

IMPROVEMENTS TO NAVIGATION IN AND AROUND MONTREAL HARBOR.

THE season's grain export from the Port of Montreal has been stated to be the greatest in history. The total amount of grain passing through the two elevators of the Harbor Commission, the Grand Trunk elevator and the floating elevator, was 73,628,132 bushels, not including a million and a half bushels of grain which had been bagged and shipped direct, or over 10,000,000 bushels handled by the elevators for local consumption.

During the year the Repentigny channel from Isle St. Therese to Lanoraie has been finished, completely buoyed, and opened to navigation for boats drawing less than 14 feet. Later it will be extended through the Sorel Islands by way of the Grand Channel to Lake St. Peter. This dredging is now nearly completed and the necessary lights will be placed in position next spring. As the result of dredging all season in Lake St. Peter, there is now a 35-foot channel for almost the entire length of the lake. Elevator dredges at St. Anne, Sorel, St. Tours, The Traverse, Varennes and Point aux Trembles, are doing the same work. In Montreal Harbor they are widening the ship channel.

Four elevator dredges, a stone cutter and two stone lifters have been removing rock in the Cap a la Roche district to make a channel with a minimum depth at low water of 30 feet and a width of from 450 feet in the straight parts to 600 feet at the curves. New light-houses will be erected in this district next year to mark out the new lines.

In the north channel below Quebec dredging has gone ahead for a channel 1,000 feet wide with a minimum depth at low tide of 30 feet, as far east as the foot of the Island of Orleans. Two dredges have worked at it this season, and the Dominion Government has awarded the contract for a seagoing hopper elevator dredge to the Canadian Vickers Company. This will hasten the work, but with the rocky bottom it will probably take nearly five years to finish it.

About \$2,000,000 has been expended by the Harbor Commission this year in dredging, renovating piers and wharves, building new sheds and wharves, and other work incident to the five-year programme of development undertaken by them at a total cost of \$15,000,000. All this work has been under the direction of Mr. W. G. Ross.

The main dredging in the harbor was south of St. Helen's Island to a depth of 20 feet. The renovation of Victoria Pier and the old low wharves east of it has been continued with the ultimate object of completing 2,700 feet of new high level and 4,800 feet of low level wharves. This will provide new berths for small river boats opposite Bonsecours Market, and for ocean steamers just below shed sixteen and in the neighborhood of the two new steel and concrete sheds, which have just been completed, at a cost of about \$400,000. Similar sheds will be built parallel to the current on the new Victoria Pier where a stretch of 1,800 feet of dock is completed.

The \$15,000,000 programme for five years includes a new warehousing system, the electrification of the railway system and the extension of the tracks from Racine Pier to Point aux Trembles, and ultimately to Bout de L'Isle. The Canada Cement and the Armstrong-Whitworth companies have had wharves built this year.

In connection with the Lachine Canal, \$500,000 has been spent this year to eliminate the curve, which proved dangerous to navigation at Cote St. Paul, and the new power house nearby will be completed next year. A larger

intake at Cote St. Paul was finished this season. Above Cote St. Paul, a mile of new cement wharf has been built.

Adjoining the easterly limits of the harbor are the newly completed works of Canadian Vickers, Limited, where \$3,000,000 worth of construction has been completed during the year in addition to the floating dry dock valued at \$1,750,000. These works consist of an iron-workers' shed, constructed in 3 bays, one being 300 feet long and the others 500 feet each, the width being 50 feet; mechanics' shop, 100 ft. x 50 ft.; joiners' shop, 120 ft. x 100 ft., 2 stories; ship building berth, 500 ft. x 132 ft.; power house, gas plant, etc., in addition to a 1,000-ft. x 500-ft. filling out basin with reinforced concrete retaining walls. Between 4 and 5 miles of service tracks give connections with the C.P.R., C.N.R. and G.T.R. In this plant some 600 men are now busy, most of them on a million-dollar icebreaker for use in the St. Lawrence River by the Dominion Government, the second largest icebreaker in the world. It is hoped that the launching will take place next June. Next month they will start a new \$835,000 bucket dredge, ordered by the Dominion Government. It is to be delivered early in 1916. During part of the season as many as 1,500 men were engaged. Twenty-seven vessels have been repaired in the dock during the summer.

A NEW SWISS TUNNEL.

The tunneling problems incident to the projection of railways in Switzerland and Northern Italy present features of considerable interest to engineers on this continent. The fact that several tunnels have recently been pierced has received comparatively small publicity owing to the prominence of military affairs in Europe. The Hauenstein base tunnel is 5 miles 94 yards in length. The Munster-Grenchenberg tunnel is slightly longer, being 5 $\frac{3}{8}$ miles in length. The latter was commenced in November, 1911, and is being constructed by the Bernese Alpine Railway Co., the builders of the electrically equipped Lötschberg tunnel. (See *The Canadian Engineer*, October 30, 1913.)

The Munster-Grenchenberg tunnel is, according to "The Engineer" (London), costing about \$5,000,000. It is being laid with a single track only, and will have steam traction. It will be used under the direction of the Swiss Federal Railways. The new tunnel pierces the Jura Range, the height of mountain overhead having a maximum of 2,624 ft. The chief difficulties encountered in its construction appear to have been due to subterranean springs and water pockets. As in the Simplon tunnel (see *The Canadian Engineer*, May 14th, 1914) a difficulty arose, prior to piercing, owing to water having accumulated in one shaft, and great care had to be exercised not to allow it to flood the other shaft.

The tunneling has been done for the most part with Meyer hand-boring machines.

The period allowed for building is 3 $\frac{1}{2}$ years. The masonry lining of the tunnel is already well advanced, and it is confidently expected that it will be entirely finished within the specified time.

A list of European tunnels with their locations, lengths, summit levels and dates of operation appeared in this journal for March 26th, 1914, page 508.

The Canadian members of the International Waterways Commission were in conference in Washington last week. It is stated that the subject under discussion was the matter of pollution of boundary waters.