The cribs are partly decked with 12 x 12-in. timbers in lengths of 24 ft. or over, all butted on cross-ties and fastened with 1-in. round drift bolts 27 ins. long. The top of the deck is provided with anchor bolts, or dowels made of ¾-in. steel driven 11 ins. in the timbers and projecting 15 ins. above the top surface, the upper 3 ins. of the bolts being bent at right angle. The anchor bolts are placed 5 ft. apart longitudinally and about 4 ft. apart transversely.

The bulkheads at the inner end of the wharf are built of similar cribs. They are of different widths, according to the depth of water The width is at least 65 per cent. of the total height of the wall, including the superstructure. The crib sites for the bulkheads is dredged to rock, made moderately level by blasting, and the bottom of the cribs is built to conform to the rock foundation.

All the timber cribs are to be sheathed with concrete 2 ft. in thickness on the outer face and 1 ft. thick on the ends and rear faces. The specifications call for a 1:2:4 concrete, deposited in uniform layers of 6 to 8 ins. continuously around the four sides of the crib, tamped in the corners and around the steel bars. It is to be mixed rather wet, no surplus of water, however, being allowed

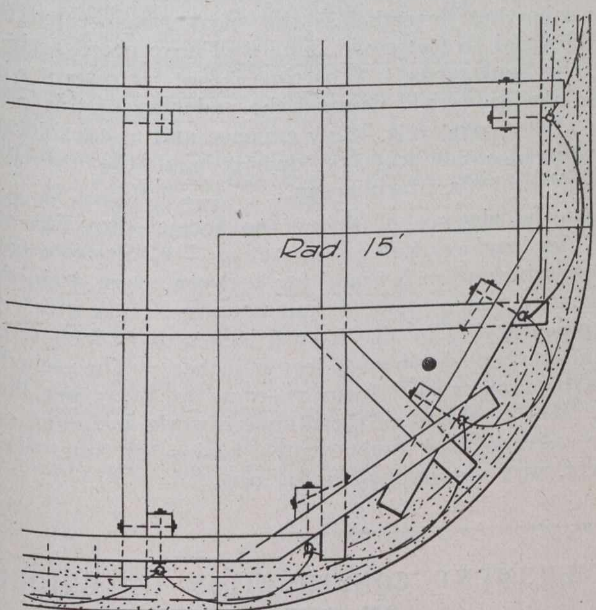

Fig. 4.—Detail of Rounded Corner at Wharf Entrance.

to flood the moulds. Concrete surfaces are to be coated with a neat cement wash, the outer faces of the wharf, including the superstructure, from the level of 2 ft. below low water spring tide, to receive two coats. The lower parts of the wall are necessarily coated before launching the cribs.

The concrete is anchored to the timber structure by bent drift bolts driven in each face timber; two and three bolts between each row of cross-ties, also by bent rods hooked in the eye-bolts passing through the vertical posts as shown. The bent anchor bolts, 1 in. in diameter, project out from the timber face 27 ins. and 7 ins. alternately from each tier of timber. They penetrate the timber 12 ins. Steel rods ¾-in. in diameter are also driven through the projecting ends of the cross-ties. Vertical rods ¾-in. in diameter are also placed 3 ins. from the outer face of the concrete. All reinforcing steel consists of plain bars. The specifications call for open hearth medium steel, with ultimate tensile strength of at least 60,000 lbs. per sq. in., an elastic limit of not less than one-half the ultimate strength, and elongation not less than 22 per cent. in 8 ins. It is to bend cold 180° around a diameter equal to the thickness of the piece tested without fracture on outside of bend.

The superstructures of the wharf and bulkheads consist of mass concrete. The outer or exposed faces of the concrete is to be finished for a thickness of 6 ins. with a granolithic concrete; the two classes of concrete to be deposited separately by using face boards. Where the mass concrete is more than 4 ft. wide, sound stones of moderate size is allowed in the concrete not closer than 6 ins. between any stone and not closer than 1 ft. from the faces. The mass concrete is composed of a 1:3:5 mix.

Two walings of B.C. fir, 15 x 18 ins. are to be placed on the outer faces of the wharf and bulkheads, in lengths of 30 ft. and over, jointed with a half lap of 2 ft. and fastened at every 5 ft. to the concrete superstructure with anchor bolts 1¼-in. diameter and 18 ins. of their length in the concrete.

At distances of about 60 ft. apart, along both sides and the end of the wharf cast iron bollards will be placed on the concrete superstructure.

Messrs. Henry, McFee and McDonald, of Vancouver, have the general contract from the Dominion Government for the construction of the wharf.

DRYDOCK AT PRINCE RUPERT.

In a few months the Grand Trunk Pacific drydock, now under construction at Prince Rupert, B.C., will be ready for operation. With the possible exception of the San Francisco dock, it will be the most commodious on the Pacific Coast. Brief descriptions have already been published in these columns concerning its general design and the machinery with which it is equipped. The following table gives some interesting data as to measurements, capacity, etc.: Length of dock over all, 600 feet (lifting capacity 20,000 tons); number of sections (steel wings), 3 independent units; length of middle section, 270 feet (lifting capacity 10,000 tons); length of each end section, 165 feet (lifting capacity 5,000 tons); length of middle and one end section, 435 feet (lifting capacity 15,000 tons); length of two ends together, 330 feet (lifting capacity 10,000 tons); number of pontoons (wood), 12; width in clear between wings, 100 feet; draft over blocks, 30 feet; pumps, 12-inch centrifugal, electrically operated.

IMPORTANCE OF ROAD DRAINAGE.

At the course of lectures given at the Agricultural College, Winnipeg, a month ago, Prof. W. J. Gilmore stated that in the average season on each mile of road, fifty feet wide, in the Red River Valley there fell 16,500 tons of water. The vast volume of water, together with that running into and held by the side ditches where drainage is poor, shows the absolute need for perfect drainage systems. "All the factories in the world," stated Prof. Gilmore, "cannot build good roads machinery enough to make a good road that will stay good unless some method is adopted of removing the surplus water."

At Fond Du Lac, Lake Athabasca, Northern Saskatchewan, it is claimed that a ledge of silver three feet deep and three miles long, has been discovered by British Columbia prospectors. When assayed, the samples ran $11,000 to the ton.