hoisted through the material shaft in buckets having a capacity of ⅔ cu. yd. Four 7-in. compressed air pipes supplied air to the working chamber and served the blow pipes. Two 6-in. pipes supplied the water for "washing" the sand. One 2-in. pipe supplied high-pressure air for drilling, etc., and a second 2-in. pipe carried the wires for the electric lighting of the working chamber and ladder shaft.

As soon as the sinking was completed on the north shore as much of the plant as could be spared was moved to the south side. The men's dining-rooms and sleeping quarters were placed on skids, launched into the river, floated across, and placed in position on the other side. The layout for the mixing plant, sand chute, coal chute, etc., was practically the same as on the north side of the river, all the materials being led to the lower level by gravity. The stone for the crushers was quarried directly from the top of the cliff so that one derrick could pick up the stone in the quarry and deposit it in the hopper leading to the crushing plant half-way down the cliff. While the boiler and compressor plants used on the south side were drawn as much as possible from the north side, yet they had to be materially increased. The steam plant included three 125- and one 250-h.p. Heine boilers, twelve 100-h.p. locomotive boilers, and seven Ingersoll-Rand and Ingersoll-Sergeant air compressors delivering to 2 coupled receivers from which a pair of 12-in. mains led to the caisson and were carried for about 200 ft. in a wooden flume constantly filled by water. This reduced the high temperature developed at the compressors to about 80° in the working chamber of the caisson. There were also two 12-in. Worthington high-pressure pumps which delivered water to the caisson for the hydraulic jets used for excavation.

On account of the very high tide which prevailed at the site, the air pressure in the caissons constantly varied and was controlled by an operator in the compressor house who adjusted it to correspond with the indications of an automatic register showing a continuous tide pressure.

The stone from the quarry on the top of the cliff was delivered by derricks into a No. 8 McCully rotary crusher near the top of the bank, which broke the larger pieces and delivered them through a chute to a No. 5 Allis-Chalmers crusher about 25 ft. below it. The second crusher reduced the stone to a diameter of 2 in. and delivered it through another chute to a storage bin adjacent to the sand bin. Both stone and sand bins delivered by gravity through gates to measured compartments in a triple charging hopper just below the floor of the working platform. This hopper was lined with steel and had a compartment into which the requisite number of bags of cement were poured by hand. The hopper gate was operated from the charging platform and delivered all of the aggregate for one batch of concrete to one of the two Ransome mixers under the platform, which discharged into 1½-yd. bottom-dump Stuebner steel buckets which were set in pairs on 2 coupled cars drawn by one horse on a 600-ft. service track to the main pier caisson, or to the anchor pier, where they were unloaded and emptied by the derricks installed there.

The compressed air, with a maximum pressure of 40 lbs. per sq. in., was delivered to the working chamber of the south caisson through two 12-in. pipes, as stated above, which in turn was distributed into four 7-in. mains.

Water at 100-lb. pressure was distributed around all four sides of the working chamber in a horizontal main from 4 to 6 in. in diameter, provided in each of the 18 compartments with a valved outlet and a jet pipe with 1-in. nozzle used to loosen the sand and excavate the earth and gravel. Each chamber was also provided with a 6-in. vertical blow-out pipe and with electric lights. The caisson was fitted with six 3-ft. material shafts, each having a Moran air lock with four 3-ft. ladder shafts having simple air-locks composed of short upper sections with top and bottom diaphragms, and with one large man-lock. The latter was a 6-ft. horizontal steel cylinder about 30 ft. long, located on the deck of the caisson, and was built permanently into the solid concrete of the pier, being approached through a 4 x 4-ft. vertical stair shaft. The lock was large enough to accommodate many "sand hogs" at once, thus greatly expediting the entrance and exit of each successive shift, effecting an economy of air consumption and considerably reducing the waste of lock air.

A hospital lock was also established on the shore near the "sand hog" house. Under moderate pressures, 100 men worked 8 hours in each shift. As the pressure increased the lengths of the shifts were diminished to a minimum of 1 hour. As many more sand hogs were required to carry on the work, great difficulty was experienced in securing enough men, so that eventually the number of men in each shift was considerably reduced. Some of the men lived in an adjacent boarding house provided by the contractors, but the majority of them lived in local villages up to five miles distant.

At the present time the contractor is at work pointing the joints in the masonry and cleaning these piers thoroughly by sand blast. There is also some work still to be done on the dressing of the bridge seats. This work is very important and has proved a very difficult operation. These bridge seats are about 32 ft. x 26½ ft. and it is necessary that they should be absolutely level to distribute the load from the main steel pedestal, the base of which is shipped in four pieces. It requires about six weeks to complete the dressing on one of these beds, and it has been found that the work can be done with such accuracy that not more than a variation of 2/100 of an inch is possible.

This work is under the supervision of the Board of Engineers, Quebec Bridge, which is composed of C. N. Monsarrat (chairman and chief engineer), Ralph Modjeski and C. C. Schneider.

RESERVING WATER POWER SITES.

Consistent with the policy of the Dominion government to preserve the water powers for the people, the department of the interior is placing under reservation all vacant Dominion land that the superintendent of water powers may recommend to be valuable for the development of water power, says Conservation.

Six whole sections of land, in township 108, range 6, west of the 5th meridian, have recently been reserved from disposition of any kind until the engineers of the water power branch have had an opportunity to make a complete survey of the famous power site at Vermilion falls, on the Peace River in northern Alberta.

Similar reservations have been made on the various rivers in the provinces of Manitoba, Saskatchewan, Alberta, and in the railway belt of British Columbia. Particular mention might be made of reservations covering land contiguous to Grand Rapids on the Athabasca River, the various power sites on the Elbow and the Bow Rivers, in the province of Alberta; for land required for the development of power at Grand Rapids on the Saskatchewan River, and all unoccupied land along the Winnipeg River, in the province of Manitoba.

Other reservations will be made from time to time upon the receipt of sufficient information to enable the superintendent of water powers to make a definite recommendation covering a description of the land that might be required for power purposes.