A Comparison of the Panama and Nicaragua Canal Routes.

W. B. Stewart.

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The Time of Passage.

Since Cortez sent his report to Charles V. of Spain, October 15th 1524 containing a map of the entire Gulf of Mexico showing that a straits did not exist between the Atlantic and Pacific Oceans: the artificial connection of these two oceans has been the dream of the human race. Cortez made a proprosition to the king to cut through the mountains.

On 1551 Gormara propored a union of the two oceans by any one of the three routes which engineers of to day concede to be the only possible routes.

About 1779 two Englishmen Hodgson and Lee Secretly Surveyed Lake Nicaragua and portions of both coasts.

On 1780 Lord Nelson, then a captain, landed two

thousand troops in
Nicaragua.
Lord Nelson said "In
order to give facility to the
great object of government
I intend to possess the
lake of Nicaragua which
for the present, may be
looked upon as the inland
Gibraltar of Spanish America,
as it commands the only
water pass between the oceans
its situation must ever
render it a principal
post to insure passage
to the Southern Ocean,
and by our possession
of it Spanish America
is severed into two."
Why is it that these
two mighty oceans
still roll against the
narrow unpierced isthmus
as they did when this
continent was discovered?
Is it because a connection

between them is less important to the commercial world of to day than it was then!
The great improvements in ocean vessels would seem to indicate less need for such a connection, but when we consider the increased amount of shipping and also the saving of time which in this day and age must never be lost sight of, we see that the need for such a canal has greatly increased.
Some of the distances saved by such a canal are shown in the following table

Distances in miles between commercial ports of the world and distances saved by the Nicaragua Canal.

From—	Via Cape Horn.	Via Cape of Good Hope.	Via Nicaragua Canal	Distance Saved
New York to—	miles	miles	miles	miles
San Francisco	14840		4946	9894
Bering Straits	17921		8026	9895
Sitka	16105		6209	9896
Acapulco	13071		3122	9949
Mazatlan	13631		3682	9949
Hongkong	18180	15201	11038	4163
Yokohama	17679	16190	9363	6827
Melbourne	13502	13290	10000	3290
New Zealand	12550	14125	8680	3870
Sandwich Islands	14230		6388	7842
Callao	10689		3701	6988
Guayaquil	11471		3053	8418
Valparaiso	9750		4688	5062
New Orleans to				
San Francisco	15052		4047	11005
Acapulco	13283		2409	10874
Mazatlan	13843		2969	10874
Guayaquil	11683		2340	9343
Callao	10901		2988	7913

Liverpool to				
San Francisco	14680		7684	6996
Acapulco	12921		5870	7051
Mazatlan	13481		6430	7051
Guayaquil	11321		5890	5431
New Zealand	12400	13975	11349	1051
Hongkong	18030	15051	13786	1265
Yokohama	17529	16040	12111	3929
Melbourne	13352	13140	12748	392
Callao	10539		6449	4090
Valparaiso	9600		7436	2144
Sandwich Islands	14080		9136	4944

The natural difficulties in construction a canal in Central America are many and though they are not impossible to over come they are greatte and should not be under-estimated. Engineers on the Panama Canal made the mistake of under-estimating these difficulties and this fact has discouraged many

who were interested
in the project.
Since the experience on
the Panama Canal the
tendency is to the other
extreme. Some even go so
far as to say that many
of the difficulties are
impossible to be overcome.
The first difficulty
that has to be contended
with is an unhealthy climate
If it were possible for
intelligent laborers from
the temperate zones to
live and work there,
all the other difficulties
would soon be sur-
mounted. Those interest-
ed in the Nicaragua
canal claim that its
climate is not unhealthy
compared with that of
Panama. While the Panama
people deny this state-
ment. It is certain

that northern men cannot work at manual labor at either place, unless they have a perfect constitution and take the best of care of themselves; and then they can stand it for a short time only. Lord Nelson lost one thousand five hundred men, or three fourths of his party at Nicaragua. The work will have to be done by colored or native labor directed by intelligent engineers, superintendents and foremen.

The condition of the soil is another difficulty. Many would have us believe that the whole Isthmus was solid rock. However there is very little solid rock.

much of the soil is of such a nature that the slopes often have to be made 2 in 1. This necessitates the removal of an enormous amounts of extra material, especially in the deep cuts.

The rain fall of Central America is very great during the rainy season which is from the middle of May to the end of November. Water in a canal is necessary for successful navigation, but Central America has more than the engineer knows what to do with. During the wet season the rivers become torrents. The Charges has been known more than once to rise forty feet during the night. These floods

destroy every thing except the most permanent of works. Thus the construction of any canal must have provisions for the protection of its works against these floods.

The construction of harbors is another important part of the works. Neither the Panama nor Nicaragua canals have what would be considered good harbors. They are small and shallow and will need a great deal of dredging to make them serviceable.

As to the special engineering features of each I will consider first that of the Panama Canal.

The Panama Canal is forty seven and three tenths miles in length and is between Colon-Aspanwall on the Atlantic and Panama of the Pacific. It is to be a tide water canals.

The orgnal plan was to use the riner Charges for part of the canal and to make a deep cut the Culebra pass for the rest of the route. This riner which was at first thought would be a great benefit has proved so far an insurmountable barrier. The plan is to build a large dam where the riner passes between two high hills which will regulate the flow and to carry off the ower flow in a different.

channel; also to change the head waters, by means of a tunnel through the Mountain so they will flow into the Pacific. The management of this river is the vital part of this canal. Many engineers claim that this river can be controled by this dam and auxilliary channels. Others claim that the figures given by the French engineers on this feature of the work are not correct; and that the dam if built would not solve the problem. The dam as given by French engineers is 975 ft long at the base with out-side slopes of 4 to 1, and is 113 ft. high. The Charges

crosses the canal twenty seven times, and in June of 1883 it is said to have raised 44 feet at San Pallo in four hours.

The next important feature is the Culebra Cut This is not impossible from any engineering stand point, but it is far beyond any thing of its kind in magnitude. The main part of this great cut is about 825ft long and 330 ft. deep. The sides of this cut on acount of the nature of the soil will not stand at a very steep angle making the cut over 700 ft wide across the top

If the French figures are correct the canal could surley have

been built under
proper and honest
management for one
half of the seven hundr
ed millions dollars
counting the indebtness
of the company, which
was squandered by the
company. Nine out of
every ten in the employ
of the company was a
cheif of somthing and
recined a salary ac-
cording to his title.

The time required
for the passage of a ship
through this canal
would be from six
to ten hours.

The Nicaragua Canal is the one that we as United States citizens are most deeply interested in. It is to be a lock canal and is 169.67 miles long.

Beginning at Greytown on the Atlantic there will be an excavation of 12.37 miles to Deseado Basin and through this basin there is free navigation for 4 miles then another excavation of 3.07 miles to San Francisco basin. Through the San Francisco and Machado basins there will be 11. miles of free navigation and 1.73 miles of excavation. From here the San Juan river gives 64 miles of free navigation to Lake Nicaragua which gives 56.5 miles of free navigation. A cut of 8.22 miles will connect the lake with

the Tola basin which gives 5.28 miles of free navigation. From Tola basin to Brito on the Pacific is an excavation of 3.5 miles. This route has a total of 140.78 miles of free navigation and 28.89 miles to be excavated.

Lake Nicaragua has an elevation of 110 ft. above sea level. This lake furnishes excellent advantages for lock canal. It not only supplies the water for lockage, but forms a goodly part of the canal. The lake during the dry season will supply eight times the amount of water needed for lockage. The locks are five in number one being a double lock.

Commencing at

Greytown the canal runs at sea-level for 9 miles to where lock No. 1 is situated, This lock has a lift of 31 ft. into the basin formed by damming the lower Desedo river. This dam is 1100 ft. long and 20 ft. high. A second dam 1400 ft long forms a small basin above lock No 2. which has a lift of 30 ft. Lock No. 3 has a lift of 45 ft, making the level of the canal above this lock 106 ft above sea-level.

The dam across the San Juan river is the most important point of the canal. This is called the great Ochoa dam. The purpose of this dam is to raise the water of the San Juan

56 ft above the present height at that point. This dam must be so constructed that all the surplus water can flow over it without destroying the works. The dam is 1500 ft. long and is 65 ft high. This will raise the waters of the San Juan 106 ft above the level of the sea, and gives the river a fall of 4 ft in the 64 miles from Lake Nicaragua which is 110 feet above sea-level as before stated.

From the lake to the Tola basin a cut about 50 ft deep is made through the divide. The Tola basin is formed by a dam across the Rio Grande. This dam is 2100 ft long and 80 ft high. From this basin

the ship will descend
85 feet by means of
double lock No. 4. and
then again by lock
No. 5. to the level of
the Pacific ocean.

The vital points
of the canal are the
dams and the locks,
but especially the
dams, as they must
be constructed so
they will stand the
heavy floods in
the rainy season.
On all cases these dams
are provided with means
to discharge the over-
flow in such a way
as to protect themselves
from being destroyed.

As to the locks
nearly all engineers
agree that such locks
can be built without
much difficulty.

The time for passage will be about 5 miles per hour on the canal and about 10 miles per hour on the lake and by allowing 1 hour for each lock will make the time about 40 hours.