PERSONALS.

ARTHUR A. COLE, president of the Canadian Mining Institute, is on a trip to the Pacific Coast for the purpose of aiding the Research Council in organizing the collection of industrial information. Mr. Cole is field organizer for the central joint committees that are assisting the Council.

Dr. HOWE, of the University of Toronto, with two technical assistants, will commence for the Commission of Conservation and in co-operation with the Laurentide Company, Limited, a survey of the cut-over pulpwood lands.

S. S. SCOVIL, B.Sc., formerly assistant chief engineer of the Manitoba Hydrometric Survey, and for the last two years engineer for the Dominion Technical Board in connection with the International Joint Commission, has been granted leave of absence to go overseas with the Pioneer Construction Battalion.

K. H. SMITH, engineer of the Nova Scotia Water Power Commission, is representing the commission in tests of some specially constructed turbines, manufactured in Pennsylvania.

WILLIAM YOUNG, chief comptroller of water rights of British Columbia, has been in Montreal and Ottawa conferring with the engineers of the Industrial Research Council.

MONTREAL AQUEDUCT ENLARGEMENT.

(Continued from page 456.)

clay or rock powder. When comparatively dry or well drained, it will stand in a bank with practically vertical face, but when fully saturated with water, tends to flow in a horizontal surface and is easily eroded and transported by running water. This latter property has a very direct bearing on the safety of the conduit, in view of the proximity of the aqueduct excavation.

The ratepaying engineers in a memorandum submitted to this board, under date of March 5th, 1917, referring to the canal section of the aqueduct, say:—

"Maximum permissible mean velocity, with material as found in earth section, shall not exceed 2.5 feet per second."

In a report made during 1894, Messrs. Keefer and Vanier, speaking of the tailrace, say:—

"The surface inclination of the water when delivering its full economical discharge with a velocity of 100 feet per minute, or a little over one mile per hour, will not be more than one-half that of the present aqueduct."

This is equivalent to a velocity of 1.65 feet per second (probably surface velocity) and would indicate that the surface velocity in the old aqueduct was as high as 3.33 feet per second (2.27 miles per hour), equivalent to a mean velocity of about 2.7 feet per second (1.84 miles per hour).

On the other hand, Mr. T. C. Keefer, in a report to the city of Montreal, dated December, 1886, gives the result of a few measurements of surface velocities made in August, 1884, which gives an average surface velocity of 1.70 feet per second (1.25 miles per hour), equivalent to a mean velocity of about 1.3 feet per second (0.89 miles per hour).

No accurate information is available as to whether erosion occurred at any time in the old aqueduct canal.

From specifications for contract No. 2 it would appear that it was anticipated that exceedingly soft material was likely to be encountered in some sections of the work, as paragraph 46 reads as follows:—

"In any case where, in the opinion of the engineer, exceedingly bad plastic or aqueous material is encountered in the bottom excavations of the canal, particularly between stations 45 and 90, and whenever this material (soft clay pockets, quick sand, loam, leaf mold or muck, etc.) is so soft or silty as to be improper to insure the required bearing power of the soil, the contractor shall be required to furnish and drive wooden piles to carry the footings * * * ."

Some of the best authorities on hydraulics give figures for the allowable velocities of water in earth canals, for different materials, which vary between the values given in the table at the foot of this page.

No paving is shown on the plans for the tailrace proper, where high velocities are bound to develop on account of its small section and steep grade. Chief Engineer Mercier, in his report of the 16th December, 1916, recognizes fully the necessity of lining with concrete that section of the aqueduct, and states that it is the intention to provide for same. We fully endorse Mr. Mercier's decision in this regard.

In view of the description of the material given by the Board of Investigation for the conduit, and other information as mentioned above, and after having inspected the works, we have concluded that for the first scheme to be considered, that of the work as per present plans, we could not assume a higher permissible mean velocity for the earth sections of the headrace than 1.5 feet per second.

In our studies, under the heading of Scheme 1, we assume that the bottom is safe for a mean velocity of 1.5 feet per second (1.02 miles per hour), but we cannot, however, accept or recommend this, or any other velocity, until thorough tests have been made to ascertain what velocity it will be safe to assume in order to guard against scouring of the bed and against the undermining of the side-retaining walls.—*(Concluded in the next issue.)*

Table Showing Figures Taken as Authoritative for Velocities in Earth Canals.

	Safe bottom velocity in feet per second.	Safe bottom velocity in miles per hour.	Mean velocity in feet per second.	Mean velocity in miles per hr.
Soft earth	0.25 to 0.50	0.17 to 0.34	0.33 to 0.65	0.23 to 0.44
Clay	0.26 to 0.50	0.18 to 0.34	0.33 to 0.65	0.23 to 0.44
Sand	0.4 to 1.00	0.27 to 0.68	0.6 to 1.3	0.41 to 0.89
Gravel	2.0 to 2.6	1.36 to 1.77	2.62 to 3.0	1.78 to 2.05
Broken stone	3.3 to 4.3	2.25 to 2.93	4.0 to 5.5	2.73 to 3.75

(The concluding portion of this report, outlining schemes 1, 2, 3, 4 and 5, will be published in the next issue of The Canadian Engineer.)