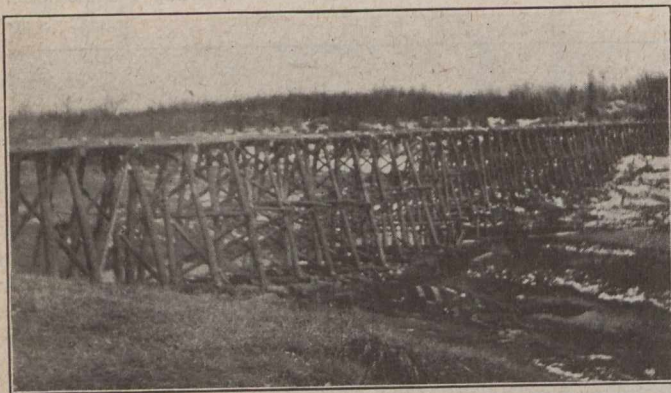


together, requiring about 1,000 pieces for the 900 ft. The ties and rails were then laid and a gravel train was operated until the timbers and gravel sank into the swamp. This method could not have been used had not the timber been near by.

On another swamp the track was laid right on the surface, and an engine, which had stood on the rails for some time, settled on the right until it lay over on its side. To save time a temporary track was laid past the "wreck" and another engine put in use. On reaching this same spot in the swamp, it settled and lay over on its side.



DUE TO INSUFFICIENT BRACING, THIS TREESTLE WAS BLOWN DOWN BEFORE IT WAS COMPLETED

Care must always be used in taking soundings in a swamp to find the slope of the rock bottom in relation to the road, as when the rock slopes to one side and a fill is put on the swamp, it may slide down the rock and be lost. Several instances of this kind were experienced, the fill having slid down the rock during the night, leaving the rails and ties bolted together and 10 or 15 ft. above the dump, suspended in the air. This necessitated disconnecting the rails and letting the track down before another train load of gravel could be put on.

At another point, foundations for a bridge over a river were excavated in solid clay to a good depth, and concrete



ON THE C.P.R., NORTH OF PARRY SOUND, DURING CONSTRUCTION, SHOWING FOUNDATION DIFFICULTIES

piers built up some 25 ft. to the bridge seat. Shortly after heavy trains were operated, one of these piers commenced to settle towards the creek. Soundings were taken, and it was found that the whole bank was sliding down the sloping rock. The only remedy was to excavate to the solid rock, blast out a few holes and set a new concrete foundation.

A temporary round-timber trestle, about 1,500 ft. long and about 20 ft. high, was constructed over the valley of

a stream, and although the pile foundations under each bent were solid, there was a strong wind the first night after the bents had been raised, and as sufficient braces had not been put on each bent when it was raised, the whole trestle was found flat the next morning; it cost about \$1,000 to re-hoist it.

"Safety First" in Foundations

Difficulty was experienced with one large trestle, some 90 ft. high, over a rock ravine. The foundations had to be blasted out of the side hill and then built up with broken stone, leaving a bench approximately 30 ft. long and 4 or 5 ft. wide, on which to lay mud sills to support each bent. There was a tendency to build up the benches without first blasting a good niche in the rock, thus reducing the cost, but no "safety first" rule was considered, as there was nothing to prevent the pile of loose rock used for a foundation from sliding down the hill unless a good niche had been blasted out.

Other foundations from which the writer has learned lessons were for large ore docks on Lake Superior, where soundings were taken and piles driven to solid rock. In some cases the rock was evidently broken, as two or more piles would have to be joined together and driven to a depth of 80 ft.

The nature of the ground should be carefully studied for some depth to make sure of the stability of the soil. In West Virginia, along the rivers where most of the railways run, the soil is a clay gumbo, getting very wet in some seasons of the year and causing large land slides. These can often be avoided by careful draining with weeping tiles, by piling and by avoiding making new cuts in side hills, thus changing the natural slope of the ground.

Conditions at Toronto Island

At Toronto Island, where nothing but pure sand is found, and that under water, a more stable foundation can be depended on than in most dry land. Piles are generally driven there by first putting down a 2-in. iron pipe, through which a stream of water is forced, thus boring a hole into which the pile is placed before the drop-hammer is used. The first concrete arch built in Toronto was across one of the lagoons on the Island. Twenty-six piles were driven about 3 ft. apart, both ways, to a depth of 20 ft. under each abutment. The span is 60 ft. clear, and the thickness of the arch at centre is 11 ins. This bridge has been in use a little over ten years and no settlement has been noticed.

The pier of a railway bridge was noticed one morning after a spring freshet, entirely undermined for a depth of 3 ft., although it had stood for a quarter of a century. The river bed was a coarse, hard gravel, too hard for piling, and a heavy rain had caused an eddy around the pier such as may often occur from logs, brush or ice jams. A cofferdam had to be built and excavation made to a good foundation.

Orders amounting to approximately \$3,000,000 have been awarded to the Eastern Car Co., a subsidiary of the Nova Scotia Steel and Coal Co., Ltd., by the Canadian National Railways.

The city council of Windsor, Ont., has joined hands with Ford City and Walkerville in a request that will be forwarded to the Ontario legislature for the appointment of a harbor commission to control the waterfront on the Canadian side of the Detroit river.

At a general meeting of the shareholders of the Grand Trunk Railway held last week in London, Eng., it was decided to accept the offer of the Dominion government to take over the railway, guarantee a fixed income upon certain of the company's stock and purchase the remainder by arbitration. Pending the award of the arbitrators, the G.T.R. will be operated as a part of the Canadian National Railway system, and the board of directors of the G.T.R. will be supplanted temporarily by a board of five men, two of whom will be representatives of the C.N.R., two representatives of the G.T.R. shareholders, and a chairman to be chosen by these four.