We do not want another major blockage of the canal. I do not have any pictures of the measuring instruments themselves.

We did detect the major slide, the Cucaracha slide, and the upper portion of it is moving significantly, as happens quite frequently toward the end of the dry season.

We have tried to increase the stability of the soil in that area and hold it.

Now, this is not a sure fire thing. We do not know whether this will work. It might not go any way, but this is some of the new technique to reduce the possibilities of a major slide.

Just in case any one thinks slides are something that happened way back in the time of who knows when, this one happened here just last September. We want to make sure we do everything so as to avoid them.

Now, the last major operation was the cut widening, the last major area of engineering improvement in the canal.

With the cut widening out of the way we started to look then at the problem of local water for the canal. As you know, every transit from every lockage takes 32-million gallons of water, and there is just so much fresh water available in Gatun Lake.

During the rainy season when we have plenty of water, we can permit a draft of 39-feet, 6-inches, which is ample for most of the ships.

As the dry season comes and the water is used for lockage purposes, and the lakes go down, we get down to 37 feet or lower. It has always been our goal to hold 37 feet, and the board of directors watch this.

If we cannot hold 37 feet, we are not going to hold customers. We would like to hold more than that. That has been a minimum that we would like to get.

Now, no 2 years are alike. In exceedingly dry years we may go lower than that, and may have to go below 37 feet.

We started studying this in more detail, 2 years ago and realized in the critical portions of the cut, if we took out 1 or 2 feet above the original project depth there were some areas we could eliminate with a small amount of work.

The canal was originally authorized to be dredged so the bottom of the canal was 40 feet above sea level. The 40 feet is represented by the black line across there. It was dug deeper in many locations, but in some cases they never quite got it.

In the course of events, several things happen. Rocks roll in, debris gets shifted at the bottom of the canal, as larger ships go through, with the larger screws on them, they churn up a lot more mud, and occasionally something pops up from the bottom by pressure from the sides, and you get a rock showing up on the bottom of the canal, so the bottom can never be smooth and uniform. For these reasons they were never able to hold successfully a uniform bottom.

Starting 2 years ago as a part of our maintenance program we went after these high spots, using our dredge as part of our maintenance program. This year we got 1 foot more depth in the canal in March, and in about another 2 weeks we will have another foot depth, so this year we are able to take the lake down 2 feet lower than we have ever been able to take it before.

This may seem like a minor thing, but to us it is a very major thing because we have had a very, very dry year this year, and we think we

can hold 37 feet instead of 35 feet. This will tide us over for the next couple of years.

The next thing we are going to have to do is to come into the Congress through the Appropriations Committee, to start deepening this channel.

We can take this down another 6 feet but we are going to need to deepen the channel and the lake as a whole so we can store enough water to continue with the lockage program.

As part of the overview of the canal operations, this is the most critical aspect of being able to keep the canal running the rest of the century.

After we get the canal deepened, then probably the next step is going to be to raise the lake level 5 feet to store more water, and if that does not give us enough, we are either going to have sea water come back into the lake or make some sort of arrangement with Panama to permit additional dams and impoundments.

Deepening the cut and adding 5 feet to the lake level by building up Lake Gatun Dam on the local structures will probably take us to the end of the century. We are not worried about this problem. We can handle it within reasonable expenditures, but it is the one that takes our most important planning.

The CHAIRMAN. May I ask this?

When you mentioned before that the one large ship replacing five others because of the capacity, does it take more water for the transit of one large ship than it would for smaller ships?

General PARKER. No. Surprising enough, it does not.

That question is asked many times. You can take a match stick for the same amount of water as a battleship because the water used in a transit or operation does not come from the top part of the lock but the bottom 30 feet of the lock that is used. That water flows out to sea from the tunnels. It is not the water in the lock that accompanies the ship that goes through. We save water that way.

The CHAIRMAN. Governor, I hate to tear myself away from this. I am going to turn the meeting over to the subcommittee chairman, Mr. Leggett.

I had a few questions to ask but I will put them into the transcript and you can answer them at a later time.

I want to thank all of you for coming. Again I am sorry it had to be on a Friday afternoon, but I think the little we have heard has been most helpful.

You know we are here any time if you need some kind of help.

If you will excuse me, I will turn this over to Mr. Leggett.

[The questions of Mrs. Sullivan follow:]

QUESTIONS BY MRS. SULLIVAN AND ANSWERS BY GOVERNOR PARKER

Question. Is it not true that containers stacked on the deck of containerships are not assessed tolls by the Panama Canal Company for transiting the Canal?

Is this a substantial loss of revenue?

Is there need of a study for a toll increase—the Panama Canal Company did do or have a study made—is that sufficient for a decision of whether or not a toll increase is needed?

Answer. Cargo stowed on deck, whether in containers or not, is not charged tolls. If tolls were assessed on deck cargo, a rather difficult procedure under the present measuring system, it has been estimated that an additional one or two million dollars would be realized. This is not a substantial amount.

The study referred to was contained in a report entitled "Report on Development and Evaluation of Tolls Policies and Alternative Systems," a copy of which is in the committee's files. This study analyzes various systems, including the Universal Measurement System, and the impact of various levels of increase on traffic, etc., if a tolls change were made. Any change is a very complex undertaking. The study did not analyze costs to be recovered through toll rates as would be essential to determine if a change in rates were necessary. Therefore it would not be used for a decision as to whether or not to increase tolls.

Question. What are your views on the proposed Third Locks Project?

Answer. As you know, such a project was started in 1939 prior to World War II in order to reduce vulnerability to attack. The United States spent about $75 million dollars and made rather substantial excavations on both sides of the Canal. However, this work was stopped early in World War II when it appeared that it could not be completed in time to be of assistance to the war effort. Such locks could be built to dimensions say, of 140 feet in width and 1200 feet in length, and would accommodate much larger ships than those that can use the present Canal. They would not be able to accommodate aircraft carriers the size of those in the U.S. Navy, nor would they be able to take the large tankers which have been built in recent years. Their addition would increase capacity by about 10,000 ships per year.

There are some advantages to such a project, again from an engineering point of view. It would cost considerably less than a sea level canal. Navigation through such canal would be relatively simple because it would make use of the existing Gatun Lake, avoiding the currents and initially narrow channel of a sea level canal. It would not alter materially the ecology of the area, Gatun Lake would be retained in its present form, and there would be a barrier to the movement of biota from one ocean to another.

However, there are several disadvantages to such a canal. There is an upper limit to lock size so that some ships, including carriers, will be unable to go through. Equally important, such an addition to the present Canal would require a major increase in the water supply for lockage purposes. Large, new impoundments would be necessary or there would be a requirement to pump sea water into the lake in order to accommodate the additional traffic. Further, although it would increase capacity to about 35,000 transits per year, it too eventually would reach saturation.

Question. What impact would there be on the operating of the Canal if the minimum wage is raised?

Answer. As you are aware the Fair Labor Standards Act is geographically applicable to the Canal Zone. Prior to 1966 its minimum wage requirements covered only employees of construction contractors and of certain of the few private business establishments located in the Canal Zone, such as banks and shipping agents. Under Public Law 89-601 (enacted September 23, 1966) the FLSA was amended to extend minimum wage coverage to employees of Federal agencies operating in the Canal Zone and to personnel of nonappropriated fund activities under the Armed Forces.

The application of the minimum wage to Federal workers in the Canal Zone in 1966 had a substantial impact on employment practices of the Canal agencies. Up to that time, the wage rates for positions at the lower skill levels for which there is adequate labor supply available in the Republic of Panama were fixed on a local wage base. For higher skilled workers in positions for which recruitment is necessary, at least in part, from the United States, rates of compensation applicable to Federal employment in the continental United States have been used. Congress has expressly sanctioned such a wage plan in the enactment of section 144 of Title 2, Canal Zone Code, 76A Stat. 17, which authorizes the head of each Federal agency here to fix basic compensation in relation either to United States rates or to wages paid in areas outside the country as designated in regulations issued under authority of the President.

Since the effective date of the 1966 FLSA amendments, the use of a local wage base has been continued, but its lowest rates have been fixed at the minimum wage prescribed under the FLSA. The result has been that the pay for workers in those jobs for which there is local recruitment has been artificially held above the local wage base that otherwise would have been applicable under the statutory wage system prescribed for the Canal Zone under 2 C.Z.C. § 144.

At the present time there are approximately 9,100 employees in the Canal Zone subject to the Act. Of this number, about 6,800 are U.S. Government personnel in the wage board category or employed by nonappropriated fund activities. The remainder are the privately employed workers referred to above, who for the most part were subject to the FLSA prior to the 1966 amendments.

In order to eliminate the disparity between Federal employees entitled to the FLSA minimum and others in occupations not subject to the Act, the U.S. Government agencies administratively established a minimum wage of $1.60 an hour for all excluded employees. For that reason all Federal workers in the Canal Zone now receive no less than $1.60 an hour.

The legal minimum wage for urban employment in the adjacent labor market in Panama ranges from 50 to 70 cents an hour. A further increase in the Canal Zone minimum wage would, of course, widen the already substantial gap between the legal wage floor in Panama as opposed to the Canal Zone minimum. The anomaly is an obvious one because most of the employees in the Canal Zone who would be affected by a change in the minimum wage reside in, and are nationals of, the Republic of Panama. Present wage levels provide more than an adequate number of applicants for employment in the Canal Zone. The higher minimum does not appear justifiable on the basis of economic need, social policy, or sound personnel practice.

One obvious effect of a law establishing a minimum that is three times the prevailing wage in the Republic of Panama is uneconomical operation by the Canal agencies and the military components. The proposed legislation would have a significant effect on the U.S. military forces in the Canal Zone. The competitive position of open messes would be adversely affected, the activity of special services would be curtailed, and post exchange payrolls would be substantially increased. The effect on special services and on the competitive position of the open messes would be to cause a greater number of U.S. servicemen to seek food and entertainment in Panama rather than to remain on the military posts. A more significant result would be the loss of jobs by Panamanian nationals who work in these service activities in the Canal Zone. The delicate relations with the present Panamanian Government could be disrupted by the reduction in force that application of the increase here would require.

The cost impact of H.R. 4757 would be greater on the Panama Canal Company and the Canal Zone Government because of the large number of Panamanians in semi-skilled positions. At current employment levels, the annual increase in cost would be $6 million for the two Canal agencies if the minimum wage goes from $1.60 to $2.20 per hour. The expense of Canal operations, a principal part of which is labor cost, is expected in the near future to exceed income from tolls. It is evident, therefore, that a $6 million increase in labor costs that would result from an increase in the minimum wage would substantially contribute to the pressure for an upward revision in tolls, since the waterway is required to be self-sustaining.

The Canal Zone is the only foreign area in which the U.S. Government pays local nationals a wage equal to the minimum in the United States rather than one based on prevailing rates in the local economy. Continuation of the present policy in the Canal Zone with the adoption of the higher rates could place in jeopardy the practice of using wage scales conforming to locality rates in other foreign areas.

A second area of concern is the proposed extension of minimum wage coverage to domestic service employees. The inclusion of the nearly 7,000 domestics in the Canal Zone in the proposed legislation is considered to be most unwise. The present minimum wage for domestics in the Republic of Panama is $40.00 per month. The requirement to pay a $2.20 minimum wage to domestics working in the Canal Zone, or even a $1.60 minimum for that matter, would create a situation where Canal Zone domestics would be working under a minimum wage scale that is almost 10 times higher than the minimum wage for comparable work in the adjacent urban areas of Panama. The use of domestics, most of whom are already paid above the Panama scale, enables dependents of U.S. Government employees and military personnel to be employed in regular Government positions and, thereby, reduces the need for additional recruitment and housing of U.S. nationals. Many positions which cannot be filled from the local labor market, such as nurses and school teachers, are filled in this way. If the cost of employing domestics is raised substantially, it is expected that many dependents would give up domestics and return to household duties. Such an action unquestionably would result in markedly higher U.S. Government recruitment expenses while at the same time increasing unemployment in Panama.

Another important consideration is that the minimum wage in the Canal Zone is one of the subjects being considered in treaty negotiations now in progress between the United States and Panama. It would not appear to be in the best interests of the United States to increase the statutory obligation for

a fixed level of compensation when the conditions under which the Canal enterprise operates may undergo substantive change.

Question. How do you view prospects for less anti-U.S. rhetoric in Panamanian media?

Answer. This is a difficult question for me to answer in my capacity as Governor of the Canal Zone. As you are aware, the Panamanian media has from time to time been critical of U.S. policies with respect to the Canal Zone, with the tempo increasing on specific occasions as was the case during the recent U.S. Security Council Meeting in Panama. Rhetoric of this type is disruptive to the operation of the Canal as it cannot fail to impact on the morale of our employees whether they be U.S. or Panamanian citizens. Any further comment on this matter would be entirely speculative, and more appropriately should be addressed by the Department of State.

Question. What is your responsibility in regard to defense of the Canal Zone?

Answer. I have all of the normal responsibilities associated with the maintenance of civil law and order within the Canal Zone. In addition, I am charged by Executive order for the security of shipping passing through the Canal. The actual military defense of the canal is the responsibility of the military.

Under the Canal Zone Code, I am authorized to call upon the Commander of the Armed Forces of the United States in the Canal Zone for military assistance whenever I deem that assistance necessary to protect the Canal Zone or to preserve the peace.

Question. Could you briefly give me your opinion as to the advisability of increasing tolls and what is the point at which such a tolls increase would commence producing negative results?

Answer. Tolls would only be increased if costs to be recovered by law exceeded revenue estimates. The study made in 1969 indicated that a 25% increase in rates would produce approximately 19% more revenue. An increase of that magnitude today would probably produce a higher level of revenue because the revaluation of the dollar which has reduced the sensitivity of traffic to an increase in toll rates.

Question. Since your costs and revenues are delicately balanced, what would be the effect of a shut-down on the canal for more than a month?

Answer. A closing of the canal for a period in excess of a month would be very serious. One, it would have a very dramatic impact on world shipping and cause a change in shipping patterns that would be expensive to the shippers. Two, the canal of course would lose its principle source of revenue, we would have to stop all capital projects to conserve cash, the great percent of our operating expenses would continue because of our remote location. If the closure extended into a prolonged period, funding assistance from the Congress would be necessary.

Question. Are there any new training schools in Panama to train and educate their citizens for clerical or technical work needed by the Panama Canal Company.

Answer. Panama has some good schools that specialize in clerical fields, principally typing, stenography, and bookkeeping.

Mr. LEGGETT [presiding]. Thank you very much, Madam Chairman.

We are indebted for the vast expertise the chairman has had in the Panama Canal matter, and she is now chairing the full committee.

Why not just proceed, Governor? We will try to get along with her absence.

General PARKER. I have actually gotten through the major portion of this. I think there is one other engineering feature of the canal which is worthy of mentioning as an overview of the canal and its engineering.

We talked about outages to the canal. Our concern is to keep the canal open as much of the time as possible. If you turn the clock back 20 years, in those days it was necessary to take a lane of the locks every year for overhaul, and this meant for about 2 months every year the canal had one-way traffic through the lock.

Through the years, by a series of unspectacular engineering achievements, because they are not noticeable to the casual visitor, a number of things have been done so that we no longer have to take the water out of the locks to overhaul our valves and gates.

This is made possible because the people who built this canal, who were looking a long way ahead, put in about every protective feature that they could think of and gave us two sets of lock gates for every gate. This means that we can take one set of lock gates out and overhaul it in dry while we leave another to operate. This is what we do today.

We do not overhaul these gates at the locks any more but down in our drydocks. I will not go into it unless you desire to pursue it, the rather complicated things that have been done in blocking off the valves and flow of water into the chambers which also permits us to overhaul the locks while traffic is moving on both sides of the lock without interruption.

This is a dramatic improvement that one does not see, but these studies, engineering changes at the locks themselves have done more to increase the capacity of the Panama Canal than anything else that has been done.

Over 20 years, the rate of capacity of the canal has been increased by the things that have been done, that have cut down the overhaul time.

President Nixon made a special award to the management engineers who worked on this project through the years. We are still working on the program. The details of this would be in the record and we can discuss them with you at some later time.

Mr. Chairman, I bring this up because I feel it is something not realized by many visitors to the canal, and one that has had more to do with canal capacity than anything else.

If I may briefly just speak about our pier operations for a particular purpose.

The piers we operate at Balboa and Cristobal are essential to the economy of Panama. It has been our policy of recent years to operate these ports in such a way as to bring the maximum possible benefit into Panama; that is, while our major responsibility is taking ships through the canal, if there is some way, by something at the piers, we can attract more traffic to Panama and more business to Panama, we feel it is incumbent on us to invest in it or do that.

At this time, we are negotiating with Sea-Land. Sea-Land would like to have a larger container operation in Panama. It is a natural transshipment point. Our offloading facilities for containers are not rapid enough to suit Sea-Land, and we are negotiating with them to bring a large gantry crane down from the States to make the unloading operation much faster.

I think this is one of the things that will pick up considerably, or will assist the economy of Panama, and we will probably follow this with negotiations with other shipping agents.

You can see here, with a typical container ship, why the ships are interested in faster container unloading facilities.

I would like to turn to one final subject and that is the subject of the tolls.

Mr. LEGGETT. The container unloading, is that primarily for commerce with the Republic of Panama?

General PARKER. It is both right now, but the buildup we are talking about is essentially to serve transshipment containers.

Mr. LEGGETT. I see.

General PARKER. On the subject of tolls, I will cover the method of measurement for tolls purposes. Again I will quote from the 1970 presentation:

The basis for tolls is stated in the Canal Zone Code: "Tolls . . . shall be based on net-vessel tons of 100 cubic feet each of actual earning capacity . . .".

Simply, we charge tolls on the basis of the enclosed space which can be used to carry cargo and passengers. The unit of measurement is not the short ton, nor the long ton, nor the metric ton, but a measurement ton, the arbitrary assignment of the term "ton" to a certain amount of space—in this case, 100 cubic feet. It is known as the Panama Canal ton.

To determine the tonnage for tolls, the Canal takes the total enclosed space, which is called gross tonnage, and deducts the space which, according to Panama Canal rules, is used for working the ship, such as engine room, fuel tanks, and crew quarters, to arrive at the Panama Canal net tonnage. The ship then pays tolls on this tonnage—90 cents per Panama Canal ton if at all laden, even if carrying only a quarter load; 72 cents per Panama Canal ton if carrying absolutely no cargo or passengers, that is, in ballast. Nonmercantile ships, for example, warships, dredges, floating drydocks, pay 50 cents per displacement ton.

The two ships shown on this slide are typical of those that transit the Panama Canal. You will note that the POLARSTERN has a Panama Canal gross tonnage of 6,924 tons and a Panama Canal net tonnage, after exclusions, of 4,492 tons, and pays laden tolls of $4,043 and ballast tolls of $3,324. The HAR MERON has a Panama Canal gross tonnage of 30,063 tons, and a Panama Canal net tonnage, after exclusions, of 22,056 tons, and pays laden tolls of $19,850 and ballast tolls $15,800.

In a matter related to tolls, there is a worldwide movement toward the adoption of the universal tonnage measurement system (UMS) as a standard of ship measurement for purposes of charging port and canal fees.

Congress can have us go to some other policy, say make a 10 percent or lose 10 percent or charge the ships what the traffic will bear, or charge them on how much effort it is to get them through the canal.

Congress chose this particular policy, and this is the one we are following.

Mr. LEGGETT. You do not include in that the cost of amortizing the cost of the canal?

General PARKER. We have been depreciating a little over half the investment in the canal as a depreciation that goes into the cost of operation every year, $10 million of our costs.

We are adding an additional element of amortization or depreciation starting in our budget for fiscal 1974 which we will be discussing with the transportation subcommittee of House Appropriation Committee next Monday. We thought that hearing would be behind us before we appeared before you.

That will add an additional $8 million or $10 million of cost to our operating costs.

Now, the law requires us to raise tolls if, and only if we are unable to meet expenses. Since we have been able to meet expenses each year, it has not been necessary to come in with a request for tolls.

Out of the toll rate that was established back in 1914, with a change in measurement in 1938, we have been able to finance the daily operations of the canal as well as the capital improvements necessary to increase its capacity.

We have attempted to follow the desires of Congress in this regard.

Through this fiscal year, we are able to operate on a better than break-even basis, at least we are recovering our costs.

As I indicated to you in the budget for fiscal year 1974, that we are discussing with the Appropriations Committee on Monday, our operating results for the year will show a deficit in operating margin of $3 million to $4 million as nearly as we can predict right now.

As a result of that operating deficit, the Board of Directors has directed me to consider whether or not it is appropriate to proceed with a recommendation to raise tolls. We have that under study at the present time.

Mr. LEGGETT. Would this be the first time tolls were adjusted in recent history?

General PARKER. If we should come in with such a recommendation, yes.

Tolls were established in 1914. Rules of measurement were changed in 1938. There was a proposal to raise tolls in 1949. That was turned down and it was withdrawn.

If we were to do this, and I am not suggesting that we necessarily are, all I am saying is that for fiscal 1974, our cost of operation would exceed our revenues, and we are, therefore, studying whether or not we should come in with a request for toll increase.

I have a number of details here on the universal tonnage measurement system which has been under discussion in international circles for some years.

I would prefer to leave this in the record and not go into detail, but the significance of what is happening right now, within several years, we think enough nations around the world will have ratified this system so it will come into effect on a worldwide basis.

As you were advised several years ago in the last oversight presentation here, we think that this does not require that the Panama Canal tolls necessarily be changed. The Government can retain the right to use any system for measurement of tolls. We are talking about tolls measurement that it wants to have for the Panama Canal.

It is our feeling generally as a matter of principle that if we can, in fact, use this universal measurement system for Panama Canal tolls that it would be a desirable thing to do to avoid having a separate set of measurements for the Panama Canal.

We discussed this before your committee 3 years ago, and pointed out if we went to such a system, there would be a very major variation and fluctuation in what happened to the tolls for individual types of ships.

The canal must recover its cost of operations regardless of the system of determining tolls. If we went to the universal measurement system (UMS) we will recover the same costs as under the present system. However, because of the change in measurements characteristics some ships would pay more than they are now paying and some would pay less. The fluctuations are more severe under the UMS net than under the UMS gross system. If we were to change to a UMS system we would take into consideration the system with the least impact on the shipper. We are presently updating our 1969 study on UMS leading, we hope, to a firm recommendation.

There are other related factors, not just the method of measurement, but whether you go to the ad valorem system, such as charging less for coal and more for diamonds, such questions were analyzed in the 1969 presentation to this committee.

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Those questions will have to be squarely faced if we propose a toll increase, but I do not have any recommendations for a complete study on this at the present time.

I am not prepared either to offer suggestions, but I will respond to any questions that you might have on it.

Mr. LEGGETT. What page of your statement are you on?

General PARKER. Next to the last page, rather page 30.

I have gone through all the material we have on tolls in an offhand presentation. I am off of traffic and tolls and engineering on the Canal.

I wish to report on the fact that last month, we had the opportunity to prepare a presentation about the Canal for members of the U.N. Security Council when they were in Panama.

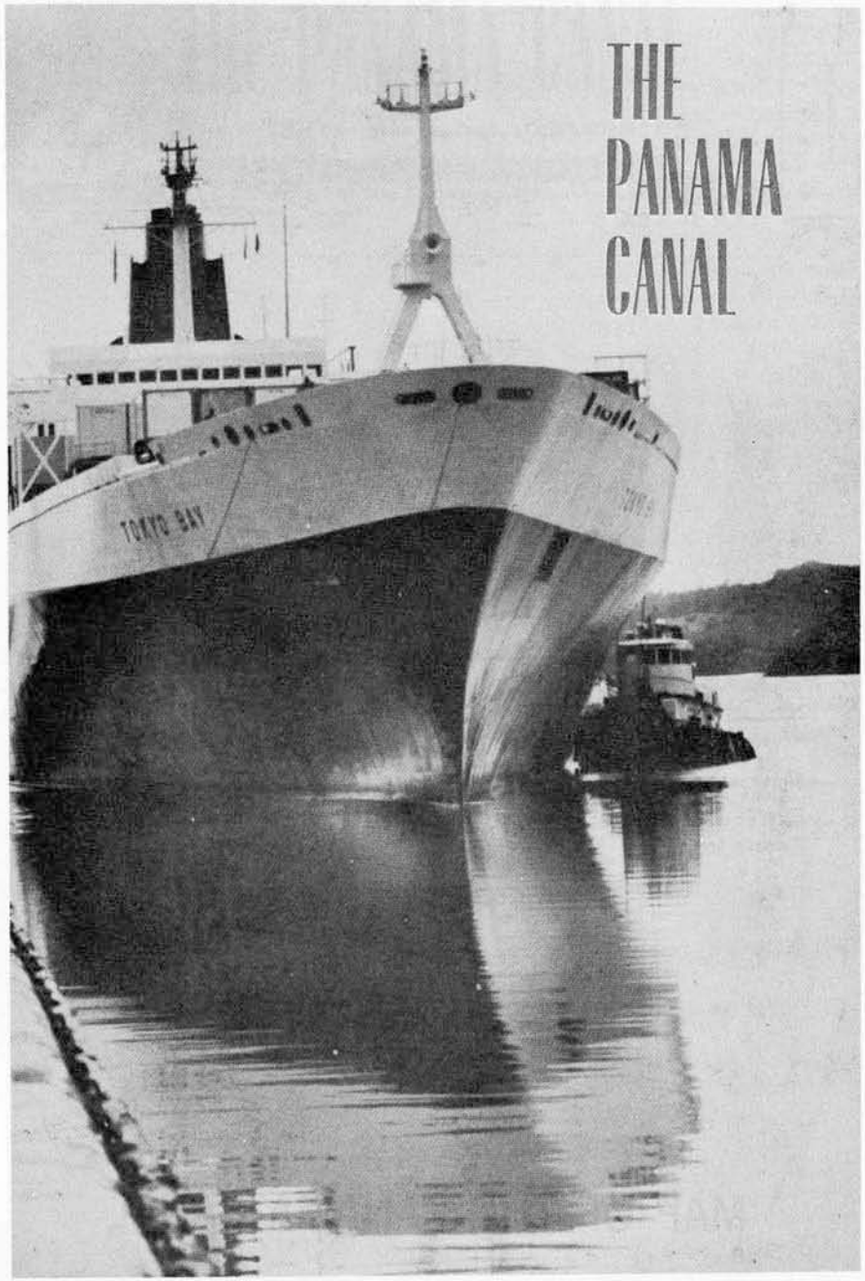
In that talk, we pointed out the Canal was far from saturation and explained some of the ways the Canal could expand capacity up to 27,000 ships a year.

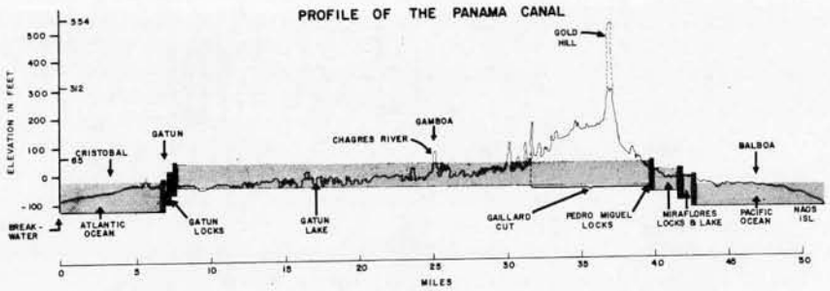
We also pointed out that should the Canal approach saturation and no alternative had materialized, such as the third locks or sea level canal, it would be possible to reduce the level of traffic or demand by raising tolls and driving traffic away.

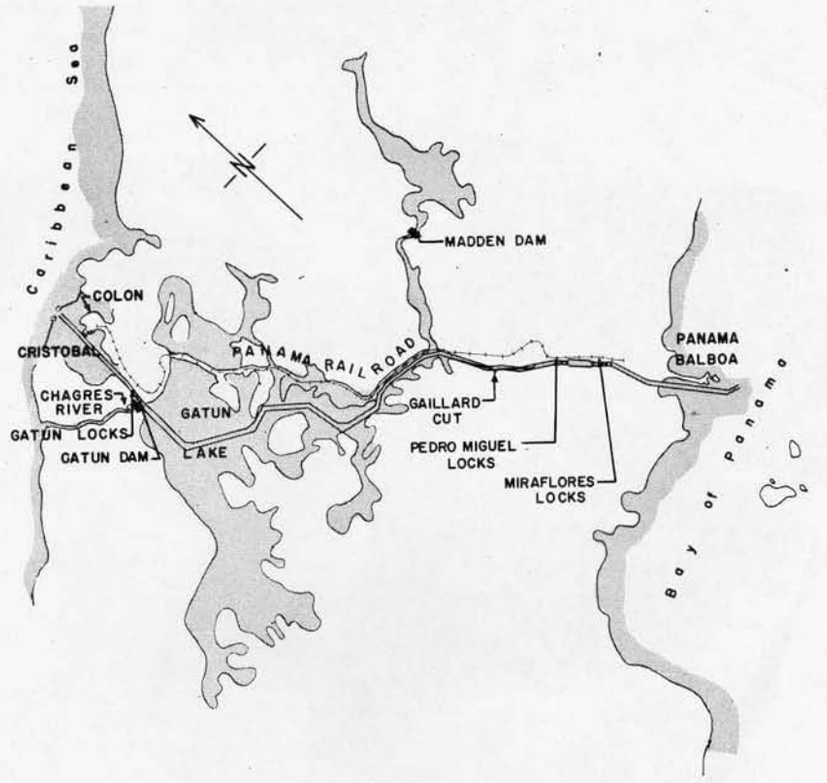
I would ask that the speech be entered as part of the record. It will fill in some of the details I had not wanted to belabor you with now.

Mr. LEGGETT. So ordered.

[The speech referred to follows:]







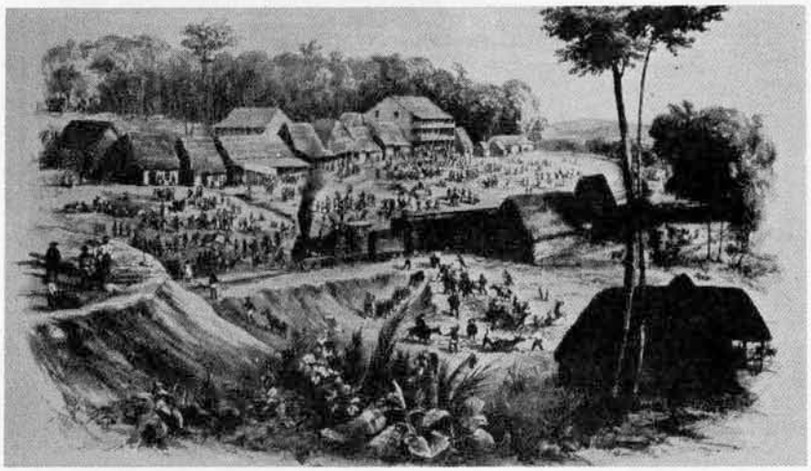
MAP OF THE PANAMA CANAL

THE PANAMA CANAL

This booklet contains the text of an address by David S. Parker, Governor of the Canal Zone and President of the Panama Canal Company.

From the time Columbus first touched the Atlantic coast of Panama in 1502, explorers sought to find ways through, over, or around the Isthmus. Balboa discovered the Pacific Ocean in 1513, and during the ensuing period of development under Spanish rule tremendous quantities of gold, silver, and other goods from the Inca Empire and the Andean mines were carried across the Isthmus by humans, horses, mules, and boats. In those days a trail led from the city of Panama, on the Pacific coast, to Portobelo, on the Atlantic coast. This trail led directly overland through the jungles and mountains and portions of it are still visible today. During those periods of the year when the Chagres River was neither too shallow nor too full from floods, the river itself was used for a portion of the crossing.

By the middle of the 18th century the volume of goods crossing the Isthmus had decreased to a mere trickle and trade was at standstill. The Isthmus sprang back to life in 1848 with the discovery of gold in California. Many eager gold seekers, from the eastern part of the United States, preferred to try to reach California via the Isthmus rather than take the long and dangerous trip around Cape Horn or overland across the still unexplored western plains and mountains of the United States. And, of course, household goods, tools and other items had to be shipped to supply them. Recognizing the potential demand for transportation across the Isthmus, American investors built the Panama Railroad during the period 1850-1855. A small island surrounded by a mangrove swamp was developed into what is now the city of Colon, and the railroad was built south to the city of Panama, following the Chagres River a good part of the way. The construction of this railroad through disease-filled jungles and mountains was in itself a remarkable engineering feat. When railroads

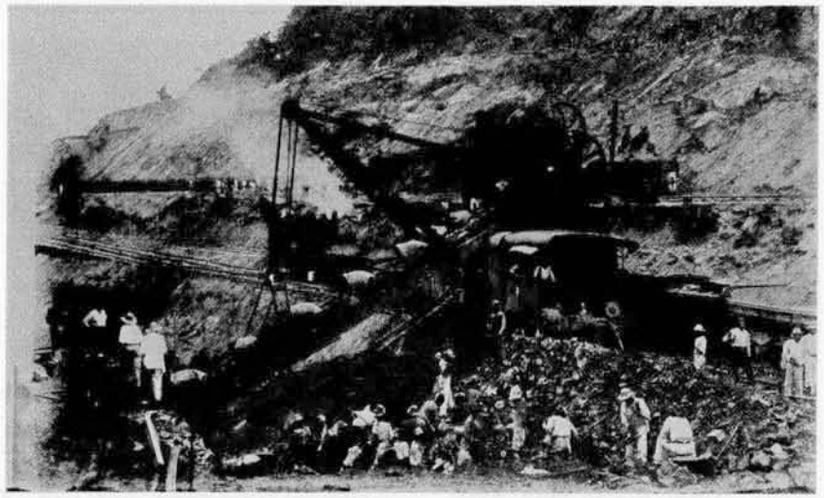


The terminus of the Panama Railroad in 1854.

were built across the United States —the very successful Panama Railroad lost out to competition and became just "two streaks of iron rust in the jungle."

The Panama Railroad in turn was brought back to life with the arrival of a private French company in 1880. Their canal construction efforts ended in failure in 1898 after 18 years of effort, $280 million in cost, and thousands of deaths from yellow fever and other tropical diseases. The leader of the effort was Ferdinand de Lesseps who by all accounts was an inspiring personality, leader, and promoter, and who had been triumphant in constructing the Suez Canal. In fact, his success at Suez was his downfall in Panama because his engineers greatly underestimated the job in Panama, a much more difficult project than Suez from every point of view. The French company's effort failed for several reasons: de Lesseps' insistence on building a sea-level canal instead of a locks canal which would have required much less excavation; inability to solve certain practical engineering problems; lack of knowledge of the cause of yellow fever and malaria; inadequate attention to housing and feeding a large work force which could not be accommodated by the small Panamanian economy then in existence; and a series of financial scandals.

The United States had been seriously interested in an Isthmian canal for half a century, starting with the Clayton-Bulwer treaty with Great Britain in 1850. During the intervening years numerous boards, commissions, and private interest groups urged canal construction at various locations in Central America. As is now well known, in 1903 the United States finally negotiated the purchase of the private company's canal rights and assets for



Laborers at work on the French Canal in 1896 in what is now Gaillard Cut.

$40 million and, after an abortive treaty with Colombia, signed a treaty with newly-independent Panama which led to the construction of the present canal. What is not so well known is that the United States very nearly committed itself to build the canal in Nicaragua and probably would have except for the intense lobbying efforts of Phillippe Bunau-Varilla, a French engineer who was anxious to salvage as much as possible from the earlier effort—and for the generous and cooperative treaty arrangements with Panama.

When the United States started construction, the city of Panama had a population of 20,000 and Colon only 2,000, and health conditions were no better than during the previous centuries. Fortunately, the role of the mosquito in yellow fever and malaria was known to the medical profession thanks in good measure to the work of the Cuban doctor Carlos J. Finlay and to U.S. Army Maj. Walter Reed's work in Havana. A disciple of Walter Reed, Col. William C. Gorgas, was placed in charge of sanitation and health in the Canal Zone and adjoining areas in Panama. Gorgas initiated a comprehensive program of drainage, spraying, trash cleanup and development of water and sewage systems. By the time Canal construction started in earnest in 1907, yellow fever had been eliminated and malaria brought under control. Interestingly enough, following construction of the Canal, Doctor Gorgas went abroad as a consultant on matters of sanitation and tropical disease. In 1913 he worked in Africa on programs for control of malaria, yellow fever, and pneumonia and in 1916 performed similar work in Colombia, Peru, Ecuador, Venezuela, Brazil, and Mexico.

Laying brick at railroad station in Colon in 1906.

Fumigation squads in Panama fighting malaria and yellow fever.

Another problem was lack of housing, stores, eating places, and supporting facilities for construction workers, because the canal work force alone, without families, exceeded the entire population of the cities of Panama and Colon. Therefore, the United States prior to construction had to develop adequate facilities to support the work force, nearly all of whom had to be imported because Panama had no available labor. Skilled workers came primarily from the United States, and unskilled labor came

principally from the West Indies and Europe. Less than 1 percent of the 45,000 work force was native Panamanian.

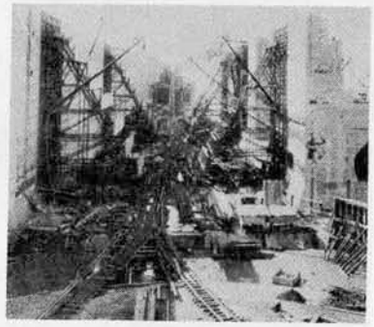
A third problem was engineering. On the advice of American engineers and rejecting the unanimous recommendations of European engineers who favored a sea-level canal, President Roosevelt convinced Congress by a narrow margin that the United States should build a lock-type canal. The wisdom of this decision became apparent during the Canal construction period.

After this major decision in 1906. the construction period started in earnest.

The scheme was relatively simple in concept: dam the Chagres River to create a man-made lake through which it would be relatively easy to dredge a channel following the old river bed; on the Atlantic side construct a harbor and dredge a sea-level channel from the harbor to the dam; build a set of locks in the dam to raise and lower ships from sea level to the lake at 85 feet; at the other end of the lake, excavate in the dry a big ditch for 8 miles through the mountains of the Continental Divide; then build locks to raise and lower ships to a dredged channel and harbor on the Pacific side; dispose of the material from the big ditch by building new land areas on the Pacific mud flats and a causeway to islands in the Pacfic; and relocate the Panama Railroad around the new lake and ditch.

Although the concepts were simple, the magnitude was without precedent. Gatun Dam, a mile and a half long and a half-mile wide at its base and containing a raging torrent, was the largest manmade earth dam in the world; Gatun Lake the largest manmade lake; the locks were far larger than any others in the world; the big ditch (later known as Gaillard Cut) was the largest excavation in history (the excavation would make a 12-foot-square hole through the center of the earth); and the engineers were pushing the state of the art in electric generators and motors because the world had just barely reached the electric age. Any single feature of the project was a major triumph—the combination was an extraordinary engineering achieve-

Gaillard Cut at deepest excavation section of the Canal in June 1913.



Gatun Locks under construction, January 1912.

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ment, and it has so been recognized by engineers throughout the world. It was the "moon shot" of the day. But unlike the moon shots which have attracted public attention for only brief periods of time, it was on the public consciousness in the United States for almost 10 years and was a continuing topic of conversation for decades. This accounts in part for the personal interest many Americans still take in the Canal today, even though the initial construction has long been completed.

The initial preparatory and design work, and the organization for

Massive slide in Gaillard Cut, December, 1913.

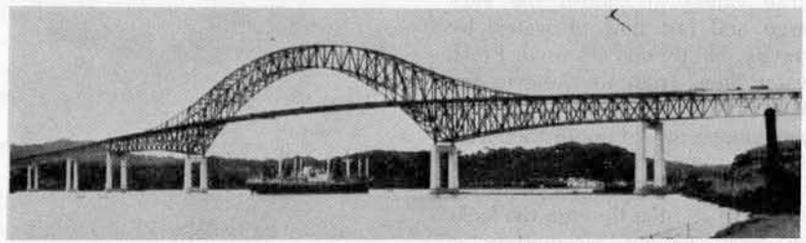
construction, were accomplished under the leadership of a hard-driving, practical engineer named John F. Stevens. Col. George W. Goethals, a U.S. Army engineer and also a strong personality and capable technician, took over from Stevens in 1907 and saw the job through to completion in 1914 when the first ship transited the Canal.

Following the opening of the Canal, massive slides occurred. In such instances, the last in 1931, the channel was closed. The geology through the "'big ditch" is an engineer's nightmare of varying types of rock and clay, and the solution during construction was simply to dig until the banks stopped sliding. As a result, we have a number of bank areas which are potentially unstable, and we have a large bank stabilization program which involves drilling and instrumentation of potential slide areas so that we can measure their movement. When a slide appears imminent we take remedial action such as improving drainage through interceptor ditches and by introducing lime to decrease capillary action and improve soil shear strength. Occasionally we get a slide anyway—there was one in September 1972 when 65,000 cubic yards went into the Canal. So far we have been able to control slide action so that traffic could continue without serious interruptions.

Although a visitor from construction days would find many of the original canal features still intact, a number of major improvements have been made. The first was in 1935 when Madden Dam was completed on the upper Chagres. This

dam controls floods which otherwise would interfere with navigation on Gatun Lake and stores water for release during the dry season to maintain adequate depths for deep-draft ships As a by-product it generates hydroelectric power.

The major visible improvement in the Canal has been the widening of Gaillard Cut from 300 to 500 or more feet which increased safety and permitted greater two-way traffic, thereby increasing Canal capacity significantly. This work was completd less than 3 years ago by a combination of contractor and



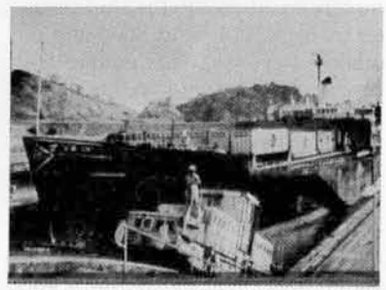
The bridge which spans the Pacific entrance to the Canal. The steel used in its construction came from Germany.

Company forces without significant traffic interruption.

One invisible project which has greatly increased capacity has been the development of engineering techniques for the overhaul of locks machinery and valves without dewatering the locks and taking them out of service. It is too complicated to explain briefly, but is of such significance that President Nixon recently gave official recognition and commendation to the management team of engineers who developed the new procedures through the years.

Other improvements have been replacement of the original towing locomotives with ones of much improved power, speed, and handling characteristics—and night bank lighting through the Cut, permitting us to operate around the clock. The towing locomotives were built in Japan, illustrating that in the interest of economy for all Canal users the United States has not limited procurement to U.S. sources only. On the Atlantic side today you may see a gas turbine powerplant under construction—it also was procured from Japanese sources. And on the Pacific side the steel for the bridge which spans the Canal came from Germany.

I will return later to Canal improvements and Canal capacity Meanwhile, I would like to take you on a quick trip through the Canal to give you an idea of the overall operation.



The towing locomotives used at the locks were made in Japan.

How the Canal Operates

There currently are an average of 40 transits of the Canal daily and operations are on a 24-hour-a-day basis, every day of the year. A ship going from Atlantic to Pacific starts its trip at the Cristobal anchorage where the pilot boards the ship. The ship proceeds 4 miles south through a dredged sea level channel to Gatun locks.

At Gatun the ship is raised 85 feet in three steps to the level of Gatun Lake. The locks are simply hydraulic elevators. with numerous large valves to control the very large and fast flow of water by gravity. No pumps are used. Fresh water flows from the lake to the sea at the rate of 3 million gallons per minute, in and out of the locks, through concrete tunnels large enough to take a freight train. Ships are assisted through the locks by large towing locomotives, a unique feature of this Canal.

From Gatun Locks the ship travels 24 miles across Gatun Lake following generally the bed of the old Chagres River, the same route over which gold and silver flowed many years ago. During the entire transit the pilot has control of the movements of the ship, rather than being merely an adviser to the ship's master as he would be at Suez and all other waterways. This unique feature of the Panama Canal is due to the difficulties of navigating a ship through the waterway, particularly in approaching the locks and tying on to locomotives.

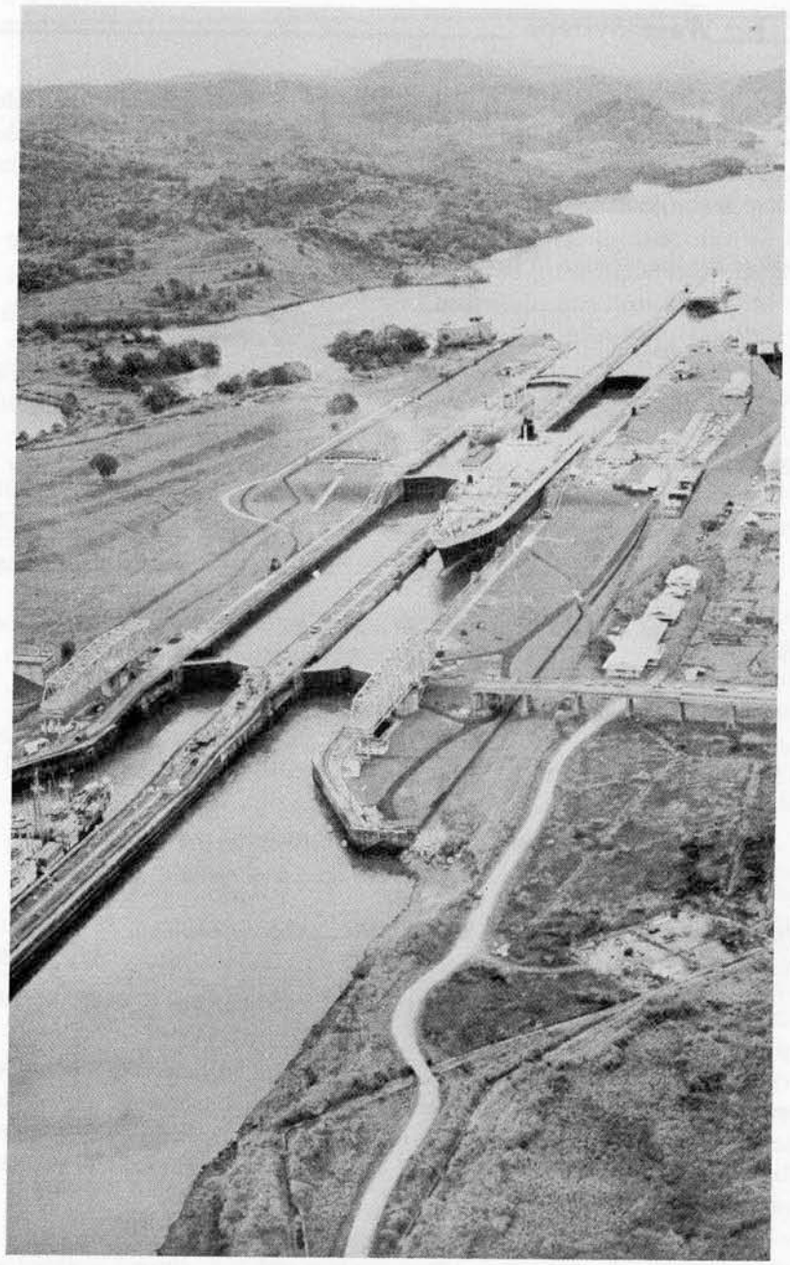
At Gamboa the ship passes the entrance of the Chagres River to Gatun Lake and starts the 8-mile run through Gaillard Cut and the Continental Divide.

At the end of the Cut the ship takes one 30-foot step down at Pedro Miguel Locks—sails across Miraflores Lake—takes two more steps down at Miraflores Locks to sea level—follows a dredged channel out past Balboa harbor—under the bridge—and then out into the Pacific Ocean.

Total transit time for the average ship from deep water to deep water is about 8 hours. Total time in Canal Zone waters for the average ship is about 15 hours. And I might also add that although our traffic has steadily increased through the years, by Canal improvements we have actually been able to decrease the average time a ship spends in Canal waters.

But the Canal's operation is not just engineering works and machinery. It is operated by people and just as the mechanical features of the Canal have changed, our work force has also changed through the years—in skills, citizenship, and pay levels.

Through World War II the Canal operations were essentially managed and directed exclusively by U.S. citizens, with pay rates for non-U.S. citizens keyed closely to local rates in Panama. But since World War II there have been major changes, particularly following the 1955 treaty negotiated while Jose A. Remon was president of Panama. Since the 1955 treaty was signed many skilled jobs have been opened to non-U.S. citizens. Further, although under no treaty obligation to do so, the United States made major increases in pay at the lower end of the scale primarily for the benefit of Panamanian workers.



At the end of the Gaillard Cut, ships take two more steps down at Miraflores Locks to sea level. In the background is Miraflores Lake.

Wage Systems

We still have two wage systems, one based on skills generally available locally and one based on skills which previously had been recruited outside the Isthmus—however, Panamanians are able to qualify for both systems, to a degree not generally appreciated. For example:

Here are the changes in the citizenship make-up of these wage bases:

	Number of Employees		
	1952	*1962*	*1972*
Local wage base			
United States	16	196	208
Panamanian and other	13,865	9,851	9,060
U.S. wage base			
United States	4,209	3,745	3,791
Panamanian and other	149	627	1,926
TOTALS	18,239	14,419	14,985

Here are the average hourly wages for Canal Agencies during the past 20 years:

	Average Hourly Wage		
	1952	*1962*	*1972*
Local wage base	$0.58	$0.99	$2.24
U.S. wage base	2.61	3.85	5.71

And here are gross payrolls by citizenship during the past 20 years:

	Gross Payrolls		
	1952	*1962*	*1972*
United States	$25,700,096	$33,659,193	$57,792,881
Panamanians and others	17,618,009	22,562,026	62,592,220
TOTALS	$43,318,105	$56,221,219	$120,385,101

The Canal Zone is covered by the U.S. federal minimum wage laws, currently $1.60 per hour as in the United States. The minimum wage in Panama varies from 50 cents to 70 cents in urban areas and is less in other areas. Therefore, the term "local wage base" is quite misleading insofar as salaries are concerned.

I would like to point out that Panamanians and U.S. citizens working at the same job receive the same basic salary, with an adjustment, as covered by the treaty, for difference in income taxes they pay to their respective governments and with a 15 percent tropical differential going to the U.S.

citizen if he or she is "head of household." The Canal Zone is the only location in the world where the U.S. Government pays locally recruited nationals of another country on U.S. wage scales.

We have developed a number of programs designed to train and qualify Panamanians for skilled jobs formerly held exclusively by U.S. citizens. For example, for some years we have been running an apprentice program designed to meet our needs for skilled craftsmen. Enrollment today in our apprentice program, including apprentices being trained for the military agencies, is 95 United States and 195 Panamanian. As a result of this program we were able in 1972 to recruit locally nearly all skilled craftsmen and recruited only 17 from the United States. As a matter of fact, every year we hire about 475 permanent new employees, about 250 on the local wage base and 225 on the U.S. wage base, but we only obtain about 75 of these from the United States, primarily in hard-to-recruit local skills such as physicians, teachers, nurses, pilots, and lawyers.

In addition to the apprentice program, we have run a Cooperative Education Program using Panamanian universities, an Office Services Intern Program, a Learnership Program, and a Latin American Student Assistant Employment Program—and we established a Special Placement Unit to recruit and employ Panamanians in higher level jobs.

Some of the results of efforts of the last 10 years to recruit Panamanians for more highly skilled jobs are shown in the following tabulations:

	Number of Panamanians		*Average Hourly*
	1962	*1972*	*Wage—1972*
Towing locomotive operators	0	52	$3.60
Floating equipment operators	0	13	6.77
Apprentices	50	148	2.83
Fire officers	0	22	5.67
Police and police related	3	88	5.10
Postal clerks	0	39	4.20
Skilled craftsmen	71	329	4.99

You may have noticed on an earlier chart that our total work force declined by over 3,000 employees between 1952 and 1972. This decrease has been due in large measure to elimination of a number of activities in the Canal Zone when the capability was developed in Panama to supply the service or product, such as hotels, laundry, dry cleaning, dairy products, and a wide range of maintenance and repair services

Who Uses the Canal

Having discussed the physical features of the Canal and the people who operate it, I would like to turn to the customers of the Canal—those who use it.

In the world merchant fleet today there are approximately 25,000 ocean-going vessels. Of these, about 4,500 go through the Canal one or more times a year.

In terms of cargo, if we exclude petroleum which is a special case, about 8 percent of the world's seaborne commerce passes through the Canal.

The principal trade routes through the Canal today are:

	Percent
East Coast United States to Asia	37
West Coast United States/Canada to Europe	8
East Coast United States to West Coast S.A.	6
Europe to Asia	5
Europe to West Coast S.A.	5
United States Intercoastal	3

It is interesting to note that when the Canal was first opened half of the traffic was from one coast of the United States to the other, but that this is a relatively small trade route today.

With respect to cargoes, the Panama Canal carries a wide range of goods and is in essence a general purpose Canal as opposed to other waterways in which one or two commodities predominate. For example, for years Suez was essentially an oil Canal. The Welland Canal is essentially for grain and ore. Principal products carried in fiscal year 1972 through the Panama Canal were the following:

	Percent
Petroleum	16
Coal and coke	13
Grains	12
Ores and metals	9
Iron and steel manufactures	8
Lumber and products	7
All other	35

With respect to registry of ships using the Canal, the following summarizes the major "flags" using the Canal now and 10 years ago:

	1972		1962	
	No.	Percent	No.	Percent
Liberia	1700	12.3	848	7.6
Japan	1533	11.1	844	7.6
United Kingdom	1472	10.7	1276	11.4
Norway	1239	9.0	1491	13,4
United States	1165	8.5	1783	16.0
German Federal Republic	937	6.8	1064	9.8
Panama	898	6.5	393	3.5

Of course these figures in some cases represent flags of convenience rather than direct maritime commerce or interest.

With routes, commodities, and flags treated briefly, I would like to show for selected nations the percentage of their waterborne commerce that passed through the Canal last year:

	Percent		Percent
Australia	3.3	Panama	29.4
Chile	34.3	Peru	41.3
Colombia	32.5	Philippines	8.8
France	0.9	United States	16.8
Japan	10.7	German Federal Republic	2.9
Nicaragua	76.8	Yugoslavia	0.8

It is clear that although many countries use the Canal to a significant degree, certain Latin American countries are proportionately more dependent upon the Canal than any other users.

On an absolute basis rather than percentage of national commerce, the United States is the major user of the Canal.

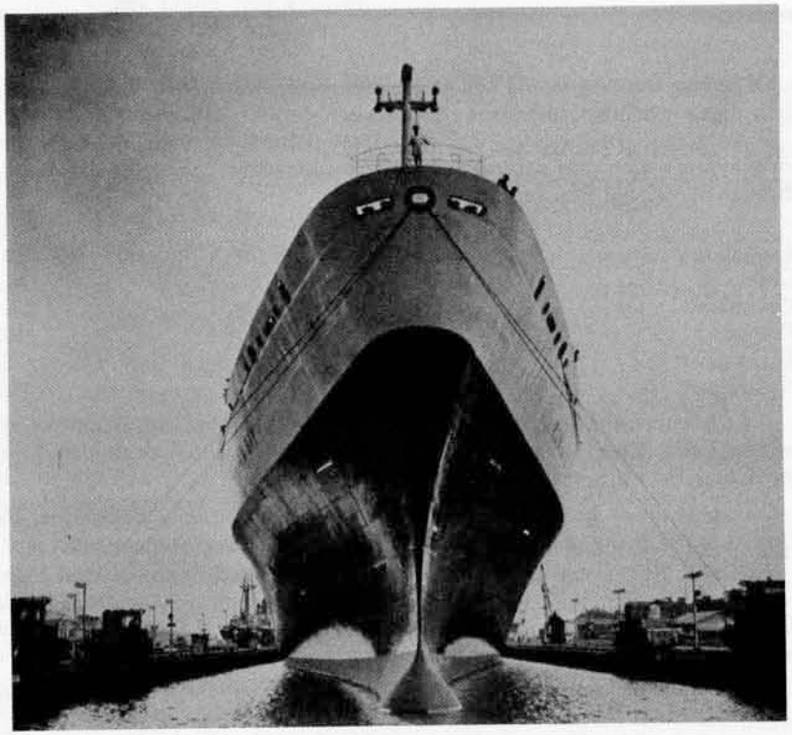
In 1972, 40 percent of all cargo tonnage originated in the United States (mostly low value bulk commodities) and 28 percent was enroute to the United States. Therefore, one might say that the United States use amounts roughly to about one-third the tonnage passing through the Canal.

Full details on traffic through the Canal can be obtained from our annual reports.

The Panama Canal has, with one exception, always been open to ships of all nations on a free and equal basis. The exception is that, based on the treaties of 1903 and 1914, government vessels of Panama and warships of Colombia go through without paying tolls, whereas the ships of all other nations, including U.S. Government ships (including warships) are charged tolls.

Toll rates for the Canal were set in 1914 and have never been changed. We are still charging 90 cents a Panama Canal net ton for commercial ships with cargo and 72 cents for ships in ballast. The average toll charged in 1972 was $7,175 and the newest and largest vessels pay over $40,000. The current tolls policy established by the United States Congress, briefly stated, is that rates will be set to cover as nearly as practicable the cost of maintaining and operating the Canal, with no provision for profit.

Financial accounting for an enterprise of this sort is extremely complicated. At the risk of over-simplification, it can be stated that had the Panama Canal and its auxiliary activities been built and operated as a commercial enterprise, the enterprise, rather than showing a net profit would represent an unrecovered cost of nearly a billion dollars. The cost to the U.S. Government related to constructing, maintaining, operating and improving the Panama Canal approximated $2.5 billion through 1972. Over the years recoveries from all sources, including tolls on U.S. Government vessels, have approximated $1.5 billion, leaving unrecovered nearly a billion dollars.

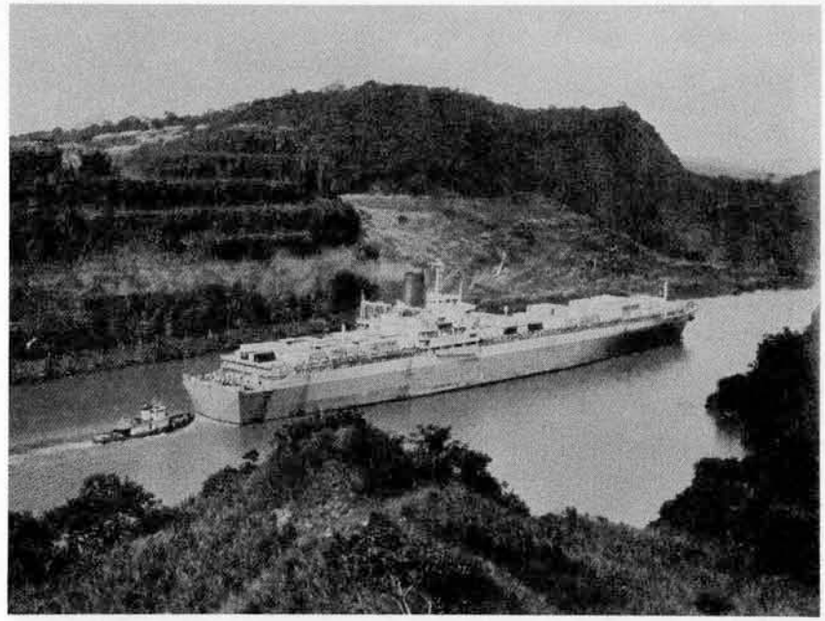


The "Kowloon Bay," giant container ship, passes through Miraflores Locks enroute from Rotterdam to Tokyo. She is a sister ship of the record breaking "Tokyo Bay."

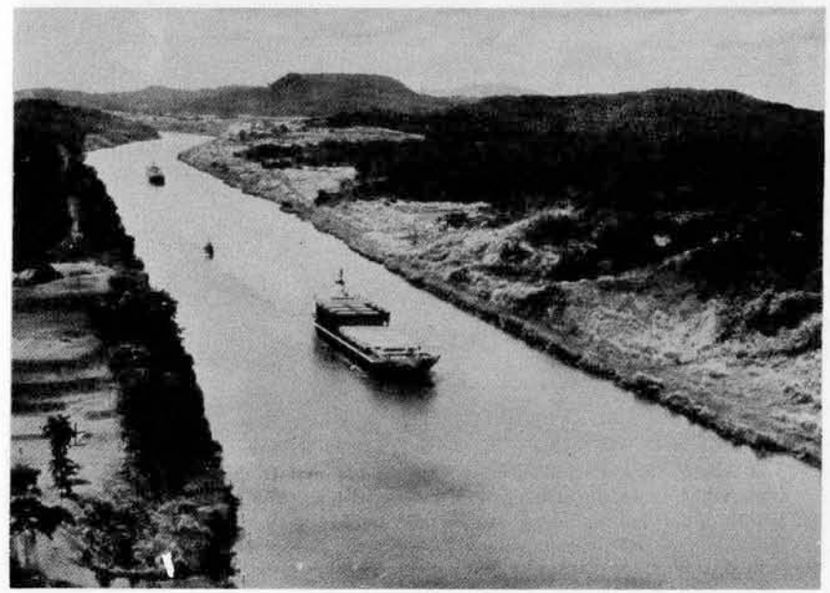
Engineering Plans for the Present Canal

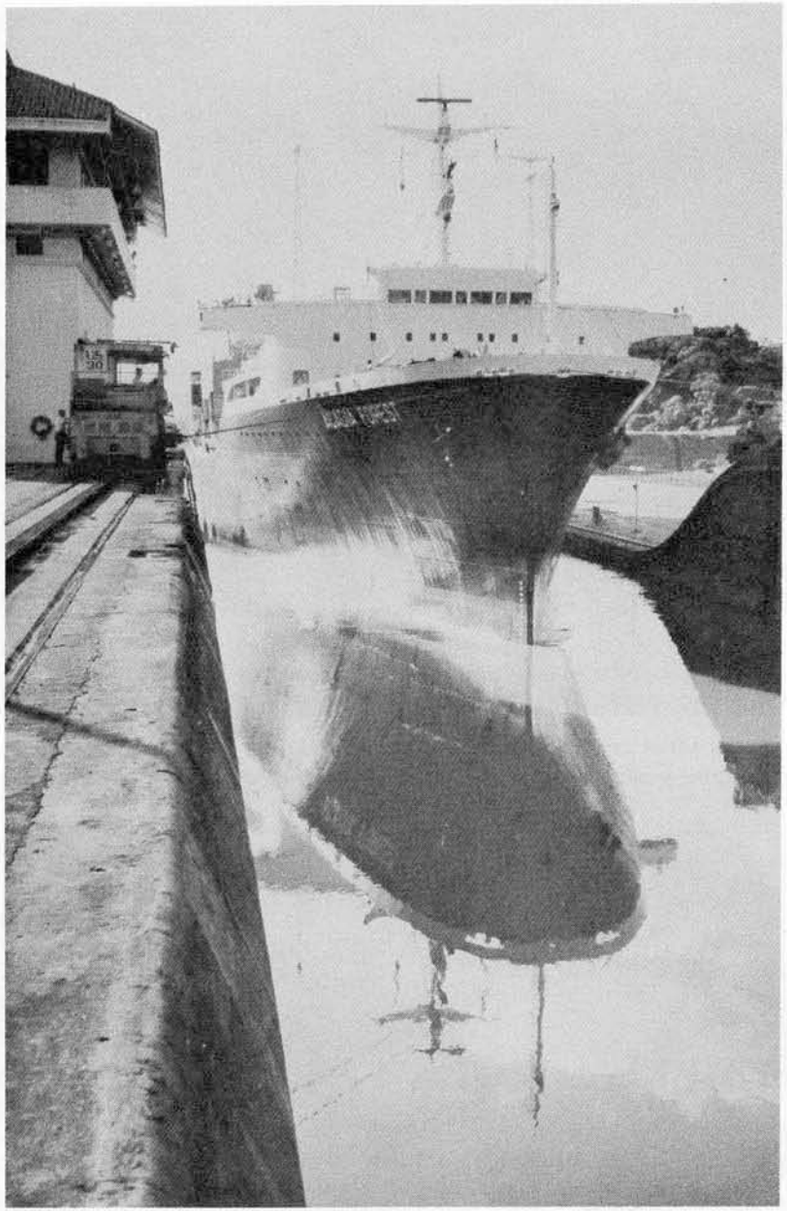
It is occasionally indicated that the Panama Canal is running close to capacity and that in a few years it will be so saturated that ships will have to wait in line for a long time before they can transit. This is simply not true. Traffic has built up steadily through the years until we are now handling about 15,000 transits per year. However, we estimate that the capacity of this Canal, from an engineering point of view, is about 27,000 ships per year. We are, therefore, still far from saturation.

Should we continue to operate this in preference to a new canal, we know in detail what is required to bring it up to full capacity. A number of the items are fairly simple and involve such things as modification of the locomotive towing tracks, additional locomotives, additional tugs, improvements to locks overhaul procedures, computer assistance in traffic control, and development of radar or some other system to assist navigation during the limited periods of the year when there is some fog. The major improvement required is to obtain additional water for the locks operations, because 52 million gallons of water are required for the transit of each ship. In a few years, we will have reached the point at which increased traffic will require more than we can draw from Gatun



Above: Container ship "Elba Maru" moves through a narrow section of Gaillard Cut, which has been widened over the years from 300 to 500 feet to increase safety and permit greater two-way traffic. Below: Traffic moves easily through the widened channel.

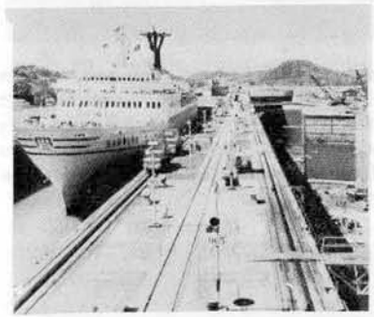




The LASH ship, "Acadia Forest," makes her first transit with her graceful lines reflected in the waters of Miraflores Locks. She measures 860 feet in length and 106.9 in the beam. She and her sister ship "Atlantic Forest" are the widest beamed commercial ships to transit.

Lake without reducing the lake to a level that is too low for navigation purposes during the dry season.

There are several alternative methods of increasing the water supply. The simplest, and one we are currently embarked upon, is to deepen the navigation channel through Gatun Lake and the Cut. By deepening the channel we make it possible to draw the lake level down further each year, thereby providing more usable storage in Gatun Lake. This is the least expensive and most practicable way to increase our dry season water supply. If necessary, we could provide additional storage by constructing one or more dams on the tributaries of the Gatun watershed.

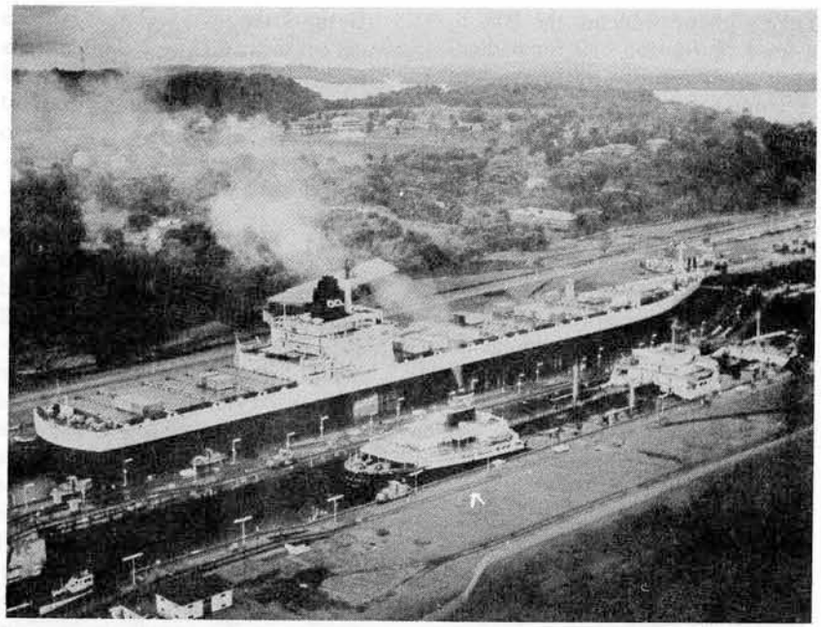


The cruise ship, "Hamburg" makes a southbound transit while the east lane at Miraflores Locks is out of service for overhaul.

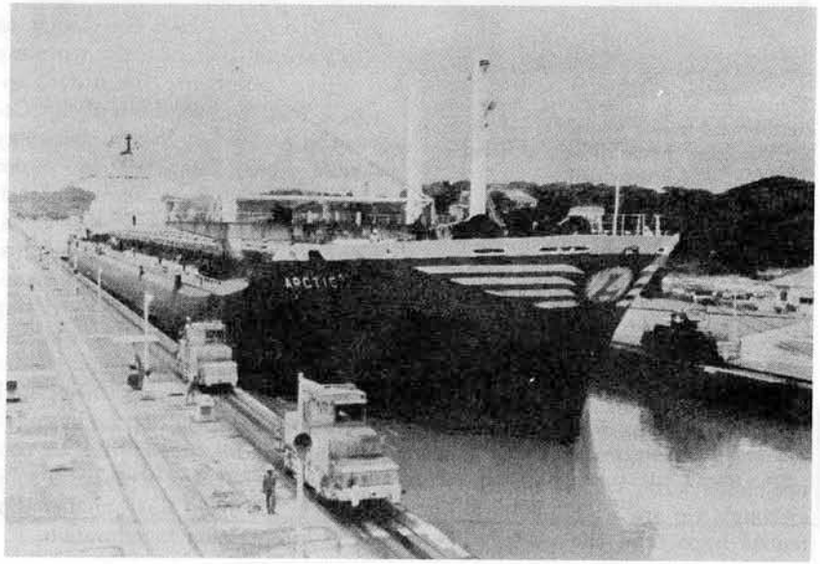
A third alternative would be to raise the level of Gatun Lake by modifying the locks at each end of the lake to accept a higher water level. This would permit us to add about 5 more feet of storage to Gatun Lake. A fourth but, undesirable alternative is to pump sea water into Gatun Lake. We do not think, at this time, that the use of sea water will be necessary although we are studying the potential impact on the ecology of Gatun Lake. We feel that we can get up to 26,000 or 27,000 transits a year through deepening and building further storage and, at that time, we will be so close to ultimate capacity that further measures probably will not be necessary.

The question is: When will we reach 26,000 or 27,000 transits a year? Several years ago it appeared that we might reach this level well before the end of the century. However, during the past year or so there has been a very strong trend toward the use of larger ships for the movement of general cargo, typified by the large container ships going through today. This means that a given volume or quantity of cargo can be taken through the Canal on fewer ships. When we extrapolate our projected cargo shipments and take into account the larger ships that are using the Canal now, we believe that the capacity of the Canal is not likely to be exceeded until well after the turn of the century.

Of course, predictions such as this are difficult to make with any degree of certainty, but it does appear that the useful life of this Canal is somewhat longer than may have been estimated in recent times. Furthermore, if we approach the saturation point of this Canal and there is no alternative in prospect, then one can keep this Canal going indefinitely by simply raising tolls or reducing service to such a point that additional traffic is discouraged from using the Canal. This is a prospect that no businessman would normally like to contemplate, but it is a practical solution in the event this Canal continues in operation to saturation.



Above: With only 2 feet to spare on each side and 25 feet on each end, a large container ship, which measures 950 in length and 106 feet in beam, moves through Gatun Locks. Dwarfing the 736 by 102-foot ship in the foreground she graphically illustrates the recent increase in the size of new vessels. Below: The super carrier "Arctic" breaks the cargo record in 1970 for the second time with a cargo of 60,391 long tons of coal.



Engineering Alternatives to the Present Canal

In considering alternatives to the present Canal, there are two separate engineering problems. One of them is the capacity of the Canal in terms of the number of ships that can be transited, and this has been briefly discussed already. The other problem is accommodating larger ships.

Size of Ships

The size of ship that can be accommodated in the present Canal is basically limited by the size of our locks. The locks are 1,000 feet long by 110 feet wide and can generally accommodate a ship with a beam of 106 feet, a length of 950 feet, and a draft of about 40 feet. The Canal channel is generally built to handle this size ship, although draft may be limited during portions of the year. In terms of tonnage, the maximum size ship that can use the Canal is about 85,000 deadweight tons in ballast or 65,000 tons laden. There are about 900 commercial ships in the world today that cannot go through these locks because of beam limitation, and each year more and more built. In addition, about 1,600 cannot pass through fully laden at all times because of draft limitations. These large ships are bulk carriers of oil and ore, for the most part. However, a majority of them are currently designed for special routes, such as from the Persian Gulf to Bantry Bay in Ireland. Even if the Canal were made larger, these ships would not use it. In general, it may be said that the demands of the petroleum industry are such that the large ships necessary for the movement of oil place that problem outside the general considerations for the Panama Canal. But insofar as we can determine now, container ships and general cargo ships, in significant-numbers, will not be built larger than our locks for many years to come.

One of the alternatives to the present Canal is simply to build a third set of larger locks parallel to our existing two locks. Such a project was started in 1939 prior to World War II in order to reduce vulnerability to attack. The United States spent about $75 million dollars and made rather substantial excavations on both sides of the Canal. However, this work was stopped early in World War II when it appeared that it could not be completed in time to be of assistance to the war effort. Such locks could be built to dimensions say, of 140 feet in width and 1200 feet in length, and would accommodate much larger ships than those that can use the present Canal. They would not be able to accommodate aircraft carriers the size of those in the U.S. Navy, nor would they be able to take the large tankers which have been built in recent years. Their addition would increase capacity by about 10,000 ships per year.

Some Advantages

There are some advantages to such a project, again from an engineering point of view. It would cost considerably less than a sea level canal. Navigation through such a canal would be relatively simple because it would make use of the existing Gatun Lake, avoiding the currents and initially narrow channel of a sea level canal. It would not alter materially the ecology of the area, Gatun Lake would be retained in its present form, and there would be a barrier to the movement of biota from one ocean to another.

However, there are several disadvantages to such a canal. There is an upper limit to lock size so that some ships, including carriers, will be unable to go through. Equally important, such an addition to the present Canal would require a major increase in the water supply for lockage purposes. Large, new impoundments would be necessary or there would be a requirement to pump sea water into the lake in order to accommodate the additional traffic. Further, although it would increase capacity to about 35,000 transits per year, it too eventually would reach saturation.

Sea Level Canal

The other engineering alternative is, of course, a sea level canal. In 1965 President Johnson appointed an Atlantic-Pacific Interoceanic Canal Study Commission which submitted a report to President Nixon in December 1970. The Commission studied a number of routes and alternative methods of construction and recommended construction of a sea level canal at a cost of about 3 billion dollars. In general, such a canal would eliminate most of the restrictions on ship size (except for large tankers) and would increase capacity initially to 35,000 transits with capability to expand to double or triple that amount. I will not go into details of the extensive conclusions and recomendations, but would like to highlight a few of them:

—The technical feasibility of the use of nuclear explosives has not yet been established for potential canal routes, and future feasibility is not predictable. This rules out any early hope for a "cheap canal."

—The investment in such a canal probably could not be recovered unless there were an extremely favorable combination of construction costs, low interest rates, and high traffic. Apparently, the Commission felt that foreign policy and national defense values would offset the inability to recover the investment.

—Other nations should be encouraged to participate in financing the canal system, if such multinational participation is acceptable to the Government of Panama.

—The Commission recognized the need for further studies concerning the environmental effects of a sea level canal. If necessary, barriers would be constructed to limit the transfer of biota between the two oceans.

Both the third locks and the sea level alternatives are described in detail in the Commission's report to the President and additional information pertaining to them can be obtained through the U.S. Mission to the United Nations.

I fear that this discussion of alternatives, as well as earlier comments on other subjects, risks some misinterpretation through brevity of treatment. Nevertheless, time does not permit elaboration.

Conclusion

In conclusion, on behalf of all our employees, United States and Panamanian, I would like to express my appreciation for this opportunity to talk to you about the Canal. As you visit the Canal today and see the ships of all nations proceeding smoothly through it, I hope you share our deep pride in the manner in which it is operated and maintained. I hope you will also share our great respect and admiration for our predecessors whose ability, foresight, and courage resulted in one of the great engineering wonders of all time.

"It is occasionally indicated that the Panama Canal is running close to capacity and that in a few years it will be so saturated that ships will have to wait in line for a long time before they can transit. This is simply not true. Traffic has built up steadily through the years until we are now handling about 15,000 transits per year. However, we estimate that the capacity of this Canal, from an engineering point of view, is about 27,000 ships per year. We are, therefore, still far from saturation."

Governor DAVID S. PARKER

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