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THE ISTHMIAN CANAL.

A Lecture by Mr. GEORGE S. MORISON,
Member Isthmian Canal Commission,
Before the Contemporary Club, Bridgeport, Connecticut,
May 20, 1902.

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It is perhaps a very unsatisfactory, and a rather appalling introduction to be brought before you as one who knows all about so mooted a question as that of the Isthmian Canal. I will acknowledged that I think I do know something about it, but there are plenty of people who will tell you I do not. I shall therefore start on the principle that I do know; and I trust, with the respect which I have no doubt you have for the opinion of your president, that you will all agree with me in what I say.

This is the third time which I have recently spoken on this particular subject. The first time was before a commercial club, and I endeavored then to describe the different canal routes, particularly Panama and Nicaragua, and to state as briefly and as plainly as I could their physical characteristics and their respective merits. The second time I spoke to a reform club, and as reformers are not supposed to deal especially with commercial considerations or engineering details, I spoke then of the reasons why a canal should be built, and the effect which an isthmian canal might be expected to have in furthering the good ends which it is supposed reformers intend to accomplish. I do not exactly understand what the special character of this club is; but in one respect it differs radically from either of the others, as all the members of each of the other clubs wore black clothes. I must therefore on this occasion take up the subject in a rather more general way, and speak both as to what the canal would be and as to why it should be.

The isthmus has four hundred years stood in the way of what men wanted to accomplish. Columbus started to reach the Orient; he might have got there, but the isthmus was in the way. After a lapse of more than four hundred years the Oregon, a great battleship, tried to go from the Pacific, where she was built, to the Gulf of Mexico, and the isthmus stood in the way. Those four hundred years from the voyage of Columbus to the voyage of the Oregon have witnessed very remarkable changes in the operations which the isthmus impeded.

First, in the matter of commerce; Columbus tried to reach Asia; it was the Asiatic commerce, the Asiatic trade which was before him, and that was the one thing that he thought of. For three hundred and fifty years the trade of the far East was the principal trade which sought to cross the isthmus. Then came an entirely different condition; it was the development of our Pacific coast; suddenly the trade of California arose, and that was the important thing which had to cross the isthmus. Finally the railroads across the continent are handling the California business, and the question of the extreme East has come up again; it is the trade of the Orient combined with the other conditions of the Pacific which now make the demand for the Isthmian Canal.

During these periods enormous changes have taken place in the class of ships which need to cross the isthmus. Columbus came in his caravels; and in the early days the same class of ship, I presume, in which he crossed the ocean, used to sail from ports in Spain across the Atlantic, through the Caribbean, up the San Juan River, across Lake Nicaragua, and landed their cargoes at the City of Granada. In the next period, the period of California activity, business was handled in side-wheel steamers; steamers seldom more than two hundred and fifty feet long, none of them drawing more than seventeen or eighteen feet, crowded with passengers, carying practically no freight; and these ships were the ones on which the earlier isthmian canal projects were based. And now we have come to ships compared to

which these California steamers are insignificant; ships not of 2,000, but of 20,000 tons; ships seven hundred feet long, drawing thirty-two feet, with seventy or seventy-five feet beam. Those are the ships which any modern canal must be built to accommodate; ships that cannot go through the Suez Canal. The largest ships now sailing from English ports to Australia necessarily go around the Cape of Good Hope because the Suez Canal is not big enough.

In another respect there has been a tremendous and radical change. All the early history of the isthmus was based on the Spanish occupation; and the Spanish occupation, like all mediæval work, was an occupation which utterly disregarded sanitation. In every Spanish city, I presume in Spain, and certainly in all Spanish-America, no attempt whatever has been made either to provide good water or to provide a proper sewerage system. All the development has been one which tended to preserve the diseases of centuries for the benefit of posterity. The Panama railroad was built fifty years ago, in a country already occupied on the Spanish principle, at a time when little was known about sanitary rules, and at a time when the isthmus was crowded by the same class of population in transit to California, which, in later years made the towns on the plains such that they were designated as "hell on wheels." This was the kind of people that covered the isthmus when the Panama railroad was built, and it was under those conditions that the isthmus obtained the name of being the most unhealthy place in the world. Then followed the construction of the Panama Canal by the French company; a company which started out with a magnificent abandon which has hardly ever been equalled, which started to spend money as if there were no end to it, and to import into a tropical country the luxuries and dangers of the French metropolis. It resulted, as was to be expected, in a disaster, in every way you can think of; financial, physical, moral, sanitary; and that perpetuated the bad name of the Isthmus of Panama. The final sanitary development is one of which this

country may well be proud; and that is the work which the American army has done in Cuba under the rule which terminates to-day. Cuba is naturally a healthy island, but its cities have all the troubles of the Spanish occupation; exactly the same thing existed in Havana which exists in Panama; and it has been thoroughly proved that the tropical diseases which have made Cuba a terror, are diseases which can be absolutely controlled; this, I believe, will be the case in the City of Panama, as much as it was in Santiago, when the same control and the same management is placed there.

And now there is one other development, in thought at least, which has come about within the last two weeks. The isthmus has been considered throughout its length not only a seat of tropical disease, but a seat of natural disturbance. It is all an earthquake country. Nicaragua is an earthquake country, Panama is an earthquake country, and the earthquakes extend well over into Central America, Colombia and Venezuela. The effect of earthquakes on a canal has been more or less spoken of. The only conclusion that I have been able to reach is that an earthquake will not injure a canal seriously. A canal is the character of structure on which earthquakes would have least effect. It is in the earth; not raised above it. Its masonry is all low, heavy, massive. There are no floors to be dropped out by spreading walls. And even though earthquakes were comparatively frequent, I do not believe the effect of those earthquakes on canal structures would be sufficiently great to be taken into consideration in selecting a canal route. I believe myself that the danger of earthquakes is three times as much at Nicaragua as at Panama; but as three times nothing differs but little from once nothing it does not bear any important part in this connection.

On the other hand, there is another natural disturbance which since I visited the Isthmus I have believed to be a real danger and that is, the danger of the canal being filled up by volcanic eruptions. This is a thing which we have heard so little

of for nearly twenty centuries, that people have been accustomed to set it aside as a matter of no importance; but the recent disturbance at Martinique has made volcanic eruptions, and especially deposits of lava and cinders, more prominent in everybody's mind than they have been for 2,000 years; and this I fully believe is a real danger. No country is fuller of volcanoes than the border between Costa Rica and Nicaragua, exactly where the Nicaragua Canal is located. I do not believe that in the whole world there exists a location in which a repetition of the Martinique disaster is more probable than directly on Lake Nicaragua.

Before entering into the features of the canals themselves, I want to refer to the general character of the world. I presume there is no one here who will dispute the fact that the earth is a sphere. I doubt whether there are many here who have ever thoroughly realized what this means, what the real character of a sphere is. We think of the globe with its North pole up, its South pole down, and we looking at the equator; and yet there is no more reason for looking at a globe from this direction than from any other. A globe appears very differently, so far as the arrangement of land and seas is concerned, according to the direction in which you look at it. The shortest line of travel on the globe is a great circle curve; and if you look at that great circle curve from a point in the plane of that curve, whatever way that curve be drawn, it looks like a straight line.

There are many ideas which we get from maps which we find to be absolutely wrong when we study the globe. We are accustomed to think that if we travel west we take the shortest line to go to a point which is directly west of us. This is true only on the equator. We are accustomed to think that the Sandwich Islands are somewhere near a line from San Francisco to Japan; and yet, if you want to find a midway station between San Francisco and Japan, you must not go south to the Sandwich Islands, but away up north to the Aleutian Islands, and there you will find it. We think that the nearest points in

America to Australia and New Zealand, which are south of the Equator, must be pretty well south, and yet San Francisco is nearer to Australia than any point in North America until you get almost to Patagonia. There are many of these things which have given entirely false ideas because we have been brought up on maps, and as an illustration of this I shall show you a few views of the globe.

The following views were then exhibited on the screen:

1. View of the globe taken from a point in space above the North Pole, the meridian of Greenwich being indicated by a full black line and the 180th meridian by a broken black line. An arrow points to the Mississippi River, which is in longitude 90° west, another arrow to the mouth of the Ganges River in longitude 90° east, and exactly opposite the Mississippi River, a third arrow points to the Panama Canal and a fourth arrow to the Suez Canal. This view shows that to go from European ports to India a vessel must pass through three times as much longitude if she takes the Panama route as if she takes the Suez route, showing that the Panama Canal will be for the Asiatic trade of America and not for that of Europe.

2. View of the globe showing a curve of uniform distance, 5,830 miles from Wellington, N. Z., which passes 90 miles from San Francisco and strikes the west coast of South America in latitude 5 degrees south.

3. View of the globe showing a curve of uniform distance, 6,500 miles from Sidney, N. S. W., which passes close to San Francisco and strikes the west coast of South America in latitude 25 degrees 30 minutes south.

4. View of the globe showing a great circle curve tangent to Southern California and passing through Yokohama, this indicating the shortest possible course which any vessel passing through the Panama Canal could take to reach Japan.

5. View of the globe showing a great circle curve connecting San Francisco and Yokohama.

6. View of the globe showing a great circle curve connecting Panama and San Francisco, this curve passing through Yucatan, crossing the Gulf of Mexico and the remainder of it being on land.

The American Isthmus properly extends from South America through to Southern Mexico. It is about fifteen hundred miles long. There are on this Isthmus but three general locations at which a passage of the Isthmus is practicable.

The first of these, starting from the south, is in the curve that surrounds Panama Bay. Around that bay the Isthmus is exceptionally narrow, and three different routes have been selected there as lines for canals.

The second place where a passage is possible is at Lake Nicaragua.

The third attractive point has been the Isthmus of Tehuantepec, west of Yucatan.

On the curve around Panama Bay three canal routes have been proposed, and each of them is subject to several variants. The most easterly of these is that commonly called the Darien route, or the Caledonia Bay route, which starts from the point where William Paterson two hundred years ago founded his town of New Edinburgh, expecting to establish there a city, which, controlling the transit of the Isthmus, would become the metropolis of the Western world; a city which lasted but a year. It was deserted after the most extreme tribulations, and to-day it has absolutely disappeared. There is not a white settlement on the coast within seventy-five miles of it in either direction. I have myself visited the site of New Edinburgh, and it was an absolute wilderness, in which I thought I could trace the old ditch or canal which was dug as a protection from Spanish and Indian invasion, but which was hardly distinguishable from any other lagoon. It is on a beautiful harbor; and seen from the

sea there is a gap in the mountains which looks as if it was an ideal passage; but that gap is six hundred feet high; and although a tunnel route could be found there, nothing else is practicable. The next line is what is known as the San Blas route. That is undoubtedly the shortest passage between the two oceans; but the summit here is over a thousand feet high. The harbors are good at both ends, and if it were not for the mountain it would be the best route; but it involves a tunnel four and a half miles long; and such a tunnel built to pass a modern ship is a work which even a modern engineer would hesitate to undertake. The third of the routes which terminate on Panama Bay, is the well-known Panama route. This is the only possible route of the three with a low summit; the summit on the line of the Panama Railroad being only two hundred and eighty-five feet above the sea. It is the lowest summit that exists any where except at Nicaragua.

The second location is the Nicaragua location, and on the Nicaragua location the lowest summit any where on the continent seems to be found. It is but one hundred and fifty feet above the sea.

The third location, Tehuantepec, is impracticable for a canal. The summit is about seven hundred feet high; it is too broad a summit to tunnel. Although the best line for the ship railroad which Captain Eads proposed to build, it is not suitable for any other method of isthmian transit. Captain Eads was a man of extraordinary ability; if he had lived indefinitely, I do not feel at all sure but what he would have built his ship railroad. On the other hand, I feel that it is a very fortunate thing that he did not build it; if a railroad of that kind had been built, even if constructionally successful, it would already be inadequate to do the work it was intended to perform.

Of the different routes, there are but three that it is worth while to say anything about; the San Blas, the Panama and the Nicaragua. The San Blas route has lately been brought into prominence because statements have been made public that the

mountain was of solid granite; that it could easily be tunneled, and that the canal could be built on an absolutely straight line. There is no reason to suppose that there is a particle of granite any where on this route. The statements that the mountain is of granite are derived from old note books, about fifty years old, in which pencil notes designate the surface rock as granite. The engineers employed by the Commission, who traveled over all the country and traced the summit, were unable to find any granite, and I know no one who has ever seen any granite anywhere on the Isthmus. Furthermore, there is no reason to suppose that it would be possible to find anything approaching a straight line. A tunnel four and a half miles long, when a possible route exists one hundred miles away without a tunnel, is fatal to the scheme.

The Panama route deserves more consideration. At Panama the distance from ocean to ocean on a straight line is only about thirty-five miles. The distance from tide water to tide water is a little over forty. The distance from the six-fathom water in the Atlantic to the six-fathom water in the Pacific, according to the location made by the French Canal Company, which has been followed by the Isthmian Canal Commission on its surveys, is about forty-nine miles, which can probably be slightly shortened. Of this, two-thirds lie in the low country back of Colon, and in the valley of Chagres. The other one-third crosses the low Cordilleras and lies in the marshes back of Panama.

The original French scheme contemplated a canal without locks, involving a cut at the summit nearly four hundred feet deep, as the canal with its easier curves cannot take advantage of the extremely low point which the railroad followed, and the cut would be from the highest level at one side to the bottom of the canal. That such a canal is practicable, I have not the slightest doubt; but it is complicated not merely by the amount of excavation necessary; but by the control of the floods of the Chagres River, which at times exceed one hundred thousand

cubic feet per second, and by the fact that there is a twenty-foot tide on the Pacific and a one-foot tide on the Atlantic. The floods of the Chagres could be taken care of by making a canal for two-thirds its length big enough to carry them off without injury. I see no other way. I do not think any diversion channel practicable; the canal itself is in the lowest part of the valley; a diversion channel would have to be put on higher ground. The tidal range on the Pacific means that a tide level canal must have a lock, it would be a tide lock with gates opening both ways, and that there would be times when both gates could be left open; but it is a limit to the capacity of a canal, much like the limit produced by any other lock. The cost of such a canal would be about one hundred million dollars more than a canal with a summit level and with locks. If this were the whole story, I believe that a tide level canal at Panama would be the best possible solution of the isthmian transit question; but practically all the work on the tide level canal would be excavation, and concentrated excavation which it would take a maximum time to remove. I believe it would take at least twenty-five years to build a proper tide level canal, and this seems to me to be absolutely fatal to the scheme. We cannot wait so long. We can afford to pay the money, but we cannot afford to wait these fifteen years without getting any returns.

Before the failure of the old company, which started work in its reckless way at Panama, the tide level scheme had been temporarily abandoned. They had begun the work of constructing locks; and it was probably a temporary abandonment which would have been measured by centuries rather than by years. Various plans have been made by different commissions for a canal with locks. Different heights of summit levels have been proposed. The plan adopted by the Isthmian Canal Commission proposes to build a dam across the Chagres about fifteen miles from Colon, about one-third of the distance across the isthmus, and to convert the Chagres above the dam into a lake, while below the dam the Chagres would be carried to sea by a route

safely away from the canal. Leaving the lake, known as Lake Bohio, the canal would cut through the range at Culebra cut, and then descend by three locks to the Pacific.

To describe it briefly, a ship entering the canal would travel fifteen miles in a tide level canal, then ascend by two locks of great lift to the summit level of Lake Bohio, which would be from eighty-five to ninety feet above tide water, the normal level being eighty-five. It would travel through this artificial lake for fifteen miles; then leaving the lake, pass through the great Culebra cut, a total distance of about seven miles, then by two locks descend almost to the Pacific level, and a mile beyond by one lock, or lift varying with the tide, pass down to the level of the Pacific and so out to sea.

Lake Bohio, an enlargement of the Chagres, would be of such dimensions that no flood ever known of the Chagres would create a disturbing current. This lake would discharge over a spillway two miles away from the canal; and the spillway, which would be founded on rock, would be of such dimensions that the regulation of the lake would be absolutely automatic. As the summit level is placed eighty-five feet higher than that of the tide level canal, the depth of the great cut is eighty-five feet less, and the quantity of excavation on this line is reduced to about three-eighths of what it is on the tide level canal.

For nine months of the year the Chagres River alone supplies ample water for all the demands of the canal; for three months the supply may be inadequate; but the lake formed by damming the Chagres supplies a reservoir which meets these conditions; and in the worst year of which we have any record the level of that lake would be lowerd by all the demands of the canal, less than three feet.

The principal works on the canal are the locks, the spillway, the dam at Bohio, and the excavation. The one work which controls the time of execution is the Culebra cut.

The time required to pass through this canal would probably be about twelve hours. In other words, a ship entering it in the

morning could go out into the other ocean in the evening. No night transit would be necessary.

The situation at Nicaragua is very different. Lake Nicaragua drains in the Caribbean Sea; and Lake Nicaragua at the nearest point is only twelve miles from the Pacific. In early days, as I have already said, ships sailed from ports in Spain, went up the San Juan River to Lake Nicaragua, crossed Lake Nicaragua to the city of Granada, discharged their cargoes, and came home. Although it is reported that the last ship that ever made that voyage never came home, that an earthquake, or something or other, disturbed the rocks somewhere in the San Juan River, and she could not get out; there is no doubt that those voyages were made.

In the early fifties a route to California was opened by way of Nicaragua. The Transit Company ran steamers from New York to Greytown, and from San Juan del Sur to San Francisco, and made quicker time than the steamers that went by way of Panama. A steamer sailing from New York entered an excellent harbor at Greytown; the passengers there were transferred to a river boat which went up the San Juan River about seventy-five miles to Castillo, where there was a rapid; they had to walk about a half a mile around the Castillo rapids, where they took another boat, which could take them up the other twenty-five miles of the San Juan to Lake Nicaragua and the seventy miles across Lake Nicaragua to the west side of the lake. There a good stage road fifteen miles long, which they could go over in three hours, took them to San Juan del Sur, where a steamer was waiting to take them to San Francisco.

To the layman it seemed as if it required little work to make a canal transit line; it was only necessary to improve the San Juan River so that ocean vessels could go up it, and to construct fifteen miles of canal between the lake and the Pacific. I think it was this feeling, the crude impressions which made Lake Nicaragua seem like an extension of the Atlantic Ocean, that made the Nicaragua route as popular as it has been. But there

are two things which the layman did not see. The first is that the San Juan River is about one hundred miles long and one hundred feet higher at one end than the other; no river can fall a foot to the mile for one hundred miles without obstruction, the removal of which will let the whole river run away. The next feature is that half way between Lake Nicaragua and the sea the San Carlos River, of about equal size, enters the San Juan River and brings down immense quantities of sand; it has no settling basin like Lake Nicaragua; and while on the upper half of the San Juan River the great fall is maintained by rocky reefs, on the lower half it is maintained by sand bars. One effect of those sand bars has been very marked, the fine harbor of fifty years ago at Greytown has absolutely disappeared, and in the place where the Transit Line steamers formerly anchored reeds are now growing in water three feet deep.

A curious feature of the Nicaragua route is that the difficulties all come not in passing across the continental divide, but in passing from Lake Nicaragua to the ocean into which Lake Nicaragua drains. The San Juan River, which is the natural route for boats now, is the obstacle in the way of building a canal. The passage from the canal to the Pacific is remarkable. The summit is only about fifty feet above the canal. Barring danger from volcanoes no better line could be asked for a canal than that between the lake and the Pacific, across the continental divide. The whole difficulty comes in the swamp country between the sea and the San Juan River, where the river below the San Carlos is obstructed by sand bars which cannot be removed.

Three different general plans have been proposed for a canal at Nicaragua. So far as the west end is concerned they might all be called practically identical, though one of them involved a dam founded on sand, which was not necessary, and which would be impracticable.

The first careful surveys were made by Colonel Childs in the early fifties. He made his estimates for the class of side-wheel

steamers which then were in the California trade. He proposed what was virtually a system of slack water navigation, with a number of dams and locks of low lift until he got down into the plain, and then he left the San Juan River and came across to Greytown.

The next plan was that of the Maritime Canal Company, prepared by Mr. Menocal; and this plan was really the first confession of the impracticability of the San Juan River route, the first confession that what appeared to be a favoritism of nature was really the greatest obstruction. He proposed to dam the San Juan River below the mouth of the San Carlos, building a dam of such height that the level of Lake Nicaragua would be extended to it; in other words, that Lake Nicaragua would be lengthened fifty miles. He also planned to extend the level of the lake out between two ranges of hills until he carried it within eight miles of the Caribbean Sea, from which he was going to lock down to the sea. It was a very beautiful scheme, but there were two or three serious defects. His dam was below the San Carlos, so that he would not escape the sand of the San Carlos, and no foundation was found for the dam. Further surveys showed that only one of the two ranges of hills between which the lake was to be extended towards the Atlantic, existed. One supposed range was only a series of isolated hills, and the lake would have to be sustained by a series of embankments about twelve miles long in all, and some of which had a height of nearly ninety feet. It was a scheme which I think no conservative engineer would ever dare to attempt.

The final plan adopted by the Isthmian Commission contemplates a dam some little distance above the mouth of the San Carlos, founded entirely on rock, to be built of masonry, and the construction of a canal from Greytown harbor to connect with the San Juan River above this dam. This would be a canal for its entire length, using no portion of the San Juan River, and it would be of about the same length as the whole Panama Canal. It would have four locks, and be constructed for prac-

tically its entire length through a swamp, and through the wildest swamp I ever saw. It is a tropical swamp in a country with an average rainfall of from two hundred to two hundred and forty inches a year. It is this feature which has been spoken of, admired, and criticized. It is said to be in a healthy country, but it is a country in which nobody lives. They say there that it is perfectly healthy to be wet; that it is very unhealthy to be occasionally wet and then dry; and that there is no occasion for ever getting dry there. It is a country which has no roads; you can only go about in boats; and it remains to be seen what its sanitary condition would be when a large force of laborers was placed there, and the earth excavated and exposed to the sun, where it would have the opportunity of having the sun shine on it and then be rained on perhaps six times a day; perhaps it would not breed the malaria which people would generally expect; but the soil of a tropical swamp is not a thing to be handled generally with impunity.

With this canal completed, artificial harbors must be made at both ends. There is no harbor at either end of the Nicaragua Canal now. A ship entering the canal at Greytown would take about twelve hours to go through the section of canal between Greytown and the San Juan River. The San Juan River is a stream apparently as big as the Mississippi at Dubuque; it is a crooked river, in some places so crooked that cutoffs are proposed in the form of canals. A ship entering the canal at Greytown in the morning would reach the San Juan River in the evening. If she was a small steamer she would probably go right through by night; if she was a large one she would probably wait till daylight, and then follow up the fifty miles of river into Lake Nicaragua. The course of navigation follows for seventy miles through Nicaragua; the western third of which is a dredged channel, the remainder deep water; and from there a passage of seventeen miles with four locks would take the ship down to the Pacific. It is estimated that it would take from thirty-three to thirty-six hours for a steamer to pass from Grey-

likely to be twice as great as these estimates indicate. However that may be, that is the cost not of building the Panama Canal, but of finishing it; of taking it where it is and completing it.

In the matter of time, my own judgment is that the Nicaragua Canal will take two years longer to build, perhaps four, than it will to finish the Panama Canal. On that there is difference of opinion.

In the matter of sanitary conditions, I would myself rather attempt to handle the diseases and the relics of Spanish occupation which exist at Panama, to handle them in the light of our experience at Cuba, than to handle the swamps of Nicaragua. It is, perhaps, infection against malaria. Our experience in Cuba has been with infection. We have not yet learned how to handle swamps. In either case there would undoubtedly be a great deal of sickness, unless extraordinary methods are taken to prevent it, but I do not believe that in either route would the necessity of sickness be as great as in some of our swamp countries on both sides of the Mississippi River.

With the canal completed, the two may be compared for purposes of operation. The Panama Canal is less than fifty miles long; the Nicaragua about one hundred and ninety including, in round numbers, seventy miles of canal, fifty miles of improved river navigation, and seventy miles of lake. The measure of the canals though is the time required to pass through. The Panama Canal requires twelve hours; the Nicaragua nearly thirty-six. This, however, does not represent the whole thing, as for all trade going to points on the North Pacific coast of North America, the west end of the Nicaragua Canal is five hundred miles nearer than Panama is. Five hundred miles represents two days at sea for an ordinary freight steamer; it represents one for a fast passenger steamer. If the steamer ran night and day through Nicaragua Canal it could probably go from New York to San Francisco in a day less time than by way of Panama; if it laid up at night, there would be no saving in

time; but any sea captain would certainly feel more comfortable if his ship spent one day land-locked in the canal than if he spent two or three.

The next matter is one of risk. The longer a canal the greater the risk, both of accident and of delays. The risk to ships passing through the long canal would probably be more than double that of the ships passing through the shorter Panama Canal; there being little risk, however, in Lake Nicaragua, except from volcanoes. The risk of delay would be considerably greater, probably four times as great at Nicaragua as at Panama. The other form of risk is that of natural disturbances; that is, a risk of winds, of earthquakes, of volcanoes. There is much more wind at Nicaragua than at Panama. This is claimed to be an advantage in giving superior sanitary conditions. It certainly is a risk in navigating large vessels through narrow channels; and there is much more curvature on the San Juan River than on any portion of the Panama Canal. The second element of risk is earthquakes; both canals are in an earthquake country, and of this I have already spoken. The third is that of volcanoes, and in that there is no comparison between the two; as I have already said, I do not believe there is any place in the world where there is more danger of volcanic eruptions than the country around Lake Nicaragua.

In the matter of maintenance, it was estimated by the Commission, the estimate being made in detail by calculating the forces required, that it would cost about $1,200,000 more per year to maintain and police the Nicaragua Canal than the Panama.

This a brief comparison between the two. In my own judgment there is no doubt as to which line should be selected. At the present day, in the light of what has occurred in the West Indies, to build the Nicaragua would seem like a blasphemous contempt of the most terrible warning which nature has ever given to a nation.

There is another reason. Much work has been done at Panama. If we can secure what has been done, we remove the

temptation for some one else to finish it. Furthermore, at Panama the French company have offered an absolute sale of all their rights there of every kind. Such a sale would give no concession under which our government could build a canal. The French concession is very burdensome and for a limited time; but a purchase of all these rights would be in the nature of a quit claim deed, estopping every vested right which now exists there, and especially all present interests from ever claiming any damages if rights are given to another. Our government would be perfectly free and unhampered by anything else, to make a treaty with Colombia. At Nicaragua this is hardly the case. The Nicaragua government has declared all franchises forfeited; the parties holding those franchises do not accept the declaration, and trouble must be expected from them, and demands for heavy payments. These payments would be to our own citizens, and undoubtedly would be contended for and ultimately made.

There is a political consideration which is important. The route across the Isthmus of Panama is very short; it is in a section of Colombia far away from the main portion of that country, and the occupation of a strip of land here would be very much like the operation of the Straits of Magellan, or any boundary strait; the Panama Canal would become the recognized boundary between North and South America, and could be used and operated without any occasion for influencing or mixing up with the adjoining republics.

The line through Nicaragua, practically on the boundary between Nicaragua and Costa Rica, between two countries which are frequently at war, nearly two hundred miles through a foreign country, does not meet those conditions. We cannot build and occupy and maintain a canal there wihout exercising influences over and entering into complications with both Costa Rica and Nicaragua of a character which I hope we shall be able to avoid.

I have taken much more time than I intended, and I am

will enable ports on both sides of the continent to trade with those on the other side of the continent, will do more than anything else to unify the interests of our country. This is, really, the strongest argument why our Government should build the Panama Canal.

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