words, the St. John has eroded a valley 300 to 350 ft. deep, and on this flat country there is opportunity for storing large quantities of water by the building of comparatively inexpensive dams.

These two streams, if fully developed, with all possible storage provided, will yield at least 7,000 h.p. (24-hr. power), or 14,000 h.p. (12-hr. power); or assuming that the working day of the future will be 8 hours, then 20,000 h.p. if the pondage at the different plants be sufficient to take care of the fluctuations.

The plan is to develop a small unit on the lower 100-ft. drop of the Pokiok, protected by the storage which is already provided by the existing dam at the outlet of Lake George. This will give power enough to cover the present requirements of Fredericton, with quite a margin for increase of requirement. When more power is demanded, the first unit can be more than doubled by building a new storage dam about 4½ miles from the St. John. When this is outgrown, the 200-ft. fall can be developed; and when that has been absorbed, the Shogomoc can be developed. This should put Fredericton on the map as a manufacturing centre just as it already is a railway centre.

St. John's Hydro-Electric Possibilities

The second and largest centre of population requiring hydro power is St. John. All the power generated in St. John is by coal, and the New Brunswick Power Co. had to be given a very substantial increase in its rates to meet the greatly increased cost of coal and labor. They have been investigating possible water power for some time and now that the war is over they will have to go ahead with the development very soon.

The Lepreaux river empties into the Bay of Fundy about 20 miles from St. John. The drainage is about the same as the Pokiok or Shogomoc, but the run-off is nearly twice as much. We have three years' continuous run-off records, and we are greatly puzzled to account for the phenomenal run-off, being 133% of the total rainfall recorded in St. John.

The engineer who installed the gauge and took the first two years' records, explained the phenomenal run-off by assuming that the stream is receiving a large amount of subterranean drainage from the watershed of an adjoining stream, but we, having taken several checks of the run-off of this stream find the same phenomenal run-off, which proves conclusively that there must be a much larger rainfall on the watersheds of these streams than there is in St. John, only a distance of a few miles away. There are three power sites on the Lepreaux, two of 90 ft. fall and one of 64 ft., and having in mind the very great run-off of this stream, these three sites will produce at least three times the amount of power now used by the New Brunswick Power Co.

There is one power site known as big falls which can be made to generate 40% more power than they used last year. When St. John and vicinity has absorbed and put to use the 5,000 to 6,000 h.p. that can be developed on the Lepreaux, the Maguadavic, 20 miles further away, can be made to produce as much more. There is no reason apparent why the development of this power should not be put in hand in the near future.

Conditions Along North Shore

The third district where hydro power is required is along the North Shore. Bathurst alone has a small and very indifferently developed and distributed system of hydro-electric power.

Campbellton and Dalhousie drive their plants with gas engines, using gas produced from anthracite coal, and the cost of that makes their power very expensive.

Newcastle uses steam at big expense, and Chatham uses oil engines.

In addition to the requirements of these several towns, the Dominion pulp mill at Chatham requires some 400 or 500 h.p.

The Tete-a-gouche river, which enters Bathurst harbor a little north of the town, drains about 100,000 acres and has an ideal opportunity for very large storage. About 8 miles above its mouth, it enters a deep and narrow gorge of nearly perpendicular rock walls; the fall through this gorge admits of four power sites, each created by a dam built to the top of the walls and flowing the water back to the next dam up the stream. At the first or upper site, a dam 70 ft. high will give a head of 105 ft., there being a sheer fall of 35 ft. in the flow of the gorge. It will flow the water back for about 4½ miles. At the second site a dam can be built to a height of 130 ft.; the third, 65 ft.; and the fourth 35 ft.; or a total of 335 ft. These four sites will put out 6,000 h.p. (24-hr. power), or 18,000 h.p. (8-hr. power).

So it will be noted that while it was represented to the provincial authorities only a few years ago that there is no water power in New Brunswick aside from Grand Falls, we have already been able to locate and fairly well prove (apart from Grand Falls) the existence of 23,000 h.p. (24-hr. power), or nearly 70,000 h.p. (8-hr. power), which if all put to work would produce a big change of conditions in this province.

This commission has only been in existence for a little over a year, and is composed of three men busy with their regular work and so unable to give any considerable amount of time to the matter. Our people in the Maritime Provinces are surely if slowly awakening to the fact that we may overcome to a considerable extent the handicap which the upper provinces hold over us in manufacturing, due to their enormous water powers, by developing what we have discovered and looking for more.

THE BEAR RIVER BRIDGE*

By A. T. Macdonald, A.M.E.I.C.

PRIOR to 1912, the Bear river was crossed by the Dominion Atlantic Railway by a bridge consisting of about 750 ft. of wooden trestle on pile bents and five-Howe truss spans, 150 ft. long, on concrete piers with pile foundation, the piles being cut off about 2 ft. above the original bed of the river. This bridge was used for upwards of 25 years, but the piers were disintegrating rapidly between low and high water marks from the action of the river ice, and were also gradually moving downstream.

This bridge was what one might call "ripe," and certain tired souls had been known to leave the train at Deep Brook and drive by road to Bear river station, or Digby, continuing their journey the next day, in order to avoid crossing the bridge. These people, no doubt, exaggerated the state of affairs, but their nerves were not equal to the strain of travelling over 1,600 ft. of bridge at the rate of two miles an hour.

Our first work there was to make the old bridge safe for traffic until it could be replaced by the new one. This in itself was a very costly proceeding. A double row of piles were driven first, clear of the footings of each pier, and framed bents of 12 by 12-in. spruce erected on these and braced to form a tower. The bottom chord of the truss was given a bearing on this tower about 10 ft. away from the end of the truss, which was reinforced to suit this new bearing.

In this way the old piers, which were increasing their downstream movement, were largely relieved of their loads. The pier supporting the swing span slid downstream to such an extent, 10½ ins. if I remember rightly, that it became impossible to operate it. This necessitated another opening to permit vessels to pass.

Towers on pile bents were therefore erected to support a 40 ft. plate girder about 200 ft. east of the existing swing span, and when everything was in readiness, an opening was cut in the bridge and the girders dropped into position. With the aid of the Dominion Bridge Co.'s derrick car, this was accomplished without any interruption to train traffic.

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