A Comparison of the Panama and Nicaragua Canal Routes.

W.H. Stewart.

Class of '95.
Introduction.
Early Propagation; Distances Sailed.
Difficulties of Construction.
Unhealthy Climate.
The Rain Fall and Floods.
The Necessity of Harbors.
Description of the Panama.
The Chagres River.
The Culebra Cut.
The Time of Passage.
Description of the Icaragua.
Amount of Excavation and Free Navigation.
Construction of Dams and Locks.
Advantages of Lake Icaragua.
The Time of Passage.
Since Cortez sent his report to Charles V. of Spain, October 13th 1524 containing a map of the entire Gulf of Mexico showing that a strait did not exist between the Atlantic and Pacific Oceans; the artificial connection of these two oceans has been the dream of the human soul. Cortez made a proposition to the King to cut through the mountains.

On 1564 Garmara proposed a union of the two oceans by any one of the three routes which impossibility of today concede to be the only possible routes.

About 1759 two Englishmen, Hodgson and Lee, secretly surveyed Lake Nicaragua and portions of both coasts.

In 1780 Lord Nelson, then a captain, sailed 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 ocean and 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 unperforated isthmus as they did when this continent was discovered? Is it because a connection
between them is less important to the commercial world of today 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 Occadoga Conduct.

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<tr>
<th>From-</th>
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<th>Via Cape of Good Hope</th>
<th>Via Imera Conduct</th>
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The natural difficulties in constructing a canal in Central America are many and though they are not impossible to overcome they are great and should not be underestimated. Engineers on the Panama Canal made the mistake of under-estimating these difficulties and this fact had 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 surmounted. Those interested in the Nicaragua canal claim that its climate is not unhealthy compared with that of Panama. While the Panaman people deny this statement. 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 Osthorne 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 enormous amounts of earth material, especially in the deep cuts. The rainfall 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 Chagres 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 work. 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 those of the Panama Canal.
The Panama Canal is forty seven and three tenths miles in length and is between Colon-Aspinwall on the Atlantic and Panama of the Pacific. It is to be a tide water canal. The original plan was to use the river charges for part of the canal and to make a deep cut the Culebra grass for the rest of the route. This river 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 river passes between two high hills which will regulate the flow and to carry off the other 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
controlled by this
dam and auxiliary
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
outside 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 Pablo in four hours. The next important feature is the Caleton Cut. This is not impossible from any engineering standpoint, but it is far beyond anything of its kind in magnitude. The main part of this great cut is about 825 ft. long and 330 ft. deep. The sides of this cut are accounted for the nature of the soil will not stand at a very steep angle making the cut over 700 ft. wide across the top. Of the French figures are correct the canal could surely have
been built under proper and honest management for one half of the seven hundred millions dollars counting the indebtedness of the company, which was squandered by the company. Nine out of every ten in the employ of the company was a chief of something and received a salary according 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
United States citizens are
most deeply interested in.
It is to be a lock canal
and is 162.67 miles long.
Beginning at Greytown
on the Atlantic there will
be an excavation of
12.37 miles to Concepción 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 Mochito
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 8.5 miles. This route has a total of 140.78 miles of free navigation and 28.89 miles to be excavated.

Lake Cuaucogua has an elevation of 110 ft. above sea level. This lake furnishes excellent advantages for lock cond. 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.
Great Town the canal runs at sea-level for 3 miles to where lock No. 1 is situated. This lock has a lift of 31 ft. into the basin formed by damming the lower Rod 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 10 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
58 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 34 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. In 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.