able transhipment charges at Buffalo from large steamers into canal boats, for less than steamers of 20 feet draft could carry it through the Erie Canal if that could possibly be deepened to over 20 feet, and steamers run continuously from Chicago to New York. In both cases tolls are not taken into account.

The estimated cost of the 11 ft. canal is 50 million dollars and of the 20 ft. 200 millions.

The great value of the Ottawa navigation is this: Out of the 975 miles between Chicago and Montreal 591 miles is an inland or perfectly protected navigation, leaving but 384 miles of open lake. In open lake a speed of 4½ miles an hour can be made by tows of barges. In the protected portion an average speed of ten miles an hour can be made. The cost of insurance by this route would be much less than by any other.

By the Welland and St. Lawrence route, there are 991 miles of open lake navigation, and but 297 of inland or protected navigation. The depth of the Welland and St. Lawrence canals would limit the draft of barges to 13½ ft. which is too shallow for navigation in lakes such as Erie, subject to sudden violent storms. The rates of insurance would be greater, and the longer time required, owing to greater length, and slower movement through the unprotected parts, would more than make up for the 22 days of longer open navigation by the Welland route.

I recommend that the scale of the Ottawa navigation be fixed as follows:—Locks 300 ft. long x 45 ft. wide x 14 ft. deep, capable of passing steel barges 280 ft. long, 42 ft. beam and carrying 3100 tons net on 13½ ft. draft of water.

The excavated channels should be fifteen feet deep and have five times the area of the vessel, with sufficient room for two vessels to pass each other, which would give a width of 160 ft. on the bottom and 170 ft. at low water level.

The cost of carrying grain from one of the Lake ports, say Chicago, to Montreal by the Ottawa route, would be as follows:—

CAPACITY.

A tow would consist of three steel barges, each 280 x 42 x 20 feet, moulded depth, carrying, on 13½ feet draft, 3,100 net tons. These would be towed by a powerful tug steamer capable of towing the barges at the rate of four and one-half miles per hour in open lake, and ten miles per hour through the sheltered lakes and rivers of the Ottawa navigation. The tug steamer would be capable of carrying a cargo of 1,200 tons, making a total capacity of 10,500 tons.

TIME.

Open Lake—	
Chicago to a point near the mouth of St. Mary's River—380 miles at 4½ miles per hour	72.2 hours.
Inland Lakes and Rivers—	
St. Mary's River to French River, 160 miles	
Ottawa navigation ..... 401 "	
561 " at 10	56.1 hours.
Canals ..... 29.3 miles at 2.9	10. hours.
Lockages 1½ minutes per foot for each vessel $\frac{1\frac{1}{2} \times 4 = 6 \times 682 \text{ ft.}}{60 \text{ min.}}$	68.2 hours.
Total	206.5 hours

206.5 x 2 = 413 hours.
In port 91 hours.

504 hours, or 21 days round trip.

The open season of navigation on this route, is limited by the closing of Lake Nipissing and gives an open season of 213 days, or *ten* round trips.