The New Welland Ship Canal Locks.

A description of the new Welland Ship Canal appeared in Canadian Railway and Marine World for July, in which the general canal scheme was outlined, and the general details discussed in comparison with the present and old canals. It will be recalled that the new canal will follow a course from Lake Ontario, where the entrance is 2¾ miles east of the present entrance at Port Dalhousie, through to Thorold, where the course of the new canal will be the same as that of the present one, with the exception of a couple of short stretches which have been changed for the reasons there explained.

The accompanying illustration shows lock 1, which is to be located directly on the shore of Lake Ontario, at the northerly end of the canal. This lock is typical of all the other single locks in all the essential particulars. The locking capacity of the canal will be 800 by 80 ft., with a draught of 30 ft., but to allow for the swing of the gates, the actual length of the lock between gate hinge pivots will be 885 ft., the length of the lock construction extending even beyond that, with a total length of 1,140 ft., not including approach wall. From the bottom of the lock to the top of the walls is a height of 84.5 ft. These dimensions give some idea of the stupendous character of the project.

The depth to which the canal structure is carried simplified the foundation problem, as the lower portion of the lock requires rock excavation, directly on which the lock is built. The rock on which locks 1, 2, 3 and 4 are founded is Medina Shale or Mudstone. Locks 5 and 6 are founded on sandstone, and lock 7 on gray shale. At locks 2 and 3 the lock excavations will not extend down to rock, but the side wall foundations will be carried down to that point, thus making the walls 100 ft. high.

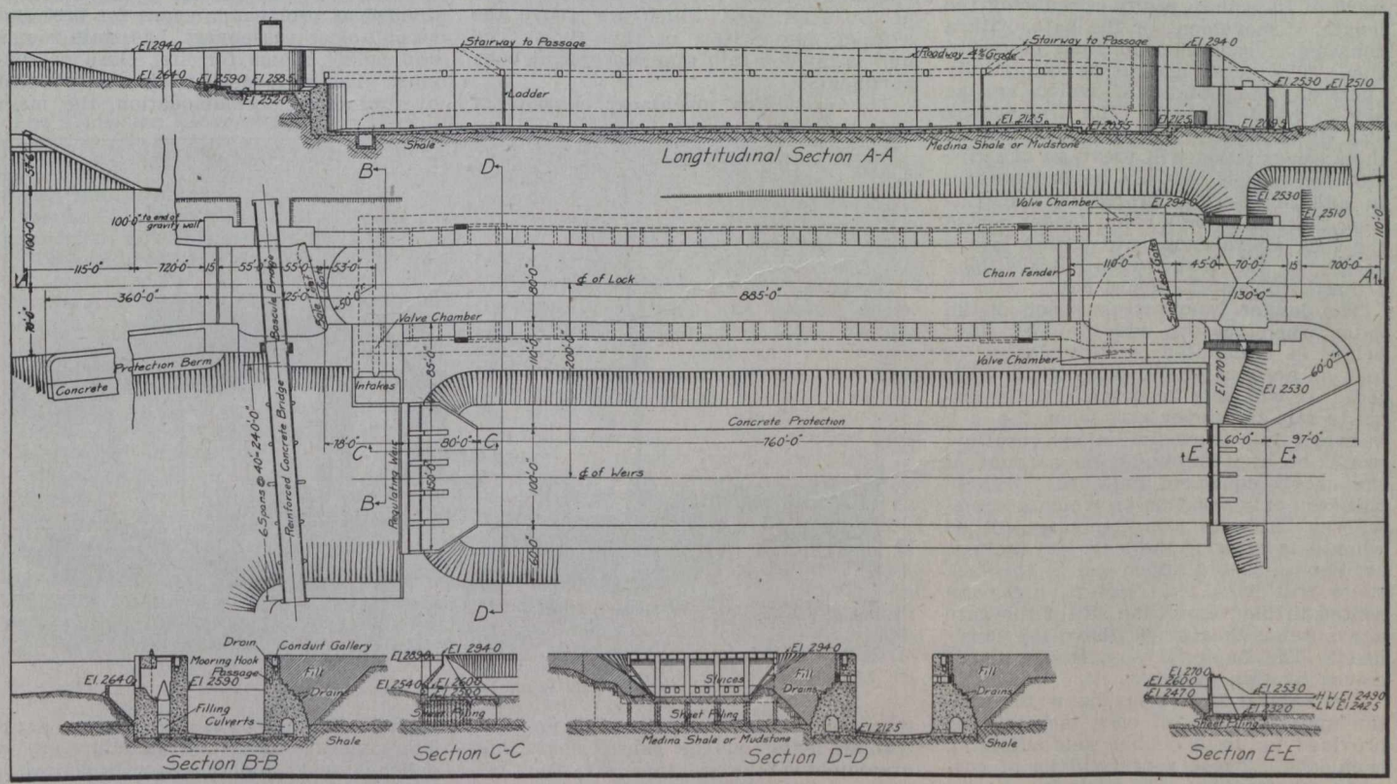
The locks are to be constructed of mass concrete throughout, built in sections of 60 ft., between each of which there will be an expansion joint, consisting of a dovetail of concrete extending the full depth of the walls, and in the centre of the dovetail there will be a strip of copper of Z section, connecting the two sections, and forming a water tight division, to prevent seepage of the water through the joint.

In the top of the side wall there will be a 5 by 9 ft. tunnel, the length of the lock. This tunnel will be floored so as to form a shallow chamber below for the electric cables, with the portion above the flooring for passing from end to end of the lock for the workmen. Below this combined tunnel there will be a 4 ft. square tunnel on each side of the lock, extending its full length, for drainage purposes.

With a floor level 30 ft. below the top of the lock walls, there is to be a 4 by 7 ft. tunnel extending the full length of the wall, with openings leading inward to the lock at every 100 ft., in which will be mooring hooks for berthing vessels passing through the lock. This tunnel is to be reached by stairways through the concrete near each end of each tunnel, from the surface above. The introduction of this tunnel is a novel feature of lock design, and should result in a considerable saving in locking time, by the expeditious manner in which the vessel can be secured in the lock. The lift of each of the locks is to be 46.5 ft., and the top of the lock wall will be 5 ft. above the water level when the lock is filled. A loaded vessel will have its deck possibly not more than 10 ft. above the water level when entering from below. Thus the deck will be upwards of 40 ft. below the top of the lock wall, which is too great a height to heave a rope. With the mooring hooks in the wall openings at every 100 ft., the rope can be thrown to an attendant, who will place it over the hook, and as the vessel rises, the line will be changed to the coping level. The usefulness of this passage is thus quite apparent. As the lock fills, the passage fills with water from the lock.

The filling and emptying of the locks have been carefully worked out, and it is expected that these operations will be carried out smoothly without the disturbance to the water in the upper reach of the canal as happens in locks of the usual design. Above each lock there is to be a considerable pondage area. Extending up the canal 360 ft., there will be a concrete berm, separating the channel of the canal from the main part of the pondage area, from which the water to fill the lock will be drawn through a valve chamber at the head of the lock from the side water, leaving the water in the channel undisturbed. At the bottom of the side walls of the lock there will be a 13 by 16 ft. horseshoe tunnel the length of the lock, with 3 ft. square openings leading from these two tunnels into the lock at every 30 ft. This will feed the water into the tunnel uniformly through the 800 ft. length of the lock, balancing the pressure in the lock, disturbing the vessel in the lock a minimum amount. Connection from the valve chamber to the horseshoe tunnel on the side opposite to the valve chamber will be through a 13 by 15 ft. square tunnel of concrete, passing under the lock. The valves will be of the swing type, requiring a minimum time for opening. The emptying of the lock will be through the same side tunnels, which will lead through valve chambers, one on each side of the lock at the lower end, and out through the channel at the lower end.

A novel departure has been made in the gate design, which is of the single leaf type. It is customary to have them of the double leaf type, mitring at the centre, but a number of accidents have occurred with their use, through vessels from below striking one of the gates sufficiently hard to open it enough to al-



Typical Lock of the New Welland Ship Canal.