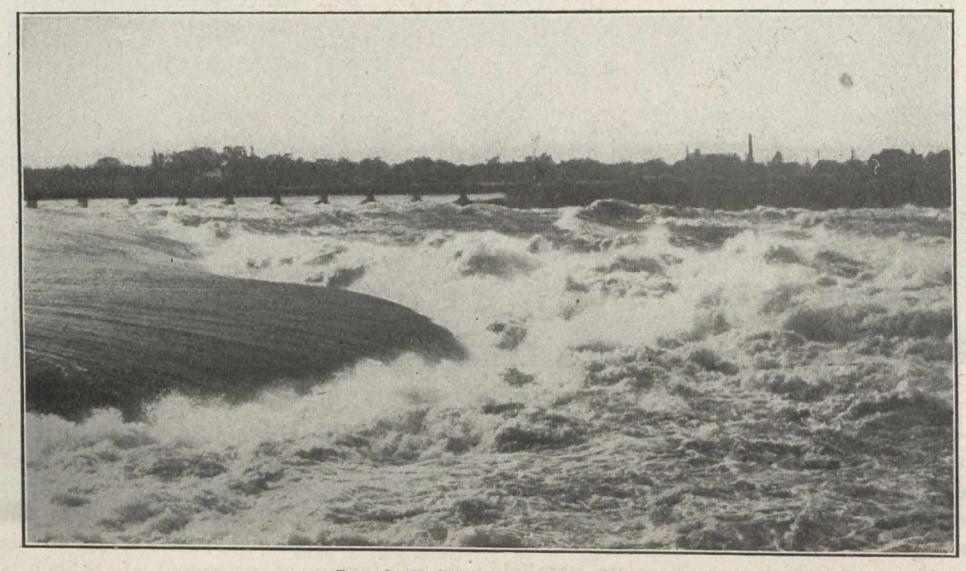
being now sufficient water over the reef, means a considerable saving each year to the Ontario power owners.

(5) To provide a dam with sufficient discharge way as to allow the spring floods to pass without appreciable backwater effects.

To obtain the results cited above, the Chaudiere Dam was located as shown on "Plan of Ottawa River from above the Little Chaudiere Rapids to below the Chaudiere Falls." A very good idea of the location of the works and their general appearance may be gained from the photograph "Dam in January 1909." This shows the dam without its bridge floor, starting from Booth's pier at lower right-hand corner of photo and reaching with its 51 piers and 50 sluice openings, in the arc of a circle, across the river to the abutment at the end of the Ottawa & Hull Power Company's new steel bulkhead. The arc, on which the piers are laid out radially, has a radius from pier-head centre to centre of arc circle, of 566.33 feet and a length of 1,300.189 feet.



Dam in Spring Flood, May, 1909.

The governing elevations, which are all referred to Ottawa City datum (can be seen on plan of final design of pier) are as follows:—

	Elev.
Stop log-sill	37.00
Crest of old dam	45.50
Beginning of 45 deg. batter on pier nose	46.00
Present water level	48.00
Proposed raised water level	52.00
High water of 1909	54.40
Bridge floor elevation	59.00

With a flood of 193,000 cubic feet per second and 50 openings 22 feet wide and 17.5 feet high, we get an area of 19,250 square feet, giving an average velocity of some 10 feet per second through the sluice openings.

The piers, the most important feature of the whole structure, were 39 feet 5 inches long at the base and battered to give a 23 feet 5½ inch bridge floor support at elevation 57.75. They had a clear height from stop-log sill to bridge floor of 22.00 feet. Their cross sections at base were modified ellipses, as the ellipse, according to tests in Europe, affords the least obstruction to flowing water. In order that any debris, which might pass the noses of two piers might not wedge between their downstream ends, owing to the convergence by their radial setting, the piers were made 4 feet wide at the nose or upstream end, tapered to 2 feet at the tail or downstream end. This gives, between piers, 22 feet of a clear sluice-way at the upstream entrance and 22 feet 5¾ inches at the downstream exit.

In designing the piers, water at elevation 52.00 and causing a pressure of 100 tons acting at elevation 42.00 was used in conjunction with an ice pressure of 200 tons acting at elevation 50.00.

To counterbalance the effect of this turning moment an anchorage of rock bolts capable of developing a stress of 200 tons was placed in the front section. The resultant stress acting 10 feet in front of the stop-log post combined with the weight of the pier acting through its centre of gravity and the ice and water pressure brought final resultant well within the middle third. The chief function of the rear anchor bolts was to resist shear.

These piers were founded on the solid Trenton limestone bed-rock. Where fissures or cracks occurred, a cut-off trench of 1 : 3 : 6 concrete was put in. This same mixture (1 : 3 : 6) was used in the foundations, while above elevation 37.00, in the piers and bridge floor 1 : 2 : 4 concrete was the order; 1¾-inch round anchors (21 to the pier) were securely grouted into the solid rock. These were set in pairs, having their upper ends secured by nuts and washers over two 5-inch channels at 6.50 lbs., which rested on four 4-inch channels at 5.25 lbs., two on each side of the pier. These 4-inch channels were placed with lower flanges at elevation 35.50

Anchorage of Piers.