from hotel and hospital supplies and services; from rentals, wharfage, and like services; from labor, materials and supplies and other services furnished to vessels other than those passing through the canal; and to others unable to obtain the same elsewhere; from the sale of scrap and other byproducts of manufacturing and shop operations; from the sale of obsolete and unserviceable materials, supplies, and equipment purchased or acquired for the operation, maintenance, protection, sanitation, and government of the canal and Canal Zone; and any net profits accruing from such business to the Panama Canal shall annually be covered into the Treasury of the United States.

In addition there is appropriated for the operation, maintenance, and extension of waterworks, sewers, and pavements in the cities of Panama and Colon, during the fiscal year nineteen hundred and nineteen, the necessary portions of such sums as shall be paid as water rentals or directly by the Government of Panama for such expenses.

SEC. 2. That all sums appropriated by this Act for salaries of officers and employees of the Government shall be in full for such salaries for the fiscal year nineteen hundred and nineteen, and all laws or parts of laws to the extent they are in conflict with the provisions of this Act are repealed.

Approved, July 1, 1918.

AN ACT Making appropriations for the naval service for the fiscal year ending June thirtieth, nineteen hundred and nineteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, to be paid out of any money in the Treasury not otherwise appropriated, for the naval service of the Government for the year ending June thirtieth, nineteen hundred and nineteen, and for other purposes:

* * * * * * *

(a) That the word "person" as used in paragraph (b), (c), next hereafter shall include any individual, trustee, firm, association, company, or corporation. The word "ship" shall include any boat, vessel, submarine, or any form of aircraft, and the parts thereof. The words "war material" shall include arms, armament, ammunition, stores, supplies, and equipment for ships and airplanes, and everything required for or in connection with the production thereof. The word "factory" shall include any factory, workshop, engine works, building used for manufacture, assembling, construction, or any process, and any shipyard or dockyard. The words "United States" shall include the Canal Zone and all territory and waters, continental and insular, subject to the jurisdiction of the United States.

(b) The President is hereby authorized and empowered, within the limits of the amounts appropriated therefor:

First. To place an order with any person for such ships or war material, as the necessities of the Government, to be determined by the President, may require and which are of the nature, kind, and quantity usually produced or capable of being produced by such person. Compliance with all such orders shall be obligatory on any person to whom such order is given, and such order shall take precedence over all other orders and contracts theretofore placed with such person. If any person owning, leasing, or operating any factory equipped for the building or production of ships or war material for the Navy shall refuse or fail to give to the United States such preference in the execution of such an order, or shall refuse to build, supply, furnish, or manufac-

ture the kind, quantity, or quality of ships of war materials so ordered at such reasonable price as shall be determined by the President, the President may take immediate possession of any factory of such person, or of any part thereof without taking possession of the entire factory, and may use the same at such times and in such manner as he may consider necessary or expedient.

Second. Within the limit of the amounts appropriated therefor, to modify or cancel any existing contract for the building, production, or purchase of ships or war material; and if any contractor shall refuse or fail to comply with the contract as so modified, the President may take immediate possession of any factory of such contractor, or any part thereof without taking possession of the entire factory, and may use the same at such times and in such manner as he may consider necessary or expedient.

Third. To require the owner or occupier of any factory in which ships or war material are built or produced to place at the disposal of the United States the whole or any part of the output of such factory, and within the limit of the amounts appropriated therefor, to deliver such output or parts thereof in such quantities and at such times as may be specified in the order at such reasonable price as shall be determined by the President.

Fourth. To requisition and take over for use or operation by the Government any factory, or any part thereof, without taking possession of the entire factory, whether the United States has or has not any contract with the owner or occupier of such factory.

That all authority granted to the President herein or by him delegated shall cease six months after a final treaty of peace shall be proclaimed between this Government and the German Empire.

(d) That whenever the United States shall cancel or modify any contract, make use of, assume, occupy, requisition, or take over any factory or part thereof, or any ships or war material, in accordance with the provisions of paragraph (b), it shall make just compensation therefor, to be determined by the President, and if the amount thereof so determined by the President is unsatisfactory to the person entitled to receive the same, such person shall be paid seventy-five per centum of the amount so determined by the President and shall be entitled to sue the United States to recover such further sum as added to said seventy-five per centum shall make up such amount as will be just compensation therefor, in the manner provided for by section twenty-four, paragraph twenty, and section one hundred and forty-five of the Judicial Code.

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Approved, July 1, 1918.

AN ACT Making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and nineteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, in full compensation for the service of the fiscal year ending June thirtieth, nineteen hundred and nineteen, namely:

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NAVY DEPARTMENT.

HYDROGRAPHIC OFFICE.

* * * * * * *

Contingent expenses of branch offices at Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, San Francisco, Portland (Oregon), Portland (Maine), Chicago, Cleveland, Buffalo, Duluth, Sault Sainte Marie, Seattle, Panama, and Galveston, including furniture, fuel, lights, works, and periodicals relating to hydrography, marine meteorology, navigation, surveying, oceanography, and terrestrial magnetism, stationery, miscellaneous articles, rent, and care of offices, care of time balls, car fare and ferriage in visiting merchant vessels, freight and express charges, telegrams, and other necessary expenses incurred in collecting the latest information for pilot charts, and for other purposes for which the offices were established, $12,500.

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SEC. 6. That all civilian employees of the Governments of the United States and the District of Columbia who receive a total of compensation at the rate of $2,500 per annum or less, except as otherwise provided in this section, shall receive, during the fiscal year ending June thirtieth, nineteen hundred and nineteen, additional compensation at the rate of $120 per annum; *Provided*, That such employees as receive a total of annual compensation at a rate more than $2,500 and less than $2,620 shall receive additional compensation at such a rate per annum as may be necessary to make their salaries, plus their additional compensation, at the rate of $2,620 per annum, and no employee shall receive additional compensation under this section at a rate which is more than thirty per centum of the rate of the total annual compensation received by such employee: *Provided further*, That the increased compensation at the rates of five and ten per centum for the fiscal year ending June thirtieth, nineteen hundred and eighteen, shall not be computed as salary in construing this section: *Provided further*, That where an employee in the service on June thirtieth, nineteen hundred and seventeen, has received during the fiscal year nineteen hundred and eighteen, or shall receive during the fiscal year nineteen hundred and nineteen an increase of salary at a rate in excess of $200 per annum, or where an employee whether previously in the service or not, has entered the service since June thirtieth, nineteen hundred and seventeen, whether such employee has received an increase in salary or not, such employees shall be granted the increased compensation provided herein only when and upon the certification of the person in the legislative branch or the head of the department or establishment employing such persons of the ability and qualifications personal to such employees as would justify such increased compensation: *Provided further*, That the increased compensation provided in this section to employees whose pay is adjusted from time to time through wage boards or similar authority shall be taken into consideration by such wage boards or similar authority in adjusting the pay of such employees.

The provisions of this section shall not apply to the following: Employees paid from the postal revenues and sums which may be advanced from the Treasury to meet deficiencies in the postal revenues; employees of the Panama Canal on the Canal Zone;

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Approved, July 3, 1918.

AN ACT Making appropriations to supply deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes, namely:

* * * * * * *

MILITARY ESTABLISHMENT.

QUARTERMASTER CORPS.

* * * * * * *

Barracks and quarters: For barracks, quarters, stables, storehouses, magazines, administration and office buildings, sheds, shops, and other buildings necessary for the shelter of troops, public animals, and stores, and for administration purposes, except those pertaining to the Coast Artillery;

* * * * * * *

including $150,166.82 for services rendered and supplies furnished on the Isthmus of Panama for the fiscal years nineteen hundred and seventeen and nineteen hundred and eighteen, $27,767,860.32.

* * * * * * *

Roads, walks, wharves, and drainage: For the construction and repair by the Quartermaster Corps of roads, walks, and wharves; pay of employees; disposal of drainage; dredging channels; and care and improvement of grounds at military posts and stations, including $7,879.01 for services rendered and supplies furnished on the Isthmus of Panama for the fiscal years nineteen hundred and sixteen and nineteen hundred and seventeen, $7,177,183.01.

* * * * * * *

FORTIFICATIONS.

PANAMA CANAL.

For continuing the construction of barracks, quarters, storehouses, and other buildings, necessary for accommodating the troops stationed there, including water, sewer, and lighting systems, roads, walks, and so forth, and for repairing and remodeling existing buildings to render them suitable for sheltering troops, $71,220.70.

For land defenses, Panama Canal, including the procurement and installation of searchlights, purchase of armored cars and locomotives, construction of roads and surveys incidental thereto, $1,600.

* * * * * * *

Approved, July 8, 1918.

AN ACT Making appropriations for fortifications and other works of defense, for the armament thereof, for the procurement of heavy ordnance for trial and service, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to be available immediately and to continue available until expended, namely:

FORTIFICATIONS AND OTHER WORKS OF DEFENSE

ENGINEER DEPARTMENT.

* * * * * * *

The unexpended balances of appropriations heretofore made for "installation and replacement of electric-light and power plants at seacoast fortifications", for "purchase and installation of searchlights for seacoast defenses, including searchlights for antiaircraft defenses and accessories therefor," and for "purchase and installation of searchlights for seacoast defenses" in the United States are consolidated and made available for the following purposes: For the installation and replacement of electric-light and power plants at seacoast fortifications in the United States; the purchase and installation of searchlights for seacoast defenses in the United States, including searchlights for antiaircraft defenses and accessories therefor; and the procurement and installation of sound-ranging equipment for use in the United States, the insular possessions, and the Panama Canal, and for salaries of electrical experts, engineers, and other employees necessary to procure and install the same.

* * * * * * *

PANAMA CANAL FORTIFICATIONS.

For fortifications and armament thereof for the Panama Canal:

For maintenance of clearings and trails, $30,000;

For protection, preservation, and repair of fortifications, including structures for torpedo defense, and for maintaining channels for access to torpedo wharves, $25,000;

For maintenance and repair of searchlights and electric light and power equipment for fortifications, and for tools, electrical and other supplies, and appliances to be used in their operation, $15,000;

For the construction of seacoast batteries, $210,000;

For the construction of sea walls and embankments, $63,000;

For the purchase or reclamation of land required for the defense of the Panama Canal, $155,000;

For the purchase and installation of searchlights for the seacoast fortifications on the Canal Zone, $158,400;

For the purchase and installation of electric light and power plants for the seacoast fortifications on the Canal Zone, $17,000;

For operation and maintenance of fire-control installations at seacoast defenses, $15,000;

For the construction of fire-control stations and the purchase and installation of accessories therefor, $342,888.85;

For the purchase, manufacture, and test of ammunition for seacoast and land defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture, $470,000;

The following portions of the unexpended balances of appropriations heretofore made for fortification of the Panama Canal, respectively, shall be carried to the surplus fund and covered into the Treasury, namely: $1,500,000 for the purchase, manufacture, and test of seacoast cannon for coast defense, and so forth; and $600,000 for the alteration, maintenance, and installation of the seacoast artillery, and so forth; in all, $2,100,000;

Ordnance Depot: For facilities for fire protection, $3,000; telephone system, $2,500; painting buildings to reduce their visibility, $7,000; fence surrounding the depot reservation, $9,000; and additional for an office building, $3,000; in all, $24,500;

For cantonment camp construction including necessary buildings, water and sewer systems, roads, walks, and so forth, and for repairing and remodeling existing buildings to render them suitable for sheltering troops, $500,000: *Provided*, That the construction of buildings hereunder shall be performed under the direction of the Governor of the Panama Canal;

In all, specifically for fortifications and armament thereof for the Panama Canal, $2,025,788.85.

BOARD OF ORDNANCE AND FORTIFICATION.

* * * * * * *

SEC. 4. That expenditures for carrying out the provisions of this Act shall not be made in such manner as to prevent the operation of the Government arsenals at their most economical rate of production, except when a special exigency requires the operation of a portion of an arsenal's equipment at a different rate: *Provided*, That no part of the appropriations made in this Act shall be available for the salary or pay of any officer, manager, superintendent, foreman, or other person having charge of the work of any employee of the United States Government while making or causing to be made with a stop watch or other time-measuring device a time study of any job of any such employee between the starting and completion thereof, or of the movements of any such employee while engaged upon such work.

Approved, July 8, 1918.

AN ACT Providing for the protection of the uniform of friendly nations, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be unlawful for any person, with intent to deceive or mislead, within the United States or Territories, possessions, waters, or places subject to the jurisdiction of the United States, to wear any naval, military, police, or other official uniform, decoration, or regalia of any foreign State, nation, or Government with which the United States is at peace, or any uniform, decoration, or regalia so nearly resembling the same as to be calculated to deceive, unless such wearing thereof be authorized by such State, nation, or Government.

Any person who violates the provisions of this Act shall upon conviction be punished by a fine not exceeding $300 or imprisonment for not exceeding six months, or by both such fine and imprisonment.

Approved, July 8, 1918.

AN ACT Making appropriations for the support of the Army for the fiscal year ending June thirtieth, nineteen hundred and nineteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, nineteen hundred and nineteen:

* * * * * * *

PAY, AND SO FORTH, OF THE ARMY.

QUARTERMASTER CORPS.

* * * * * * *

HOUSING OF OFFICERS SERVING IN THE CANAL ZONE: Hereafter officers of the Army pertaining to the United States troops serving in the Canal Zone shall not be required to pay rent for the occupancy of houses of the Panama Canal to which they may be assigned.

* * * * * * *

MEDICAL DEPARTMENT.

MEDICAL AND HOSPITAL DEPARTMENT: For the manufacture and purchase of medical and hospital supplies, including gas masks, motor ambulances, and motorcycles for medical service, their maintenance, repair, and operation, and disinfectants, and the purchase and exchange of typewriting machines for military posts, camps, hospitals, hospital ships, and transports, and supplies required for mosquito destruction in and about the military posts in the Canal Zone: * * * $267,408,948.

* * * * * * *

HOSPITAL CARE, CANAL ZONE GARRISONS: For paying the Panama Canal such reasonable charges, exclusive of subsistence, as may be approved by the Secretary of War, for caring in its hospitals for officers, enlisted men, military prisoners, and civilian employees of the Army admitted thereto upon the request of proper military authority: *Provided*, That the subsistence of the said patients, except commissioned officers, shall be paid to said hospitals out of the appropriation for subsistence of the Army at the rates provided therein for commutation of rations for enlisted patients in general hospitals, $60,000.

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Approved, July 9, 1918.

AN ACT To confer on the President power to prescribe charter rates and freight rates and to requisition vessels, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That when used in this Act—

(a) The term "United States" includes any State, Territory, or District of the United States, the insular possessions, the Canal Zone, and all lands or waters subject to the jurisdiction of the United States.

(b) The term "person" includes corporations, partnerships, associations, and States, municipalities, and other subdivisions thereof.

(c) The term "charter" means any agreement, contract, lease, or commitment by which the possession or services of a vessel are secured for a period of time, or for one or more voyages, whether or not a demise of the vessel.

SEC. 2. That the President may exercise the power and authority hereby vested in him through such agency or agencies as he shall determine from time to time.

SEC. 3. That all power and authority hereby vested in the President or by him delegated and all restrictions imposed in this Act shall cease upon the proclamation of the final treaty of peace between the United States and the Imperial German Government: *Provided*, That if, in the judgment of the President, the tonnage shortage at such time is so severe that national interests of the United States are jeopardized, he may, by proclamation, extend the provisions of this Act for a further period of not exceeding six months.

SEC. 4. That the powers herein conferred shall be without prejudice to any power heretofore conferred on the President, or by him delegated.

SEC. 5. That the President may, by proclamation, require that vessels of the United States of any specified class or description, or in any specified trade or trades, shall not be chartered unless the instrument in which such charter is embodied, and the rates, terms, and conditions thereof are first approved by him. Whenever any vessel is comprised in any such proclamation, it shall be unlawful to make any charter thereof, or comply with or perform any of the rates, terms, or conditions of any charter thereof, or to operate such vessel under any charter, without first obtaining the approval thereof by the President.

Whenever any charter of such vessel is approved, it shall be unlawful, without the approval of the President first obtained, to make any alterations in such charter, or additions thereto or deletions therefrom, or to make or receive any payment or do any act with respect to such vessel, except in accordance with such charter.

SEC. 6. That the President shall have power to determine, prescribe, and enforce reasonable freight rates and the terms and conditions of affreightment which shall govern the transportation of goods on vessels of the United States, which shall be filed with the United States Shipping Board and open to public inspection. It shall be unlawful to charge or collect any compensation for the transportation of goods on any such vessel, or to enforce or attempt to enforce any terms or conditions of affreightment, or to make or receive any payment or do any act with respect to such transportation, not in accordance with the rates, terms, and conditions so prescribed, anything in any contract, whether heretofore or hereafter made, to the contrary notwithstanding.

SEC. 7. That the President shall have power to prescribe the order of priority in which goods shall be carried or other services performed by any vessel of the United States and to specify goods which shall be carried or to direct the voyage or employment of any such vessel and to make such rules, regulations, and orders, with respect to any such vessel, relating to the loading, discharging, lighterage, or storage of goods, or the procurement of bunker fuel, or any other matter relating to the receiving, handling, transporting, storing, or delivering of goods, as may in his judgment be necessary and proper for the efficient utilization of transportation facilities and the effective conduct of the war.

SEC. 8. That the President may by proclamation extend the provisions of sections five, six, and seven, or any of them, to any vessel of foreign nationality under charter to a citizen of the United States or other person subject to the jurisdiction thereof.

SEC. 9. That the President shall have power to make such rules, regulations, and orders regarding voyages, courses, the use of protective devices, and any other matters affecting the navigation, equipment, fueling, painting, or arming of vessels of the United States as may, in his judgment, be conducive to the protection of such vessels from submarines, mines, or other war perils, any expense so incurred to be allowed for in determining freight and charter rates under this Act. If in his judgment any vessel or class of vessels on account of size, speed, structure, method of propulsion, or for any other reason is unfit for service in any waters which he may declare to be a danger zone, he may, by order, exclude such vessel or vessels from such danger zone. It shall be unlawful to violate any order, rule, or regulation made under this section. Rules, regulations, or orders issued under this section may, in the discretion of the President, be issued confidentially, in which event they shall be binding only on such persons as have notice thereof.

SEC. 10. That the President may by proclamation require that no citizen of the United States, or other person subject to the jurisdiction thereof, shall charter any vessel of foreign nationality unless the instrument in which such charter is embodied and the rates, terms, and conditions thereof are first approved by the President. After the making of such proclamation it shall be unlawful for any such citizen or person to make any charter of any such vessel, or comply with or perform any of the rates, terms, or conditions of any charter thereof, or to operate any such vessel under any charter, without first obtaining the approval thereof by the President.

Whenever any such charter is approved it shall be unlawful, without the approval of the President first obtained, to make any alterations in such charter or additions thereto or deletions therefrom, or to make or receive any payment or do any act with respect to such vessel, except in accordance with such charter.

SEC. 11. That the President shall have power to requisition for military purposes, or for any other national purpose connected with or arising out of the present war, the temporary possession of any vessel, or, without taking actual possession, to requisition the services of any vessel and to require the person entitled to the possession thereof to issue to the master such instructions as may be necessary to place the vessel at the service of the United States.

Upon requisitioning such possession or services, or as soon thereafter as the exigencies of the situation may permit, the President shall transmit to the person entitled to the possession of such vessel a charter setting forth the terms which, in his judgment, should govern the relations between the United States and such person and a statement of the rental or rate of hire which, in his judgment, will be just compensation for the use of such vessel and for the services

required under the terms of such charter. If such person does not execute and deliver such charter and accept such rental or rate of hire, the President shall pay to such person a sum equal to seventy-five per centum of such rental or rate of hire as the same may from time to time be due under the terms of the charter, and such person shall be entitled to sue the United States to recover such further sum as added to such seventy-five per centum will make up such amount as will be just compensation for the use of the vessel and for the services required. In the event of loss of or damage to such vessel, due to the operation of a risk assumed by the United States under the terms of such charter (in the event that no valuation of such vessel or mode of compensation has been agreed to), the United States shall pay just compensation for such loss or damage, to be determined by the President; and if the amount so determined is not satisfactory to the person entitled to receive just compensation, the President shall pay to such person seventy-five per centum of the amount so determined, and such person shall be entitled to sue the United States to recover such further sum as added to such seventy-five per centum will make up such amount as will be just compensation.

SEC. 12. That the President shall have power to prescribe the order of priority in which persons in possession of dry docks, wharves, lighterage systems, or loading or discharging terminal facilities in any port of the United States, or warehouses, equipment or terminal railways connected therewith, shall serve vessels and shippers, and to determine, prescribe, and enforce the rates, terms, and conditions charged or required for the furnishing of such services, including stevedoring and handling of cargo, and the handling, dispatching, and bunkering of vessels, and to make such rules and regulations with respect to the conduct of any such business as may be necessary and proper. It shall be unlawful to charge, collect, or claim any compensation, or to enforce or attempt to enforce any terms or conditions, or to make or receive any payment or do any act, with respect to any such service not in accordance with the rates, terms, and conditions so prescribed, any thing in any contract, whether heretofore or hereafter made, to the contrary notwithstanding.

SEC. 13. That the President shall have power to lease or requisition the use or temporary possession of, or to assume temporary control of, any dry docks, wharves, or loading or discharging terminal facilities, in any port of the United States, or warehouses, equipment, or terminal railways connected therewith.

Whenever the President requisitions or assumes control of any such property, the United States shall pay just compensation therefor, to be determined by the President. If the amount so determined is not satisfactory to the person entitled to receive just compensation, the President shall pay to such person seventy-five per centum of the amount so determined and such person shall be entitled to sue the United States to recover such further sum as added to such seventy-five per centum will make up such amount as will be just compensation.

Whenever the President acquires by purchase, lease, or requisition, or assumes control of any such property immediate possession may be taken thereof to the extent of the interest acquired therein, and such property may be immediately occupied and used without regard to the provisions of section three hundred and fifty-five of the Revised Statutes.

Nothing in this section shall authorize the President to requisition the title to any such property owned by any State, municipality, or subdivision thereof.

SEC. 14. That whenever by this Act permission is given to sue the United States such suit shall be brought in the manner provided in section twenty-four, paragraph twenty, and section one hundred and forty-five of the Judicial Code.

SEC. 15. That all vessels of which the possession or services are requisitioned under this Act, and all dry docks, wharves, loading or discharging terminal facilities, warehouses, equipment, or terminal railways, of which the President may acquire the title or possession or of which he may assume control under this Act, may be operated and managed as the President may from time to time direct. The net proceeds derived from any activity authorized in this Act or the joint resolution of May twelfth, nineteen hundred and seventeen (Public Numbered Two), or the division entitled "Emergency shipping fund" of the Act of June fifteenth, nineteen hundred and seventeen (Public Numbered Twenty-three), shall be deposited in the Treasury in a separate and distinct fund and may be expended by the President in carrying out the purposes of this Act, and within the limits of the amounts heretofore or hereafter authorized, for the construction, requisitioning, or purchasing of vessels:

Provided, That none of the provisions of this Act shall apply to vessels plying exclusively on the inland rivers and canals of the United States.

SEC. 16. That whoever does or attempts to do anything in this Act declared to be unlawful, or willfully violates any rule, regulation, or order issued under authority conferred herein, shall be punished by a fine of not more than $5,000 or by imprisonment for not more than two years, or both: *Provided*, That the district court of the Canal Zone shall have jurisdiction of offenses committed against the provisions of this Act within the Canal Zone.

SEC. 17. That if any provision of this Act, or the application of such provision to certain circumstances, is held unconstitutional, the remainder of the Act, and the application of such provision to circumstances other than those as to which it is held unconstitutional, shall not be affected thereby.

Approved, July 18, 1918.

AN ACT Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and nineteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury of the United States not otherwise appropriated, in full compensation for the fiscal year ending June thirtieth, nineteen hundred and nineteen, for the purposes and objects hereinafter expressed, namely:

DEPARTMENT OF AGRICULTURE.

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WEATHER BUREAU.

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GENERAL EXPENSES, WEATHER BUREAU: For carrying into effect in the District of Columbia and elsewhere in the United States, in the West Indies, in the Panama Canal, the Caribbean Sea, and on adjacent coasts, in the Hawaiian Islands, in Bermuda, and in Alaska, the provisions of an Act approved October first, eighteen hundred and ninety, so far as they relate to the weather service transferred thereby to the Department of Agriculture,

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Total for Weather Bureau, $1,912,930.

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Approved, October 1, 1918.

AN ACT Making appropriations to supply deficiencies in appropriations for the fiscal year ending June 30, 1919, and prior fiscal years, on account of war expenses, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply deficiencies in appropriations for the fiscal year ending June 30, 1919, and prior fiscal years, on account of war expenses, and for other purposes, namely:

* * * * * * *

FORTIFICATIONS.

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PANAMA CANAL.

For the purchase, manufacture, and test of ammunition for seacoast and land defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture, $350,000.

For purchase of submarine mines and nets and the necessary appliances to operate them for closing the channels leading to the Panama Canal, $2,000, to be available for the fiscal years 1918 and 1919.

For alteration, maintenance, and repair of submarine-mine material, $6,866, to be available for the fiscal years 1918 and 1919.

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Approved, November 4, 1918.

EXECUTIVE ORDER.

By direction of the President, it is ordered:

That the Executive Order dated September 14, 1917, fixing the compensation of Burt New and George A. Connolly, members of the Joint Commission for the appraisement and settlement of damages to property in the Canal Zone, is hereby amended so as to permit the payment to Messrs. New and Connolly of their salaries of Twenty-five Dollars ($25) per day, including all expenses, effective November 8, 1917, regardless of the date of their sailing from New York. This Order is issued in view of the fact that, in accordance with my instructions, Messrs. New and Connolly have to-day reported in Washington for duty in connection with their services as members of the Joint Commission.

NEWTON D. BAKER,
Secretary of War.

WAR DEPARTMENT,
Washington, D. C., November 8, 1917.

PROCLAMATION.

WHEREAS the Congress of the United States in the exercise of the constitutional authority vested in them have resolved, by joint resolution of the Senate and House of Representatives bearing date of April 6th, 1917, "That the state of war between the United States and the Imperial German Government which has been thrust upon the United States is hereby formally declared";

WHEREAS it is provided by Section four thousand and sixty-seven of the Revised Statutes, as follows;

> Whenever there is declared a war between the United States and any foreign nation or government, or any invasion or predatory incursion is perpetrated, attempted or threatened against the territory of the United States, by any foreign nation or government, and the President makes public proclamation of the event, all natives, citizens, denizens, or subjects of the hostile nation or government, being males of the age of fourteen years and upwards, who shall be within the United States, and not actually naturalized, shall be liable to be apprehended, restrained, secured, and removed, as alien enemies. The President is authorized, in any such event, by his proclamation thereof, or other public act, to direct the conduct to be observed, on the part of the United States, toward the aliens who become so liable; the manner and degree of the restraint to which they shall be subject, and in what cases, and upon what security their residence shall be permitted, and to provide for the removal of those who, not being permitted to reside within the United States, refuse or neglect to depart therefrom; and to establish any other regulations which are found necessary in the premises and for the public safety;

WHEREAS, by Section four thousand and sixty-eight, four thousand and sixty-nine, and four thousand and seventy, of the Revised Statutes, further provision is made relative to alien enemies;

AND WHEREAS, by a proclamation dated April 6th, 1917, I declared and established certain regulations prescribing the conduct of alien enemies;

NOW, THEREFORE, I, WOODROW WILSON, President of the United States of America, pursuant to the authority vested in me, hereby declare and establish the following regulations, additional and supplemental to those declared and established by said proclamation of April 6th, 1917, which additional and supplemental regulations I find necessary in the premises and for the public safety:

> 13. An alien enemy shall not approach or be found within one hundred yards of any canal; nor within one hundred yards of any wharf, pier or dock used directly by or by means of lighters by any vessel or vessels of over five hundred (500) tons gross engaged in foreign or domestic trade other than fishing; nor within one hundred yards of any warehouse, shed, elevator, railroad terminal or other terminal, storage or transfer facility adjacent to or operated in connection with any such wharf, pier or dock; and wherever the distance between any two of such wharves, piers or docks, measured along the shore line connecting them, is less than eight hundred and eighty yards, an alien enemy shall not approach or be found within one hundred yards of such shore line.
>
> 14. Whenever the Attorney General of the United States deems it to be necessary, for the public safety and the protection of transportation, to

exclude alien enemies from the vicinity of any warehouse, elevator or railroad depot, yard or terminal which is not located within any prohibited area designated by this proclamation or the proclamation of April 6th, 1917, then an alien enemy shall not approach or be found within such distance of any such warehouse, elevator, depot, yard or terminal as may be specified by the Attorney General by regulation duly made and declared by him; and the Attorney General is hereby authorized to fix, by regulations to be made and declared from time to time, the area surrounding any such warehouse, elevator, depot, yard or terminal from which he deems it necessary, for the public safety and the protection of transportation to exclude alien enemies.

15. An alien enemy shall not, except on public ferries, be found on any ocean, bay, river or other waters within three miles of the shore line of the United States or its territorial possessions; said shore line for the purpose of this proclamation being hereby defined as the line of sea coast and the shores of all waters of the United States and its territorial possessions connected with the high seas and navigable by ocean going vessels; nor on any of the Great Lakes, their connecting waters or harbors, within the boundaries of the United States.

16. No alien enemy shall ascend into the air in any airplane, balloon, airship, or flying machine.

17. An alien enemy shall not enter or be found within the District of Columbia.

18. An alien enemy shall not enter or be found within the Panama Canal Zone.

19. All alien enemies are hereby required to register at such times and places and in such manner as may be fixed by the Attorney General of the United States and the Attorney General is hereby authorized and directed to provide, as speedily as may be practicable, for registration of all alien enemies and for the issuance of registration cards to alien enemies and to make and declare such rules and regulations as he may deem necessary for effecting such registration; and all alien enemies and all other persons are hereby required to comply with such rules and regulations; and the Attorney General in carrying out such registration, is hereby authorized to utilize such agents, agencies, officers and departments of the United States and of the several states, territories, dependencies and municipalities thereof and of the District of Columbia as he may select for the purpose, and all such agents, agencies, officers and departments are hereby granted full authority for all acts done by them in the execution of this regulation when acting by the direction of the Attorney General. After the date fixed by the Attorney General for such registration, an alien enemy shall not be found within the limits of the United States, its territories or possessions, without having his registration card on his person.

20. An alien enemy shall not change his place of abode or occupation or otherwise travel or move from place to place without full compliance with any such regulations as the Attorney General of the United States may, from time to time, make and declare; and the Attorney General is hereby authorized to make and declare, from time to time, such regulations concerning the movements of alien enemies as he may deem necessary in the premises and for the public safety, and to provide in such regulations for monthly, weekly or other periodical report by alien enemies to federal, state or local authorities; and all alien enemies shall report at the times and places and to the authorities specified in such regulations.

This proclamation and the regulations herein contained shall extend and apply to all lands and water, continental or insular, in any way within the jurisdiction of the United States.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia, this sixteenth day of November, in the year of our Lord one thousand nine hundred and seventeen, and of the [SEAL] independence of the United States the one hundred and forty-second.

WOODROW WILSON.

By the President:
FRANK L. POLK,
Acting Secretary of State.

[No. 1408.]

EXECUTIVE ORDER.

Clause (a), paragraph 8 of Civil Service Rule X, relating to an employee proposed for transfer, is hereby amended to read as follows:

(a) He must have served for a term of three years in an executive department or independent establishment at Washington, as required by law, before transfer to another such department or establishment. The same restriction shall apply to all other transfers, but may be waived upon a statement of reasons satisfying the Commission that a transfer is necessary in the interest of the service. In any case he must have received absolute appointment and have actually served at least six months next preceding the transfer; but the Commission may waive this latter requirement in cases of transfer from the Isthmus of Panama or where the person has been separated within a year from a competitive position after six months' service therein, upon the certificate of the proper officer that the separation was caused by necessary reduction of force and not by inefficiency, and may allow transfer to any other department or office upon his passing an examination prescribed by the Commission testing his efficiency for the position to which his transfer is proposed, subject to the other provisions of this rule.

WOODROW WILSON.

THE WHITE HOUSE, *10 November, 1917.*

[No. 2753.]

EXECUTIVE ORDER.

Regulations Establishing Maximum Rates of Fare and Governing Transportation of Passengers for Hire in the Canal Zone.

By virtue of the authority vested in the President by the Act of Congress approved August 21, 1916, and mutual agreement having been heretofore made with the Republic of Panama touching the reciprocal use of the highways of the Canal Zone and the Republic of Panama, as by said Act authorized, the following regulations establishing maximum rates of fare and governing the transportation of passengers for hire by horsedrawn and self-propelled vehicles over the highways of the Canal Zone, and between points in said Canal Zone and the cities of Panama and Colon, in the Republic of Panama, are hereby established:

SECTION 1. Charges over the scheduled routes herein set forth shall be based on the fare in United States currency for one adult passenger as set forth in Schedules A and B, hereto attached and made a part hereof, wherein the fare, except as otherwise therein stated, between any point named in the column at the left to any point named in the column at the top is the amount appearing at the point where the lateral column of figures extending to the right from a point named in the column at the left meets the perpendicular column of figures extending downward from a point named in the column at the top. Between points not scheduled in said columns the fare shall be the same as that between the first scheduled point beyond that at which the passage begins and the next scheduled point beyond that at which the passage ends. This schedule shall apply to all persons except infants in arms, who shall be carried free, and except children under twelve years of age accompanied by an adult, whose fare shall be one-half of the scheduled rate.

SEC. 2. Vehicles regularly operating on the scheduled routes aforesaid shall, on request in advance by a passenger, operate on an hourly basis as follows: Self-propelled vehicles, $2.00 for the first hour or fraction thereof, and thereafter 50 cents for each quarter hour or fraction thereof; horsedrawn vehicles, $1.00 for the first hour or fraction thereof for one passenger and 25 cents additional for each additional person, and thereafter one-fourth the initial rate for each quarter hour or fraction thereof.

SEC. 3. Between the hours of 11:00 o'clock P. M. and 6:30 o'clock A. M. the rates set out in Schedules A and B and the hourly rates above established for self-propelled vehicles may be increased 50 per cent, and the hourly rates for horsedrawn vehicles may be increased 25 cents per hour.

SEC. 4. In all cases where the computation of fare results in a fraction of 5 cents a full 5 cents in lieu of such fraction may be collected.

SEC. 5. Automobiles may be maintained for "Special Service." Such automobiles shall not be required to carry passengers except on an hourly basis or by special agreement, at the election of the passenger. For such vehicles the hourly rate shall be: For the first hour or fraction thereof for one or two passengers, $4.00; for three to five passengers, $5.00; for six or more passengers, $6.00; and for each quarter hour thereafter in all cases, $1.00.

SEC. 6. For the use of any vehicle a special fare may be agreed upon which shall take the place of the rates herein fixed, but if in any such case a dispute shall arise the regular rate herein established shall govern unless the existence and terms of such special agreement be clearly shown. No charge shall in any case be made which is based upon the time of a delay not due to the fault of a passenger.

SEC. 7. A reasonable rate of speed shall be maintained at all times by all vehicles.

SEC. 8. "Special Service" automobiles, when on public stands, shall display in English and Spanish the sign "Special Service" on the windshield, which sign shall be removed as soon as the car is engaged. All other vehicles for hire, when not engaged, shall display in English and Spanish on the windshield or other prominent place the sign "For Hire," which sign shall be removed as soon as the vehicle is engaged; and such vehicle, when proceeding under orders to a designated point to take passengers, shall likewise display in English and Spanish the sign "Engaged."

SEC. 9. A vehicle not engaged may not refuse to stop for a passenger who signals it plainly.

SEC. 10. A copy of these regulations must be carried in every vehicle operating for hire and must be shown to passengers upon request. Upon application by the owners or licensees of such vehicle The Panama Canal will furnish copies for this purpose.

SEC. 11. Any person violating any provision of these regulations shall be punished as provided in Section 5 of the Act of Congress approved August 21, 1916, entitled "An Act extending certain privileges of Canal employees," etc.

SEC. 12. These regulations shall take effect on the first day of the month following their publication in *The Panama Canal Record.*[1]

NEWTON D. BAKER,
Secretary of War.

January 12, 1918.
By the President.

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[1] Published in *The Panama Canal Record* of February 13, 1918, and February 20, 1918.

Regulations establishing maximum rates of fare and governing transportation of Passengers for hire in the Canal Zone.

SCHEDULE A.—SOUTHERN DISTRICT.

	Balboa Heights.					Balboa.						Ancon.				Interior points.[1]							Panama.						
	Administration Building.	Quarry Heights.	Governor's Residence and Nurses' Quarters.	Railroad Station.	District Quartermaster.	Clubhouse, Restaurant, Commissary.	Shops and Dock 18.	Yacht Club, Quarantine Station, Ft. Amador Gate.	Fort Amador (Inside).	Coaling Station, Old Panama Railroad Wharf, La Boca.	Zone Boundary Line.	Tivoli, Com'y, Restaur't, Laundry, Hosp. Admit. Off., Zone B'dary line.	Corral.	Hospital, Superintendent's Office, Wards.	Administration Building, Ancon.	Diablo.[1]	Corozal.[1]	Miraflores.[1]	Pedro Miguel.[1]	Paraiso.[1]	Summit.[1]	Gamboa.[1]	City, South of Calidonia Bridge.	Soldiers' Club.	Bella Vista.	Las Sabanas Police Station.	Rio Abajo.	Old Panama.	Juan Diaz.
Balboa Heights.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1. Administration Building	.. ..	$0.15	$0.15	$0.10	$0.10	$0.10	$0.10	$0.20	$0.25	$0.20	$0.20	$0.20	$0.15	$0.25	$0.25	$0.60	$0.80	$1.60	$2.25	$2.50	$3.00	$5.00	$0.25	$0.30	$0.35	$0.85	$1.35	$1.75	$2.50
2. Quarry Heights.	$0.15	.....	.10	.20	.20	.20	.20	.25	.30	.25	.25	.25	.20	.20	.20	.70	.90	1.60	2.25	2.50	3.00	5.00	.30	.35	.40	.90	1.40	1.75	2.50
3. Governor's Residence and Nurses' Old Quarters	.15	.10	.....	.20	.20	.20	.20	.25	.30	.25	.25	.25	.20	.20	.20	.70	.90	1.60	2.25	2.50	3.00	5.00	.30	.35	.40	.90	1.40	1.75	2.50
4. Railroad Station	.10	.20	.20	.....	.10	.10	.10	.20	.25	.20	.20	.20	.15	.25	.25	.60	.80	1.60	2.25	2.50	3.00	5.00	.25	.30	.35	.85	1.35	1.75	2.50
5. District Quartermaster	.10	.20	.20	.10	.....	.10	.10	.20	.25	.20	.20	.20	.15	.25	.25	.60	.80	1.60	2.25	2.50	3.00	5.00	.25	.30	.35	.85	1.35	1.75	2.50
Balboa.																													
6. Clubhouse, Restaurant, Commissary	.10	.20	.20	.10	.10	.....	.10	.10	.15	.10	.10	.25	.20	.25	.25	.70	.90	1.60	2.25	2.50	3.00	5.00	[2] .20	.35	.40	.90	1.40	1.75	2.50
7. Shops and Dock 18	.10	.20	.20	.10	.10	.10	.....	.15	.20	.15	.15	.25	.20	.25	.25	.70	.90	1.60	2.25	2.50	3.00	5.00	.25	.35	.40	.90	1.40	1.75	2.50
8. Yacht Club, Quarantine Station, Fort Amador Gate	.20	.25	.25	.20	.20	.10	.15	.....	.10	.15	.15	.30	.25	.30	.30	.75	.95	1.60	2.25	2.50	3.00	5.00	.25	.35	.40	.90	1.40	1.75	2.50

9. Fort Amador (Inside)	.25	.30	.30	.25	.25	.15	.20	.10	.....	.20	.20	.35	.30	.35	.35	.80	1.00	1.60	2.25	2.50	3.00	5.00	.30	.40	.45	.95	1.40	1.75	2.50
10. Coaling Station, Old Panama Railroad Wharf, La Boca	.20	.25	.25	.20	.20	.10	.15	.15	.20	.....	.15	.30	.25	.30	.30	.75	.95	1.60	2.25	2.50	3.00	5.00	.25	.35	.40	.90	1.40	1.75	2.50
11. Zone Boundary Line	.20	.25	.25	.20	.20	.10	.15	.15	.20	.15	.....	.10	.20	.20	.20	.70	.90	1.60	2.25	2.50	3.00	5.00	.10	.20	.25	.75	1.25	1.75	2.50
Ancon.																													
12. Tivoli, Commissary, Restaurant, Laundry, Hosp. Admit. Office, Zone Boundary Line	.20	.25	.25	.20	.20	.25	.25	.30	.35	.30	.10	.....	.10	.20	.20	.50	.70	1.50	2.25	2.50	3.00	5.00	.10	.20	.25	.75	1.25	1.75	2.50
13. Corral	.15	.20	.20	.15	.15	.20	.20	.25	.30	.25	.20	.10	.....	.25	.25	.60	.80	1.60	2.25	2.50	3.00	5.00	.15	.25	.30	.80	1.30	1.75	2.50
14. Hospital, Superintendent's Office, Wards	.25	.20	.20	.25	.25	.25	.25	.30	.35	.30	.20	.20	.25	.....	.10	.60	.80	1.60	2.25	2.50	3.00	5.00	.20	.30	.35	.85	1.35	1.75	2.50
15. Administration Building, Ancon	.25	.20	.20	.25	.25	.25	.25	.30	.35	.30	.20	.20	.25	.10	.....	.66	.80	1.60	2.25	2.50	3.00	5.00	.20	.30	.35	.85	1.35	1.75	2.50
Interior Points.[1]																													
16. Diablo[1]	.60	.70	.70	.60	.60	.70	.70	.75	.80	.75	.70	.50	.60	.60	.60	.....	.25	1.00	1.65	2.00	2.50	4.50	.60	.60	.75	1.25	1.75	2.00	2.75
17. Corozal[1]	.80	.90	.90	.80	.80	.90	.90	.95	1.00	.95	.90	.70	.80	.80	.80	.25	.....	1.00	1.40	1.65	2.50	4.50	.80	.80	.90	1.40	1.75	2.00	2.75
18. Miraflores[1]	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.50	1.60	1.60	1.60	1.00	1.00	.....	1.00	1.25	2.50	4.50	1.60	1.60	1.70	2.25	2.75	3.25	4.00
19. Pedro Miguel[1]	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	1.65	1.40	1.00	.....	.25	1.50	4.00	2.25	2.25	2.35	2.60	3.00	3.50	4.25
20. Paraiso[1]	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.00	1.65	1.25	.25	.....	1.25	4.00	2.50	2.50	2.60	2.80	3.20	3.70	4.45
21. Summit[1]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.50	2.50	2.50	1.50	1.25	.....	3.00	3.00	3.00	3.00	3.25	3.75	4.25	5.00
22. Gamboa[1]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.50	4.50	4.50	4.00	4.00	3.00	.....	5.00	5.00	5.00	5.25	5.75	6.25	7.00
Panama.																													
23. City, South of Calidonia Bridge	.25	.30	.30	.25	.25	[2] .20	.25	.25	.30	.25	.10	.10	.15	.20	.20	.60	.80	1.60	2.25	2.50	3.00	5.00	.....	[3] .20	.25	.75	1.25	1.75	2.50
24. Soldiers' Club	.30	.35	.35	.30	.30	.35	.35	.35	.40	.35	.20	.20	.25	.30	.30	.60	.80	1.60	2.25	2.50	3.00	5.00	[3] .20	.....	.10	.50	1.00	1.50	2.25
25. Bella Vista	.35	.40	.40	.35	.35	.40	.40	.40	.45	.40	.25	.25	.30	.35	.35	.75	.90	1.70	2.35	2.60	3.00	5.00	.25	.10	.....	.50	1.00	1.50	2.25
26. Las Sabanas Police Station	.85	.90	.90	.85	.85	.90	.90	.90	.95	.90	.75	.75	.80	.85	.85	1.25	1.40	2.25	2.60	2.80	3.25	5.25	.75	.50	.50	.....	.50	1.00	1.75
27. Rio Abajo	1.35	1.40	1.40	1.35	1.35	1.40	1.40	1.40	1.40	1.40	1.25	1.25	1.30	1.35	1.35	1.75	1.75	2.75	3.00	3.20	3.75	5.75	1.25	1.00	1.00	.50	.....	.75	1.50
28. Old Panama	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	2.00	2.00	3.25	3.50	3.70	4.25	6.25	1.75	1.50	1.50	1.00	.75	.....	1.50
29. Juan Diaz	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.75	2.75	4.00	4.25	4.45	5.00	7.00	2.50	2.25	2.25	1.75	1.50	1.50	.....

[1] A fare of 10 cents is established for all hauls within limits of habitation of interior villages.
[2] Points north of Santa Ana Plaza, 25 cents.
[3] From the Panama Railroad station, Panama, to the Soldiers' Club, 10 cents.

(Fares are indicated in U. S. Currency.)

Regulations establishing maximum rates of fare and governing transportation of passengers for hire in the Canal Zone.—Continued.

SCHEDULE B.—NORTHERN DISTRICT.

	Cristobal Commissary.	Cristobal Docks.	Camp Bierd and Dock 13.	Folks River and Corral.	Mount Hope and Dry Dock.	Diversion, Mt. Hope Road.	Brazos Brook Reservoir.	Fort Randolph.	New Gatun.	Gatun R. R. Station.	Colon Hospital.	Washington Hotel.	Wireless Station.	New Cristobal.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Cristobal Commissary	.....	$0.10	$0.10	$0.10	$0.20	$0.50	$0.75	$2.00	$2.25	$2.25	$0.10	$0.10	$0.15	$0.15
2. Cristobal Docks	$0.10	.....	.10	.10	.20	.50	.75	2.00	2.25	2.25	.10	.10	.15	.15
3. Camp Bierd and Dock 13	.10	.10	.....	.15	.20	.50	.75	2.00	2.25	2.25	.15	.15	.20	.20
4. Folks River and Corral	.10	.10	.15	.....	.10	.40	.65	2.00	2.25	2.25	.20	.20	.25	.25
5. Mt. Hope and Dry Dock	.20	.20	.20	10	.....	.20	.50	2.00	2.00	2.00	.25	.25	.30	.30
6. Diversion, Mt. Hope Road	.50	.50	.50	.40	.20	.....	.25	2.00	2.00	2.00	.60	.60	.60	.60
7. Brazos Brook Reservoir	.75	.75	.75	.65	.50	.25	.....	2.00	1.50	1.50	.75	.75	.75	.75
8. Fort Randolph	2.00	2.00	2.00	2.00	2.00	2.00	2.00	.....	4.00	4.00	2.00	2.00	2.00	2.00
9. New Gatun	2.25	2.25	2.25	2.25	2.00	2.00	1.50	4.00	.....	.25	2.25	2.25	2.25	2.25
10. Gatun Railroad Station	2.25	2.25	2.25	2.25	2.00	2.00	1.50	4.00	.25	.....	2.25	2.25	2.25	2.25
11. Colon Hospital	.10	.10	.15	.20	.25	.60	.75	2.00	2.25	2.25	.....	.10	.10	.10
12 Washington Hotel	.10	.10	.15	.20	.25	.60	.75	2.00	2.25	2.25	.10	.....	.10	.10
13. Wireless Station	.15	.15	.20	.25	.30	.60	.75	2.00	2.25	2.25	.10	.10	.....	.10
14. New Cristobal	.15	.15	.20	.25	.30	.60	.75	2.00	2.25	2.25	.10	.10	.10	.....

NOTE.—A fare of ten cents is established for all hauls within limits of habitation of interior villages.
(Fares are indicated in U. S. Currency.)

PROCLAMATION.

WHEREAS, The United States of America is now at war, and the Army and Navy thereof are endangered in their operations and preparations by aircraft, I, WOODROW WILSON, President of the United States, by virtue of the authority vested in me by the Constitution as Commander-in-Chief of the Army and Navy of the United States and of the Militia of the several States when called into the actual service of the United States, do hereby for the protection of such forces issue the following proclamation.

I. A license must be obtained from the Joint Army and Navy Board on Aeronautic Cognizance by or in behalf of any person who contemplates flying in a balloon, aeroplane, hydroplane, or other machine or device over or near any military or naval forces, camp, fort, battery, torpedo station, arsenal, munition factory, navy yard, naval station, coaling station, telephone or wireless or signal station, or any building or office connected with the National Defense, or any place or region within the jurisdiction or occupation of the United States which may be designated by the President as a zone of war-like operations or of war-like preparation.

II. The license will specify the person to whom it is issued, the machine to be used, the persons to operate the machine and all other persons to be carried therein, the mode of marking or otherwise identifying the machine, and other details intended to assure the military and naval forces of the peacefulness of the errand.

III. The license will also specify the territory and the time wherein it shall be available.

IV. In case any aircraft shall disregard this proclamation or the terms of the license, it shall be the right and duty of the military or naval forces to treat the aircraft as hostile and to fire upon it or otherwise destroy it, notwithstanding the resultant danger to human life.

V. For the present, the President designates as a zone of military operations and of military preparation the whole of the United States and its territorial waters and of the insular possessions and of the Panama Canal Zone.

VI. The provisions of this proclamation do not apply to aircraft operated by the Army or Navy of the United States.

VII. No private flying without a license will be permitted after the expiration of thirty days from the date of this proclamation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE in the District of Columbia, this 28th day of February, in the year of [SEAL] our Lord one thousand nine hundred and eighteen, and of the independence, of the United States the one hundred and forty-second.

WOODROW WILSON.

By the President:
ROBERT LANSING,
Secretary of State.

[No. 1432.]

EXECUTIVE ORDER.

WHEREAS, by the treaty between the United States of America and the Republic of Panama, to insure the construction of a ship canal across the Isthmus of Panama to connect the Atlantic and Pacific Oceans, ratified under date of February 26, 1904, the Republic of Panama granted to the United States in perpetuity, the use, occupation and control of a zone of land and land under water ten miles in width for the construction, maintenance, operation, sanitation and protection of the said canal, and the use, occupation and control in perpetuity of any other lands and waters outside of the said zone which may be necessary and convenient for the construction, maintenance, operation, sanitation and protection of the said canal.

AND WHEREAS, the use, occupation and control of the lands hereinafter described, a part thereof being within the limits of the said ten mile zone and a part within the Republic of Panama adjacent thereto but outside of the said zone, are deemed necessary for the protection of the said canal.

NOW, THEREFORE, I, WOODROW WILSON, President of the United States, by virtue of the authority granted by the said treaty and of the authority vested

in me by the laws of the United States made and provided, do hereby set apart for the protection of the said canal and for use as a military reservation in connection therewith, subject to private rights, if any there be, lands and land under water, the same being described as follows:

Beginning at the southwest end of the Toro Point Breakwater, Latitude N. 9° 22′ 26.29″ Longitude 79° 57′ 06.49″ W., the boundary follows the low water line of Limon Bay to a concrete monument on right bank of the mouth of the Rio Pilibio, Latitude N. 9° 19′ 15.48″ Longitude 79° 57′ 14.48″ W.; thence S. 49° 15′ W., 12,300 feet to a concrete monument on the left bank of the mouth of the Rio Mojinga; thence northwest along the right bank of the Rio Chagres to its mouth; thence northeast along the low water line of the Carribean[1] Sea to the initial point.

WOODROW WILSON.

THE WHITE HOUSE, *25 March, 1918.*

[No. 2825.]

EXECUTIVE ORDER.

Schedule A of classified positions excepted from examination under the civil service rules is hereby amended by adding to Subdivision I, applying to the entire classified service, a paragraph to be numbered 15, as follows:

15. All officers and employees in the Federal service upon the Isthmus of Panama, except those who are to perform the duties of clerk, bookkeeper, stenographer, typewriter, surgeon, physician, trained nurse, or draftsman. Appointments to clerical positions on the Isthmus of Panama paying not more than $75 in gold per month may be made without examination under the civil service rules.

The similar provision contained in paragraph 1 of Subdivision X of Schedule A applying to the Isthmian Canal Commission is revoked as no longer necessary, by reason of being included in the general provision.

This order is recommended by the War Department, with the concurrence of the Civil Service Commission, because of the difficulty in many cases of obtaining persons who are citizens.

WOODROW WILSON.

THE WHITE HOUSE, *5 April, 1918.*

[No. 2834.]

EXECUTIVE ORDER.

By direction of the President it is hereby declared that on account of the war with Germany an emergency exists within the meaning of Section 3709 of the Revised Statutes and amendments thereto and other statutes as to purchases to be made for the Government by The Panama Canal.

It is therefore ordered that, in view of such emergency and the necessity of cooperating with the War Industries Board in the manner outlined by the President in his letter to Mr. Bernard M. Baruch of March 4, 1918, The Panama Canal is hereby authorized to make purchases without advertising for bids for the material and supplies to be procured which are on the clearance list as announced and supplemented from time to time by the War Industries Board: Provided, however, that such material and supplies as are not on the clearance list issued from time to time by the War Industries Board shall be purchased by The Panama Canal in the usual way and under the usual requirements now applicable to The Panama Canal.

The Panama Canal shall use every effort to procure material and supplies at the lowest price obtainable, taking into consideration the necessity of cooperating with and being governed by the advice of the War Industries Board as to prices, priorities and deliveries of material.

This order is issued for the purpose of enabling The Panama Canal to legally cooperate with and coordinate its purchases with the operations of the War

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[1] Should be Caribbean.

Industries Board and to meet the emergency created by the War with Germany, so far as it affects purchases to be made by The Panama Canal.

NEWTON D. BAKER,
Secretary of War.

WAR DEPARTMENT,
Washington, D. C., May 18, 1918.

EXECUTIVE ORDER.

The following described portion of that certain tract of land situated at Balboa, Canal Zone, and placed under the control of the Secretary of the Navy by the Executive Order of May 26, 1914, No. 1948, is hereby transferred from the control of the Secretary of the Navy and placed under the control of the Secretary of War for military purposes:

> Beginning at Monument V in the present boundary line of the Naval Reservation, Balboa; thence on a line connecting the said monument V with the center of the most southerly foot of the south radio tower to its intersection with the top of the slope a distance of 63 feet more or less; thence a distance of 554 feet more or less on a line having an azimuth of 260° 44′ to a point immediately west of the main road to Fort Amador; thence a distance of 408.6 feet more or less on a line having an azimuth of 250° 0′ to the intersection with the present southerly boundary line of the Naval Station, marked W. Z.; thence in a southeasterly direction along said line W. Z., that has an azimuth of 307° 40′, a distance of 630 feet more or less to the Monument Z; thence in a northeasterly direction along the line marked V, that has an azimuth of 217° 40′ a distance of 765 feet more or less to the point of beginning, all as shown on blueprint marked "United States Navy Radio Station, Balboa, C. Z., March 17, 1915, F. H. Cook, Civil Engineer, U. S. N.," which plan is on file in the Navy Department.

The transfer of the above described tract of land is made subject to the continued right of the Navy Department to lay and maintain therein, underground antennæ receiving wires needed in connection with the maintenance and operation of the Naval Radio Station at Balboa, C. Z.

WOODROW WILSON.

THE WHITE HOUSE, *28 May, 1918.*

[No. 2869.]

EXECUTIVE ORDER.

Whereas a national emergency exists of the character contemplated in Section 1 under Title II of the Act of Congress approved June 15, 1917, commonly known as the Espionage Act:

Therefore, I, WOODROW WILSON, President of the United States of America, by virtue of the powers conferred upon me by the said Act of Congress, do hereby authorize the Governor of The Panama Canal to exercise, within the territory and waters of the Canal Zone,[1] all the powers mentioned in said Section 1, Title II, of said Act, to the same extent as is conferred therein on the Secretary of the Treasury with regard to the territorial waters of the United States, and all acts heretofore done by the Governor of The Panama Canal or under his authority pursuant to said section of said act are hereby ratified and confirmed.

WOODROW WILSON.

THE WHITE HOUSE, *28 May, 1918.*

EXECUTIVE ORDER.

Amending paragraph 20 of the navigation rules and regulations of The Panama Canal.

By virtue of the authority vested in me, I hereby establish the following Executive Order for the Canal Zone:

SECTION 1. Paragraph 20 of the Executive Order of July 9, 1914, entitled "Rules and Regulations for the Operation and Navigation of The Panama

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[1] As amended by Executive Order No. 2907, dated July 9, 1918.

Canal and approaches thereto, including all waters under its jurisdiction," is hereby amended to read as follows:

"20. The captain or master of a vessel in Canal waters, except while the vessel is being passed through the locks, shall be charged with the safe handling and proper navigation of the vessel; the pilot is to be considered as being on board solely in an advisory capacity, but masters of vessels must abide by rules and regulations of the Canal as interpreted by the pilot. No claim against The Panama Canal for damages on account of injury to a vessel or its cargo while in Canal Zone waters, arising from the operation of the Canal (other than the passing of vessels through the locks) shall be allowed unless it shall be determined by the Governor of The Panama Canal that such injury was due to the negligence or want of care on the part of agents or employees of The Panama Canal and there shall be an appropriation available for the payment of such claim."

SECTION 2. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *26 July, 1918.*

[No. 2926.]

EXECUTIVE ORDER.

Under authority conferred by "An Act authorizing the President to coordinate or consolidate executive bureaus, agencies, and offices, and for other purposes, in the interest of economy and the more efficient concentration of the Government, approved May 20, 1918, it is hereby directed that one hundred and twenty thousand dollars ($120,000) be transferred from the appropriation of $1,620,000, for the Censorship of Foreign Mails under the Post Office Department for the fiscal year ending June 30, 1919, and allotted to the Secretary of War for the conduct of the censorship of the mails in the Panama Canal Zone during said fiscal year.

This sum will be deducted from the appropriations made for the Post Office Department for the current fiscal year and charged to the War Department.

WOODROW WILSON.

THE WHITE HOUSE, *3 October, 1918.*

[No. 2968–A.]

EXECUTIVE ORDER.

Providing for the licensing of chauffeurs.

By virtue of the Act of Congress entitled "An Act extending certain privileges of canal employees to other officials on the Canal Zone and authorizing the President to make rules and regulations affecting health, sanitation, quarantine, taxation, public roads, self-propelled vehicles, and police powers on the Canal Zone, and for other purposes, including provision as to certain fees, money orders and interest deposits," approved August 21, 1916, I hereby establish the following Executive Order for the Canal Zone:

SECTION 1. That hereafter it shall be unlawful for any person to operate any automobile over the streets and roads of the Canal Zone without first having obtained a license as hereinafter provided.

SECTION 2. Each person desiring to obtain a license to operate an automobile over the streets and roads of the Canal Zone shall make written application to the Executive Secretary of The Panama Canal, stating therein his nationality, age, and experience in the operation of automobiles, whether operated by gasoline, electricity, or other motive power; and his application must be endorsed by two reputable citizens of the Canal Zone or of the city of Panama or Colon, Republic of Panama, vouching for his sobriety and trustworthiness. The Executive Secretary shall thereupon cause the applicant to be examined touching his knowledge of gasoline and electric motors and machinery, and of the mechanism and operation of automobiles, as well as in respect to the road laws and regulations of the Canal Zone; and the applicant may be required to make a practical demonstration of his ability to operate an automobile.

SECTION 3. No person shall be granted a chauffeur's license unless he is eighteen years of age or more, is of sober habits, and is able to read either the English or Spanish language, and shall prove to the satisfaction of the examiners that he has the knowledge, skill, and judgment necessary for the safe and skilful driving and handling of automobiles.

SECTION 4. The persons detailed by the Executive Secretary to examine applicants under this order shall meet at Balboa Heights or Cristobal, or at such other points in the Canal Zone as the Executive Secretary may from time to time designate, and shall examine all applicants whose applications have been referred to them, and shall make a report upon such examinations to the Executive Secretary with their recommendations as to the fitness of the applicants to operate automobiles over the streets and roads of the Canal Zone. The Executive Secretary shall cause a record to be kept of all applications, together with the reports of the examiners in each case and any other papers relating thereto. If the report of the examiners is favorable to the applicant, the Executive Secretary may issue to such applicant a chauffeur's license in form substantially as follows:

THE GOVERNMENT OF THE CANAL ZONE.

LICENSE TO CHAUFFEURS.

No. ------

Whereas, it has been reported to me by the duly appointed examiners that ---------- has given satisfactory evidence to said examiners that he is a skilful chauffeur or operator of automobiles, and can be entrusted to perform the duties of chauffeur upon the streets and roads of the Canal Zone, he is, therefore, licensed to act as such chauffeur until such time as this license may, for cause, be revoked.

Witness my hand this ------ day of ---------- 191----.

Executive Secretary, The Panama Canal.

The license issued hereunder shall continue in force until revoked for cause, as hereinafter provided for.

SECTION 5. When the Executive Secretary issues a chauffeur's license he shall thereupon cause to be issued to the licensee either a card, check or badge, as may be determined from time to time by regulations of the Governor of The Panama Canal, and in such form as the latter may designate. The licensee shall be charged a fee of one dollar ($1) for such license, to be paid to the Collector of The Panama Canal; provided, that no fee shall be charged for licenses issued to chauffeurs who only operate automobiles belonging to or controlled by The Panama Canal or other agency of the United States or the Panama Railroad Company.

Applicants for licenses to operate automobiles belonging to or controlled by any government agency or the Panama Railroad Company need not be endorsed by two citizens as provided in Section 2 hereof for other applicants, but such applications shall be endorsed by the chief of the office, division, or unit in which the applicant is employed.

Upon the request of any Canal Zone police officer it shall be the duty of every licensee hereunder, while in charge of any automobile on the Canal Zone streets or roads, to exhibit to such officer the card, check or badge so issued to him.

SECTION 6. The Executive Secretary is hereby authorized to revoke for cause any license issued hereunder or heretofore issued.

SECTION 7. The Governor of The Panama Canal is hereby authorized to promulgate rules and regulations from time to time to carry out this order. The licenses, cards, checks and badges heretofore issued in conformity with preexisting laws, shall continue to be effective unless revoked for cause.

SECTION 8. Any person who operates an automobile over the streets and roads of the Canal Zone without first having obtained a license as provided for under this order, or who fails to comply with the other requirements of this order or of the regulations of the Governor issued pursuant to this order, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by fine not to exceed $25 or by imprisonment in jail not to exceed thirty days, or by both such fine and imprisonment, in the court's discretion, as authorized by the above-mentioned Act of Congress.

SECTION 9. The ordinance enacted by the Isthmian Canal Commission of April 15, 1911, entitled "Ordinance providing for the licensing of chauffeurs for automobiles", the ordinance enacted by the Isthmian Canal Commission dated February 3, 1914, "Amending Section 8 of Ordinance providing for the licensing of Chauffeurs for automobiles", and all other ordinances, orders and regulations, or parts thereof, in conflict with this order are hereby repealed.

SECTION 10. This order shall take effect thirty days from and after its publication in The Panama Canal Record.

WOODROW WILSON.

THE WHITE HOUSE, *9 October, 1918.*

[No. 2971.]

EXECUTIVE ORDER.

Guarapo Naval Air Station.

1. The areas hereinafter described situated within the Canal Zone are hereby set apart and assigned for the uses of a naval air station, and other naval purposes, under the control of the Secretary of the Navy; but the said areas shall be subject to the civil jurisdiction of the Canal Zone authorities in conformity with the Panama Canal Act.

2. The said areas are described as follows:

I. That island named Guarapo Island, in its entirety and shown on Hydrographic Office Chart No. 5000, dated December, 1914, lying to the westward of and approximately parallel to the Canal prism, and directly to the southward of Gatun Dam, between latitudes approximately 9° 14′ 50″ north and 9° 15′ 40″ north, and longitudes approximately 79° 55′ 44″ west, and 79° 56′ 04″ west; together with the small islets immediately adjacent to the westward.

II. The water area lying between the Canal prism and the Island of Guarapo, also the water areas off of the northerly, westerly and southerly shores of said island, to a distance of two hundred (200) yards.

3. The said areas are more particularly described on blueprint No. 4301–16, dated the 27th day of September, 1918, issued by the Governor of The Panama Canal.

WOODROW WILSON.

THE WHITE HOUSE, *4 November, 1918.*

[No. 2987.]

Date Due

Due	Returned	Due	Returned

Date Due

DUE	RETURNED	DUE	RETURNED