## FOREST RESERVES IN ONTARIO AND THEIR RELATION TO WATER POWERS.

THE present area of forest reserves and parks in Ontario is 22,574 square miles, or 14,447,360 acres. This area, while large in itself, is not great in comparison with reserves and parks in Quebec; nor is it large in proportion to the total area of non-agricultural lands in Ontario which must always be chiefly valuable for the production of timber. There are many millions of acres of cut-over or burned-over forest lands in this province, belonging to the Crown which are now practically without fire protection, but which contain a great deal of young growth and much timber at present below merchantable size, but which, if protected from fire, would ultimately become merchantable.

The present annual revenue from woods and forests in Ontario is in the neighborhood of $2,000,000. Hon. Clifford Sifton, chairman of the Commission of Conservation, in his annual address presented last January, states that if this revenue is to be maintained new areas must be continually opened up for lumbering, and this in turn necessitates the protection of the non-merchantable areas and the young growth, in order that when the time comes, they may contain merchantable timber ready for cutting. Any other policy means the sacrifice of a large future revenue, in order to avoid much smaller present expenditures.

The problem is undoubtedly a difficult one, since the expense of protecting the large areas of young growth during the necessary period of many years would in the aggregate be heavy, while there is at the same time a strong demand for the surplus revenues for purposes of general governmental administration. It seems probable that the situation could best be met by the adoption of a definite policy which would result in the reservation and placing under protection each year of a limited but definite area of young forest growth found upon examination to be most suitable for this purpose. An excellent step in this direction was the addition last year of 2,000 square miles to the Mississaga forest reserve, and 811 square miles to the Algonquin national park; but this constitutes only the beginning of what should be adopted as a definite and continuing policy.

The necessity for further protection of important watersheds must be considered. Waterpower development is now a vital factor in the industrial life of the provinces, and this importance is bound to increase tremendously in the future. For the intelligent protection of this great interest forest protection is absolutely essential. A concrete example of this relationship was brought to the attention of the Commission of Conservation at the annual meeting in 1914 by Mr. J. B. Challies, superintendent of the Dominion Water Powers Branch. As a result of the representations made by Mr. Challies, a resolution was adopted by the Commission, favoring the establishment of a forest reserve on the upper waters of the Winnipeg River and especially on the watershed of the Lake of the Woods. So far as known, however, there has been no action taken by the Ontario Government.

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A shipment of 6,000 tons of zinc ore from Australia is being smelted in the southern Kansas and Oklahoma smelters. The shipment comes as a result of the war in Europe, which has closed most of the big European smelters. The Broken Hill district in Australia, from which the shipment of 6,000 tons has come, produces about 400,000 tons of zinc a year.

## AVOIDING DEFECTS IN CONCRETE WORK.

Failures and defects in ordinary concrete work are invariably due to one or other of the three following primary causes, alone or in combination: (1) Inadequate design, (2) inferior materials, (3) inferior workmanship. Consequently, it may fairly be said that the most effectual way of avoiding failures is to secure the services of a thoroughly qualified designer, and to employ none but experienced contractors. The wisdom of this procedure becomes evident on consideration of the most frequent contributory causes, which include:

(1) The use of inferior cement imported from abroad.

(2) The employment of unsuitable aggregates, consisting of perishable stone, coal residues, slag, and the like.

(3) The acceptance of aggregates inadequately graded, or containing an undesirably large proportion of earthy matter.

(4) The adoption of inadequately graded sand containing an excessive proportion of foreign matter, or of fine stone chippings containing quarry refuse.

(5) The use of impure water.

(6) Want of care in proportioning and mixing concrete.

(7) Using concrete which has commenced to set.

So far as reinforced concrete is concerned, there have been very few actual failures in this country, but these and the more numerous mishaps which have occurred abroad point to the following causes of failure:

(1) Inadequate design, including miscalculation and unscientific disposition of reinforcement.

(2) The misplacement or omission of important parts of the reinforcement.

(3) The use of inferior concrete, and poor workmanship or carelessness in depositing concrete.

(4) The inadequate construction and temporary support of moulds and centering.

(5) The premature removal of moulds and centering, or of temporary supports.

The last mentioned is by far the most frequent cause of failure, but represents a mistake not at all likely to be made by experienced contractors. Inadequate design may result from lack of experience, and is most unfortunately encouraged by the pernicious system of inviting competitive designs. Errors in the application of reinforcement and in the preparation and placing of concrete are obviously preventible by efficient supervision on the part of the contractor and the clerk of works or resident engineer.

One particularly suggestive characteristic feature of reinforced concrete work is that no failures have been known to occur after the completion and hardening of the concrete. This point constitutes definite proof of the fact that the comparatively few mishaps so far recorded have been the result of errors or carelessness in construction.

Equal proportions of stone, brick, timber and steel structures have failed during or immediately after construction for similar reasons. Moreover, many structures of these classes have collapsed at varying intervals after completion, and as the result of gradual decay.

On the other hand, the history of reinforced concrete gives the assurance that when a properly designed and carefully built structure has once been completely finished it is perfectly safe, and will go on increasing in strength and durability from year to year.—(Ferro-Concrete.)