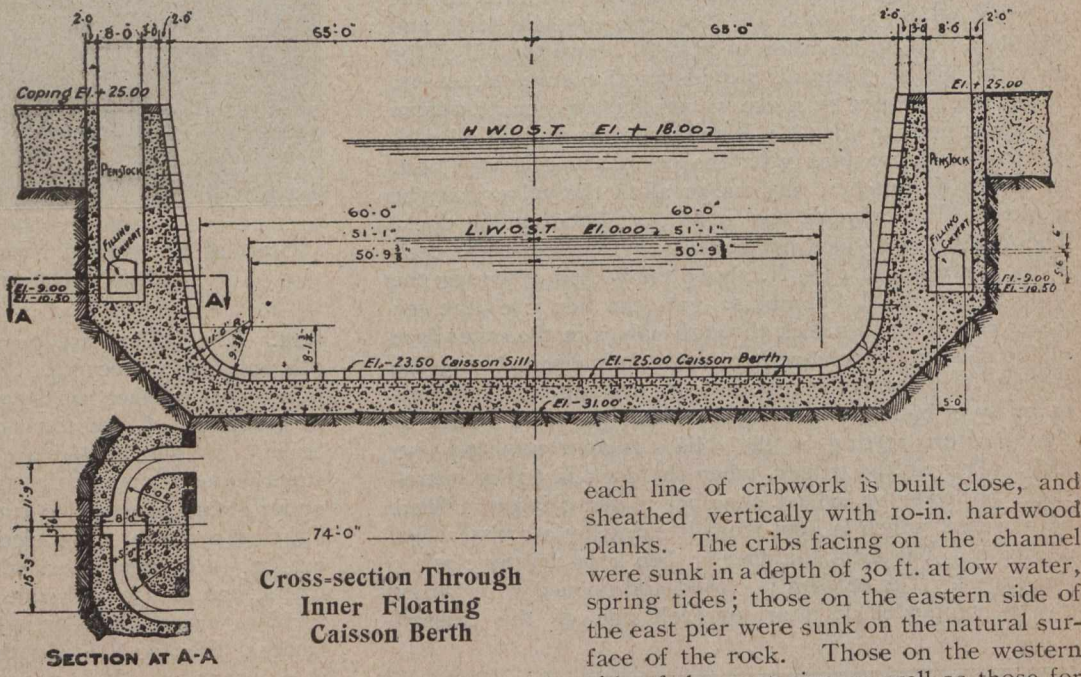
Pumps

The dock is emptied by three main pumps of the horizontal centrifugal type, each having a capacity of 63,000 gallons a minute. The bronze shafts are connected to the armature shafts of 800 h.p. motors, running at 750 revolutions a minute. The motors are built to stand an overload of 25% for two hours; the total lift will very rarely be more than 33 ft. The suction and discharge pipes are 48 ins.; the water is discharged into a chamber provided with non-return valves, and to a culvert through the entrance wall outside of the caisson. The main pumps are guaranteed by the builders to deliver 63,000 gallons a minute against a total head of 25 ft. At the time of writing, these pumps have not been tested as to efficiency. Two auxiliary pumps, each of 6,000 gallons a minute capacity, driven by electric motors of 125 h.p., will take care of leakages and seepage; these pumps will also help while the dock is being pumped. The pumps were manufactured by the Allis-Chalmers Co.

The time occupied in emptying the dock will vary according to the height of tide when the pumps are started and the size of the vessel being docked. At high water of spring tides the dock contains over 38,000,000 gallons of water. This quantity of water, however, will very rarely, if ever, exist, when pumping is started. It is estimated that the average time for pumping out the dock will be about 2½ hours.

Underground culverts 9 x 10 ft. convey the water from the sumps in each compartment of the dock to the pumps; these culverts are provided with sluice gates so as to permit of operating each compartment separately. The gates are operated from coping-level by 15 h.p. electric motors. The pressure against the gates may at times be due to a head of 50 ft. of water. From the non-return valve chamber the discharge culvert is 7 x 12 ft.; it is also provided with a sluice gate. The capacity of discharge of this culvert was obtained from Chezy's formula $V = c\sqrt{rs}$, c being obtained from Kutter's formula. Under a head of 4 ins. the capacity will be ample to take care of the output of the pumps when discharging in open air.

The dock is filled through the 6 culverts in the outer caisson, each having a sectional area of 9 sq. ft., also 2 culverts, one in each side wall of a sectional area of 30 ft., the valves of which are operated by electric power. These culverts are made exceptionally large, due to the fact that each may only be partially opened until the water in the dock has reached the centre of the culvert opening, to prevent the heavy current that would result from a large opening from disturbing the beds prepared to receive a vessel; further, as the head between the outer and inner levels of water decreases, the valves are fully opened, thus obtaining a large flow. The time required to fill the dock may at times be as much as four hours. The middle entrance is similarly provided with filling culverts as the outer entrance.



Cross-section Through Inner Floating Caisson Berth

SECTION AT A-A

In order to obtain sea water by gravity for the purpose of washing the floor of the dock, 6-in. pipes were laid in the concrete side walls of the dock, at an elevation of 2 ft. above low tide; each pipe has 6 hose connections and valves at the face of the walls, where 50-ft. lengths of 2½-in. hose may be attached for the purpose. The water is available within one hour of extreme low time. Washing the floor is necessary owing to the sediment accumulated while the dock is flooded.

Guide Piers

The western guide pier is 400 ft. long and 75 ft. wide; the one on the eastern side is 500 ft. long, 75 ft. wide at the outer and 200 ft. wide at the inner end. Each is built of two lines of 12 x 12 timber cribwork substructure up to 6 ft. above low water, spring tides; the outer face of each line of cribwork is built close, and sheathed vertically with 10-in. hardwood planks. The cribs facing on the channel were sunk in a depth of 30 ft. at low water, spring tides; those on the eastern side of the east pier were sunk on the natural surface of the rock. Those on the western side of the west pier, as well as those for the landing pier, were sunk in a depth of 24 ft. at low tide. From the elevation of 6 ft. above low tide the superstructure consists of mass concrete walls, stepped at the back and filled between with excavated material. The railway spur track from the Intercolonial Railway will be extended to the end of the western pier. These piers are intended to be used, when necessary, for unloading parts of cargoes from vessels to be docked. The entrance channel has a depth of 30 ft. at low water, spring tides. The landing pier on the west side of the entrance is intended for unloading the dock supply of coal, when delivered by water.

Buildings

The power house is 120 x 100 ft., divided by a brick wall into two rooms, 120 x 50 ft., one being the boiler room and the other the generator room; the walls are solid brick, built on concrete foundation; the roof is built of reinforced concrete slabs, supported by steel I-beams, which were procured from the unused steel of the first Quebec Bridge. The building is provided with extra large windows with steel frames. Skylights and ventilators are also provided. The floor is concrete, overlaid with red tiles; and the lower part of the interior walls for the generator room is finished with a white tile wainscotting, 6 ft. high. Each room is furnished with water closets and wash basins; the water is obtained from the Lauzon village aqueduct. A special pump in case of fire and the