

in such cases to screen the gravel and re-mix the sand and stone in proper proportions. In this particular instance there will be a saving of $\frac{1}{4}$ barrel of cement per cubic yard of concrete by using proportions of 1:2:3; also the resulting strength may be increased.

Stone

The stone should be clean and contain hard durable particles from limestone, granite trap, conglomerate gravel or other hard rocks free of dust and organic matter.

The sizes of stone called for in concrete road construction require little screening and only those screens need to be used that will obtain a stone that will pass a 2-in. ring and be retained on a $\frac{1}{2}$ or $\frac{1}{4}$ -in. screen.

Mixing

The concrete mixers generally used are those of the batch type, provided with traction-driven power loader and automatically regulated water tanks. Mixers with boom and bottom-dump buckets of sufficient size to convey one complete batch, are those most commonly used and specified.

The filling of the skip is accomplished in practice in two ways: Shovelling directly from supply piles or loading from wheel-barrows. The former means, however, is generally discouraged, as accuracy is impossible; besides, the entire loading gang loses time waiting while the skip is raised and lowered. In all cases the drum should be completely emptied before the next skip of material is dumped into the mixer.

Proportioning

The question of correct proportions for concrete is being taken up in practically every laboratory in Canada and United States. The result of investigations accomplished so far indicate that unsatisfactory concrete will result from even the best aggregates if they are not properly proportioned. The recommendation of 1:1½:3 or 1:2:4 mix must be considered only general, and it is most essential that the material for use be thoroughly tested in the laboratory before use in construction.

Consistency

The question of correct consistency is, in most instances, treated with the proportioning of aggregates, as this combination results in the best concrete. Most engineers prefer dealing with the question of consistency first and allowing the question of proportion to be dealt with afterwards.

A scheme that was used on the work with which I am most familiar, proved to be of great value in keeping the consistency constant. The method was to place a shovelfull of green concrete at one end of an inclined board and note whether it would flow when the board was at the angle at which concrete of the best consistency should flow as predetermined by laboratory investigation.

After heavy rains, stock piles absorb a considerable quantity of water, but with the scheme mentioned above it is quite easy to keep the same consistency throughout the work. It requires very little time to determine the right angle and the method has the advantage of keeping the water content of the mixture fairly constant, and assists in placing and finishing.

Joints

Studies have been made of various slab lengths under various weather and subgrade conditions, and it would appear that on sandy subsoils, the slab length can be lengthened to 50 or 60 ft., and on clay subsoil to 35 or 40 ft. The more recent tendency, however, has been to increase the slab length to 70 and 80 ft. for sandy subsoil, and to 40 to 50 ft. for clay subsoil. This is a matter that should be given due consideration, as climatic conditions and temperature changes such as we have here in Ontario must be taken into account.

Reinforcement

It is generally recommended that reinforcing be placed in concrete roads over 20 ft. wide.

The amount of reinforcement to be used per square yard should be determined by an engineer familiar with

local conditions. The temperature range and percentage of moisture vary with each locality. It is evident, therefore, that each roadway must be studied to meet these conditions.

Finishing

Prior to finishing, it is essential that the surface of the concrete be brought to the proper grade and cross-section. The manner of doing this will depend primarily upon the width of the road and whether side forms or curbs will be used to guide the strike board.

Curing

During hot weather it will usually be found necessary to cover the surface of the finished pavement with canvas as soon as floating or belting has been completed, as covering assists in keeping a more uniform temperature over the finished work, which results in increased strength and assists in giving a better wearing surface to the road.

The process of curing involves two distinct features: (1) Protection until the concrete has reached its final set; and (2) protection after final set.

In the first instance, a canvas is supported over the road by means of portable framework, 2 ft. above the surface. For protection after final set, the canvas is removed and the concrete covered with earth or other water-retaining material. This covering should be at least 2 ins. thick and should be kept thoroughly wet for a period of from 10 to 14 days.

Superintendent Archibald of the Water and Light Department, Woodstock, Ont., whose salary is \$2,790 per annum, has refused a proffered \$300 increase.

It is stated that the Hydro-Electric Power Commission of Ontario will require \$17,000,000 this year from the provincial treasury for the construction of radial railways and the development of water powers in eastern and northern Ontario.

The seventh annual convention of the Canadian Good Roads Association will be held June 1st, 2nd and 3rd in the Royal Alexandra Hotel, Winnipeg. These dates were finally decided upon at a recent special meeting of the executive of the association.

Sam. G. Porter, of Lethbridge, has been chosen temporary chairman of the "Association of Professional Engineers of Alberta," which association has been formed by the Alberta members of the Engineering Institute of Canada for the purpose of introducing the institute's model bill in the Alberta legislature. R. J. Gibb, of Edmonton, will act as temporary secretary.

In the article appearing on page 267 of last week's issue, entitled "Reorganization of the B. Blair Plant," it was announced that McCracken concrete pipe is now being used in Ontario by the cities of Galt, Guelph and Woodstock, and by the Toronto Harbor Commission. Mention of the city of Galt was a typographical error, as the list should have read: "London, Guelph, Woodstock and the Toronto Harbor Commission."

The Administrative Commission of Montreal have sent copies of the aqueduct report recently presented by R. S. & W. S. Lea to the Board of Trade, Chambre de Commerce and the League of Proprietors for their consideration. Messrs. Lea outlined the possibilities of three alternative schemes for the use of the aqueduct, and the commission desire the advice of the above-mentioned civic bodies before proceeding with any one of the three schemes.

D. H. McDougall, retiring president of the Canadian Mining Institute, in his presidential address at the 22nd annual meeting of that association, held this week in the King Edward Hotel, Toronto, said that no Canadian government has ever given a worthy appropriation to the Geological Survey. "The governments have placed an inadequate number of workers in the field," said Mr. McDougall, "and have given them an inadequate appropriation. The department has not been appreciated in its true worth."