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Dam That Withstood Unusual Service Test

Gravity Section With Very Wide Apron—Rock and Hard Pan Foundation—Work Carried on Through Heavy Autumn Freshets—Severe Ice Pressure—Water Rose Ten Feet Above Crest by Failure of Dam Above

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EMINENT suitability for the work required of it may be claimed for the new gravity dam at Marysville, N.B., a small manufacturing town three miles from Fredericton, on the Nashwaak River. The drainage area of the Nashwaak River above this point is 650 sq. mi., a very small portion of which is controlled by three timber storage dams.

Description of the Dam

The total length of the dam is about 500 ft., consisting of three waste sluices, 375 ft. of rollway, log sluices and provision for future hydro-electric power-house. The rollway is placed diagonally to the axis of the river, and about 100 ft. of this overflow is controlled by stop-log piers placed on the crest, the purpose of which is to control the current leading to the log sluices. A standard fish ladder is provided at the end of the rollway next to the log sluices. The site of the future head-race leading to the power-house is closed temporarily by means of a wooden crib dam.

Nature of the River Bed

About one-third of the length of the dam is founded on ledge rock and the balance on hard pan, composed of firm, impermeable red clay, containing at least 50% of large boulders. A test-pit, dug 14 ft. below the river, showed no rock bottom at the power-house site, and the hard pan at this end was found to be absolutely dry. The river bed was closely overlaid by very large boulders.

Details of Design

Owing to the nature of the bottom and the comparatively low height of the dam, it was decided to adopt a gravity section having a very wide apron to prevent erosion of the river bed below the dam.

The overlying boulders and gravel were first cleaned off carefully to the firm clay beneath, allowing all large boulders which were firmly embedded in the solid bottom to remain in place. This was done both under the dam itself and under the apron. Below this, along the upstream face of the dam, a cut-off trench of a minimum depth of 5 ft. was excavated into the solid bottom and filled with concrete, in which were placed ¾-in. square bars at 24 in. centres to provide for anchoring the body of the dam to the cut-off. The same size bars were used at the lower end of the spillway bucket and out into the apron. Rods were also placed in the concrete laid between the boulders left in place. This provided a very firm anchorage to the river bed, which was very fortunate in view of the events later described. Where the dam rested on solid rock, every particle of loose material was carefully

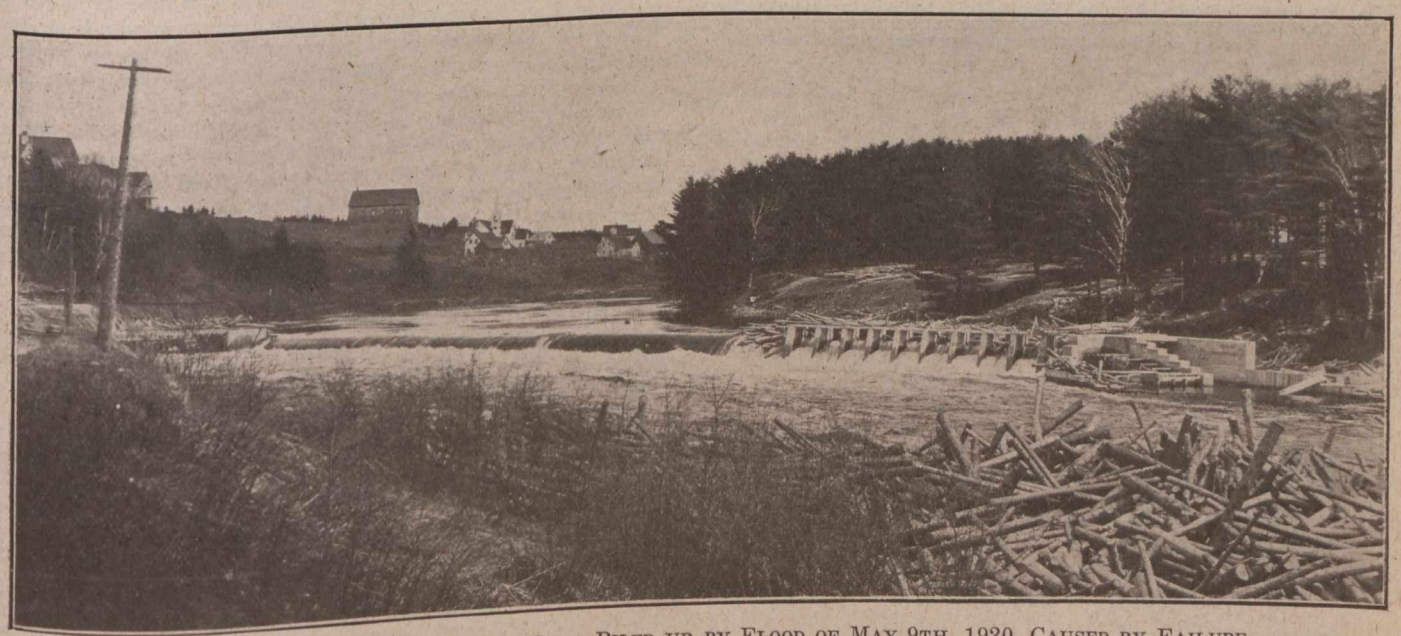

FIG. 1—DAM IN SERVICE SHOWING LOGS PILED UP BY FLOOD OF MAY 9TH, 1920, CAUSED BY FAILURE OF LOG-HOLDING DAM ABOVE