

a special report on sanitary conditions. He arrived at Colon December 31, 1903, and for the following six or eight months made his headquarters at Panama. Dr. Pierce is now Quarantine Officer at Colon. The next in order was Dr. J. P. Perry, also detached from Marine Hospital duties for temporary service on the Isthmus. Dr. Perry arrived Feb. 6, 1904 and was stationed at Colon for several months. On the organization of the Department of Sanitation he became connected with it, and now holds the position of Chief Quarantine Officer, with headquarters at Panama.

The first large permanent party to arrive was headed by Major-General George W. Davis, and consisted besides of Major Black, Ernest Lagarde jr., the first Executive Secretary of the Canal Zone; Eugene C. Tobey, Paymaster, U. S. Navy; Richard L. Sutton, M. D., U. S. Navy; Mason E. Mitchell, stenographer; George Reynolds Shanton, Charles L. Stockelberg, and Jeremiah Corcoran. The party arrived May 17, 1904, and its appearance constituted the initial step in the organization of the work under American management. Paymaster Tobey not only assumed the duties of Disbursing Officer, but at one time was in charge of the Material division, Revenues, and Posts. In fact, he and Major-General Davis had practically the running of things for a month or so. There were a lot of ragged ends to draw together when the canal was taken over from the French, and with lack of sufficient and adequate help, it was nip and tuck with these two men for one while, to keep matters running smoothly. The Major-General acted as "Managing Representative" until Chief Engineer Wallace arrived, while Tobey continued in the performance of his multifarious duties until Paymaster George C. Schafer came to relieve him of the disbursing end, and Col. Tom. Cooke arrived to take charge of revenues and posts. Owing to the pressure of work, pay days at that period were long deferred, the longest on record for the gold men, if the memory of the writer

serves correctly, being in August, 1904 when there was "nothing doing" until the 17th of the month. However, everybody accepted the situation good-naturedly enough, the bunch of penniless "recruits" up at Ward 9 in the hospital paid working up considerable excitement o' nights during these waits on a ten-cent limit, and that in debased Colombian currency

E. C. Tobey was subsequently made Chief of the Department of Material & Supplies, and continued in that capacity, with Victor S. Jackson as his Assistant until November, 1905, when he was succeeded by Mr. W. G. Tubby, the present head of that department. Mason Mitchell served under Mr. Tobey, and later under Paymaster Schafer. He is still on the Isthmus, though not with the Commission. Capt. Shanton was appointed Chief of Police, an office he still holds, while Mr. Stockelberg has been Supervisor of Plumbing from first to last. Col. Wm. C. Gorgas was another of the early arrivals. Reaching here in June, he with the able assistance of Major H. R. Carter commenced at once the work of building up the mighty structure that has made Panama, Colon and the Canal Zone one of the healthiest spots in the tropical belt. Others followed in the wake of these pioneers, List, Ehle, Nichols, Dose, Major Lagarde, Dr. Ross, and many others, the most of whom have long since departed for other fields of labor.

TAKING NO CHANCES.

Who says that strangers in Panama are not reverent and respectful. Yesterday while the auctioneer's bell was ringing about the streets, a gentleman who thought it might be some religious ceremony, took off his hat and stood uncovered in the hot sun until the red flag had passed. He evidently thought it best to be on the safe side.—Panama Star & Herald in 1871.

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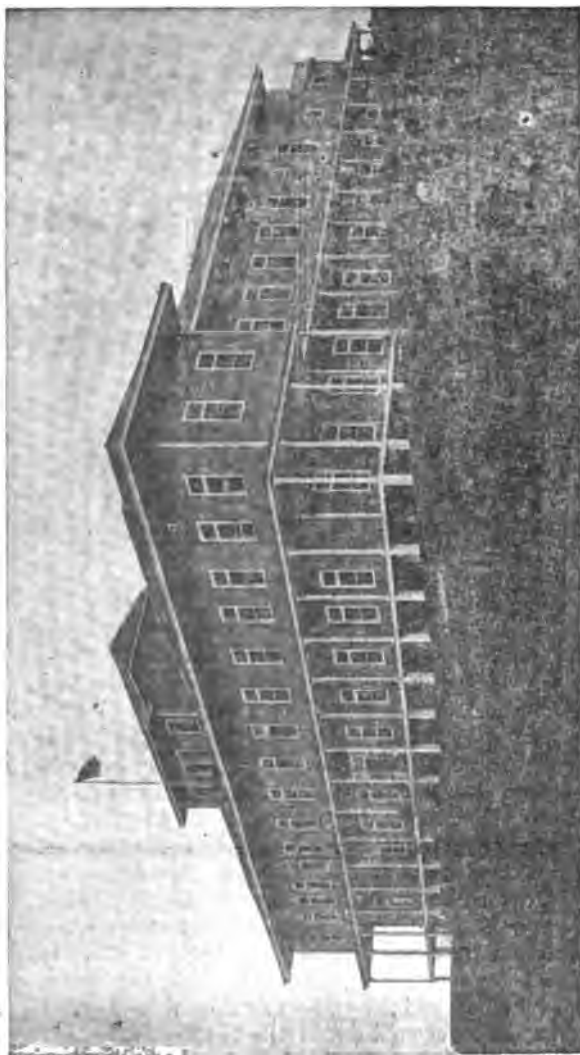
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New Commission in Harness.

On March 8, 1904, President Roosevelt issued the letter appointing the members of the first commission to be composed of Rear-Admiral John G. Walker, United States Navy, Chairman. Major-General George W. Davis, United States Army; William Barclay Parsons, William H. Burr, Benjamin M. Harrod, Carl Ewald Grunsky, civil engineers, and Mr. Frank J. Hecker. The President's charge to this commission reads in part as follows:—

"I have appointed you as the Commission which is to undertake the most important and also the most formidable engineering feat that has hitherto been attempted. You are to do a work the doing of which, if well done, will reflect high honor upon this nation, and, when done, will be of incalculable benefit, not only to this nation, but to civilized mankind. You have been chosen purely because of your personal and professional reputations for integrity and ability. You represent the whole country. You represent neither section nor party... . The plans are to be carefully made with a view of the needs not only of the moment, but of the future. The expenditures are to be supervised as rigorously as if they were being made for a private corporation dependent for its profits upon the returns. You are to secure the best talent this country can afford to meet the conditions created by every need which may arise. The methods for achieving the results must be yours. What this nation will insist upon is that results be achieved."



Administration Building - Culebra, Panama.
26th Street - Panama & 25th Street - Panama - Panama

The Commission held its first meeting at Washington on March 22, 1904, and immediately planned for a trip to the Isthmus to study the conditions on the spot. It arrived at Colon on April 5, 1904, and established provisional headquarters in the old De Lesseps mansion on Cristobal Point. During its visit the Commission occupied itself with a study of the plans and methods of work, as then carried on by the New Panama Canal Company and with an examination of the physical conditions of the proposed canal route. At the time of the Commission's visit, the only work in progress was the excavation of Culebra cut. The outfit here consisted of a few French steam excavators and dump trains, and a force of about 700 men engaged on the work. Although small progress was being made, the Commission deemed it advisable to continue the employment of the existing force until a better organization could be effected.

The Commission's investigations developed the fact that while under M. de Lesseps and the New Panama Canal Company a large amount of study was done of an accurate and scientific kind, new and extended surveys would have to be made by reason of the difference of the standpoints from which the work was approached twenty-five years ago with to-day. This, to a large extent is due, to the immense increase of dimensions of the waterway demanded by the ships of to-day and the near future. The Commission returned to the States on April 29, having decided that the first step in field operations should be the organization of survey parties to examine further into certain problems of canal construction with which it was confronted.

The Commission was received very cordially by the Panama Government officials and several functions were held. To provide against contingencies, the party brought along a large stock of mineral waters, and also, it is reported, a number of zinc caskets. The latter, however, were not called into requisition.

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Getting Down to Work.

The engineering work of the Commission had its beginning in the organization of five engineering parties, each in charge of a resident engineer. The first of these engineering parties sailed for the Isthmus about the middle of May, 1904, and the remainder followed soon after. One party was assigned to making surveys for proposed harbor improvements at Colon, another to making investigations and borings in the vicinity of Gatun, a third to conducting similar investigations at Bohio, the fourth and one of the largest parties put in the field, to making surveys for a possible dam at Gamboa, and the fifth and last for designing of a waterworks and sewer system for the cities of Panama and Colon.

On May 5, 1904, Mr. John F. Wallace was appointed Chief Engineer at a salary of \$25,000 per annum, to take effect June 1. Mr. Wallace arrived on the Isthmus June 24, relieving Major-General Davis of all work in connection with engineering operations. At that time there were very few suitable residences available, and during the greater part of his connection with the Commission, he occupied the three-story building in Panama, now the home of the American Legation.

The attention of the Chief Engineer during the remainder of the year 1904 was principally confined to supervising the work of the field parties, to ascertaining what

the French company had left of value, and conducting experiments in Culebra cut with a view of arriving at the cost of excavation per cubic yard. The work of this period may be said to have been wholly preparatory. A start was made on the Panama waterworks project, and work was commenced on a few new buildings for employes.

It at once became necessary to place large orders for material, and the slowness with which these were filled was a source of considerable dissatisfaction to the officials on the Isthmus. In order to relieve this situation much material was purchased in the local market especially in the line of building materials.

Some Early Drawbacks.

Employes coming down were obliged to find quarters as best they could. The Administration Building in Panama for the first year and a half was the general office headquarters, engineering, sanitation and everything else, and large numbers of employes were constantly in Panama. This influx had the immediate effect of raising the price of rents, and at one time a room that wouldn't rent in New York City for more than \$5.00 per month was bringing \$20.00 here. Salaries in 1904 were on a much lower scale than at the present time, the average for clerks being about \$100 per month. The tenants of rooms had to pay for their own water, and as the only method of getting it at that time, especially during the dry season, was from the *aguadores*, or street water peddlers, it cost quite a penny, particularly if one indulged in the daily luxury of a bath. Water generally retailed for five cents gold for five gallons, but as the dry season advanced, and the wells on the outskirts of the city began to get low, the price rose, until the article, including the lugging up a flight of stairs, sold for as high as 15 cents gold per five gallons.

Another standing complaint among employes was the food question. Hardy fellows coming out of the North accustomed to three full meals a day, with a lunch or two

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on the side were not prepared to be pleased with the seven o'clock coffee of that beverage and bread, with an egg if you asked for it, and insisted upon it, and sometimes fruit. The monotony of the cooking routine in time too palled upon the appetite. It was simply a matter of mathematical calculation to figure the menu ahead. Ice at five cents gold per pound, and only a limited supply at that, was too costly an article to be supplied by the boarding-house keeper at every meal. It is true, the latter had his or her troubles, and these were not always given proper consideration. Every American housewife on the Isthmus knows the servant-girl problem in the States is not a marker to what it is here.

These and kindred drawbacks, together with the "quiet" life created in the employes a longing for a return to the "flesh pots of Egypt", and during the first year of the canal in American hands, about every boat that brought a batch of new employes took another load back. Especially was this so when the festive stegomyia began to get busy. During the year 1904, there were comparatively few cases of yellow fever; not enough to cause alarm. There was a small outbreak in December of that year (during which Mrs. John Seager, wife of the chief engineer's private secretary, fell victim. This caused a feeling of gloom over the American colony, but as there were but few additional cases no undue excitement was caused. In April and May, 1905 and on up to September of that year, the conditions

among the American employes had all the earmarks of a panic. One of the principal sources of infection during that period was the Administration Building in Panama in which two or three hundred clerks were then employed. M. O. Jackson, Supervising Architect, and R. R. West, Auditor, were counted among the victims. During the height of the scare some of the offices had scarcely a working force available, not from sickness, but because of desertion. The boats left Colon crowded on every trip, and many a one took steerage passage rather than wait for the next vessel. There were two or three cases that resulted fatally where employes had been on the Isthmus less than ten days. The more hardened sort took a huge delight at this time in retailing terrible stories for the edification of the scared newcomer. A case is called to mind where two young men arrived on the Isthmus on the morning of a certain day and reported for duty; sent in their resignations in the afternoon, and returned to the States by the boat leaving the day following. They lost no time in getting out.

It became necessary at this juncture in order to re-establish the working morale to make a decided increase in salaries, as the thousands and thousands of fairy stories printed in the States began to have its effect on the efforts of the Commission to maintain the personnel. Most of the appointments of this period specified that quarters would be provided, but as the Commission was unable to comply with the provision, commutation was allowed employes, at first eight per cent., and later fifteen per cent. of their monthly salaries. Employes and members of their families were at first allowed the reduced rate of \$15, for steamship passage New York to Colon. This was raised a few months later to \$25, and afterwards reduced again to \$20 where it stands at present.

Old Commission for Sea-Level Canal.

The engineering committee of the Walker Commission consisting of Messrs. Burr and Parsons visited the Isthmus:

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early in 1905. Under a resolution of the Commission Maj. Gen. Davis, then Governor of the Canal Zone, was made a member of the committee during its stay on the Isthmus. After holding sessions almost daily for several weeks, the committee met and presented a report in favor of a sea-level canal which is summed up in the following:—

RESOLVED, That this committee approve and recommend for adoption by the Commission a plan for a sea-level canal with a bottom width of 150 feet, and a minimum depth of water of 35 feet, and with twin tidal locks at Miraflores, whose usable dimensions shall be 1,000 feet long and 100 feet wide, at a total estimated cost of \$230,500,000. Such estimate includes an allowance for administration, engineering, sanitation, and contingencies, amounting to \$38,450,000, but without allowance for interest during construction, expense of Zone Government, or collateral costs, and water supply, sewers, or paving of Panama or Colon, which last items are to be repaid by the inhabitants of those cities.

To facilitate the committee's conclusions, an estimate on three types of canal was submitted by Chief Engineer Wallace, one being for a canal with a summit level at 60 feet elevation to cost \$178,013,406; another with summit level at 30 feet elevation to cost \$194,213,406, and the third, the sea level type, to cost \$230,500,000. Each of the above estimates included probable cost of constructing a breakwater at Colon figured at \$6,500,000.

The committee set forth that a sea-level canal would furnish a waterway with no restriction to navigation, and which could easily be enlarged by widening and deepening at any time in the future to accommodate an increased traffic, without any inconvenience to the shipping using it.

whereas a lock canal would be a permanent restriction to the volume of traffic and size of ships that use it. The additional cost of a sea-level canal over that of a canal with locks with a summit level of 60 feet above mean tide was \$52,462,000, or \$79,742,000 more than the estimated cost of a lock canal with a summit level 85 feet above mean tide, proposed by the former Isthmian Canal Commission.

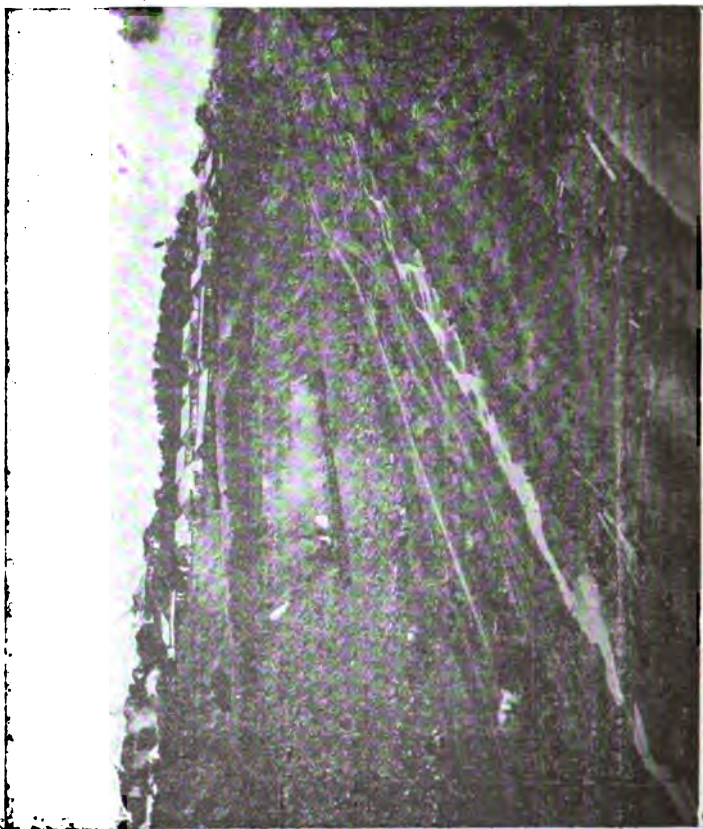
Referring to the proposed dam at Gatun, the committee reported that, "The surveys and examinations which have been made in regard to a possible dam site across the Chagres River at Gatun show that such a structure is not feasible. The width of the floor of the valley at that point is about 5,000 feet, and two borings made at what appears to be the most favorable section penetrated to a depth of 172.7 feet and 139.2 feet below sea-level, respectively, without finding bed rock. Other examinations and borings have also been made at other sections of the Chagres valley where a dam site seemed possible, between Gatun and Bohio, but with equally unfavorable results. It is clear, therefore, that it is not feasible to construct a dam across the Chagres River at any point lower down in its course than at Bohio."

"The borings along the sites proposed for the dam across the Chagres near Bohio have shown that bed rock is deeper than has been supposed at all the sites contemplated. The greatest depth to rock, both at the French site and on that tentatively proposed by the former Isthmian Canal Commission, is about 158 feet below sea level. . . . These results indicate greatly increased difficulties in the construction of any dam in the vicinity of Bohio."

HOW ABOUT IT TODAY?

The Panama market is now abundantly supplied with fruit, vegetables, eggs, fish, string beef, almejas, old women, naked children, John Chinamen, bad odors and hungry dogs. The Colombian Eagle rejoices outside.—Panama Star & Herald in 1875.

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Ancon Hill the Best Site.

While on the Isthmus, the committee also considered the matter of quarters for Employees and adopted a resolution authorizing the Chief Engineer to proceed with the work at once. A resolution was also passed declaring that Ancon Hill and adjacent territory afforded the best site for erecting permanent quarters for the Commission, Zone officers, and certain classes of employes, together with offices and hospitals, and that the Commission be recommended to despatch a landscape architect to the Isthmus to devise a plan for artistically developing this site.

This resolution was the first step toward building the Ancon of today. At that time there had not been a building put up at this point, outside of the Ancon Hospital grounds, and corral yard. The Hotel Tivoli had not been dreamed of, the new Zone administrative building had not been planned, and the site now dotted with cottages and apartment houses was then only a pasture. Goats browsed contentedly on Gobbler's Knob and "El Tivoli."

Old Commission Disbanded.

"It became apparent," says Secretary Taft in his annual report for 1905, "during the six months succeeding the appointment of the first Commission that the body of seven men as organized was not an effective force for doing

the work required in the construction of the canal. The members of the Commission themselves agreed that as constituted, good results could not be expected from it. You (President Roosevelt) had submitted to Congress during the winter of 1904-5 a recommendation for an amendment to the law by which you should be given a free hand in the number of agents to be selected by you for the work which the act of Congress made it mandatory upon you to perform, and informed Congress that the method of construction by a commission of seven was clumsy and ineffective. The House of Representatives gave the requested power in a bill which it sent to the Senate. There the bill met determined opposition, and in the short session it was entirely possible for its enemies to defeat it. It became very apparent that radical action was necessary if better work was to be secured. By your direction, in March, 1905, I requested the resignation of the then canal commissioners, which were at once tendered."

Under Executive order of April 1, 1905, the organization of a new commission became effective, the members being Theodore P. Shonts, Chairman; Charles E. Magoon, also to be Governor of the Canal Zone; John F. Wallace, to be member as well as Chief Engineer; Rear-Admiral Mordecai T. Endicott, U. S. Navy; Brig. Gen. Peter C. Hains, U. S. Army (retired); Col. Oswald H. Ernst, Corps of Engineers, U. S. Army, and Benjamin M. Harrod. The salaries were fixed at \$7,500 for each member per annum, the Chairman in addition to receive the sum of \$23,500 annually; the Chief Engineer, \$17,500 annually, and the Governor of the Canal Zone, \$10,000 annually.

The first meeting of this Commission was held April 3, 1905, and an executive committee appointed consisting of Messrs. Shonts, Wallace and Magoon. It was then arranged that Mr. Shonts should assume charge of the Washington office, the making of contracts, the purchase of material, and general executive control of the whole business of the Commission. Mr. Wallace was to take complete

charge of the engineering and construction work on the Isthmus, while Governor Magoon who succeeded Gen. Davis, assumed control of the Zone administrative functions, and the sanitation work, with Col. Gorgas in direct charge of the latter. Mr. Shonts drafted into service to assist him in the reorganization of the Washington office, Col. Edwards, formerly Chief of the Bureau of Insular Affairs; David W. Ross, General Purchasing Agent at a salary of \$10,000 per annum, and E. S. Benson, as Auditor, at the same salary.

Wallace Quits the Canal.

The resignation of Chief Engineer Wallace came like a clap of thunder out of a clear sky. It was remotest from the thoughts of anyone in any way connected with the undertaking from the President down. While it was generally known that he was dissatisfied with the working methods of the first Commission, the reorganization by which he was delegated almost plenary powers in the field of construction and engineering, tended to the belief that he would put his shoulder to the wheel with renewed vigor. He had been summoned to the States shortly before this to discuss plans for the future, and had been back on the Isthmus but six days, when on June 28, 1905, he forwarded a cablegram to Secretary Taft announcing his desire to leave the service.

"I was greatly taken aback," reports the Secretary of War, "for I heard indirectly from reliable sources that he had received an offer of a much higher salary, and that he was determined to accept the offer and give up this job. Mr. Wallace came north and at an appointed interview stated to me that he had received an offer of \$65,000 and had accepted it, that he was anxious to assist me and the members of the Commission, as far as possible, with his advice, and would be glad to continue as a member of the Commission, but that he could not and

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would not go back to the Isthmus at all. I gave Mr. Wallace a full opportunity to state all the reasons that actuated him in withdrawing, but this is the only one he mentioned."

It is quite probable that the question of health entered considerably into Mr. Wallace's decision. At the time he returned from the States, yellow fever had been doing a pretty brisk business for several months, and the prospects for its abatement did not look particularly good. While on the Isthmus, Mr. Wallace continually guarded against possibility of infection. His residence was the first to be screened, and every possible precaution taken to prevent the introduction of the disease by mosquito infection.

Mr. Wallace's place was filled without loss of time by the appointment of Mr. John F. Stevens, an experienced railroad man, who was on the eve of departing for the Philippines to supervise important railroad works for

the Government. Mr. Stevens arrived on the Isthmus on July 27, 1905 and immediately took up the work where his predecessor had left off.

Engineering Operations Suspended.

After the visit of the Commission to the Isthmus in July and August, 1905, it became evident that two things must be done before results in an engineering way could be expected. One was the proper housing of employes, and the other, the improvement of health conditions. It might be said that at this juncture, the former was the more important, as it in reality dovetailed into the other, it being self-evident that sanitary conditions would improve immediately modern, well-ventilated quarters were furnished. The Commission recognized that this preparatory work was the first essential, and ordered a partial suspension of engineering operations. Quite a number of men were sent back with the information that as soon as it was decided to recommence work on a large scale, they would be notified. It was at this time that plans were made for a large number of quarters, and the work in this department increased apace, while Col. Gorgas and his squads continued their daily battles with the little demons of the air.

To Decide Type of Canal.

On June 24, 1905, the President by Executive order appointed the following board of consulting engineers for the purpose of reporting on the type of canal to be adopted:—

Gen. George W. Davis, Chairman, Alfred Noble, one of the constructing engineers of the Soo canal; William Barclay Parsons, engineer of the New York underground system; William H. Burr, professor of engineering in Columbia college; Gen. Henry L. Abbott, army en-

gineer, whose observations on the topography and characteristics of the canal territory, now in book form, are valuable; Frederic P. Stearns, hydraulic engineer of Boston; Joseph Ripley, at one time chief engineer of the Soo Canal, and afterwards employed by the Isthmian Canal Commission as lock expert; Horman Schussler, Isham Randolph of Chicago Drainage canal fame; W. Henry Hunter, chief engineer of the Manchester ship canal, representing the British Government; Eugen Tincauzer, chief engineer of the canal at Kiel, representing the German Government; Adolphe Guerard, civil engineer, representing the French Government; Edouard Quellenec, consulting engineer of the Suez Canal, and J. W. Welcker, engineer and constructor of the North Sea canal, representing the Holland Government.

The Board failed to reach an unanimous agreement, and on January 10, 1906 presented two reports, the first a majority report, signed by eight members, of whom five were the representatives of foreign governments, favoring a sea-level canal, and the second, or minority report, signed by five members, all Americans, in favor of a lock canal at an elevation of 85 feet.

The Isthmian Canal Commission, to whom these reports were submitted for consideration, made a report to the Secretary of War on February 5, 1906, one member dissenting, in favor of the lock canal recommended by the minority report of the Advisory Board. The dissenting member, Civil Engineer Endicott, U. S. N., submitted a minority report in favor of the sea-level plan. Accompanying the Commission's report was a statement from Chief Engineer Stevens recommending the adoption of the lock-canal plan.

Congress Decides for a Lock Canal.

The reports were before Congress from February 19, 1906, until near the date of adjournment on June 30,

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1906. On June 21, the Senate by a vote of 36 ayes to 31 noes passed the act decreeing the construction of a lock canal of the general type proposed by the minority of the Advisory Board. The House of Representatives concurred, without division, on June 27, and on June 29, 1906, the act became a law through the approval of the President. While the passage of the act set at rest the uncertainties that to some extent had existed hitherto, and enabled the engineering forces to proceed on a definite basis, it is doubtful that much headway could have been made up to this time, outside of Culebra cut, for lack of preparedness in other directions. By the middle of 1906, the clouds surrounding the sanitary horizon had well nigh disappeared, and considerable advancement had been made toward furnishing quarters for employes, both gold and silver. Under Stevens, the rather chaotic state of affairs that marked the end of the first Commission had been reduced to a well-defined system, and things had begun to



*Bas Obispo Cliff, Catal Zone, Pinal Co.,
Arizona. View from a P.M. train along authority line, Yuma.*

work much more smoothly. Material and supplies were being handled with a degree of promptness not known in earlier days. The service on the railroad also began to improve. At one time in 1905, it took all the way from three weeks to two months to get a consignment across the Isthmus from Colon, which caused a storm of protests from the local merchants. The delay did not occur in the transit across, but was attributable to an enormous congestion of freight at the northern end of the road, and lack of proper facilities in handling. Among other measures passed by Congress in 1906 relating to the canal, was one restricting the purchases of material and equipment for its use, to articles of domestic production and manufacture, except in cases where the price or bid was plainly unreasonable.

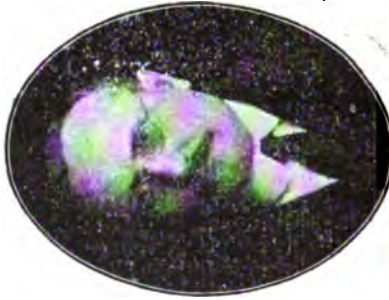
Army Engineers in the Saddle.

The year 1907 witnessed another line-up in the personnel of the Isthmian Canal Commission. The first break occurred on September 25, 1906 with the transfer of Governor Magoon to Cuba. The final disintegration began with the resignation of Mr. John F. Stevens which came about with a degree of suddenness only equalled in the case of Mr. Wallace. Mr. Stevens' resignation however, did not become effective until April 1. Meanwhile the resignation of Chairman Shonts took effect March 4, and the remainder of the Commission on March 16.

According to a Washington dispatch, Mr. Stevens became alarmed over the possibility of awarding the contract of constructing the canal to the Oliver-Bangs combination, and wrote a letter to the President setting forth that the canal organization had been pretty well perfected; that more dirt had been taken out during the past thirty days than was ever taken out before in the same time; that he did not care to share the work of building the canal with anyone, nor be hampered with men less familiar with the subject than himself. He intimated that if his

wishes were not complied with he would feel compelled to sever his connection with the undertaking.

*Army Engineers who will dig
The Panama Canal.*



*Maj. Wm. B. Smart
U. S. A.
Asst. Chief Engr.*



*Lieut. Col. George W. Goodale
U. S. A.
Chief Engr.*



*Major D. Du R. Gaillard
U. S. A.
Asst. Chief Engr.*

A. Brestowski, P.R.R. News Agency, Ancon, Canal Zone.

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The letter is reported to have been something of a shock to the President, who after deliberation cabled Stevens acceptance of his resignation. With the retirement of the Shonts Commission, the plan of carrying on the work under what might be termed civilian direction was abandoned, and steps were at once taken toward putting the project in charge of the army organization. This end was effected by the appointment of a commission consisting of the following:—

Lieut.-Col. Geo. W. Goethals, U.S.A., Chairman and Chief Engineer.

Maj. D. D. Gaillard, U.S.A.,

Maj. Wm. L. Sibert, U.S.A.,

Mr. H. H. Rousseau, U.S.N.,

Mr. Jo. C. S. Blackburn,

Col. W. C. Gorgas, U.S.A.,

Mr. Jackson Smith,

Mr. Joseph Bucklin Bishop, Secretary.

Under the new arrangement the positions of Chairman and Chief Engineer were combined, and it was required that all the Commissioners take station permanently on the Isthmus. Later the work was divided as follows:— Col. Goethals to have general charge; Maj. Gaillard to have charge of the Department of Excavation and Dredging; Maj. Sibert, Department of Locks and Dam Construction; Mr. Rousseau, Departments of Municipal Engineering, Motive Power and Machinery, and Building-Construction; Mr. Blackburn, Head of the Department of Civil Admin-

istration and Governor of the Canal Zone; Col. Gorgas, Chief Sanitary Officer, Head of the Department of Sanitation; Mr. Jackson Smith, Manager of the Department of Labor, Quarters & Subsistence, and Mr. Joseph Bucklin Bishop, as Secretary of the Commission, and in charge of *The Canal Record*, the official I. C. C. organ. Under the Executive order of November 17, 1906, the judiciary and canal zone government was combined under the name of Law and Government, with Mr. Richard Reid Rogers, General Counsel, in charge. The civil government was later transferred to the Isthmus and now comes under the head of Department of Civil Administration.

At the time Col. Goethals took charge there was much talk about militarism. Shortly after his arrival, a reception was given him at the Corozal Hotel. On this subject he said, "I will say that I expect to be the Chief of the division of engineers, while the heads of the various departments are going to be colonels, the foremen are going to be the captains, and the men who do the labor are going to be the privates. There will be no more militarism in the future than there has been in the past. I am no longer a commander in the United States Army. I now consider I am commanding the Army of Panama, and that the enemy we are going to combat is the Culebra cut, and the locks and dams at both ends of the canal. Every man here who does his duty will never have any cause to complain on account of militarism."

The Canal Route—Plans Amended.

On December 9, 1907, a special report was made by the Chairman of the Commission to the Secretary of War, recommending locks and dams at Miraflores, instead of at La Boca. This does away with the necessity for Lake Sosa, and the Sosa-Corozal and La Boca-San Juan dams. It also probably removes the necessity of changing the

site of old La Boca, and saves many legal preliminaries in connection with the securing of private lands in the submerged area contemplated by Lake Sosa. A brief sketch of the canal by sections, and the work that is being done is given herewith:—

LIMON HARBOR CHANNEL.—The harbor channel of the canal at the Atlantic end begins at a point in Limon Bay about half a mile outside of a line drawn across from Manzanillo Point, to Point Toro. The width of the channel's mouth will be approximately 1,000 feet, and the opening will be protected by converging jetties. The channel from this point to the mouth of the Mindi River, a distance of four and one-half miles, will have a bottom width of 500 feet, and will be dredged to a depth of 40 feet. At Mindi where the canal proper starts the ground is only a little above sea level, but rises until at Gatun 2.6 miles away, the elevation is 85 feet.

GATUN DAM.—Gatun is the site of the great dam destined to impound the waters of the Chagres. The dam will be of earth work ripped in the portions most exposed to wear. The top of the dam is to be 100 feet wide, and its crest will be 50 feet above the normal lake level. The width of the dam at water level will be 374 feet, and at sea level 2,625 feet. Its total length will be in the neighborhood of 1700 feet, and its height 135 feet. The cross-section of the dam has been slightly changed from the original plans; the upstream slope is to be more gradual. A spillway will be constructed through the dam and work on this was begun in April, 1907.

GATUN LOCKS.—Gatun is also the site of a triple flight of locks. The original plans called for locks with usable lengths of 1,000 feet, and widths of 100 feet. During 1907, the question was raised as to whether the width as planned would be sufficient for future requirements. It is now proposed to increase their width to 110 or 120 feet. The President in his message to Congress in Decem-

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ber, 1907, favored locks of the latter width. The gates are to be in duplicate and of the miter type, except that the rolling gate similar to that now in use on the Ohio River will be substituted for the duplicate set at the lower end of each summit-level lock. In addition there will be provided an auxiliary pair of gates at the lower end of each flight for use as coffer dams in case it may be necessary to pump out the locks, and it has been determined tentatively to adopt a swing-bridge type of dam for emergency use.

GATUN LOCK SITE.—There has been a considerable division of opinion with reference to the suitability of the Gatun lock site. Former Chief Engineer Wallace went on record as opposed to dam and locks at this point on account of what he claimed to be lack of proper foundation. To actually develop the character of the foundations on which the locks are to rest five test pits, each six feet by eight, were sunk early in 1907 to the depths of the lock walls at Gatun, and one at the Gatun dam spillway. On their completion Engineers Alfred Noble, Frederick P. Stearns and John R. Freeman made a personal examination of material taken therefrom, and under date of May 2, 1907, reported as follows:—

We beg to record that we found that all of the locks of the dimensions now proposed will rest upon rock of such a character that should furnish a safe and stable foundation.

Since that time careful borings have been continued over the entire area in order to secure a contoured plat of the rock surface with a view to the most economical adjustment of the locks to the site. Soft sandstones of a dirty greenish-gray color, derived from igneous rocks with a calcareous and clayey cement, are the most abundant rocks of the Gatun formation. The rocks are all well consolidated, though in a few rare cases sandy layers are found which crumble on exposure to the air. These are the beds that have been referred to frequently as "indurated clays." The term is a misleading one since true clays make up but a small part of the formation. The beds are all "rock", though in some instances soft enough to be loosened with a pick. It is evident that at one time this section was entirely under water, as sea shells have been picked up on top of some of the hills. Recently a steam shovel dipper dug up at Gatun an ancient bomb at a depth of fourteen feet below the surface of the ground. How it came there is a mystery. An extensive erecting plant, cable ways, etc. will be installed at this point, for the carrying and conversion of material required for use in the locks and dam.

GATUN LAKE.—As soon as the portions of the dam abutting Spillway Hill are high enough to stand 50 to 55 feet of water in the lake, it is proposed to build across the channel through Spillway Hill, a concrete dam high enough to hold the lake at the aforementioned level. During the dry season following, the dam across the channel through Spillway Hill will be brought to its full height, and a permanent spillway constructed, including the necessary regulating works by means of which the surplus water of the lake will be passed down to the sea. It is probable the lake will not be allowed to fill to the height of 50 to 55 feet until the upper end of the Gatun locks has been erected, and the upper gates built. The area of the lake will be 164.23 square miles. Its cubical capacity is not yet known. The lake will extend all the

way from Gatun to Bas Obispo, and the towns of Lion Hill, Frijoles, Tabernilla, San Pablo, Gorgona, and Matachin will be on islands entirely surrounded by water. Between Gatun and Bas Obispo, the Chagres River crosses the center line of the canal no less than 23 times.

OVER THE DIVIDE.—The Chagres will enter the lake near Bas Obispo, and at this point the canal begins to cross the divide, by way of Culebra cut, and thence to Pedro Miguel near where the low level is again reached, a distance of about ten miles. During the past year the work of excavation in the Cut has been progressing satisfactorily. The August, 1907 excavation from the canal prism made such an excellent showing as to call forth the following congratulatory cable from the President:—

Oyster Bay, N. Y.,

Sept. 5, 1907.

Goethals, Culebra.

I heartily congratulate you and all the men on the canal for extraordinary showing you have made during the month of August. As this is the height of the rainy season, I had not for a moment supposed you would be able to keep up your already big record of work done, and I am surprised as I am pleased that you should have surpassed it.

THEODORE ROOSEVELT.

The record for the month of August was 1,274,284 cubic yards, the highest up to that time since the canal has been in American hands, and this despite a rainfall of 11.89 inches during the month.

As the work of excavation proceeds in the heavy cuttings of the Culebra Division, the question of drainage becomes more and more important. At the north end of the Culebra Division, where the Chagres crosses the line of the canal, the elevation of the water surface of the river at dead low water is about plus 44, and during the rainy season under normal conditions about plus 49 to plus 50,



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but during the great flood of December, 1906, the water surface there reached a height of plus 79.9. "It is therefore evident," states the report of the Commission for 1907, "that when the canal is approaching completion, a barrier or dam must be placed at the northern end of the Culebra Division, near the river, to keep out the waters of the Chagres, and that the larger part of the drainage of the canal must be carried to the south, where toward the Pacific, the land slopes more rapidly. It will however, be necessary to install centrifugal pumps in order to dispose of the water which will come down into the cut and cannot be conveniently carried off by natural drainage to the south. It is very important to divert from the canal, for construction purposes as well as for economy in maintenance after the canal has been completed, all possible water which would get into it from the adjacent watershed. It is therefore proposed, during the next fiscal year, to repair and put in operation the old French diversion channel ex-

tending from Culebra and emptying into the Chagres on the west side of the canal below Gamboa. A survey party has been at work locating a diversion channel for the Obispo River, and other streams on the east side of the canal, which will extend from Culebra and will run approximately parallel to the canal, discharging its waters into the Chagres near Gamboa."

CHANGES AT PACIFIC END.—The changes at the Pacific end are the most important made since the adoption of the original plans. The Chairman's report to the Secretary of War states:—

"The adopted plan for the building of the Panama Canal contemplated the formation of a lake on the Pacific side by the construction of three earth dams (Sosa-Corozal, Sosa-San Juan and Corozal-Diablo), the differences of level between the lake and the Pacific being overcome by a flight of two locks projecting into the Pacific on the west side of Sosa Hill."

"The Board of Consulting Engineers that accompanied you to the Isthmus in April last, inspected the sites of the dams, as finally located, with a view to outlining a detailed description of the preparation of the foundations for the structures to be erected, reporting thereon as follows:—

"The borings showed so-called mud in the swampy portion, having a depth of 8 or 10 feet. This material is firmer than we had expected, and at the time of our visit, about two days after it had been flooded by spring tides, it could be walked on in most places. . . . For the dam construction . . . we do not think it will be necessary to remove the soft material at any of these places (Sosa-Corozal, Sosa-San Juan). The very softest material will either be displaced or consolidated by the material disposed on it. We do not think the amount displaced beneath the impervious portion of the embankment will be great, and if compressed in place the material will be impervious."

As regards the character of the material that should compose the body of the structures, the same Board reported:—

"For the Sosa-Corozal and La Boca dams the bottom width of the impervious portion should not be less than would result from a top width of 80 to 100 feet at 15 to 20 feet above the water level in the lake, with slopes not steeper than 1 on 4 to 1 on 5. The resulting width at sea level would be 640 feet, or more. The comparatively small cross-section suggested for the impervious portion of each of the Pacific dams is permissible only if it is reinforced by wide and heavy rock embankments on both sides. . . . On account of the nature of the bottom on which this rock fill will be deposited for the dams on the Pacific side, it should extend a long distance outside of the impervious portion in accordance with the principle adopted for the La Boca dam by the minority of the Board of Consulting Engineers in 1905-1906, of spreading the base on soft bottoms so that the change in weight imposed on the foundations from the toe towards the crown will be gradual. This protection at the Sosa-Corozal and La Boca dams may be given great width with economy since they will afford convenient dumps for the Culebra material."

To construct the dams in accordance with these views trestles were built along the toes of the Sosa-Corozal dam, from which to dump material from the Culebra cut. The trestles failed, after the dumping of material from them began, and the material overlying the rock moved laterally carrying the superimposed mass with it, the dumps flattening out until the side slopes were about 1 on 12 and even less. In places, this lateral motion continued for two weeks after dumping had stopped. The ground on either side of, and at some distance from the dump was forced up forming mounds of mud, the crests of which gradually approached the level of the top of the dump proper. After an equilibrium was established between the dump and the adjacent mounds, the hump or wave would again move out when the track was shifted towards it, accompanied by a sudden vertical

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settling of the track of six to ten feet when loaded trains were applied. It was thought that if the trestle was lower, better results might be obtained, but with the west trestle only eight feet above the surface of the ground and the piles driven to rock, similar failures followed.

When the difficulties on the east trestle developed, an investigation by borings and test pits was made to determine the character of the material overlying the rock. It was found to be for the greater part of an unctuous blue clay without grit, possessing but little supporting power, instead of stiff clay as indicated on existing profiles.

The investigations clearly demonstrate that the construction of dams which would remain in place after the lake is filled can be accomplished only by the removal of all material overlying the rock, and after preparation of the rock surface, by building the dams of selected material. The depth to which the material would have to be removed is from 10 to 70 feet, and suitable material for dam construction would have to be transported to the site. Investigations of the foundations of the Sosa-San Juan dam show that the material is the same; the difficulties to be encountered will be greater because of the river.

It is estimated that the cost of building the two dams following the plan that the investigations and work done indicate as necessary will be about \$11,573,800. The estimate submitted by the minority of the Board of Consulting Engineers for these dams is \$4,314,000, a difference of \$7,259,800. As this difference to secure stability

is excessive, an examination of the canal route from Pedro Miguel to the Pacific was undertaken to ascertain if more suitable places for the locks and dams could be found. In making these examinations care was taken to secure samples of the materials to be encountered at various depths, and cores procured of the rock. A careful study was made of all data obtained and four possible projects present themselves for constructing that portion of the canal extending from the south end of Culebra cut to deep water in the Pacific Ocean.

First Project.—This is the present project and consists of one lock at Pedro Miguel and two at La Boca, with dams of suitable material on rock. The estimates submitted by the Board of Consulting Engineers are corrected to conform to methods, quantities and unit prices that additional information and experience show will give more nearly the actual cost of the work. The project provides a 500 foot channel from Pedro Miguel to Miraflores, a 1,000 foot channel through Sosa Lake to La Boca, and a 500 foot channel from La Boca locks to deep water.

Second Project.—Two locks at Pedro Miguel and one at Miraflores, with a 500 foot channel through the lake from Pedro Miguel to Miraflores, and a 500 channel from Miraflores locks to deep water in the Pacific Ocean.

Third Project.—One lock at Pedro Miguel, and two at Miraflores with a 500 foot channel through the lake from Pedro Miguel to Miraflores, and a 500 foot channel from Miraflores locks to deep water in the Pacific Ocean. In this and Project No. 2, provision is made for diverting the waters of the Rio Grande and the Corundu and the Cocoli Rivers, as well as for a channel of uniform width to the sea, having no connection with any other tidal basin; as a consequence the currents in the channel will result only from the tidal flow and will not attain a velocity as great as one foot a second, which will not interfere with navigation.

Fourth Project.—One lock at Pedro Miguel, one at Miraflores, and one at La Boca, with 500 foot channels between locks and to deep water in the Pacific.

In each case locks and dams are on rock foundations. Assuming that inverters are used, the total cost of the various projects are as follows:—

Project No. 1.	\$58,395,540.
Project No. 2.	58,467,048.
Project No. 3.	50,927,268.
Project No. 4.	66,690,618.

From the foregoing it is seen that Project No. 3, one-lock at Pedro Miguel and two at Miraflores is the most economical. It has the advantage over the present project in that the dams of lower height, less length and resting on rock comparatively near the surface can be more easily constructed, and completed at an earlier date. It is to be preferred to Project No. 1 by reason of the fact that the location of the locks secures them against all possibility of distant bombardment and affords them greater security against gunboat or torpedo boat attack.

The Commission unanimously recommends the adoption of Project No. 3, and its substitution for the existing project."

The President approved Project No. 3 on December 20, 1907.

The two new locks at Miraflores will be built diagonally across the Rio Grande valley, connecting on the east with the hills at Miraflores and on the west with Cocoli Hill by short dams founded on rock. Recent investigations have shown that there exists a suitable foundation at the new location for the locks and dams contemplated. The locks lie directly across the valley and almost eliminate the question of dams, the upper end of the locks being so close to the Miraflores hills and the lower end so close to Cocoli Hill that the gaps can be closed by very short dams founded on rock. Under this plan there will be vir-

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tually no Sosa lake, as it provides for only about a mile of lake navigation between Pedro Miguel and Miraflores. From Cocoli Hill to deep water in the Pacific a sea level canal is contemplated 500 feet wide. The locks and dams will lie immediately behind high hills, thus being effectively protected from hostile operations from the bay.

The Contract Phase of Canal Work.

On January 12, 1907, bids were opened for the construction of the canal by contract. The proposal of the Oliver-Bangs syndicate was the lowest, but on the ground that the specifications were not fully complied with, this and all other bids were rejected. The report of the Commission for 1907 comes out flat-footed against letting any of the work out by contract, and advances a number of arguments why the United States should continue the undertaking in the same manner as at present. When Col. Goethals first took charge of the work, he was re-

quested by the President to make a report relative to contract work after he had been on the Isthmus a sufficient time to form an opinion. The report says in part:—

“The Panama canal presents a piece of work unprecedented in magnitude, which must be done under conditions entirely different from similar classes of work in the United States. The work naturally divides itself into dredging, dry excavation, the construction of the locks and dams, and the construction of the new Panama Railroad. There is no contractor, or syndicate of contractors that by any combination could bring to the Isthmus an organization ready for team work on any of these units. From the United States the supply of labor is the same whether the work be done by contract or by the Government, and the character of the labor must be the same. So long as work is plentiful the dread of the tropics will deter men from seeking work here in preference, and this is equally applicable to the contractor and the Government. An adequate supply of labor from the United States is not possible. The records here show that no contractor can even attempt to recruit labor in the West Indies, and that great opposition will develop to any recruiting by authorized agents of the Commission if the labor procured is turned over to the contractors. These island governments cannot be blamed for their hostility toward the latter, because of their experience under the French, which left an indelible impression throughout the islands.”

“Conditions on the Isthmus are peculiar. It is contended, apparently on reasonable grounds, that service in the tropics saps the energy and that a man is incapable, after a time, of performing the same amount of work that he would be able to accomplish had he spent the same period in a cooler climate. This creates a desire to accumulate sufficient means to avoid the necessity of relatively harder work on the return to the United States, and it is a question that the contractor would be obliged to face, as well as the United States. The wage scale on the



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Isthmus is practically adopted and a contractor would be obliged to maintain it."

"The excavation of the Culebra division has already been undertaken by hired labor; practically all of the plant required for this work has been secured and paid for; a complete and thoroughly efficient organization for the same has been built up, and the Government is not hampered in any way in procuring the necessary labor for filling vacancies that arise. The Government has on hand, or under contract, all the dredges that will be needed for excavating such parts of the canal prism as can be most economically performed by this class of machinery. The success of lock construction depends largely upon the quality of cement used, and there is no question but that the Government should furnish all the cement. No contractor, or association of contractors possesses the necessary plant for handling the enormous quantities of concrete required for these structures. Subsequent to the construction of the locks the contractor could have no further use for the machinery installed, even if the payment of freight for its return to the States was warranted. The gates and operating machinery, it is believed, can best be constructed by contract at the proper time."

"No account has been taken of the question of sanitation, one very important to the successful prosecution and completion of the work on the canal. Proper sanitation can be maintained more easily and satisfactorily with the Government in supreme control of the work, than with the contractor. The relative advantages of the contract system versus hired labor under Government supervision are very different to-day from what they were two years ago. To one familiar with conditions on the Isthmus there can be no doubt at this stage of the work as to the advisability of continuing it with hired labor."

"It is estimated that 80 per cent. of the entire plant needed for the construction of the canal has been purchased or contracted for. Machine shops have been erected

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and equipped for making all needed repairs to machinery now on hand or still required for the work. So far, therefore as the plant, its care and repair are concerned, the Government is better equipped to carry on the work as advantageously and economically as any contractor. Many thousands of employes have been secured, and an effective working organization has been perfected. The employes are well sheltered and in general, well-fed; the salaries paid are satisfactory and the work is progressing smoothly. A change from these favorable conditions in the method of prosecuting the work would disorganize all existing conditions and would undoubtedly increase the estimated cost and time of completing the canal. The conclusion that the work can be done better, cheaper, and more quickly by the Government has been reached only after free and full discussion by the various members of the Commission and the higher officials connected with the construction work, and after careful consideration of all sides of the proposition."

Record of Excavation to Jan. 1, 1908.

The following table will show amount of excavation done since the canal has been in American hands; also, amount yet remaining to be excavated, as of January 1, 1908:—

Amount excavated under American control:	CUBIC YARDS
In Culebra Division (canal prism) to January 1, 1908.....	13,037,847
Total excavation at all points under American control to Jan. 1, 1908	22,755,291
Total excavation by the French at all points and including diversion channel..... about	81,548,000
Total estimated excavation required April 1, 1907 for an 85-foot level canal:	
In Canal prism.....	101,050,000
On lock sites.....	7,965,000
For regulating works and diversion channel.....	2,150,000
Dredging in old Channel; Cristobal to Gatun, to open construction channel; and at Panama, to keep channel open to La Boca	3,350,000
Total.....	114,515,000

Canal Finances to July 1, 1907.

EXPENDITURES.

Construction of Canal.....	\$29,782,682.60	
Buildings.....	5,962,384.90	
Panama waterworks, sewers and paving.....	1,217,445.52	
Colon waterworks, sewers and paving.....	763,302.30	
Panama Railroad advances.....	1,826,683.50	
Total construction and engineering.....		\$39,452,498.82
Government of the Canal Zone.....	1,431,151.71	
Buildings.....	388,101.40	
Zone highways.....	499,023.70	
Total civil government.....		2,318,276.81
Sanitation and hospitals.....	4,799,642.04	
Buildings.....	750,565.96	
Total sanitation.....		5,550,208.00
Loans to Panama Railroad.....	1,631,257.34	
Purchase of Panama Railroad stock.....	157,118.24	
Purchase of Santa Rosa and Tivoli Hill property:.....	56,882.96	
Balance due by laborers for their transportation.....	210,664.45	

Bills rendered against Panama Railroad and others, but uncollected	466,988.52	
Collections from individuals and companies remitted to United States Treasurer as miscellaneous receipts..	1,949,699.91	
Labor furnished and material sold to Panama Railroad, the Republic of Panama, Commission employes, and other allied interests	1,950,852.28	
Cash and uncollected bills at various hospitals.....	2,312.71	

Total miscellaneous.....	6,422,906.41	
Less....		
Amount due individuals and companies for claims allowed but not paid on this date.. \$ 505,375.18		
Amounts unpaid on pay-rolls.....	1,431,746.21	
June rolls	\$1,290,419.14	
Prior months.....	141,327.07	
Total amount of collections made and bills rendered and included in expenditures which have been, or will be deposited in the U. S. Treasury as miscellaneous receipts	2,873,146.63	
Value of French material charged to the work or sold to individuals and companies which has been credited to purchase price of Canal.....	648,511.65	5,438,779.67

Net miscellaneous		964,126.74

Total expenditures		48,285,116.37
Balance available July 1, 1907.....		31,323,458.21

Total		\$79,008,568.58

In August, 1907, the Chief Engineer advised the Secretary of War that construction work for the fiscal year ending June 30, 1908 was proceeding faster than contemplated, resulting in increased expenditures for labor and material. He estimated that additional funds to the amount of \$8,000,000 would be required in order to keep up the same record of work for the remainder of the period. On August 26, the President approved the request. An appropriation of \$33,183,143 has been asked for the fiscal year ending June 30, 1909.

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Labor on the Canal.

Up to June 30, 1906 most of the labor on the canal was drawn from the West Indian peoples. The Commission's report for that year states: "Another year's experience from nearby tropical islands and countries has convinced the Commission of the impossibility of doing satisfactory work with them. Not only do they seem to be disqualified by lack of actual vitality, but their disposition to labor seems to be as frail as their bodily strength. Few of them are steady workers. The majority of them work just long enough to get money to supply their actual bodily necessities, with the result that while the Commission is quartering and caring for about 25,000 men, the daily effective force is many thousands less. Many of them settle in the jungle, building little shacks, raising enough to keep them alive, and working only a day or two occasionally, as they see fit. In this way, by getting away from the Commission's quarters, practical control over them is lost, and it becomes very difficult for foremen to calculate on keeping their gangs filled."

"The experiment with laborers from northern Spain has proved very satisfactory. Their efficiency is not only more than double that of the negroes, but they stand the climate much better. They have malaria in about the same degree as the white Americans, but not at all to the extent that the negroes have it. Their general condition is about as good as it was at their homes in Spain. The chief engineer is convinced by this experiment that an white man so-called, under the same conditions, will stand the climate on the Isthmus very much better than the

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negroes, who are supposed to be immune from practically everything, but who, as a matter of fact, are subject to almost everything."

The Department of Labor, Quarters & Subsistence in charge of Mr. Jackson Smith (a member of the Commission), as Manager, attends to the securing of all skilled and unskilled labor and its assignment, according to the needs of the work. Recruiting agents have been maintained at Barbados, and Martinique, and a representative kept at Paris to keep in touch with European labor conditions and with European emigration. On June 30, 1906, there were on the canal work 500 Europeans and 13,825 West Indians. On June 30, 1907, there were 4,317 Europeans and 14,606 West Indians, a large increase in the "gallego", or European labor, but only a small increase in the negro labor. To maintain this force of laborers, and also to provide the Panama Railroad with a force of 5,000 laborers, 6,899 Europeans and 10,947 West Indians were

brought to the Isthmus during the fiscal year ending June 30, 1907, an average of nearly 1500 men per month.

The total force of skilled and unskilled laborers of the Isthmian Canal Commission and Panama Railroad on June 30, 1906, was 19,600, and June 30, 1907, it was 29,446, an increase of about 10,000 men. During this period 20,884 men were brought to the Isthmus by the Commission from all parts. At the end of October, 1907, the grand total of men employed in all branches was 32,054, the largest force ever on the canal pay roll since the inauguration of the work in 1880. At the present time the force in some smaller, owing to completion of work and reduction of forces in some of the departments.

The Commission's report for 1907 states: "The labor problem is still an unsolved one, but the experiments of the past year with a diversity of races and nationalities has improved the efficiency of the force and promises to make the term of service longer. Tropical labor is migratory, and notwithstanding superior wages, housing and subsistence, there will always be large periodical changes in the individual force. A regular recruiting organization, changed from one labor center to another, will always be necessary to keep a maximum force available."

Feeding the Canal Army.

At the close of the fiscal year, 15 hotels were operated for white Americans, the price per meal being 30 cents. This does not include the Hotel Tivoli, where on account of superior accommodations, higher rates prevail. Eighteen mess halls are operated for Europeans where a day's board is furnished for 40 cents. The stewards and cooks at these messes are usually Europeans and food to which these laborers are accustomed, is served. There are 23 kitchens for West Indian laborers where a day's board is supplied for the sum of 30 cents, and prepared by cooks of their own nationality. The subsistence operations are designed to be only self-sustaining.

The income from hotels during the fiscal year ending June 30, 1907, amounted to \$492,694.40; expenditures, \$475,967.54, leaving a net profit after deducting an item of \$3,755.32 charged to loss account, of \$12,971.54. The Washington showed a loss during the year of \$820.34, and the Hotel Tivoli, a loss of \$6,667.32 since January 1, 1907. The income from kitchens amounted to \$525,632.74; expenditures, \$466,247.30, a net profit of \$59,385.44. The average number of meals served during one month was about 1,000,000.

The report of quarters for all classes of employes shows the following: Houses for skilled married employes, 537; houses for skilled bachelor employes, 223; houses for unskilled married employes, 329; houses for unskilled bachelor employes, 528; hotels, 16; mess halls, 19; kitchens, 55; miscellaneous, including offices, club houses, etc., 501, a grand total of 2208.

Redemption of the Isthmus.

In a sketch on Panama, a noted encyclopaedia a few years back made the unqualified statement that "the climate is such that no white man can live there." Everything hygienically evil about the Isthmus has hitherto been charged against the climate. Yellow fever, malaria, and a half-dozen lesser ills formerly common to the isthmian country have all been charged to that same disreputable (?) climate. We, of this day and generation however, have come to know better. The sanitary showing made on the Isthmus since the canal has been in American hands has well nigh disproven all previous surmises, doubts and fears.

The history of the French companies goes to show that in a hygienic way they placed no credence in the well known maxim that "An ounce of prevention is worth a pound of cure." They took care of their sick in a commendable manner after disease had stricken them down, but they made not the slightest provision for preventing sickness.

UNIVERSAL BAR.

JOSE PADROS, Proprietor.

In front of Panama Railroad Station, Colon, Republic of Panama.

DIRECT IMPORTER OF THE HIGHEST GRADES OF WINES, LIQUORS,
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At that period it must be said that the mosquito theory relative to the spread of yellow fever and malaria had not become an accepted fact. The inroads made by yellow fever in the ranks of the French employes was taken as the workings of the hand of fate and accepted philosophically. No attention was paid to draining stagnant pools and low places; no safeguard was thrown about dwelling-places of employes in the way of screening; anyone suggesting fumigation would have been laughed to scorn.

The administrative heads of canal affairs under American control foresaw that the first move on the board in order to insure success must be the cleaning up of the canal strip and the cities of Panama and Colon. It therefore behooved them to exercise careful judgment in the selection of a man to put at the head of this important line of operations. That selection resulted in the sending to the Isthmus of "the man who has made good", Col. W. C. Gorgas, who had acquired valuable experience in the Cuban sanitary campaign.

When the sanitary forces first lined up on the Isthmus in 1904, it didn't look such a difficult task. From May to December there were only a few sporadic cases of yellow fever and these were quickly squelched. It looked as if Yellow Jack was going to capitulate his fortress without opposition. But as the employes began streaming to the Isthmus furnishing abundance of suitable raw material for voracious members of the anopheles and stegomyia tribes, a battle royal was begun. And it was a battle

royal. From March to September 1905, the commonest sight on the streets of Panama was some detachment of the fumigation brigade. The city was fumigated in sections once, then again, yet again, and in the fourth and supreme effort there was a general fumigation over the entire city at the same time. Tons upon tons of paper went to plaster up the crevices in the walls of houses, and some of the crevices in some of the houses would easily have admitted the historic barn door. The fumes of sulphur and pyrethrum were in constant ascent to the upper air, while all around a Pelee-like aspect prevailed. Those were trying days to the householder. He'd barely recovered from his last dose before men with ladders, buckets and rolls of paper were again besieging his premises.

It was a nip and tuck battle for three or four months in 1905. At one time the outcome might be said to have looked dubious, but the leader of the sanitary forces never wavered in his belief in his theory, and the contest went steadily on. At last toward the end of 1905, results began to be apparent. Sources of infection were destroyed, and on November 11 of that year occurred the last case of yellow fever in Panama. The last case in Colon was reported on May 17, 1906.

The Department of Sanitation of today has a magnificently equipped plant, ramified into every part of the Zone. The two main hospitals at Ancon and Colon are fortified by line hospitals at all the principal settlements along the canal route. In addition, at all these points a dispensary, district physician and sanitary inspection force is maintained. When the writer passed over the railroad early in 1904, the jungle reigned supreme at nearly all the little settlements built up by the French. Now one sees only well-ordered villages with the brush and grass cut away from around them; drainage ditches running in every direction, sidewalks, and in some cases electric lights.

Up to 1907 the lepers and insane were housed at Miraflores, a station on the railroad about six miles from

Panama. During this year the insane were removed to new quarters on the Ancon Hospital site, and the lepers have been segregated at Palo Seco, a point on the bay, west of La Boca. Ancon Hospital possesses a finely-equipped laboratory and all other facilities required for an up-to-date hospital.

The convalescents are nursed back to complete health at Taboga Sanitarium, an institution on Taboga island founded by the French, and afterwards remodeled and enlarged by the Commission. There are two American cemeteries, one at Monkey Hill, or Mount Hope, on the Atlantic side, and the other at the foot of Ancon Hill between La Boca and the Ancon Hospital buildings. The sick are carried in either direction on the railroad each day in hospital cars.

Figures are often dry, but occasionally they are eloquent and speak for themselves. In October, 1884 when the French had 19,234 men on the Isthmus, they lost 161. In 1905, when the Commission and P. R. R. had 19,685 in their employ, they lost but 55. The death rate of the general population of the Canal Zone, and the cities of Panama and Colon in 1905 was 53.78 per thousand; in 1906, 49.10, and of the 1907 fiscal year, 42.08, a steady diminution in mortality, as will be observed. The total deaths from all causes among employes in 1907 numbered 1273, of which 104 were due to accident. The casualty rate was unusually large, due to an increase in the number of railroad and blasting accidents.

The negro employe death rate compared to the whites is 3 to 1. It is apparent from this that the white man stands the conditions on the Isthmus just about three times as well as the negro, a statement that would have been flatly contradicted a few years ago. The negro death rate shows a constant decrease however.

The total number of cases of yellow fever reported from May, 1904, to the last case known is 112. Out of this number, fifty were fatal. Pneumonia claims more victims