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A NEW ISTHMIAN CANAL—
KEY TO HEMISPHERIC PROGRESS

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INTRODUCTION

President Lyndon Johnson announced at a White House press conference on 18 December 1964 that the United States had decided to press forward with its plans for a sea-level canal across the American Isthmus.[1] This historic announcement signaled the implementation of plans American diplomats and adventurers have discussed for years. The idea of a sea-level canal is not new; plans for such a route through Nicaragua predate construction of the Panama Canal itself. The President's decision to proceed with sea-level canal plans was twofold. The United States would immediately enter into discussions with interested Central American governments concerning plans for the new canal. Secondly, the Republic of Panama was advised that the United States stands willing to negotiate an entirely new treaty for the existing canal. President Johnson went on to point out that these steps are required now in order to assure the continued promotion and protection of peaceful trade and for the welfare of our hemisphere.[2] The Panama Canal has carried the ships of all nations on terms of complete equality for over 50 years. It has served the cause of freedom in two world wars and during the Korean conflict. It is rapidly growing old and will soon be unable to meet the demands placed upon it.

The need for a sea-level canal will be discussed only incidentally in this paper, this decision having already been made.

Rather, the author will investigate how best to proceed with the job at hand–the construction of the canal itself. Such an undertaking involves a multiplicity of complex decisions regarding economic, political, technological, and strategic factors relating to the selection of a route for the new canal. Each of these areas will be reviewed in detail. The possibility of modernizing existing canal facilities will also be investigated. Each of the five principal routes under consideration for the sea-level canal will be examined in an effort to learn their advantages and disadvantages. A cursory review of the Panama Canal as it exists today will set the stage for a better understanding of our relationship with Panama. The questiou of internationalization of the new sea-level canal will also be discussed. In conclusion aud in the light of all factors concerned, a route will be selected as being the most advantageons for the United States. As a corollary, a course of action will be proposed which should lead to an improved economic climate for Central America and the elimination of existing friction between the United States and Panama.

Exploratory talks concerning construction of the new canal have already been held. Mr. Stephen Ailes, Secretary of the Army, and Mr. Thomas C. Mann, Assistant Secretary of State for Inter-American Affairs, acting as President Johnson's personal envoys have recently returned from Nicaragua, Costa Rica, Panama, and Colombia.[3] The battle of the routes is on!

FOOTNOTES

INTRODUCTION

1. "U.S. Plans New Sea-level Canal and New Treaty on Existing Canal," *The Department of State Bulletin,* 4 January 1965, p. 5.

2. *Ibid.,* p. 6.

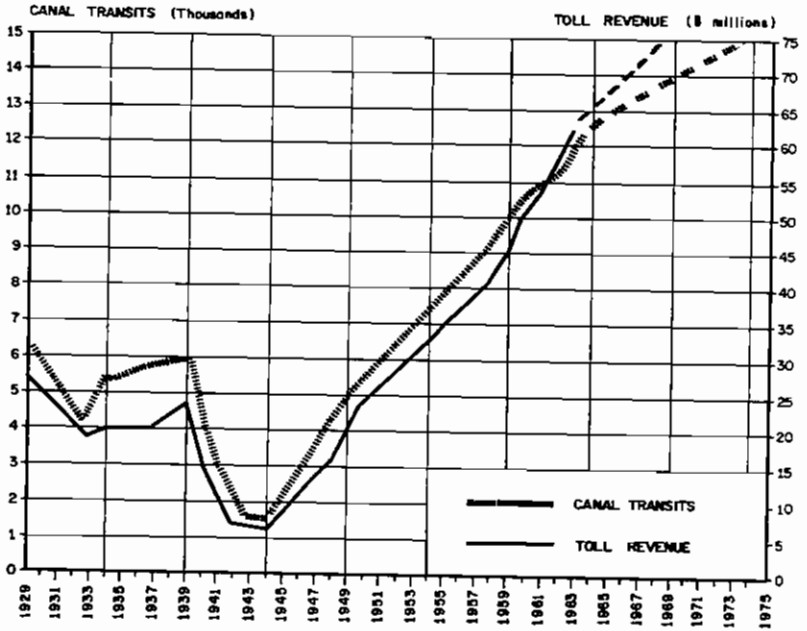
3. Benjamin F. Meyer, "Washington Begins to Move on a New Sea-Level Canal," *The Providence* (Rhode Island) *Sunday Journal,* 24 January 1965, p. 17.

CHAPTER I

THE PANAMA CANAL TODAY

The Problem of Obsolescence. Even the most visionary of our canal builders of 50 years ago could not have foreseen the rapid improvements in ship design and cargo handling capability that have made the construction of ships of immense proportions economical. The 1902 Isthmian Canal Act provided that the canal should be of sufficient capacity and depth to afford convenient passage to vessels of the largest tonnage and greatest draft then in use or which might reasonably be anticipated.[1] The canal locks were constructed with intermediate gates dividing them into 600 and 400 foot lengths. Their width is 110 feet. Ninety-eight percent of all ships then existent could pass into the 600-foot lock section, including the largest battleships being built. The total lock length would accommodate the largest commercial ships planned in that day—1000-foot length by 88-foot beam.[2] The Navy unwittingly mortgaged the future when its General Board went on record declaring the 110-foot lock width ample for its future needs. They claimed that future naval construction, in any event, would be limited to the size of available drydocks. When the canal opened for business 50 years ago an average of only five ships a day used it. Today the canal operates at near-peak capacity, traffic having doubled in the last ten years alone to its present level of 12,000 ship transits a year.[3] (See Figure 1) Despite subsequent widening and deepening of the old channels the three sets of locks constitute a bottleneck to traffic. At best they can only accommodate 60 ships a day and then often involving delays up to 15 hours awaiting transit.[4] One factor contributing to transit delay is the number of "clear-cuts" requiring special clearance. The term "clear-cut" as used on the canal refers to any vessel which must transit Gaillard Cut at less than average permissible speed due to its size, cargo, or navigational qualities. Such vessels must either be towed through the cut or proceed very slowly under their own power. While such a ship is clearing the cut no other vessel is allowed to pass it. This precautionary procedure creates a severe bottleneck with resnltant delays. The trend over the years has been toward a much higher ratio of "clear-cuts" to routine transits.[5] It is presently estimated that maximum capacity for the existing canal will be surpassed some time between 1980 and the year 2000.[6] At present there are a total of 24 naval vessels and 50 commercial

Figure 1 – NUMBER OF CANAL TRANSITS AND TOLL REVENUE PROJECTED TO 1975



Compiled from the following sources: Andre Siegfried, *Suez and Panama*, p. 341; *Encyclopaedia Britannica*, XVII, 1962 ed., Table, p. 172B; and *Britannica Book of the Year*, 1963, Table I, p. 631.

ships which are too large to pass through the canal at all. An additional 556 vessels cannot pass the canal while fully laden.[7] Of these, some must reduce their cargo by 30 percent in order to lighten their draft sufficiently for passage. The 24 Navy ships too large to transit the canal ironically include all of our aircraft carriers except one–the USS *Lake Champlain.* She is the only carrier not to have received the canted flight deck conversion which bars canal passage to all others. In this regard Major General William E. Potter, Governor of the Canal Zone, while testifying before Congress stated, "The locks would have to be two and one-half times wider for the *Forrestal* class carriers to get through." [8]

The Panama Canal, when viewed from the perspective of hemispheric defense, is equally obsolete. Admiral Mahan's writings constantly stressed that communications dominate war in all its aspects. His theory was proven correct in World War I, and again during World War II, when the canal proved its military value by facilitating the movement of entire fleets from one ocean to another and by maintaining the flow of strategic raw materials for the nation's war industries. Today this picture has changed along with technological developments and strategic concepts. The Navy still relies heavily on the canal for fleet dispositions although it is frustrated in its inability to shift attack carrier striking forces from one ocean to another. The likelihood of "brush-fire" wars erupting in widely separated parts of the world is a continuing one. It is imperative that the Navy regain mobility for the deployment of carrier striking forces anywhere in the world on a moment's notice. This could not be accomplished at present without sending our ships on an extended voyage around South America, a position in which we found ourselves in 1898! Such a delay might well spell the difference between success and failure of our strategic plans. The canal's vulnerability to an atomic missile attack has been clearly demonstrated in various war games.[9] It has been estimated that, if hit by nuclear attack or subversion, the present canal would be put out of action for from four to seven years, whereas a direct hit on a sea-level canal would incapacitate it for only a week or two.[10] Admiral James S. Russell, when addressing Congress in 1960, said, "Our canal has great value in a limited war and, if not destroyed, in an all-out war. One must have less and less reliance on the military value of any fixed installation. If a sea-level canal existed it would be easier to repair after being destroyed."[11] The defense of the canal–if today it can be defended at all–must be fought far out in the Pacific and Atlantic and with airpower based in the United States.

The Army and Navy's withdrawal of all defensive antiaircraft batteries and fighter aircraft from the Canal Zone stand in mute testimony to this truth.

Political Unrest in Panama. The original Hay-Bunau-Varilla Treaty of 1903 vested in the United States the monopoly, in perpetuity, for construction, maintenance, and operation of any system of communication across Panamanian territory. The treaty further granted the United States all rights, power, and authority within the Canal Zone.[12] The clause allowing the United States to intervene in order to maintain order in Panama itself was subsequently rescinded. Another series of changes raised Panama's share of canal operating profits from the original $250,000[13] to $1.9 million per year.[14] Otherwise, the original treaty stands unchanged. Panama has experienced a complete metamorphosis since those early days, until today treaty revision has become a national obsession. Since 1903 Panama's predominantly Indian population has increased from 125,000 persons, mostly illiterate, to over one million, 80 percent of whom are literate. Conditions for revolution in Panama have never been far from the boiling point. Over one third of Panama's gross national product is derived from canal operations. In addition to the $1.9 million it receives in annual canal rent, Panama realizes $25 million in the form of wages paid to Panamanian canal employees, and another $27 million spent in Panama by American officials and their families.[15] Despite this revenue, per capita income in the country remains at a paltry $275 with unemployment steady at 12 percent. The average farm laborer receives a total of $1.50 for a 12 hour day.[16] The wage scale in Panama City is 35 to 40 cents an hour for regular labor. Yet all in Panama are not poor. The country's 800,000 mestizos (mulattos) are quick to point out the corruption and decadency of the ruling class. Approximately 40 families own all the best land, the media of information and communications, and constitute the flower of Panamanian society. They have formed themselves into a political clique. This group is not adverse to using the United States as a whipping boy and to stir up resentment against us to divert the attention of Panama's 400,000 voters from domestic grievances.[17]

In January 1964 uncontrolled rioting broke out along the Canal Zone border. Such incidents had occurred in the past, but this time the price of the disturbance was 21 dead and 500 injured.[18] One of the principal issues behind the rioting was the flag issue. Panamanians want sovereignty over the Canal Zone to be demonstrated by the flying of their flag. The rioting started, seemingly

innocently enough, when a group of American students raised a United States flag over their high school at Balboa in defiance of the governor's order not to fly any flag at all.[19] When Panamanian students were repulsed in an effort to raise their ensign alongside our own, the rioting began. Mobs of men wearing red "T shirts" and shouting "Viva Fidel" raged through the city setting fire to and destroying the United States Information Service, the Braniff and Pan-American Airways buildings, a Sears Roebuck store, and a Goodyear rubber plant.[20] Others carried submachine guns and homemade Molotov cocktails. President Chiari of Panama immediately broke diplomatic relations with the United States. There is ample evidence that the strategy of the rioters had been planned in advance by professional communist agitators. For one thing, Molotov cocktails take time to make and are not the handiwork of untrained amateurs. Although outlawed, Panama's Communist Party numbers about 500 hard-core members and an additional 1000 fellow travelers.[21] Many Panamanian students have received training in insurgency in Cuba. This incident subsequently led to a charge by Panama before the United Nations that the United States violated three articles of the Universal Declaration of Human Rights by opening fire on its defenseless civilian population. The United States was later exonerated of this charge.[22]

Past offers of higher wages for Panamanian workers and the flying of both countries' flags as evidence of titular sovereignty have fallen far short of Panamanian expectations. Panama's demands center around the issue of sovereignty over the canal and the Canal Zone. Panamanians have never been able to accept the fact that the United States has the legal right in perpetuity to a strip of land they consider their own. Other issues center on the abrogation of the "perpetuity" clause; greater participation in the benefits of the canal operation; equal employment conditions, opportunities, and pay for Panamanians and Americans; the cessation of commercial competition within the Canal Zone; jurisdiction over the Canal Zone ports of Balboa and Cristobal; and a voice in the actual operation of the canal, right down to insignificant issues such as the use of Panamanian postage in the Canal Zone.[23] Panamanians feel that their $1.9 million annual canal revenue is ridiculously low and demand an equal sharing of gross (not net) canal revenues, claiming that such a distribution of revenues would increase their rental income to between $40-$50 million per year.

The question of Panamanian nationalization of the canal, although theoretically possible, is not too likely in view of the

willingness of the United States to revise the existing treaty and in light of construction of a second canal. Nevertheless, it has been in the minds of many Panamanians for years. There were Panamanians in Cairo within 30 days after Nasser nationalized the Suez Canal in 1956, and there were Egyptians in Panama after that. It is no coincidence that three new Arab consulates opened in Panama shortly thereafter.[24] Great similiarities exist between the two canals in that each was constructed in the territory of an undeveloped country by powerful foreign interests and each serves as a vital and strategic waterway of Western powers.

The Panama Canal issue remains highly nationalistic and volatile. It is extremely susceptible to exploitation by Castro type revolutionaries bent upon sabotaging the remaining good will between our two countries. There seems to be no question but what the failure of Panama to modernize and reform its present outmoded political, economic, and social system has bred an atmosphere dangerous to United States interests. Unquestionably, Panama's demands border on the ridiculous. The United States, however, cannot take an unbending stand such as that advocated by the Honorable Daniel J. Flood, an outspoken advocate of asserting United States rights. Senator Flood in speaking against erosion of our rights in Panama stated, "If their flag goes up, you are a dead pigeon sooner or later." [25] On the other hand we must recognize that in Latin eyes the existing canal treaty should be changed to protect the welfare of Panama and the honor of the United States. We must accept evolution or run the risk of revolution.

FOOTNOTES

CHAPTER I

1. George W. Goethals, *The Isthmian Canal* (Washington: U.S. Govt. Print. Off., 1910), p. 52.

2. *Ibid.*, p. 53.

3. "Another Panama Canal: A-Blasts May Do the Job," *U.S. News & World Report,* 10 June 1963, p. 74.

4. Lawrence Galton, "A New Canal–Dug by Atom Bombs," *The New York Times Magazine,* 20 September 1964, p. 24.

5. Charles McG. Brandl, "Widening the Panama Canal," *The Military Engineer,* September-October 1962, p. 353.

6. "Still and Forever," *Time,* 22 June 1962, p. 37.

7. John W. Finney, "A Second Canal," *The New Republic,* 28 March 1964, p. 22.

8. U.S. Congress, House, Committee on Foreign Affairs, *United States Relations with Panama,* Hearings (Washington: U.S. Govt. Print. Off., 1960), p. 46.

9. Martin B. Travis and James T. Watkins, "Control of the Panama Canal: an Obsolete Shibboleth?" *Foreign Affairs,* April 1959, p. 409.

10. "The Canal's Too Small Anyway–Problem Is to Find a Better One," *U.S. News & World Report,* 27 January 1964, p. 33.

11. Committee on Foreign Affairs, p. 98.

12. International Commission of Jurists, *Report on the Events in Panama, January 9-12, 1964* (Geneva: 1964), p. 10.

13. Whenever a dollar figure is cited the author is referring to contemporary value at the time in question.

14. Leopoldo Aragon, "Has the Panama Canal a Future?" *The New Republic,* 30 July 1962, p. 17.

15. Martin B. Travis and James T. Watkins, "Time-Bomb in Panama," *The Nation,* 30 April 1960, p. 378.

16. "Uncle Sam's Canal," *The New Republic,* 13 June 1960, p. 50.

17. Travis and Watkins, "Time-Bomb in Panama," p. 380.

18. "Panama–No U.S. Backdown," *U.S. News & World Report,* 27 January 1964, p. 29.

19. Panamanian and United States flags flew side by side at seventeen select locations within the Canal Zone. Balboa High School was not one of them. No other United States flags were to be flown in deference to the feelings of the local population.

20. "Crisis over the Canal," *Time,* 17 January 1964, p. 30.

21. "Panama–No U.S. Backdown," p. 30.

22. International Commission of Jurists, p. 5.

23. Aragon, p. 17.

24. Committee on Foreign Affairs, p. 11.

25. *Ibid.,* p. 12.

CHAPTER II

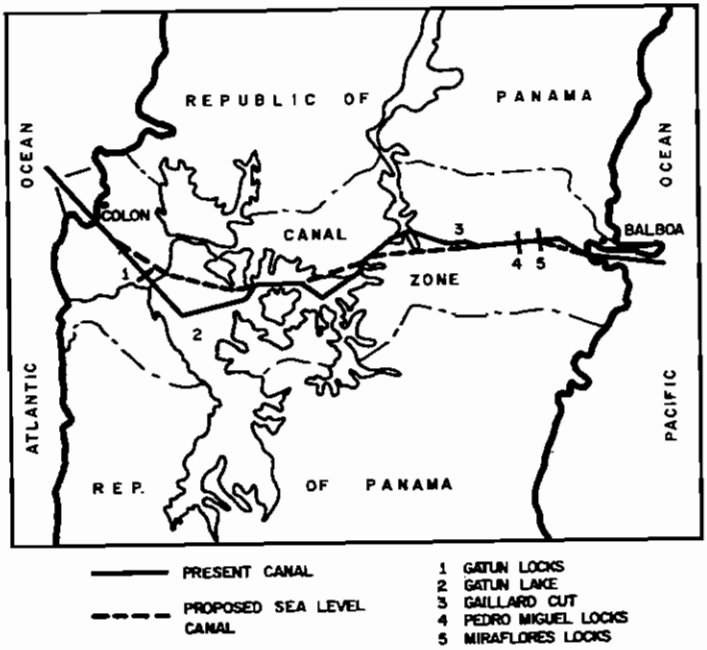
MODERNIZATION OF EXISTING CANAL FACILITIES

Current Canal Operations. Whatever is done to alleviate the restrictive dimensions of the present canal and its rapidly approaching traffic saturation, one thing is certain; a way must be found to build a bigger canal. For 25 years canal officials have recognized the need for improvement to existing facilities. Three principal plans have evolved. These are the Third Locks Project, the Terminal Lakes Plan, and a sea-level plan calling for construction of a sea-level canal at the existing site, utilizing conventional excavation techniques. To fully appreciate these alternate schemes one must have a basic knowledge of the present lock system.

The canal is 50 miles long from deep water to deep water, with a minimum depth of 40 feet. Seven to eight hours, including lockage time, is required for a ship to transit the canal. The canal complex consists of six principal features: Pacific and Atlantic sea approaches, approach terminals, channels leading to the locks, three sets of locks, the navigable lakes, and the Gaillard Cut. Ships commence transiting the canal each morning at 0600 and are dispatched from the terminals at half-hour intervals until mid-afternoon. Vessels are not allowed in the canal overnight, the locks operating as late as required to clear all shipping through the canal. Ships transiting from East to West are raised a total of 85 feet in three successive pairs of locks to the level of Gatun Lake. (See Figure 2) Ships then transit the 24-mile stretch of Gatun Lake to the Gaillard Cut. Since the passage through the cut is narrow, ship speeds are held to six knots. Visibility while passing through the cut is restricted due to the bends in the channel. It is necessary to control traffic through a system of ball and flag hoists mounted on the surrounding hills which operate much the same as semaphores on a railroad. Approaching the Pacific Ocean, ships are lowered 31 feet through the Pedro Miguel Locks to the level of Miraflores Lake. One mile further on, the ship is lowered 53 feet to sea level through the Miraflores Locks. Vessels then follow the channel to Balboa harbor and thence into the Pacific.[1]

"Locking-up" is an intricate process requiring an hour for each ship from the time the ship comes to a stop at the approach

FIGURE 2 - CONTEMPORARY CANAL ZONE INSTALLATIONS
SHOWING PROPOSED SEA LEVEL ROUTE



walls of the locks until the last towline is cast off at the opposite end of the lock. Coordination is maintained by the pilot on the ship and the lock master on the walls. Once a ship is in the lock the gates are closed electrically by a lock operator in the lock's control tower. The ship's engines are then secured and the ship is towed through the locks by powerful electric locomotives which move back and forth on a rack and pinion railway. Six locomotives are required for the operation. Two engines in front tow the ship, two in the middle steady it, and the two behind hold it back.[2] Accidents are a rarity, but locomotives on occasion have been pulled off the walls into the canal through faulty cable handling.

The Third Locks Project. Concern for the vulnerability of the canal to air attack during World War II motivated Congress to authorize $277 million for the Third Locks Project. The plan envisioned the construction of a third set of locks physically removed from the existing double lock pairs at Gatun, Pedro Miguel, and Miraflores. The size of the new locks was to be 1200 by 140 feet—30 feet wider and 200 feet longer than existing locks. The third locks were to be connected to the existing channel by new by-pass channels.[3] Considerable excavation work was accomplished before the project was cancelled in 1942 due to the reduced threat of enemy air attack. The excavation work at Gatun and Miraflores is virtually completed while work on the Pedro Miguel by-pass was never started. Objections have been raised to the sharp bends in the new channels at the Pacific end which are considered by some to be grave navigational hazards. In the interest of expediency the continuance of work on the Third Locks Project would greatly improve navigational facilities in the canal. The plan would not, however, allow for the transit of our modern aircraft carriers or the 106,000 to 135,000 ton commercial bulk carriers now being built.[4]

The Terminal Lakes Plan. Once the canal was operational it became obvious that it contained some basic engineering design errors. The foremost of these was the separatiou of the two Pacific sets of locks at Pedro Miguel and Miraflores requiring time-consuming double handling of all shipping. To overcome this deficiency the Terminal Lakes Plan was devised in May 1948. The proposal recommended the elimination of the Pedro Miguel locks and their replacement with new and wider continuous step locks at Miraflores.[5] The level of Miraflores Lake would, as a result, be raised to the level existing in Gaillard Cut and Gatun Lake thus impounding all the waters between the Atlantic and Pacific locks at one continuous level.

The plan would reduce canal transit time by one hour. To date no action has been initiated to implement the Terminal Lakes proposal. This plan, or a combination of the Third Locks and Terminal Lakes Plan, would provide in an economical way substantial improvement to existing canal facilities.

New Sea-Level Route for Old Canal. Proposals for building a sea-level canal at the present canal site antedate construction of the canal itself. During the 1906 controversy over canal construction the Navy Department was the last to concede defeat, never wavering in its support of the sea-level plan vice a lock canal. Proponents of the sea-level route through the Panama Canal have never really abandoned their fight against the locks. Construction of such a sea-level canal would necessitate the deepening and widening of Gaillard Cut and excavation of new channels through the Gatun and Miraflores Lake beds. The tidal range on the Atlantic side of the canal is not more than two feet; however, 40 miles distant the Pacific tide rises and falls from 12 to 16 feet.[6] Because of this substantial difference in tidal range, a by-pass tidal basin would have to be constructed on the Pacific side for use during periods when strong currents through the canal prohibit safe navigation. Elimination of the locks and use of a sea-level channel would cut transit time in half. The problem of transit by aircraft carriers would also be solved. A sea-level canal through the present Canal Zone would of necessity have to be cleared by conventional excavation–the employment of nuclear blasts being out of the question in such a populated area. This factor makes conventional cost estimates ranging from $2.8 to $3.0 billion compare unfavorably with all other routes where nuclear excavation is feasible.[7] United States diplomats hasten to point out that such a canal, although extremely healthy for Panama's economy, might well remain a political football, subject to the vicissitudes of the governing clique at Panama City.

FOOTNOTES

CHAPTER II

1. Norman J. Padelford, *The Panama Canal in Peace and War* (New York: Macmillan, 1948), p. 84.

2. Andre Siegfried, *Suez and Panama* (London: Jonathan Cape, 1940), p. 315.

3. Miles P. DuVal, "Isthmian Canal Policy–an Evaluation," *United States Naval Institute Proceedings,* March 1955, p. 268.

4. Carl Svarverud, "Sea-Level Canal in Nicaragua Feasible?" *Marine Engineering Log,* February 1962, p. 55.

5. Miles P. DuVal, "Isthmian Canal Policy–an Evaluation," p. 269.

6. Rachel L. Carson, *The Sea Around Us* (London: Staples Press, 1957), p. 50.

7. "Will a New 'Big Ditch' Be Built?" *Business Week,* 15 February 1964, p. 47.

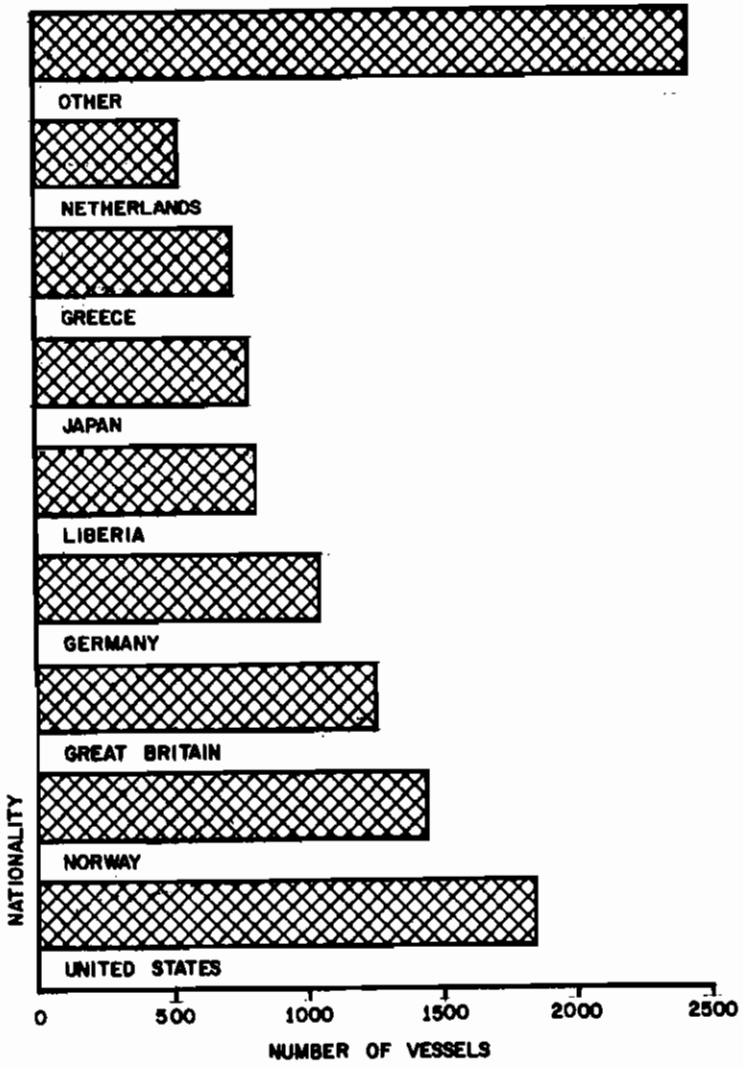
CHAPTER III

BASIC CONSIDERATIONS FOR ROUTE SELECTION

Thorough investigation, many surveys, and careful weighing of all available evidence will have to take place before an actual canal site can be chosen. The final choice of one site over all others will reflect a composite of many advantages, and not merely the lowest excavation cost alone. Economics of construction are important, but other factors must be considered. There are physical and geographical factors, defense considerations, and mileage savings to shippers to be weighed. Legal and political considerations loom large. They could easily present greater obstacles than the actual construction of the canal itself. A treaty will have to be negotiated with the country through whose territory the canal would pass. The question of radioactive fallout has arisen in connection with nuclear construction. Until sufficient lucubration has been given these areas, the United States cannot wisely select the route which would hold forth the greatest prospect for success.

Economic Considerations. The economic importance of the present Panama Canal is incalcuable. Directly or indirectly, all the nations of the world benefit from the canal. The principal beneficiary is the United States. Of all commerce passing through the canal, 60 percent either originates in, or is destined to, the United States.[1] In seeming contradiction to this is the fact that only 22 percent of all ships transiting the canal are under United States flag. This low figure is explained in part by the volume of United States shipping registered under the so-called flags of convenience of Panama, Honduras, and Liberia. The United States is still the leader in the number of vessels using the canal, followed by Norway, Great Britain, Germany, Liberia, and Japan. (See Figure 3) In commenting before the Committee on Foreign Affairs in 1960, Admiral James S. Russell, in discussing the importance of the Panama Canal, pointed out that the United States imports by sea 66 of the 77 strategic raw materials required in time of war.[2] For example, ten percent of the United States' requirements of zinc move through the canal from Peru. One ton of zinc shipped through the canal from Peru to an East Coast port costs $18 per ton and requires 11 days in transit in contrast to $48 per ton and 33 days shipping time if required to be moved around South America. Other strategic materials shipped from the west coast of South America through the canal include antimony, bauxite,

Figure 3 – COMMERCIAL VESSELS TRANSITING THE PANAMA CANAL IN 1962

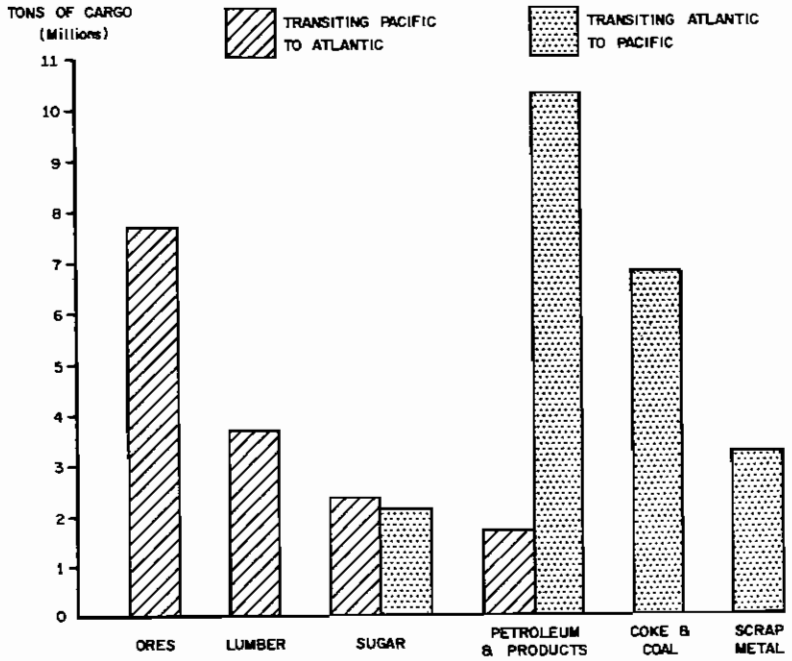


Source: *Britannica Book of the Year*, 1963, text, p. 631.

manganese, vanadium, copper, tungsten, and tin.[3] In addition to ores; crude and refined petroleum products, coal, lumber, sugar, and scrap metal account for the overwhelming bulk of canal commerce. (See Figure 4) At one time the bulk of trade flowing through the canal was intercoastal shipping. As late as 1922 intercoastal shipping accounted for 50 percent of total canal traffic. Today this figure has fallen to 14 percent. This drop in intercoastal shipping makes the proximity of Mexico's Tehuantepec route to both coasts of the United States a less decisive factor. The largest single element in canal traffic today is the United States-Japan trade which accounts for 16 percent of the total, followed closely by the West Coast of South America-United States East Coast trade representing 11 percent.[4] Looking at the canal from the perspective of Japan and South America we find that over 50 percent of Japanese exports pass through the canal while the nations of South America depend on it for between 75 percent to 90 percent of their total imports and exports.[5] In defending the canal in hearings on United States relations with Panama, the Honorable Roy R. Rubottom, Assistant Secretary of State for Inter-American Affairs, said, "I think commercial traffic alone as this social and economic revolution in Latin America continues and trade opens up further between all countries of the Americas . . . will continue to justify the canal."[6] The Free World has been compared to a big island, dependent upon its imports and the merchant shipping to deliver them. The question remains, "Do we have enough merchant bottoms and free access to the source of strategic materials to win a future war?"[7] Without a new sea-level canal the answer would certainly be "no."

It is recognized by our new sea-level canal planners that construction of such a canal will have a profound effect on Panama's present economy. Serious economic dislocations, unemployment, and other problems will arise unless the Panamanian economy is better prepared to absorb the shock of adjustments resulting from relocation of the present canal. The problem must be examined from a number of perspectives, depending on whether or not the new canal is built across Panama or some other site and whether or not the old Panama Canal is continued in use. Regardless of the new sea-level canal's location it is doubted that it would be economically feasible to continue the old canal in operation after the sea-level route were opened to navigation. There is some possibility of building a case for continuance, however, if the new route were built a significant distance away—in Mexico, for instance. Present plans call for renegotiating the 1903 canal

Figure 4 - PANAMA CANAL CARGO BY MAJOR COMMODITIES
FY 1962



Source: *Britannica Book of the Year*, 1963, text p. 631.

treaty with Panama at the same time that the sea-level canal treaty is entered into.* It may well develop that the present Panama Canal will revert to full Panamanian sovereignty; in which case, the financial ability of the Panamanian government to operate and maintain the old canal at a profit comes into the picture. The Honorable Thomas C. Mann stated in hearings before the Senate Commerce Committee that operation of both the new and old canals would depend in the last analysis on the economics of the situation, and that possibly, traffic requirements would require both.[8] Other observers are not so optimistic, pointing out that a sea-level canal constructed in another country many miles distant from the present site would be disastrous for Panama's economy. A new sea-level route capable of handling up to 200 ships a day would eclipse the present operation overnight. The old canal would have to be abandoned. One official has suggested that the present canal could be converted into a source of hydroelectric power for Panama at small cost.[9] Even if another route within Panama were chosen for the sea-level route, serious disruption to her economy would occur. Panama's two largest cities, Panama City and Colon, have grown up adjacent to the Canal Zone. These two cities contain 25 percent of Panama's population and being wholly dependent upon the present canal operation, might entirely wither away.

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* [Ed. Note: Since the writing of this paper, the President of the United States has announced that a new Panama Canal Treaty was under negotiation. The areas of agreement reached to date are:

1. The 1903 Treaty will be abrogated.

2. The new treaty will recognize Panama's sovereignty over the area of the Canal Zone.

3. The new treaty will be terminated after a specified number of years, or on or about the date of the opening of the sea-level canal, whichever occurs first.

4. The new treaty will provide for the political, economic, and social integration of the area used in the canal operation with the rest of the Republic of Panama.

5. The new treaty will provide for the defense of the existing canal and any sea-level canal which may be constructed in Panama.

6. The new treaty provides that the present canal and any new canal which may be constructed in the future shall be open at all times to the vessels of all nations on a nondiscriminatory basis.

For the full text see the President's statement of 24 September 1965 on the Panama Canal Treaty Negotiations.]

Panama's biggest employer is the Panama Canal Company which counts 11,000 Panamanians on its payroll.[10] These men account for an annual income of $45 million. The total work force now employed on the Panama Canal, including Americans, is 14,000. Because of its lack of intricate machinery and its ease of navigation, a sea-level canal would need only a small fraction of the present work force for its upkeep. Estimates run as low as 600 men with only a fraction of this number actually required at the site.[11] As a result, thousands of Panamanians would be jobless unless other industries could be developed to absorb these skilled workers.

The Honorable Leonor K. Sullivan, chairman of the subcommittee on the Panama Canal within the Committee on Merchant Marine and Fisheries, made an interesting observation when discussing Panama Canal problems in 1963. Mrs. Sullivan stressed that the United States must help raise Panama's living standards so that the canal no longer stands as the symbol and sole means by which Panamanians could hope to live decently.[12] To the impoverished peoples of Panama the canal, with its double standard of living, has always stood out as an oasis in their midst. To the "have-nots," the Canal Zone seems to have everything—jobs for all, good housing, inexpensive utilities, stores offering an abundance of inexpensive merchandise, and free education. Since the United States directly or indirectly is responsible for the bulk of Panama's income and gross national product, we have a moral obligation to uphold the Panamanian economy, particularly if the new canal is built elsewhere. Even if the sea-level canal were built on Panamanian soil, the United States must find ways to help Panama to industrialize and in other ways increase their revenues and, at the same time, decrease their dependence on the Canal Zone. It is also incumbent upon the United States to avoid any stigma of punitive action or abandonment of Panama when negotiating for the future sea-level site. Despite Panamanian uprisings in the past we must help Panama move into a better economic climate regardless of where the new canal is built. This we must do to uphold our American image of fair play before a world audience of underdeveloped nations. Panama stands representative of all Latin America. What we do in Panama will have a profound effect on the rest of Central and South America.

Latin America has the highest rate of population growth in the world today. Its population is expected to reach 375 million by 1975 and 624 million by the year 2000.[13] Panama's population

alone has grown by 32 percent in the past ten years; and in Panama, life expectancy is higher than in any other Latin American country.[14] Accounting for one-sixth of the land surface of the globe and only seven percent of the world's total population, Latin America still counts 130 million hungary citizens. She has suffered from an adverse trade balance since 1937. Even so, per capita income has increased by 60 percent since 1930. In citing these statistics Admiral B. L. Austin, Chairman of the Inter-American Defense Board, stated that another canal undoubtedly would enhance the future development of all Latin America.[15]

With our help, our neighbors to the south are making progress in improving their economic climate. The Alliance for Progress represents a start in the right direction toward improving economic and social conditions in Central America. Panama has received millions of dollars in direct grants of aid, Point Four Program technical assistance, and substantial loans from the Inter-American Development Bank.[16] In 1962, the last year for which complete figures have been tabulated, the government of Panama received a total of $84.4 million[17] income from all canal-connected sources, an amount equivalent to one-fourth of her gross national product.[18] In addition to this direct economic support, Panama has benefited from the proximity of the United States' presence in the Canal Zone in many ways. Benefits include a safe, pure water system; freight subsidy rights, including free carriage of Panamanian mail on the Panama Railroad; hospitals, schools, and many additional AID-type programs carried out by members of our armed forces. Panama, having no deep-water piers of her own, is dependent upon Canal Zone port and harbor facilities for her export-import trade.[19] It is not difficult to visualize the chaos that sudden termination of these programs would engender. What is needed most drastically is a firm resolve on the part of Panamanians to broaden their economic base.

In the past this base has been too narrow. In addition to Canal Zone operations the two remaining prime sources of revenue have been the United Fruit Company and Panama's merchant marine. The United Fruit Company has developed a substantial banana industry, marketing its Panamanian grown bananas under the famous "Chiquita" brand. Recent labor troubles and prolonged wind and rain storms in Bocas del Toro and Chiriqui provinces have cut deeply into wages. Panama has recently undergone an economic crisis which decimated her once powerful merchant marine. For years ship owners

had avoided high operating costs and taxes by placing their vessels under Panama's flag. This was made possible because these charges were lower under the flag of Panama. Wages and working-condition standards were substantially lower under Panamanian law. This eventually caused the merchant sailors working on flag of convenience ships to seek remedial action. The International Transport Workers Federation took up their grievances and fostered a world-wide boycott of Panamanian registered ships.[20] As a result Panama's merchant marine, once numbering over 800 ships, has been seriously curtailed through shifts in registry with a resultant loss of tax revenue further depressing the economy. Panama's merchant marine did not recoup its World War II losses, new construction in postwar years being placed principally under the Liberian flag. Liberia's merchant fleet, virtnally nonexistent prior to 1946, now numbers 900 ships while Panamanian flag vessels number fewer than 600. Other segments of Panama's economy, now minor in nature, which are capable of expansion are the cultivation of oranges, coffee, cocoa, sugar cane, and tobacco; gold mining; timber; and fishing. Panama is relatively rich in natural resources, some of which have never been exploited. This is primarily due to lack of financing, organization, and an incentive to develop them.

In 1952 the five Central American countries, including Panama, undertook a program to promote close integration of their economies based on free trade, industrial specialization, and coordination of economic development.[21] These countries have two things in common. They all have similar economic backgrounds and all recognize the cold fact that none of them alone possess the capacity to effect the changes necessary to raise their standard of living substantially. In a speech delivered before the Industrial College of the Armed Forces, Professor Kalman H. Silvert, an acknowledged expert on Latin America, cited El Salvador and Panama as the two Central American republics closest to economic transition.[22] An agreement to form a Common Market for Central America was signed in 1960 by El Salvador, Gnatemala, Honduras, and Nicaragua, with Costa Rica subsequently joining.[23] To date, Panama has shown little interest in the proposal. In essence, the scheme calls for an equitable distribution of new indnstrial plants among member countries and elimination of tariff walls to facilitate trade among themselves. To accomplish this lofty goal, machinery would have to be set up which would be responsive to a multinational agency.

A decision to place the new canal outside of Panama would be ruinous to Panama's economy. Even if the canal were to built across the Isthmus of Panama, serious disruption of the economy would result. In either case the new sea-level canal will mean for Panama a reduced economic posture necessitating increased United States' help. On the other hand, should the canal be built through Mexico, Nicaragua, Costa Rica, or Colombia, these countries, never having been dependent on canal income, could only benefit from such operations in a positive way. A sea-level canal through Nicaragua-Costa Rica would act as adrenalin on the economic health of these nations. Nicaragua and Costa Rica both contribute less than one percent to the total value of all Latin American exports. Their respective gold, coffee, lumber, banana, and livestock exports, approximate $80 million annually, an average export income which is substantially above Panama's. Even so, per capita incomes in Costa Rica and Nicaragua are significantly lower than those in neighboring Panama–a fact which points to the existing canal's impact on Panamanian employment. Mexico and Colombia are comparatively better off. Colombia accounts for five percent of total Latin American exports while Mexico boasts eight percent. Coffee has long been the money maker in Colombia although diversification in recent years has broadened her economic base. The products of Mexico's mines–gold, silver, lead, zinc, copper, and antimony–together with cotton and hemp have been the mainstays of her economy.[24] Sea-level canal revenue would not have the impact on either Mexico or Colombia that would be felt in Nicaragua and Costa Rica.

Political Considerations. Since it has been estimated a new sea-level canal would take from 10 to 15 years to complete, we must first renegotiate the old Panama Canal treaty. Detailed preliminary surveys alone will require three years at a cost of $17.5 million.[25] Our intention to amend the 1903 treaty as announced by President Johnson on 18 December 1964 brought forth a rare moment of praise from Panama and Latin America. President Robles of Panama hailed President Johnson's statement as an "historic day full of happy prospects" for his country.[26] The new treaty for the existing Panama Canal would be in effect until the new sea-level canal is opened and, by eliminating the age-old source of irritation to Panamanians, should set the stage for an improved disposition toward the United States. Once the new canal is open to navigation the Canal Zone should revert to Panamanian sovereignty. But what

use would an old canal be to Panama? The new canal, being faster, would attract most shipping and it is doubtful that Panama could operate and maintain the complex Panama Canal with its own resources. If the old canal were to remain operational, the United States would certainly have to retain a hand in its maintenance despite Panamanian sovereignty.

One thing is certain. In negotiating for a treaty governing the sea-level canal the United States will never again be able to exercise sovereignty over territory surrounding the canal. Latin blood boils at the thought of being subjected to the "indignities" to sovereignty suffered by Panama. None of the republics would grant the United States exclusive control and virtual sovereignty over their territory as Panama did in 1903. Even Nicaragua, upon hearing President Johnson's announcement, hastened to renounce the 1914 Bryan-Chamorro treaty which gave the United States the right to lease lands for a canal.[27] Nicaragua, like all other Central American republics, would welcome the sea-level canal, but only on her own terms. The new canal treaty must be negotiated with the chosen government on terms acceptable to both the United States and the local government. This could prove a bigger obstacle than building the canal itself. Thorny questions as to ownership, canal operations, and tolls will have to be resolved. The United States can afford to be magnanimous in bargaining for terms. We must, however, stand firm on three points. The canal must remain open to the navigation of vessels of all nations. The United States must retain the right of passage for its naval forces at all times free from all interference, political or otherwise. Lastly, we must reserve unto ourselves the right to defend the canal against attack.

In many ways a sea-level canal would differ from the present canal. A sea-level canal wonld not present the major security problems inherent in the present lock-type canal. With the security problem removed, there would be no need for a buffer zone around the canal as exists in the Canal Zone. It would require only a fraction of the present canal's compliment of personnel to operate and administer it.[28] A sizeable reduction in the number of American canal employees would help reduce political friction. The new canal would be more modern, more economical to maintain, and easier to defend.

Any interruption of the harmonions relations currently existing between the United States and Panama would have a deleterious effect npon present canal operations and could well endanger

future canal negotiations. It is important, therefore, to understand what kind of government faces us in Panama. President Marco Robles was inaugurated in October 1964. He is very popular with the army and commands the backing of two thirds of the members of the National Assembly.[29] He has a reputation for honesty and determination, is an avowed anticommunist, and in the past has dealt roughly with communist agitators. He has expressed confidence in the United States on many occasions. The amelioration of Panama-United States relations has already manifested itself under his regime. Since taking office he has launched programs to set government finances iu order, to reform the tax structure, to cnt back on government payrolls, to stimulate agriculture, and to stabilize the economy.[30] All this has been done despite the interests of the powerfnl commercial ruling class who historically have opposed chief executives who tamper with the *status quo.* Ironically this same clique was instrumental in putting Robles in office. This group constitutes his biggest worry. Nevertheless, President Robles appears to be Panama's best hope for future peaceful development.

It is always possible that the government of the country through whose territory we wish to build the canal will choose to "go it alone." This situatiou has already been attributed to Mexico. The Mexican press has quoted its Foreign Minister as saying that Mexico prefers to construct a canal with its own funds at a later date, and is therefore not interested in negotiations with the United States at this time.[31] Panama's Foreign Minister, Fernando Eleta, has been quoted as hinting of such a move by Panama.[32] Borrowing from the World Bank would be contingent upon nuclear construction since Panama would be in no position to bear the expense of the estimated five to six billion dollars for conventional excavation. (See Table I) It is more probable, however, that Eleta's stand was designed solely for the purpose of strengthening Panama's hand at a future bargaining table. Such a move could easily be countered by the United States by increased interest in either Colombia or Nicaragna.

Strategic Considerations. The strategic importance of the present canal has diminished over past years. Today the canal lies defenseless, its antiaircraft batteries and fighter aircraft having been removed. In fact the present canal is indefensible against an all-out attack by ICBM's.[33] Today's defense is vested in the retaliatory might of continental United States bases. The Panama Canal's strategic value in a limited war situation, such as Korea or Lebanon, cannot be overlooked.

TABLE I

STATISTICAL COMPARISON OF ALTERNATE ROUTES

ROUTE	LENGTH IN MILES	MAXIMUM ELEVATION AT CONTINENTAL DIVIDE (FEET)	COST ESTIMATE, CONVENTIONAL EXCAVATION (BILLIONS)	COST ESTIMATE, NUCLEAR EXCAVATION (BILLIONS)	SUITABILITY FOR NUCLEAR BLASTING
TEHUANTEPEC ROUTE (MEXICO)	125	872	$13.0	$2.3	NO
NICARAGUA-COSTA RICA BORDER ROUTE	140	760	4.1	1.9	YES
SAN BLAS GULF ROUTE	37	1100	6.2	.62	NO
CALEDONIA BAY ROUTE	62	1100	5.13	.77	YES
ATRATO-TRUANDO ROUTE (COLOMBIA)	95	932	5.26	1.2	YES

Source: *The New Republic*, 28 March 1964, Table, p. 23 (adjusted).

During the Korean conflict Military Sea Transport Service ships moved 54 million tons of cargo and 22 million tons of petroleum products through the canal. This was the equivalent of 64 pounds of material per day for every American fighting man. Admiral Russell, testifying before the House Committee on Foreign Affairs, explained that if the canal were used, it would take eight days to reinforce the United States' Pacific antisubmarine forces against a Russian submarine threat, but 21 days otherwise.[34] During the same hearings Major General William E. Potter, Governor of the Canal Zone, pointed out the role the canal plays in moving supply ships where they are needed. If the canal can be depended upon, each warship becomes more valuable in our planning.[35] Our military reliance upon the canal was last demonstrated in 1962 when we quickly moved key amphibious units from California to Cuban waters. Our proposed 1000-foot-wide sea-level canal would, of course, offer no obstacle to the passage of our largest warships. A sea-level canal should prove infinitely less vulnerable to nuclear attack, while the lock canal could receive damage beyond repair.

The sea-level canal should be built without organic defenses. In war our forces could easily occupy and control the area contiguous to the canal. Care should be exercised when drafting the new canal treaty to transcribe this right into law and thus avoid the plight of the British in Suez. Despite our two ocean navy and despite a canal without defenses, our operational planning must guard against surprise attack; for, if the Russians ever gained control of the world's sea straits, they could strangle the United States just as surely as if they attacked our mainland itself. The dynamic concept which led to the building of the canal in the first place was naval strategy.[36] Today this fact is still paramount although no one would dispute the canal's importance to both intercoastal and worldwide commerce. Lying as it does across the isthmian land bridge, the canal dominates a position of military strength and access to resources.

Technological Considerations. The feasibility of employing nuclear excavation techniques in canal construction is no longer questionable. A nuclear constructed canal could be completed in one fifth the time required by conventional means. In current estimates, nuclear construction costs are less expensive by a factor of four over conventional means.[37] This is made possible because of the tremendous and relatively inexpensive energy released in nuclear explosions. As improvements in technique are perfected it is anticipated that costs will drop even further.

The Atomic Energy Commission in its Plowshare program has developed nuclear explosives for peaceful applications which produce the least possible amount of radioactivity.[38]

The ever-present question of safety arises when considering the use of nuclear excavation. The intense heat created by a nuclear explosion lines the crater with molten rock which in turn quickly solidifies, trapping 90 percent of the lethal radiation underground. A small amount of radioactive material becomes airborne and is deposited nearby. The Atomic Energy Commission has concluded that radioactivity need not constitute a hazard and that exposure can be held to safe levels. To date, considerable progress has been made in the development of "clean" explosives utilizing only a small amount of fissionable material. With continuing advances in technology it is possible that the megaton yield from underground blasting will be sharply curtailed, resulting in a drastic reduction in radioactivity. Dr. Glenn Seaborg, Chairman of the Atomic Energy Commission, when questioned on this point by the Senate Commerce Committee stated, "We do this in two ways: one, by developing nuclear explosives with smaller and smaller amounts of this radioactive fallout; and, secondly, by trying to better our techniques for containing radioactivity produced by a given explosive underground or in the immediate neighborhood."[39]

The first step in preparation for nuclear construction on any site would be a survey to determine the subsurface geology of the site. The detailed turns of the sea-level route are more likely to follow the advantageous features offered by the geology of the subsurface rather than what appears on the surface. Once core drillings are made and the rock formation is known, a proper cratering technique for future blasting can be developed with this knowledge in mind. The feasibility of cratering has successfully been demonstrated in Project Sedan. In 1962, during this first major excavation experiment held at the Nevada test site, a 100-kiloton device was detonated 635 feet underground creating a crater 1280 feet wide and 320 feet deep.[40] Once a site has been selected and the geology of the area is known, the Atomic Energy Commission plans to build nuclear devices tailored to the specific site requirements since suitable explosives are not now in our stockpile.[41] Another consideration affecting possible route selection is density of population. For this reason several sites are not suited to nuclear exploitation. Of the remaining sites, varying numbers of inhabitants would have to be evacuated while construction were in progress.

The restrictions upon nuclear excavation, under the terms of the Nuclear Test Ban Treaty, raise another issue. Dr. Seaborg has advised Congress that modification of the existing treaty may be needed before construction could commence.[42] The treaty now bans explosions that would generate radioactive debris across international boundaries. Modification would require agreement by the Soviet Union, a signatory to the treaty. Since it is known that Soviet engineers have their own plans for peaceful application of nuclear devices, whether or not they would exercise their veto right is problematic. Dr. Seaborg; in noting the interest of Russia, France, Israel, India, and others in global cooperation concerning peaceful use of the atom was optimistic enough to say, "We probably should begin to give serious consideration to some kind of international cooperation in Plowshare. This could either be in connection with the International Atomic Energy Agency or other appropriate groups."[43] It may well prove that international boundaries will not be a question if megaton yields and corresponding fallout can be reduced as anticipated. In any event, time is in our favor since the diplomats have five to ten years to work on treaty revision. It will take at least that long to complete surveys, develop excavation technology, and produce the required nuclear explosives.[44]

FOOTNOTES

CHAPTER III

1. House Committee on Foreign Affairs, p. 41.

2. *Ibid.*, p. 94.

3. "America's Troubled Canal," *Fortune,* February 1957, p. 167.

4. *Ibid.*, p. 168.

5. "Dig We Must," *Time,* 25 December 1964, p. 16.

6. House Committee on Foreign Affairs, p. 73.

7. Clifton R. Largess, "Japan and Germany–Why Sea Power Failed," Lecture, U.S. Naval War College, Newport, R.I.: 2 February 1965.

8. U.S. Congress, Senate, Committee on Commerce, *Second Transisthmian Canal,* Hearings (Washington: U.S. Govt. Print. Off., 1964), p. 16.

9. "Another 'Panama Canal': A-Blasts May Do the Job," p. 75.

10. Senate Commerce Committee, p. 68.

11. *Ibid.*, p. 12.

12. U.S. Congress, House, *Panama Canal Problems,* Hearings (Washington: U.S. Govt. Print. Off., 1963), p. 29.

13. Bernard L. Austin, "The Strategic Significance of Latin America," Lecture, U.S. Naval War College, Newport, R.I.: 23 November 1964.

14. Gereon Zimmermann, "The Threat to the Panama Canal," *Look,* 1 August 1961, p. 67.

15. Austin, lecture.

16. August C. Miller, "Prognosis for the Panama Canal," *United States Naval Institute Proceedings,* March 1964, p. 68.

17. This figure includes canal rent ($1.9 million), purchases of goods by government and private organizations, contractor's purchases, and the expenditures of United States citizens employed in the Canal Zone.

18. Miller, p. 72.

19. Senate Commerce Committee, p. 68.

20. Lawrence O. Ealy, *The Republic of Panama in World Affairs* (Philadelphia: University of Pennsylvania Press, 1951), p. 180.

21. Victor L. Urquidi, *The Challenge of Development in Latin America* (New York: Praeger, 1964), p. 130.

22. Kalman H. Silvert, *Latin America: the Economic and Political Climate,* L63-150 (Washington: U.S. Industrial College of the Armed Forces, 1 April 1963), p. 9.

23. Urquidi, p. 130.

24. Preston E. James, *Latin America* (New York: Odyssey Press, 1950), p. 638.

25. Senate Commerce Committee, p. 8.

26. "Historic Day Applauded by Panama Chief," *The Providence* (Rhode Island) *Journal,* 19 December 1964, p. 12.

27. "New Canal Issue for El Salvador," *The New York Times,* 10 January 1965, p. 29.

28. Senate Commerce Committee, p. 10.

29. "New Riots in Panama?" *The New Republic,* 28 November 1964, p. 10.

30. Olive Brooks, "Canal Zone Is Watchful on U.S. Plans," *The New York Times,* 22 January 1965, p. 56.

31. Senate Commerce Committee, p. 17.

32. "Panama Considers Building Isthmian Sea-Level Canal," *Newport* (Rhode Island) *Daily News,* 3 February 1965, p. 15.

33. Miller, p. 70.

34. House Committee on Foreign Affairs, p. 94.

35. *Ibid.*, p. 46.

36. R.S. Fahle, "The Panama Canal—an Auxiliary of the Fleet," *United States Naval Institute Proceedings,* May 1954, p. 496.

37. Finney, p. 21.

38. Senate Commerce Committee, p. 26.

39. *Ibid.*, p. 30.

40. Finney, p. 22.

41. Senate Commerce Committee, p. 30.

42. *Ibid.*, p. 33.

43. "Problems in Digging a Canal with Nuclear Blasts," *The Providence* (Rhode Island) *Journal,* 8 January 1965, p. 28.

44. Finney, p. 24.

CHAPTER IV

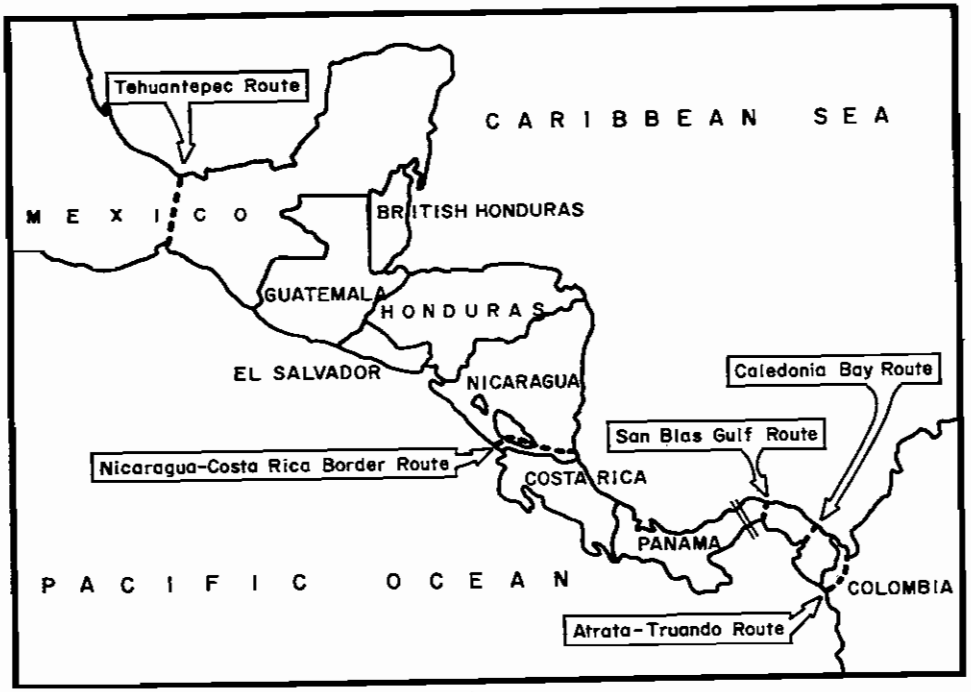
ALTERNATE ROUTES FOR NEW SEA-LEVEL CANAL

Alternate sites for the building of an entirely new sea-level canal have been explored from time to time in past years, due primarily to the political instability within Panama. On 6 July 1962 Senator Warren G. Magnuson, Chairman of the Senate Commerce Committee, introduced a bill authorizing preliminary surveys of possible sites.[1] These preliminary surveys have now been completed. On 3 March 1964 Senator Magnuson introduced Senate bill S.2497 which provides for an investigation and study to determine an actual site for construction of a sea-level canal through the American isthmus. The bill calls upon the Secretary of State, the Secretary of Defense, and the Atomic Energy Commission, to act together in considering matters of national defense, foreign relations, intercoastal shipping, interoceanic shipping, and other matters deemed to be important when selecting the canal site.[2] Plans now call for nuclear construction of an unrestricted sea-level waterway 1000 feet wide and 250 feet deep designed to handle up to 200 ships a day. Altogether a total of 30 different transisthmian routes have been proposed at one time or another.[3] Of these, five principal arteries have emerged as the most likely of accomplishment. (See Figure 5)

Mexico's Tehuantepec Route. If President Johnson's announcement of 18 December 1964 is to be taken seriously, the Tehuantepec route for the new sea-level canal has already lost out to its four rivals.[4] One must not be too hasty in dismissing this possibility, however, as it has much to commend it. Mexico possesses the manpower and skills required for canal construction and operation. Her political stability lends itself to successful peaceful operation of the canal, free from communist agitation and intrigue. Mexicans in general are enthusiastic about building their own Tehuantepec Canal. They are equally insistent upon national control, yet they lack sufficient capital to tackle the estimated $2¼ billion building job without outside financial assistance. Upon Mexican application such financial assistance might be forthcoming from the World Bank for Reconstruction and Development.

The chief objections to the Tehuantepec route are that it is too long and mountainous. However, the summit at the Continental Divide is 872 feet compared to elevations of 1100 feet in Panama.[5]

FIGURE 5 – ALTERNATE SEA LEVEL CANAL SITES



Only 22 miles of the route lie above the 400 foot elevation. The route, 125 miles in length, is not the longest, being exceeded by the 140 mile Nicaragua-Costa Rica route. Colombia's Atrato-Truando route, at 95 miles, runs a close third. (See Table 1, page 28) On the average, ships using the Mexican route rather than the Panama Canal would add nine hours to their sailing time; however, this is offset by a savings of 60 hours per trip for the inter-coastal operator.[6] In an engineering sense, construction appears entirely feasible especially if nuclear construction techniques could be employed. Nuclear excavation would bring construction costs in line with other routes under consideration. However, serious doubts exist as to the feasibility of employing nuclear devices because of six towns situated in the region with populations of approximately 55,000.[7] The Tehuantepec route would be expensive to construct, may not be open to negotiation with the Mexican government, yet would provide the maximum speed and economy to intercoastal commerce and naval redeployment.

Nicaragua-Costa Rica Border Route. It was only by last-minute political maneuvering that the canal wasn't built in Nicaragua in the first place. Public opinion had been in favor of this route ever since the 1896 Republican National Convention at Philadelphia had advocated a Nicaraguan canal in their platform.[8] By 1899 negotiations were under way to prepare treaties with Nicaragua and Costa Rica to settle construction details and the matter of ownership and control. However, Bunau-Varilla's activities were destined to upset these plans. It was not until 1947, when Panama forced the United States to abandon its defense bases adjacent to the Canal Zone, that attention reverted to Nicaragua as an alternate site. The Nicaragua route has never really died but has lain dormant over the years always presenting an alternate possibility to Panama.

Present plans for a Nicaraguan canal call for either one of two possible approaches to construction. The first of these involves utilization of the existing San Juan River and Lake Nicaragua for the majority of the route. Since a sea-level canal would drain elevated Lake Nicaragua, and since much of Nicaragua's population and industry is located adjacent to the lake, it is generally felt that such a step would seriously disrupt the country's economy.[9] An alternate scheme has been advanced that would make drainage of Lake Nicaragua unnecessary. The plan calls for construction of the sea-level canal in a straight line through the narrowest part of the isthmus in the area. The line would run a length of 130 miles due east and west on latitude 11°08' north from Salinas Bay on the Pacific to a point ten miles north of

Greytown on the Atlantic side.[10] This line runs alternately through the Nicaragua-Costa Rica border, and since it passes south of Lake Nicaragua, drainage would become unnecessary. Some flexibility in the straight line would be allowed in order to avoid high elevations. Maximum elevation at the divide is 760 feet, and only six miles of the route exceed a 400 foot elevation. Another advantage lies in the fact that tidal locks would not be required as at Panama since maximum tidal variations are five feet contrasted to 16 feet at Panama. Sea-level navigation would be safer and delays, incident to strong currents, eliminated.[11] The Nicaragua-Costa Rica Border Route appears well suited to either conventional or nuclear excavation. The cost of a nuclear built canal is estimated to be $1.9 billion, approximately half that of conventional methods. In any event treaties with both countries would be involved, a factor that carries a certain appeal to those opposed to unilateral or even bilateral canal operation. If our second canal is to be built with conventional means, this route seems to offer the greatest advantages.

San Blas Gulf Route. The track across the isthmus of Panama at San Blas is by far the shortest of the proposed canal routes. It is but 37 miles from coast to coast with a maximum elevation of 1100 feet at the divide with a total of seven miles lying above the 400 foot level.[12] The San Blas Gulf route is one of two possible sea-level sites situated in Panama between the present canal and the Colombian border. The route would utilize a river bed halfway across the isthmus. In 1960 the Panama Canal Company estimated, in their Isthmiau Canal Plan, the cost of construction using nuclear excavation to approximate $620 million.[13] The big drawback to the San Blas Gulf route stems from its proximity to heavily populated areas making nuclear construction extremely hazardous if not altogether impossible.[14]

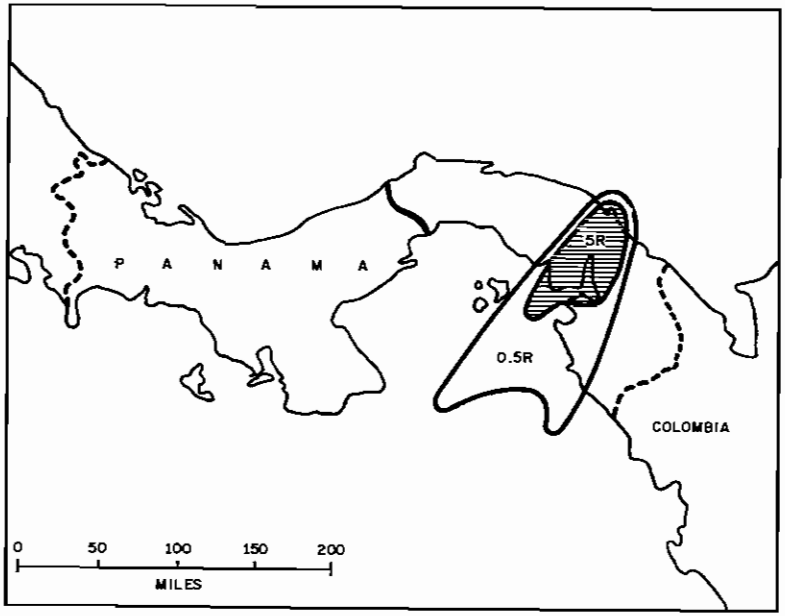
Caledonia Bay Route. This route, often referred to as the Sasardi-Morti route, lies 110 miles east of the present canal. The route extends 62 miles from Caledonia Bay on the Atlantic side, partially following the course of the Sabana River to the Gulf of San Miguel on the Pacific. As at the San Blas site, a 1100 foot elevation is encountered at the intersection of the canal line and the Continental Divide. The route passes through primeval jungle sparsely populated with primitive Darien Indians. Only four towns lie within 25 miles of the site, the largest having a population of 1708.[15] This site is considered well suited to nuclear blasting. To blast a channel across the isthmus at Caledonia Bay, Atomic Energy Commission engineers anticipate working from both coasts toward the center. After borings to sample rock formations are

made, holes would be drilled approximately 800 feet apart to a depth of between 650 and 2600 feet. The holes would then be lined with thick steel casings. It is estimated that a maximum of 4000 men would be required to complete the job in two and a half years. In practice it has been demonstrated that the earth and rocks to be excavated by nuclear underground demolition are broken up, and being ejected, form a huge crater. Actual nuclear blasting would require relatively little time. After placement in the drilled holes, the nuclear charges would be detonated in strings of 15 charges to a section thus forming a continuous smooth trench. Nuclear blasting would follow on behind as new holes were drilled inland. The Caledonia Bay route would require no more than 325 nuclear blasts of varying yield for completion.[16] Additional conventional work would be required to dredge approach channels to the canal on both the Atlantic and Pacific sides. Mosquito control to combat yellow fever and malaria, reminiscent of Panama Canal construction days, would be needed to protect demolition crews.

In 1960, when the Panama Canal Company made their first site surveys, plans called for the detonation of 325 nuclear devices containing a yield of 300 megatons to dig the Caledonia Bay canal. Due to advances in technology it is now held that this job could be done today with 310 blasts bearing a total yield of 170 megatons.[17] By the time actual construction commences additional technological advances should bring the yield down even further. In a statement made by Dr. Gerald Johnson, Associate Director for Plowshare, it was revealed that the radioactivity now expected in the fallout pattern is about one one-hundredth of that predicted in 1960.[18] The fallout expected along the Caledonia Bay route would not exceed five roentgen.[19] (See Figure 6) Ten roentgens corresponds to the average radiation dose a person receives from natural sources in a lifetime. The 0.5 roentgen value is equivalent to exposure acquired in less than five years from the earth's natural radiation. In order to receive a five roentgen exposure a person would have to be caught in the fallout and remain there. The prevailing winds in the area are generally southwest. Blasting would be done at a time when the wind pattern would carry the nuclear debris out over the Pacific Ocean. Sufficient radioactive decay will have taken place to allow persons evacuated from the area during construction to be returned to the area within the year in which the operations terminated.[20]

Fewer obstacles to a sea-level canal would be encountered along the Caledonia Bay route in contrast to San Blas, although

FIGURE 6 - PREDICTED FALLOUT FROM NUCLEAR EXPLOSIONS AT CALEDONIA BAY SITE IN ROENTGENS BASED ON 1964 STATE OF TECHNOLOGY



Source: U.S. Congress, Senate, Commerce Committee, *Second Transisthmian Canal*, p. 66.

the elevation at the Continental Divide is the same. Original 1960 cost estimates for nuclear construction of this route ran $770 million; however, further studies indicate the cost could be reduced to $500 million.[21]

Atrato-Truando Route through Colombia. The Colombian route lies close to the Panamanian border. Its 95 miles cross uninhabited swampland. Distance from population centers makes the route ideally suited for nuclear excavation. A substantial stretch of the route would make use of the Atrato and Truando Rivers—low swampy terrain—while 80 of its 95 miles transit ground less than 100 feet above sea level. Surveys showed the highest point of elevation at the divide to be 982 feet with only six miles exceeding 400 feet.[22] Aerial mapping of this site has been completed. Estimates as high as $1.2 billion make this route more expensive to construct with nuclear explosives than the Caledonia Bay route, but the Atrato-Truando route would be far less hazardous. An overwhelming number of nuclear engineers favor it. Even if rejected, the Colombian route may serve a very useful purpose. Lying so close to Panama it could well serve as a political lever for negotiation of a new sea-level site in Panama.

FOOTNOTES

CHAPTER IV

1. Aragon, p. 16

2. Senate Commerce Committee, p. 3.

3. Galton, p. 77.

4. In his announcement the President mentioned only four possible routes: two in Panama (San Blas Gulf and Caledonia Bay routes), one in Colombia, and one through Nicaragua and Costa Rica. No mention was made of the Mexican route.

5. Senate Commerce Committee, p. 36.

6. *Ibid.*, p. 18.

7. "Will a New 'Big Ditch' Be Built?" p. 47.

8. Dwight C. Miner, *The Fight for the Panama Route* (New York: Columbia University Press, 1940), p. 101.

9. Senate Commerce Committee, p. 36.

10. Svarverud, p. 57.

11. Earl Harding, *The Untold Story of Panama* (New York: Athene Press, 1959), p. 171.

12. Senate Commerce Committee, p. 36.

13. "Will a New 'Big Ditch' Be Built?" p. 46.

14. The Pacific terminus would be less than 25 miles from Panama City and the Continental Divide crossing, the site of heaviest blasting, under 35 miles from both Panama City and Colon.

15. Galton, p. 72.

16. *Ibid.*, p. 73.

17. *Ibid.*, p. 74.

18. Senate Commerce Committee, p. 61.

19. *Ibid.*, p. 57.

20. *Ibid.*, p. 56.

21. *Ibid.*, p. 40.

22. *Ibid.*, p. 37.

CHAPTER V

THE QUESTION OF INTERNATIONALIZATION

Internationalization of the Panama Canal is not an entirely new idea. President Truman is credited with an offhand suggestion made during the Potsdam Conference of 1945 calling for the internationalization of all the world's major waterways. These included the Suez, Kiel, Rhine-Danube, and Panama canals, and the Black Sea Straits.[1] During the 1956 Suez Canal crisis Senator Flanders of Vermont publicly urged that the Panama Canal should be the first to be internationalized, thus providing Nasser a face-saving precedent for doing the same with Egypt's canal.[2] The then Senator Hubert Humphrey of Minnesota was a strong advocate of this view. He believed that placing the Panama Canal under international or United Nations control was a prerequisite for settling the Suez crisis.[3] Other prominent men subscribing to internationalization of the Panama Canal under United Nations auspices included Congressman James Roosevelt and Great Britain's Labor Party leaders Clement Atlee and Hugh Gaitskill.

Proponents of internationalization under the aegis of the United States or Organization of American States offer arguments for this action which look appealing enough on the surface. The guiding principle behind internationalization assumes that an isthmian canal is so vital to so many nations that no one nation should have exclusive control over it. Supporters of internationalization point out that the real interests of the United States; preservation of the canal, free access, good service at low cost, and a voice in canal operations would be unimpaired by such action.[4] In the event of total war, international control would make the canal a less attractive target.[5] If the canal were attacked, it is argued, the United States could come to the defense of the canal acting within Article 51 of the United Nations Charter. Such action would gain greater moral support from the world-at-large than action in defense of an exclusive United States interest.[6] Finally, it is argued, if Panama were ever pushed to revolution the canal would certainly be nationalized. International communism would not likely be caught looking the other way. Proponents of internationalization make the following conclusion: since United States control of the canal is no longer vital, but preservation of free world shipping is, the canal should be placed under international control.[7]

International control under the United Nations would not serve the best interests of the United States. Control in the hands of the United Nations would invite obstructive pressures and misuse of the Soviet veto power, handing the Soviets the very key to control of Central and South America. Senator Butler of Maryland felt so strongly on this point that he declared internationalization of the Panama Canal would, "sign the death warrant for the entire Western Hemisphere." [8] The Panamanians themselves are the last ones that would like to see an isthmian canal internationalized. President de la Guardia and President Chiari, former Panamanian chief executives, have vigorously opposed it.[9] There was no international convention governing the 1903 treaty, therefore Panama is not obligated to recognize any country's rights other than the United States. Relationships with an international agency would be far more complex and difficnlt. Panama would undoubtedly benefit less from such an arrangement than she now does. Neither do the Panamanians want to run the canal under OAS control. Operation of the canal under an Organization of American States specialized agency would be less odious than under the United Nations, however. There would be no Soviet veto to contend with, nor would the Afro-Asian bloc be permitted a voice in canal policy. Control would be manifested in the nations of the Western Hemisphere with the United States exercising a dominant role. This is not what Panama wants. Recognizing the efficient management of the present canal, Panama conld not risk an interruption of service because of its heavy reliance on canal revenues. The idea of handing over a new sea-level canal to international control, an operation so vital to the local economy, holds even less appeal.

One final international scheme deserves attention. This is the "Colombine Plan" (Primer Plan Colombino) for construction, operation, and maintenance of the sea-level canal. Under this plan an international corporation would be formed to be presided over, and under the sovereign control of, the host country. The plan envisages worldwide subscription of stock open to individuals, companies, and governments. Stock would be sold with the proviso that no single country would hold a commanding number of shares. An exception would be made for the host country or a Latin American pool of countries to enable the purchase of stock for sale in the future. Bids for nuclear excavation of the canal would be solicited from the world's atomic powers. Five percent of current operating costs would be set aside annually for maintenance. The plan anticipates a high

return on the initial investment based on projections of upwards of 15,000 ship passages per year by 1985. Canal revenues of $120 million annually are expected by the year 2000. The somewhat visionary Colombine Plan concludes, "Seeing several atomic powers employ their weapons of destruction for peaceful purposes will be a beautiful sight to behold in this world plagued by dissention and hatred. Panama or Colombia will be proud to be the ground for this tournament of peace." [10]

FOOTNOTES

CHAPTER V

1. Miller, p. 71.

2. Harding, p. 121.

3. *Ibid.*, p. 122

4. Martin B. Travis and James T. Watkins, "Control of the Panama Canal: an Obsolete Shibboleth?" p. 417.

5. Martin B. Travis and James T. Watkins, "Time-Bomb in Panama," p. 380.

6. Martin B. Travis and James T. Watkins, "Control of the Panama Canal; an Obsolete Shibboleth?" p. 417.

7. Martin B. Travis and James T. Watkins, "Time-Bomb in Panama," p. 381.

8. Harding, p. 129.

9. "A New Pact on the Panama Canal?" *U.S. News & World Report,* 25 June 1962, p. 26.

10. Aragon, p. 17.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

The fact is inescapable that the United States must maintain a continued and growing interest in the American isthmus. We are the only hemispheric nation possessing the financial and technological resources necessary for nuclear construction. We have the most at stake in a new sea-level canal and are in the best position to insure that its completion and operation will serve the interests of all.

The new canal should be built in Panama at the Caledonia Bay site. This site is chosen as the shortest route readily adaptable to nuclear excavation. The use of nuclear devices and cratering technology in the canal's construction will allow for the speediest possible construction at the lowest possible cost. Proximity to the present centrally located Panama Canal will alter shipping routes of the world to the least possible degree. Locating the new canal in Panama will enhance rather than hinder her economy. Conversely, locating the sea-level canal outside of Panama would be ruinous to her economy which is so deeply dependent on canal revenues. Overnight the country would be ripe for communist subversion and control.

Full sovereignty over the sea-level canal should be vested in Panama. The sea-level route, lacking complex operating machinery and the necessity for accompanying technical personnel, requires no zone separating it from adjacent Panamanian territory. Upon opening the new canal to operations, the present Panama Canal, being operationally obsolete, should revert to Panama for use as she sees fit. Old canal debts due the United States should then be written off. Having regained full sovereignty over all Panamanian territory, the political posture of the United States in relation with Panama should be greatly enhanced.

In negotiating the sea-level canal treaty with Panama the United States must insist on three unequivocal conditions. First, the canal must be open to the free passage of the ships of all nations with the same scale of tolls charged to all. Secondly, the United States must retain unrestricted use of the canal for movement of its military forces in peace or war. Lastly, the

United States must insist on its right to defend the canal in event of war or attack.

The canal should be operated as a joint venture by Panama and the Uuited States, each contributing 50 percent of the operational and administrative personnel required. Annually a portion of operating revenues should be set aside to retire the United States' capital investment–the cost of building the canal. Additionally, five percent of revenues should be set aside for canal maintenance. The ever-increasing volume of shipping using the canal coupled with extremely low operating costs inherent in a sea-level canal operation, due to the absence of expensive machinery and skilled technicians, will leave a substantial balance in the form of profit. Sea-level canal tolls should remain at their present levels. Shippers using the new canal will experience no delays and faster transit time which equates into quicker turn around time and greater profits for the same toll charges. Revenue remaining after annual retirement of capital investment and reserves for maintenance should be shared equally between Panama and the United States. What Panama does with her share, which should be many, many times greater than the ten million dollar per year annuity proposed under the revision of the existing Panama Canal treaty, will be Panama's decision.

The United States, on the other hand, has in its share of canal profits a golden opportunity to live up to its responsibilities toward Central America and demonstrate to the world the qualities which make our country great. The United States should take its half of the canal's operating profits and turu them over to a Central American agency set up for the purpose of area development. Our nation would hardly miss this source of revenue while at the same time would stand to profit by its distribution by a factor many times over its real dollar value. The financial agency thus established would pool our share of the canal profits for financing Central American economic development. A governing board composed of representatives of each Central American nation would approve projects submitted to it and lend development funds at a very low rate of interest. Thus the fund would be revolving and ever-increasing as subsequent yearly canal revenues and interest payments were added. Even those countries whose sites were not chosen for the canal would thus still participate in canal profits. The stigma of the dole would be eliminated and the dignity of the borrowing country upheld by the interest payments. In this way a small beginning could be made to build a needed cement plant here, a shoe factory there, and a

rubber tire factory somewhere else, perhaps under the guidance of the Central American Common Market. Later on, as increasing profits accumulated, larger enterprises could be undertaken. By strengthening the economic base of Central America in this manner, poverty would be reduced and the living standard of the people rapidly improved, thus thwarting the spread of communism. The *Yanqui* image of the rich Goliath of the North paying little heed to Latin American needs should vanish as material advantages become widespread.

Such a plan would be a manifestation of our acceptance of the moral obligation toward our Latin American neighbors less fortunate than ourselves. By our actions the United States would demonstrate before the world our willingness to yield a little politically and economically for the common good of all, while at the same time reaffirming our position as the hemisphere's number one power and leader of all the world's free peoples.

TABLE II

SEA-LEVEL CANAL FACTOR GRADING MATRIX

	TEHUANTEPEC (MEXICO)	NICARAGUA-COSTA RICA	SAN BLAS GULF	CALEDONIA BAY	ATRATO-TRUANDO
ECONOMIC IMPACT OF CANAL ON HOST NATION(S)	1	3	4	4	2
PROBABILITY OF ADVERSE POLITICAL REACTION IF CANAL BUILT ELSEWHERE	2	2	4	4	2
STRATEGIC IMPORTANCE TO UNITED STATES	3	2	2	2	2
SUITABILITY TO NUCLEAR CONSTRUCTION*	1	3	1	4	4
DESIRABILITY OF PHYSICAL FEATURES	1	1	4	3	2
RELATIVE CONSTRUCTION COST*	1	3	1	4	3
SCORE	9	14	16	21	15

*Relative construction costs are calculated on the basis of suitability to nuclear construction. Conventional cost estimates are utilized where route is not suitable for nuclear excavation.

1 - POOR; 2 - FAIR; 3 - GOOD; 4 - EXCELLENT

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