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# The Canadian Engineer

A weekly paper for civil engineers and contractors

## Water-Power Administration in Canada

Summary of Fourteen Articles of Existing Laws, Regulations and Practices in Common to Each of the Four Canadian Jurisdictions, Quebec, Ontario, Prairie Provinces and Territories, and British Columbia

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ANY summary of water-power legislation and practice, as it exists in Canada to-day, must necessarily be more or less incomplete and unsatisfactory. The whole question of procedure has been in process of evolution during the past 20 years.

This process will probably continue for some years before a satisfactory working policy is finally established. Today, almost every new lease has some small change from its predecessor. Policies are, so to speak, in the formative stage. Administrators are therefore loath to state in precise terms the details of the policy of their particular government, and it is not always possible for others to do this accurately from an inspection of the meagre laws and regulations which have been published.

### Dominion

(Prairie Provinces and Territories.)

(1)—Definite term lease plan adopted. (Dom. Lands Act, sec. 35, and Regls. of 1909).

(2)—Application Procedure. The applicant files a written application with the Minister of the Interior, giving statistical data and accompanied by sketch plans. The Minister may call for such other plans and information as he may deem necessary, and if he approves of the proposed scheme of development, an agreement for a license may be entered into setting out the time for commencement of the works, the minimum expenditure in first and second years, the amount of power to be developed within five years, the lands which may be occupied and the basic terms of the license which will be granted upon completion of the works. (Regls. of 1909).

(3)—Term of license twenty or twenty-one years, renewable for three further consecutive terms of the same length unless the Governor in Council orders cancellation at the expiry of any term. (Do. sec. 8 (a) & (b)).

(4)—Renewal provisions may include new conditions, and will in all likelihood subject the licensee to the laws and regulations then in force, because, if the licensee does not agree, the Governor in Council may cancel. (Do. 8 (b)).

(5)—Inspection during and after construction, enabling the securing of cost data and the most approved construction. (Do. 8 (L)). Licenses generally provide that the Minister may have both consulting and resident engineers on the work and their salaries are paid by the licensee.

(6)—Compensation paid if license terminated as above, based on values of physical properties, without the inclusion of "going concern" or other so-called intangibles.

(7)—Rentals revisable at beginning of each term of twenty-one years. (Do. 8 (a)).

(8)—Development, up to the full capacity of the works authorized, may be ordered by the Governor in Council as public demand requires. In default of compliance the extreme penalty of cancellation without compensation may be exercised. (Do. 8 (h)).

(9)—Where a more comprehensive development of the site is shown desirable, and the licensee, after notice, fails to proceed, the Government may take over the works paying a bonus over the appraised value of the physical properties

of from thirty to ten per cent. according to the length of occupancy. (Do. sec. 8 (i)).

(10)—Stream Regulation and Control. All recent agreements and licenses provide that the Minister may control the manner of diverting the waters authorized so as not to interfere with the maximum advantageous development of the power resources of the river on which the site is located, and that the Minister may regulate the flow of the river in the interests of all users. A further condition is that the Government may construct storage or regulating works and may pro-rate their cost and upkeep among the various licensees on the stream, the Minister to fix the rental for the additional flowage created.

(11)—Rates charged consumers subject to revision every seven years. (Do. 8 (k)).

(12)—Cancellation Features. On default of licensee in complying with terms, license subject to cancellation by the Exchequer Court on application of the Crown. (Do. 8 (j)).

(13)—Agreements have in some cases contained clauses providing that contractors shall be subject to any general regulations thereafter passed. Others are made subject to the general regulations then in force or thereafter passed "in so far as not inconsistent with the terms of this agreement."

(14)—Transfer of license requires written consent of Minister. (Do. 8 (j)).

### Ontario

(1)—Definite term lease plan adopted. (Public Lands Act, R. S. 1914, chap. 28, sec. 58 and Regls. of 1907).

(2)—Application Procedure. Applicant must in every case file plans and field notes by an Ontario land-surveyor and a report by a competent engineer, setting forth the entire scheme of development, its extent, its scope, the precise lands affected, the use to be made, the business to be carried on in connection therewith, and the estimated cost of the whole. Also, if, and as called for by the Minister, any additional measurements, specifications, profiles, plans, or other data. The Minister may refer plans to Hydro-Electric Power Commission and the applicant cannot proceed unless the commission approves the same. Applicant must also submit proof of financial standing and ability to carry out development and deposit with provincial treasurer a sum of money named by the Minister to guarantee performance before lease is issued. Lease calls for development and use of specified horse-power within a period named. (Regls, 1907, secs. 4, 5, 6, 7, 12a).

(3)—Term of lease, twenty years. Renewable for two further periods of ten years each, if lessee and Minister can agree on terms. (Do. 9).

(4)—Renewal lease does not necessarily perpetuate the terms of the original lease. Renewal conditions are such "as may be agreed upon or may be fixed by the Minister". (Do. 9).

(5)—Inspection during and after construction to ascertain if plans carried out and to determine the quantity of



power developed or capable of being developed from time to time. The power-commission's estimate of this as a basis for rentals is final and binding on the lessee. (Do. 12 (i & g).)

(6)—Compensation paid for works taken over at the end of the term only if power-commission reports that works are "necessary or useful for the proper development or utilization of the water privilege". Amount of compensation, if any, is left entirely in the discretion of the Lieutenant Governor in Council after receiving report of the power-commission, and the necessary sum being appropriated by Legislative Assembly. If works not useful, licensee is given opportunity to remove movables. (Do. 12 (L).)

(7)—Rentals specified in lease for the entire term thereof, but revisable at renewal periods, i.e. after 20, 10 and 10 years. (Do. 8 & 9).

(8)—Development may be required to the full capacity of the water privilege by an order of the Lieutenant Governor in Council, upon the power-commission reporting that production is not up to capacity and that demands for power exists. The Commission has full powers of inspection of books, records and so forth to carry out this duty. (Do. 12 b & g).

(9)—Where a more comprehensive development is considered desirable at or near the site. The regulations provide that the expropriation features of the Power Commission Act, R.S.O. 1914, chapter 39, shall apply to any water-power leased under the regulations and to any works connected therewith. (12 (h)). This Act should therefore be invoked for this purpose. Compensation would be determined by arbitration under the procedure of the Public Works Act, or at the option of the owner under the Arbitration Act. (Sec. 10 3 & 4, R.S.O. 1914, chap. 39).

(10)—Stream Regulation and Control. While the Ontario regulations and lease forms contain no clause on this point, the total term of the lease and renewals is so short (20 & 10 & 10 years), the conditions of repossession by the Crown are so stringent (see 6 above), and the powers of expropriation through the power-commission so great, that a plan of common storage and regulation works once decided upon for any river system, could be easily put into force.

(11)—Rates charged consumers. The licensee or any party affected may submit the question of rates or conditions for supplying power to the power-commission, and Lieutenant Governor in Council may thereupon pass an order prescribing rates and conditions on the basis of the said report. (Regls. 1907, sec. 12 (d)).

(12)—Cancellation Features. Lease may be cancelled by the Lieutenant Governor in Council for non-payment of rentals or upon report of the power-commission that the lessee has failed to comply with any condition of a lease "or any O. in C. respecting any matter or thing arising under the lease, concerning which, such order is made". (Do. 13).

(13)—"The lease shall at all times be subject to *any general regulations thereafter made* by the Lieutenant Governor in Council affecting the construction and operation of works for the development of water privileges or the supply of power therefrom." (Do. 12 (m)).

(14)—Transfer of lease requires written consent of Minister. (lease form 18).

#### British Columbia

(Does not include Amendments of 1918.)

(1)—Definite term lease plan adopted. (Water Act 1914, sec. 10).

(2)—Application Procedure. Written application giving preliminary data and sketch plans. Applicant must go before provincial water-board with general scheme in a widely advertised public hearing. On favorable report by the board, Minister may issue certificate of approval, after which Comptroller of Water Rights may issue authorization to make detail surveys. Certificate and authorization practically constitute final concession if no lapse on applicant's part. When final plans completed and approved, but not before again advertising and giving objectors a further opportunity of being heard, applicant gets conditional license authorizing him to construct works, and on satisfactory completion of works he gets final license. (Water Act 1914, Part V.).

(3)—Term of license may not exceed fifty years. (Sec. 10). Act silent on renewals, also on mode of terminating licensee's possession.

(4)—Act and regulations silent on whether renewals must be subject to laws and regulations then in force, although the inference from section 10 is that this is so, and that renewal licenses may include conditions entirely foreign to those of the original license.

(5)—Inspection during and after construction permitted. (Do. 41, 65, 117 (4)).

(6)—Act silent on compensation to be paid licensee if license terminated on expiry of term. Possibly under the general powers given the Minister by section 81, he might come to terms with licensee on this point and insert the governing terms in the certificate.

(7)—Annual rentals payable to the Crown. First during the survey-construction period rental made up by applying a charge of from fifty to ten cents per horse-power to the total horse-power capable of being developed. This rental is remitted if construction is completed according to contract. Its purpose is to insure development. Second, during the operation period rental made up by applying a per horse-power charge to the reasonable station out-put for preceding year, as estimated by the Minister. The board is to classify all plants in the province into several groups according to their respective natural and economic advantages, and is to fix the per horse-power charge for each group. This is to be done at least once every five years. (Regls. 1913, secs. 54-68).

Rentals regulations may be revised by Order in Council at any time, providing any particular licensee's rentals not changed oftener than once in three years. Minister may deal specially with paper and pulp companies. (Water Act 1914, secs. 66 & 67).

(8)—Licensee required to deliver and sell power up to capacity of his works on terms laid down by Board. (Do. 136 & 156).

(9)—Act silent regarding expropriation for the purpose of establishing more comprehensive development of the power resources of the stream at or near the site or for benefit of a municipality.

(10)—Act silent on power of Government to regulate stream flow or to construct and operate storage works in the interests of all power users and others. However, there is some control by the Government of storage by licensees, and of use of surplus in possession of one licensee by another on payment of pro-rated costs. (Secs. 122, 123, 156). Also general provisions insuring beneficial use, protecting logging and fishing operations, and providing against the obstruction of the stream. (Secs. 29, 35, 47).

(11)—Rates charged consumers must be approved by board after widely advertised public hearing. Approved schedule to remain effective for time fixed by board, but not longer than ten years. (Do. 159).

(12)—Cancellation Features. License subject to cancellation by board for waste or non-use or default in complying with terms. (Do. 18).

(13)—Act silent as to whether future laws and regulations apply to renewal lease, but the inference from section 10 is that this is so.

(14)—Transfer of license or undertaking connected therewith requires a special petition, a hearing, and an order of the Governor in Council; and transfer of license which involves separation from the undertaking for which it was granted would require the same procedure as an entirely new application under the Act. (Do. 14).

#### Quebec

(1)—Definite term lease plan employed, except for water-powers of 200 horse-power or less, or where special reasons for sale exist.

(2)—Application Procedure. Applicant files plan of river or lake, sketch plans of proposed works, states use to be made of power generated, and gives other general data. Minister of Lands and Forests, if he approves application, states conditions of lease or grant. The applicant is required to deposit a sum fixed by the Minister as a guarantee



of the fulfilment of his obligations. (Water Resources paper No. 16, page 326).

(3)—Term of lease twenty-five to ninety-nine years according to importance of water-power and capital required for development. (Do. p. 326).

(4)—Unless otherwise mentioned, which is the exception, property leased automatically reverts to the Crown on expiration, which is, therefore, free to renew or otherwise dispose of the water-power for future period. (File 8924-W).

(5)—Inspection permitted officers of the Crown at all times to ascertain if conditions of lease fulfilled or concerning the amount of power produced. Officers' reports final. Lessee must also twice each year submit a sworn statement of horse-power developed and how utilized. (Lease A, secs. 11 & 13).

(6)—Compensation on termination. As a rule the works are to revert to the Crown at the end of the term without compensation. But notwithstanding the general principle, in a few cases a clause has been inserted providing for the appraisal of the property by experts and the Government may be led through arbitration to indemnify to a certain extent the lessees for a certain class of works. (File 8924-W).

(7)—Annual Rental is made up of two factors. (a) A fixed sum payable from inception of lease varying according to size of development. In one case this factor was something over \$3,000.00. The object is to avoid speculative holdings. (b) An additional yearly charge of ten to thirty-five cents per horse-power developed, according to geographical and other advantages of site, this charge being payable from the time the power is produced.

Rental revisable every twenty-one years counting from signing of contract, but in case of disagreement is left to arbitration under provisions of code civil procedure. (File 8924-W).

(8)—Development up to the full capacity of plant is provided for. As a rule a minimum development is stipulated by the Government and it is approximately equal to 50% of the minimum or permanent power of the site. As a rule, also, the lessees are under obligation to supply their surplus power, on demand, to any corporation, company or person for such time and price as may be determined by the Quebec Public Utilities Commission. (Lease A sec. 9, and File 8924-W. Follow sec. 9, of lease form Quebec file).

(9)—The establishment of a more comprehensive development of site would apparently require coming to terms with lessee and, in case of non-agreement, special legislation.

(10)—Stream Regulation and Control. Leases now provide that Crown may collect extra royalty for surplus power developed by lessee from additional flowage caused by storage reservoirs constructed or acquired by the Crown. Quebec has undertaken the construction of large storage works and regulation of certain of its rivers, notably the St. Maurice, the St. Francois and the St. Anne. From the regulation of the St. Maurice alone it is estimated that the different falls and rapids that are to be found along the river including the developed emplacements have become capable of generating 1,000,000 permanent horse-powers, that is to say power available 365 days in the year.

There is already an assured revenue of \$130,000.00 obtained from three companies. (File 8924-W).

(11)—Revision of rates charged consumers. Apparently governed by general statutes relating to public utilities. No special provisions in leases except as indicated in five and eight above.

(12)—Cancellation Features. Sixty days after default lease may be cancelled by Order in Council without recourse to law, thirty days notice of intention being given lessee. Upon cancellation lessee forfeits deposit and all rights on lands leased. (Lease A, sec. 18).

(13)—Apparently there are no general regulations governing the disposal of water-powers, but lessees look to their individual leases to determine the extent of their rights and obligations besides which they must observe the ordinary federal and provincial laws respecting navigation and the use of water. (W.P. of Can. p. 150 and file 8924-W).

(14)—Transfer of lease requires assent of Lieutenant Governor in Council. (Lease A, sec. 12).

## FLOOD STRIKES CENTRES IN TWELVE DAYS

### But Does no Damage to Big Reinforced Concrete Truss Bridge Over Etobicoke River on Toronto-Hamilton Highway

WITHIN twelve days after the pouring of the arched top chords and the lower chords and hangers of the reinforced concrete truss bridge built across the Etobicoke River by the Toronto-Hamilton Highway Commission, a flood carried away part of the centering, yet no failure ensued, although it has always been the general practice to allow a month (and more in cold weather) to elapse before striking centres.

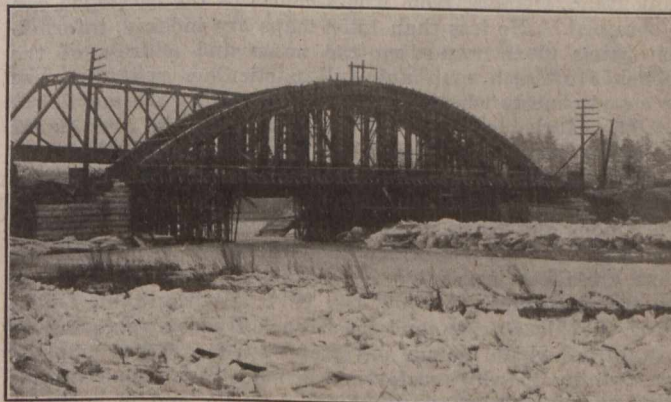
This bridge has a clear span of 122 ft. 7½ ins. and is probably one of the largest of its kind in Canada. It is one of four, all of similar design, along the route of the Toronto-Hamilton Highway, for which contracts were awarded about



DAMAGE TO TEMPORARY TRESTLE AND CENTERING UNDER NEW CONCRETE BRIDGE CROSSING ETOBICOKE RIVER

a year ago. Construction was started last summer but owing to labor shortage was not completed before cold weather. Shortly after completion of the bridge in December, ice 4 ins. thick formed a short distance upstream, the water under the bridge running clear. (The river is about 100 ft. wide, with a depth of 3 ft. at low water).

The weather moderated within a few days and the ice broke and jammed against the wooden trestle that had been built alongside the new bridge in order to carry the highway traffic during construction. About 40 ft. of the trestle was hurled against the falsework of the new bridge, leaving a gap of about 27 ft. in the centering, as shown by the accompanying illustrations.



FIELDS OF ICE PILED ON BANKS OF ETOBICOKE RIVER FOUR DAYS AFTER FLOOD HAD SUBSIDED

The trestle was rebuilt, but about three weeks ago was again carried away by flood. Then it was decided to remove the remainder of the falsework of the new bridge and to put the concrete structure into commission, levels were



taken under the direction of S. A. Cummingford, engineer of the Toronto-Hamilton Highway Commission, but no settlement or other indication of failure could be observed either before or after traffic was allowed over the bridge.

### ENGINEERING INSTITUTE'S ANNUAL MEETING

AT Ottawa this week the annual meeting of the Engineering Institute of Canada is being held. A formal meeting was called last month at Montreal in order to comply with the Institute's charter, which requires the annual meeting to be held at Montreal, and after a short session the meeting was adjourned to Ottawa.

The program called for a business session last Tuesday morning, to be followed by luncheon and addresses by the Duke of Devonshire; C. A. Adams, president of the American Institute of Electrical Engineers; and A. D. Flynn, secretary of Engineering Council.

The remainder of the program was as follows:—

Tuesday afternoon, business session, with the president's address at 4 p.m.

Tuesday evening, informal dinner and smoker.

Wednesday morning, completion of unfinished business. "Standards in Engineering," by Capt. R. J. Durley; "Soldiers' Re-establishment," by Major Anthes; "The Development and Future of Aviation in Canada," by M. R. Riddell, chief engineer, Canadian Aeroplanes, Ltd.; luncheon and address by Dr. Ira N. Hollis, representing the American Society of Mechanical Engineers.

Wednesday afternoon, "National Highways and Good Roads," by J. Duchastel, honorary president, Canadian Good Roads Association; "Frazil," by R. N. Wilson, chief engineer, Montreal Light, Heat & Power Co., Ltd.; "Standard Datum Planes in Canada," by W. Bell Dawson, superintendent of Tidal Survey, Department of Naval Service.

Wednesday evening, formal gathering, reception by President.

Thursday morning, topical discussion on the "Economics of Railway Electrification," opened by John Murphy, electrical engineer, Department of Railways and Canals; "Mining and Metallurgy of Cobalt Silver Ore," by Lt.-Col. R. W. Leonard, president, Coniagas Mines. Luncheon and short address by Hon. F. B. Carvell, Minister of Public Works, to be followed by a visit to the New Parliament Buildings.

Thursday, at 4.30 p.m., motion pictures, by B. E. Norrish.

### CANADIAN MAPS CATALOGUED

ALL maps of Canadian territory have been catalogued and indexed by the Geographic Board of Canada, Royal Bank Bldg., Ottawa, from whom copies of the catalogue can be obtained. No less than 1,258 maps are indexed, information being given regarding the name and address of the publisher of each map and full particulars regarding the scale and exactly what territory is covered by the map.

The catalogue is divided into five parts, the first, under the title "Dominion," containing all maps more than 400 miles in length or breadth. Provincial and other maps are divided between the other four parts of the catalogue.

Among the maps indexed are those of the Geological Topographical, Hydrographic and Military Surveys. Other maps are those issued by the British Admiralty, the U. S. Coast and Geodetic Survey, the U. S. Hydrographic Office, the U. S. Lake Survey, and the French Hydrographique Surveys, all of which include parts of Canada. Other maps of this country to which reference is made, are found in bulletins or journals of geographical societies and in books of travel and exploration.

R. Ewart Cleaton, president of the Cleaton Co. (Canada) Ltd., presented a moving picture "Coal is King" last Saturday evening before the Sault Ste. Marie branch of the Engineering Institute of Canada.

### SALARIES OF CIVIL SERVICE ENGINEERS

IN an effort to get better recognition of the monetary value of services rendered by engineers in government employ, the Engineering Institute of Canada has appointed a committee to meet with the Civil Service Commission for the purpose of discussing salaries of engineers appointed by the Commission. W. F. Tye is chairman of the committee and the other members are past-president H. H. Vaughan and president R. W. Leonard. It is expected that an increase will be accorded to engineers in the Civil Service in the reclassification soon to be made by the Commission, and the committee of the Institute wish to make certain that the increase will be a substantial one, in keeping with the real value of the services rendered.

#### ARTICLE IN "CANADIAN ENGINEER" FINANCES STRATFORD'S WATER WORKS IMPROVEMENTS

IN a pamphlet issued by the Stratford, (Ont.) Public Utility Commission, the story is told of how an article published in *The Canadian Engineer* enabled the Commission to finance extensive improvements to the city's water works without asking the taxpayers for a cent.

Stratford's raw water supply was fearfully polluted. An entire change of supply was desired. Over \$15,000 was considered necessary to pay for the desired improvements, after considerable difficulty, approval was secured of a \$12,000 expenditure and a by-law was prepared to be submitted to the people.

But here is how the story is told in the Commission's pamphlet:—

"The Canadian Engineer, in writing up an article on the changes, mentioned that the filters would not be needed. (These were six old filters, which the pamphlet says would have been nothing but scrap but for the circumstances here related). This notice brought an inquiry from a Toronto engineering firm for a price on three of the filters and an offer was accepted for these at \$7,600. The other bank of three was sold later (to the same firm) for \$12,000 . . . . The by-law passed by the city council has been cancelled and the authority to spend \$12,000 has not been acted upon."

From the sale of the old filters \$19,600 was realized. The improvements to the supply, which made filtration unnecessary and which also resulted in the total elimination of typhoid in Stratford, cost \$18,621.

Another Canadian town needed filters in a hurry. On account of the war and steel shortage, the desired delivery could not be obtained at the time. The town's engineers were—and are—readers of *The Canadian Engineer*. The town got its filters without delay; Stratford got its improvements without expense.

Just one little example of just one phase of the constant usefulness of *The Canadian Engineer* to the engineering industry and to the whole community.

Messrs. Mussels Limited, of Montreal are re-opening their branch office in Toronto. This will be in charge of Mr. Chester F. England and will be located at room 546 Confederation Life Building, 17 Queen St. East. Mr. England was formerly connected with Mr. A. C. Douglas on the wheel pit and tunnel contracts for the Electrical Development Co. and the Ontario Power Co. Following that, he was connected with Cairnie & St. George, Ltd., road contractors, and has latterly been identified with the Foundation Company.



## CREATING OPPORTUNITIES FOR EMPLOYMENT

**T**HAT the Dominion government is alive to the necessity for providing employment opportunities, and stands prepared to assist in every way possible, is the assurance given by H. J. Daly, Director of Repatriation, Ottawa.

"If corporations and private citizens will join in this feature of repatriation work," says Mr. Daly, "Canada should have little difficulty with the unemployment problem. Besides helping to distribute employment through a chain of employment offices, the government has developed plans to create opportunities for employment. Briefly, these plans cover the following phases:—

### Public Works

"During the war, many important public works have been held up. The Minister of Public Works has his plans and preparations made to proceed with the more necessary of these in the near future. The Repatriation Committee has also been in touch with provincial governments and municipalities, with a view to impressing upon them the necessity for similar action. The building and public works program now in sight will provide employment for many returned soldiers and war-workers.

### Railways

"During the past four years, a great deal of work necessary to keep our railways up to standard has been postponed. Some millions of dollars must be expended on improving road-bed, constructing bridges, buildings and other improvements. Vast quantities of ties are being got out this winter. Equipment of various kinds must be secured. The Minister of Railways states that as soon as weather conditions will permit, some thousands of men will be absorbed in various railway undertakings. The supplies and materials required will also provide employment.

### Shipbuilding

"The shipbuilding program arranged for by the government will provide employment for many men during 1919. It is expected that arrangements will be completed to keep the shipbuilding yards in active operation throughout the year. The government recognizes that this ship construction is one of the best means of providing suitable employment for many skilled and other workers.

### Export Trade

"The government has established a Canadian Trade Commission. This commission has an office in Canada and a 'trade mission' overseas. Through this trade mission it is anticipated that Canada will secure an important share in the business of providing materials and manufactured products required for reconstruction work in Europe. A short time may be required before final details are completed and definite results are announced. The business so secured will be distributed through the regular channels of trade and thus afford extra opportunities for employment.

### Housing

"The government has set aside the large sum of \$25,000,000 to be loaned through the provinces in order to encourage the building of workmen's houses. When the season for building arrives, this work should give employment to many hundreds of men both in construction work and in the supply of materials.

### Land Settlement and Highways

"The government, as already explained in a former announcement, has developed plans to help soldiers to become farmers, providing land, granting loans and giving training and supervision where necessary. It is expected that a large number of returning soldiers will take advantage of these opportunities. The scheme will involve the expenditure of some millions of dollars, a good deal of which will find its way into building materials, supplies, machinery, etc., all of which will assist in providing employment.

"The government now has under consideration the question of joining the provincial governments in financing the

construction of public highways. Should a favorable decision be reached, a large field for employment opportunities will be opened up. Regardless of federal action, provincial governments are preparing their own road-making programs."

[NOTE.—Since the above was written, the government has decided favorably in regard to extending federal aid for highways construction, and will probably vote \$25,000,000 for that purpose, to which the provinces will likely have to add \$37,500,000.—EDITOR.]

## DEVELOPMENT OF WATER POWERS

**U**NDER the above title, the "Toronto Globe," in its issue for February 6th, prints the following editorial:—

"One lesson from the war is that Canada should develop at once all water powers that may be used profitably. The demands for munition-making showed how small is the margin of available power of all kinds over everyday requirements. The shortage of coal will certainly increase from year to year, making it necessary to utilize more and more the other source of power so lavishly placed at our disposal by nature.

"The Globe has frequently called attention to the necessity of utilizing the millions of horsepower running to waste along the St. Lawrence. It can be accomplished only by redesigning our system of canals, and this very question is now involved in the movement by the States and cities of the United States bordering on the Great Lakes to make their ports available for ocean-going ships.

"A deputation has gone to Washington to ask that the matter be referred to the Joint International Commission on Waterways, and unfortunately Ontario, the province chiefly interested, is not represented on the Canadian section of that Commission.

"In order to permit ocean-going vessels to reach the Great Lakes it will be necessary to enlarge and improve the St. Lawrence canals, and this will be the opportunity to put into operation a comprehensive plan to utilize every foot of water available for power purposes.

"The United States Senate has suddenly wakened up to the fact that a bill for the development of water powers on a large scale was passed eight years ago, but was held up for a conference between the two Houses and has been forgotten. The conference, however, will meet this week, and it is expected that an agreement will be reached and that the bill will become law.

"It is now eight years since a single permit has been granted for water power development on any navigable stream in the United States, which is equivalent to saying that in spacious sections of the country where coal is scarce or non-existent industrial development has been checked for that period. But the wakening of the Senate will undoubtedly lead to great developments.

"According to Senator Jones, the enactment of legislation on this subject will put 100,000 men at work in construction, will add tremendously to the industrial power of the country, 'will incidentally result in the irrigation of immense tracts of arid land, and within one year after the passage of the Act projects involving the investment of \$350,000,000 by private capital and designed to develop 2,000,000 hydro-electric horsepower will be under way. The plants using this power will give employment to 500,000 persons.'

"The demand for power and the situation created by the aspirations of the lake cities to become seaports should stimulate our own government to prepare plans for the development of our St. Lawrence water powers."

Canada has storage capacity for approximately 180,000,000 bushels of grain, according to an official statement issued by A. E. Boyle, secretary of the Winnipeg board of trade. The grain storage capacity in the Dominion has been increased by 1,500 per cent. in the past 20 years. The storage capacity last year was increased by 13,000,000 bushels. In 1917 the total storage was 163,144,000.



## TAKING A CHANCE WITH AN UNSAFE WATER SUPPLY PROVES COSTLY

**I**MPERFECT disinfection of a portion of the public water supply of Xenia, Ohio, was responsible for the outbreak of 44 cases of typhoid fever in that city during the last few days of August and the first half of September, 1918, according to investigations made by representatives of the Ohio State Department of Health, as reported in the Ohio Public Health Journal. The fault, it was found, lay with a defective supply of bleaching powder used as a disinfecting agent.

### Typical Water Borne Typhoid

All epidemiological evidence disclosed by the investigation pointed to the water supply as the source of infection. Cases were widely distributed over the city and city water was used at home by all but one patient, who used it only at her place of business. A study of the occupations of the patients revealed no similarity in this regard. Milk, ice cream and fresh vegetables were used in varying quantities and obtained from many sources. None of the patients had eaten any raw shellfish recently before falling ill. No public gatherings had been attended by patients recently enough to be suspected as sources of infection. Contact infection as an important cause is ruled out by the facts that only eleven patients resided in homes where other cases developed either before or after the case in question and that only two households had as many as three cases each.

### Public Water Supply Privately Owned

The Xenia water supply is furnished by a private company. It is derived from two sources—a system of drilled wells southwest of the city and a combined surface and ground water supply obtained from reservoirs, springs and dug wells north of the city. The surface and ground water supply was installed in 1887 and remained in use after the drilled wells were installed in 1896, because the latter source was insufficient to supply the city.

Water from the drilled wells has always appeared satisfactory from a sanitary standpoint. That pumped from the station north of the city has been shown at several times to be unsatisfactory, in consequence of which a hypochlorite disinfection plant was installed in 1914. On the average two-thirds of the city's water comes from the drilled-well source and one-third from the disinfected supply, the amount pumped from the drilled wells becoming relatively smaller in dry weather. This variation makes it impossible to determine just what part of the city is being supplied from each source at a given time, but the presence of a large amount of iron in the drilled-well water makes a reasonable degree of differentiation possible.

### Hypo Below Guaranteed Strength

Disinfection of the water at the north pumping station had been carefully conducted, according to the report of the Department investigators, who found that bleaching powder had been added in definite, prescribed quantities for 2½ years. Analysis of water samples collected in the city, however, demonstrated that the water from this station was of doubtful and unsatisfactory quality, while that from the other station was satisfactory. This led to an analysis of the bleaching powder, which was found to be of one-fifth guaranteed strength.

### Liquid Chlorine Recommended

"Since this substance was guaranteed to be of proper strength," says the report of the investigation, "it follows that the undertreatment of the city water was purely accidental; nevertheless, it is significant that such a possibility always exists when disinfection of a public water supply is necessary to render it safe for domestic use. In order to avoid the recurrence of a polluted water being supplied the consumers at Xenia, the water company should abandon the existing supply at the Springfield Pike station (the surface and ground water source) and procure water of satisfactory sanitary quality from another source. In the meanwhile it is advisable that the company abandon its hypochlorite method of disinfection and employ the more dependable and up-to-date method of using liquid chlorine."

## CANADIAN PACIFIC CONSTRUCTION SCHEME

**D.** C. COLEMAN, western vice-president of the Canadian Pacific Railway, who has been at Montreal in connection with the betterments appropriations for the year, has given out the following statement as to the programme of the company:—

"The company will continue to follow the policy of making timely and prudent provision for the continually expanding traffic in western Canada, and for the maintenance of the property in the best possible condition.

"At Vancouver, the construction of a new ocean pier will be undertaken, and the necessary studies are now being made. When these are completed, the work of dredging and filling will be started immediately.

"New station building will be erected at Harding, Marchwell, Schwitzer, Rutland and Dafoe.

"The engine-houses at Weyburn, Moose Jaw and Cranbrook will be extended and the engine-house at Sirdar, B.C., will be rebuilt.

"The interior of the station at Medicine Hat will be remodelled with a view to securing better accommodation for the public.

"Coaling plants will be built at Raith, Ont., and North Bend, B.C.

### Trackage Extensions

"Additional trackage for handling train movements will be provided at High Bluff, Rosser, Fusilier, Stephen, Melita and Rosetown, and extensions made to terminal trackage at Portage la Prairie, Revelstoke and Vancouver.

"Locomotive boiler washout plants of the most modern design will be installed at Medicine Hat and Revelstoke.

"To accommodate the largest type of locomotives, new turntables will be installed at Moose Jaw, Field and Revelstoke.

"The work of lining the Connaught tunnel with concrete will be continued.

"An additional transfer barge will be built for Okanagan Lake, and an additional car slip provided.

"A permanent concrete floor will be placed in the stock yards at Fort William, and improvements also made in the stock yards at Moose Jaw.

### Bridge Work

"The work to be done on bridges will be most extensive. The most interesting work of this nature to be undertaken will be the replacement of the bridge over the Assiniboine, at St. James, and the filling of the great structures over Scissors Creek and Bear Creek on the Neudorf line, and the large bridge over the Battle River at Hardisty.

"At Winnipeg station the temporary wooden platforms in the train shed, which were put into service until the fill had reached its permanent location, will now be replaced with permanent mastic platforms.

"The station at Moose Jaw having proved inadequate for the traffic handled there, plans are now in preparation for a new building and the work will be undertaken this year. At Regina additional paving will be done in the local yards to permit more convenient teaming of freight, and there will be improvements made in the ash pit facilities to provide for the more prompt handling of locomotives.

"The usual generous provision is made for ballasting, steel replacements and improvements to the roadbed.

"Notice has been given that the railway will apply for an act in parliament enabling it to build six branch lines in Saskatchewan and one in Alberta. The latter is to be from Duchess northward. The Saskatchewan extensions are as follows:—From Archive to Wymark, from Fortune southeast for eighty miles, from Lenigan to Cumberland House, from Leader to Big Stick Lake, from its Weyburn-Sterling branch southwesterly, and from its Manitou Lake branch northwesterly to Whitford Lake. From other notices presented to the government it is evident that numerous branch lines are to be built in the west this coming summer. Applicants to parliament include the Western Dominion Railway Company, the Athabasca and Grande Prairie Railway Company, and the Northwest Route, Limited."



## TOWN PLANNING\*

By THOMAS ADAMS

*Town Planning Adviser, Commission of Conservation*

IN preparing development schemes for cities, towns, rural districts and regional areas, we simply exercise foresight, common sense and business judgment in regard to all questions relating to civic growth and civic welfare. The first question to be considered in the planning of any kind of area is the question of its industry—using the word in the broad sense as representing the whole of its productive, industrial and commercial undertakings. Industry is the condition of community's being. Health, convenience, beauty, are the conditions of its well-being. The being of the city depends upon the units of its industrial organization which provide the necessities of life, food and clothing, shelter and social intercourse, to the community—to society in its different grades and forms. A city can exist only so long as it has the means of securing these necessities, even if it has not health, convenience and beauty.

## Well-Being As Distinguished From Being

But in modern life and in the large conglomerations of population which we call cities, we cannot merely exist; we must have facilities for enjoying those things which represent the well-being of the city. These things are health of mind and body—promoted by good housing, by educational facilities, by park systems and other things which contribute to the building up of physique and mental faculty. Secondly, in addition to health of body and mind, there is the question of convenience, including adequate means of transportation; co-operation between separate industries—in the matter of securing convenient distribution of the products; suitable opportunities for making the best of and getting the cheapest power; facilities for providing healthy housing for those who, after all, in their labor, provide the chief raw material of industry. Thirdly, there is the question of beauty or agreeableness in connection with the building up of the city; beauty and refinement in the home, beauty and refinement in the home of the poor as well as in the home of the rich—beauty and refinement in the public place, in the boulevard and in the civic centre. These things represent the coping stone of the city structure, but at the foundation we have the industrial organization and next the healthy home in which the unit of the city, the family, has to live.

Now, this question is no mere city question. It is not even a national question. It is a nation-wide question, affecting every organized community, whether city or town or village. One of the first things to consider is the radial lines of communication by road and rail, and the means of connection between those radial lines so as to distribute traffic to the best advantage. There is a constant inflow of rural population into cities and towns from the rural districts, and the future prosperity of the cities and towns depends upon maintaining a healthy and vigorous race in the rural territory of the state. Then from the provincial standpoint we have to consider that the stimulation of agricultural production would be assisted by good roads—by better communication between the farms and the cities—such means of communication as would help to keep people from leaving the land, a vastly more important thing than taking people "back to the land."

The question of planning—as distinct from re-planning—is of great importance in the small towns, or in the suburbs of cities, where the bad development always begins, more so than in the large cities, where the bad development is established.

Where is it that the bad development is beginning in most cities in Quebec? The worst development, the most unsanitary, is beginning just over the borders of the towns and cities, in the rural areas, because the towns and cities have no control of that new development. And yet it is precisely that new development which can be most easily controlled by simple regulation, without any cost to the com-

munity. Why do we fail to exercise that control? Perhaps we assume that to do so would be injurious to the real estate business; or that the fact of the real estate operator being less public-spirited than he should be, stands in the way. On that point I will mention one illustration which will show that it is not the lack of public spirit on the part of either the city authorities or the real estate men, but simply the lack of initiative and legal power on the part of the former that presents the chief difficulty.

## The Example of Renfrew

In Renfrew, Ont., two new factories were recently erected. These factories brought a large number of working people to Renfrew. As a result, some real estate companies started to subdivide lots all around one side of the town. The town council of Renfrew consulted me, and as a result we had a skeleton plan prepared for their main arterial highways, and they sent the real estate subdivisions for my inspection. The men who were subdividing that land met the advisers of the council and discussed these subdivisions. Instead of having the roads all the same width, we asked for a road 100 ft. wide intersecting the subdivided property to form a boulevard connecting up the different radial thoroughfares of the town. Secondly, we wanted some open space for the people, so that they could enjoy the privilege of having recreation facilities near their homes. Thirdly, we wanted sites reserved for public buildings; also a ravine and the banks of a creek, to be given to the council, partly for public enjoyment and partly to provide land in the best position for laying a main sewer.

They discussed the whole matter with the real estate men; they looked at it from their point of view. They saw the advantages from the point of view of the public. They both agreed, in the end, on everything that was suggested for the public benefit, without involving any immediate cost to the community and to the entire satisfaction of the owners of the real estate. The only obligation entailing ultimate cost which the council entered into, was to build a bridge over a ravine and to maintain the open spaces in a proper manner when they entered into possession of them.

In that small town of about 5,000 inhabitants, they obtained a 100-foot road around the north side of the town, running in part along the top of a ravine, where they wanted it. They persuaded one owner to give the ravine, because it was of no use as building land and he saw that if he gave it before he made his subdivision, it would make the balance of his property more valuable. They obtained the reservation of sites for schools and public buildings, and protected both banks of a creek running through one of the properties. Because that town council had the foresight to say to the real estate men exactly what they wanted, they found that they could get everything that they required. All the objects were accomplished by co-operation—but by co-operation initiated by the local authority.

If in the case of Renfrew, the council had waited five years, or even one year, until that land was developed, it would have had to pay thousands of dollars for the land for open spaces, and would not have got its main arteries at all.

## The Real Housing Problem

The housing of the great bulk of the people who cannot afford to live in expensive dwellings and select suburbs, together with the planning of manufacturing, business and working class suburbs, constitute the real problem.

The main factors in promoting industry—if it has not been found out before, it has been found out in the last three years, in connection with war and other things,—the main factors are the factors of the nerve power, the capacity for concentration, the physical endurance of the workman. These are becoming more and more important. Those who have been into a modern machine shop or factory, know that skill does not count for everything; a man has to have that power of nerve and endurance which will enable him to concentrate on his work from morning to night, in order to be an efficient instrument of labor. And those things that are most valuable to the manufacturer are the very things that we are destroying by bad housing conditions in some

\*Excerpt from article in the "South Shore Board of Trade Review."



parts of our great cities. They are surely the very things that we need most to conserve during and after the war.

#### Sense of Proportion Needed

Reference has been made to the main requirements of a city, outside of its industries—as health, convenience and beauty. These three things are desirable to secure the well-being of the city, but even they should not be purchased at too great a cost. There must be some sense of proportion.

We can purchase beauty at the cost of health and convenience. It is the duty of the town planner to exercise proper judgment and a due regard to the inter-relationship of these things. He must co-ordinate them, so that industry will not suffer from extravagance in procuring beauty, so that health will not suffer by too elaborate adornment obtained at excessive cost to the taxpayer, and so that convenience will not suffer unduly for purely aesthetic reasons. You must deal with the city not as regards its public highways or park systems alone, but as a comprehensive organization, which must first be looked at with regard to its industrial enterprises, its health, and cleanliness, and then with regard to the beauty of its buildings and natural surroundings. And that question of taking a broad perspective of these matters and considering their relation to one another, is the one that most needs emphasis. To accomplish it properly you must have expert advice and the co-operation of the province with the city, town and village.

#### The Problems of Growth

In the big cities, we have two problems of growth or development. One is new development in the suburbs, the other is the change in the character of past development. The latter represents the transition stage of development in the old centres—such as is taking place in the older parts of Montreal. Business districts are changing; residential districts are being transformed into manufacturing districts. The town planner who knows his business tries to direct changes and also tendencies to change, in old centres, so as to improve and re-model old conditions as well as to prepare plans to deal with new conditions. He has got to apply his judgment and skill to control these changes in the public interest, and to select the best time for doing it economically and effectively.

While there is only a limited amount that can be done in reconstruction schemes, there is an enormous field of effort and unlimited scope for enterprise open to city authorities in directing new tendencies, so that the city will, in every change it makes, be under the guidance of proper expert advice, so that every available opportunity will be taken to improve its main arteries at the right time. In an English city, it cost at the rate of \$4,000,000 per mile to widen a street in the centre of the city. It will cost about \$4 or \$5 per acre to get the full width required for a radial thoroughfare in the open suburbs of the same city, under a proper town planning scheme; \$4,000,000 a mile to correct an evil; \$4 an acre to prevent its creation! Once we allow a large number of people to have vested interests in congested development, the result is that we cannot remove the congestion except at enormous expense; whereas, by planning beforehand we can get all you require at small cost.

#### Width of Streets

The average man is apt to assume that if a street is 60 or 66 ft. wide, nobody can be harmed and that after all 60 or 66 ft. of width is necessary for the purpose of securing air space. Well, the tremendous cost of the taxpayer of insisting on a minimum street width of 66 ft. is apparently never inquired into or understood. Say we accept 66 ft. as the average width that every street should be. If it is right for the average, it is too wide for residential neighborhoods. If it is right for the average, it is too narrow for main arteries.

Now, what does that mean? It means that if we have a minimum width of 60 or 66 ft., our residential roads are wider than they need be, a greater cost is imposed upon the taxpayers than need be, and we have on the other hand to pay out of the general fund for any increase over 66 ft. required for our main arteries.

Would it not be more sensible to plan our cities and secure our main arteries without any increased cost to the community, by an arrangement with real estate owners? For short roads, leading to private residences, comparatively narrow carriage drives should be permitted and the surplus land from those streets should be transferred to the main arterial thoroughfares. No working man can afford the expense of paying local improvement taxes for paving a boulevard 33 ft.—that is, half the width of 66 ft.—of laying down a durable sidewalk and putting in the sewer and water main and other things, and at the same time pay for the cost of a decent home. The result of the present system is that he has often to pay so much for street that he has to cut down the sanitary provisions for his home; we make him suffer in his home in order that he may have a street of unnecessary width.

Let us keep the question of air space separate from the question of street width. A street is for traffic. If we have our manufacturing districts and if we zone our cities—as we should do—so that our manufacturing industries are arranged in one part of the city, and another is devoted to residential purposes, we can save money by confining heavy streets to our manufacturing district and having light streets in our residential district. We can have narrow streets, 30 ft. wide, or even 24 ft. wide in areas restricted for residences. People do not want motor traffic going past their private houses; they do not want their gardens spoiled by dust; they want the privacy of a quiet, residential road, away from the main thoroughfares. If we properly plan new development, we can get our main arteries without an additional burden on the community, merely by an interchange of facilities with those who own real estate—by a give and take arrangement with the owners. We can get our average width of 60 or 66 ft. for all our business and principal traffic streets; and we can have our private carriage drives constructed at comparatively small cost in our residential neighborhoods.

#### Question of Air Space

But what about air space? That is a separate question. Air space should be secured by limiting the width between the buildings erected on the opposite sides of a street and restricting the area that can be built over on each lot. If we erect a home, why should we not provide the necessary air space for our home? Why should we have to make costly asphalt road surfaces under our air space? Even if we only pave a narrow strip in the centre of your wide streets, remember that the construction and proper maintenance of a grass surface in a public street is nearly as expensive as pavement. Why not provide the air space over our gardens? We are told that town planning means spending more money. It certainly means spending money more wisely; but it means, above all, saving money now being wasted on the wrong things.

Town planning means the control of the land. To secure that control we must either purchase the land or regulate its use. The latter is the most practicable in this country—and is also likely to be the most popular. Henry George said, and everyone will agree with him on this point, whether single-taxer or not, that what we call land values do not constitute wealth. Land values merely represent the amount of money that you or I are prepared to pay somebody else for the right to occupy certain land in the city. We do not create wealth by increasing land values, we merely transfer money from the pockets of one group of citizens to the pockets of another group. Now, let us equalize our land values more by city planning.

We must spread our cities out more evenly so that the aggregate value will not be less, so that more of those who own the land and pay taxes on its building value will get some of the benefit from the development and so that we will get healthy conditions and room for expansion. In residential suburbs the tendency is to make development much too scattered and to add enormously to the cost of making streets and providing public services and utilities. Canadian cities need to spread out their business districts and to close up their struggling residential districts. They can do a great deal by city planning legislation to secure both objects.



MEMORANDA OF OFFICE RECORDS\*

BY ALLAN W. CUDEBACK  
 Engineer and Superintendent, Passaic Water Co.,  
 Paterson, N.J.

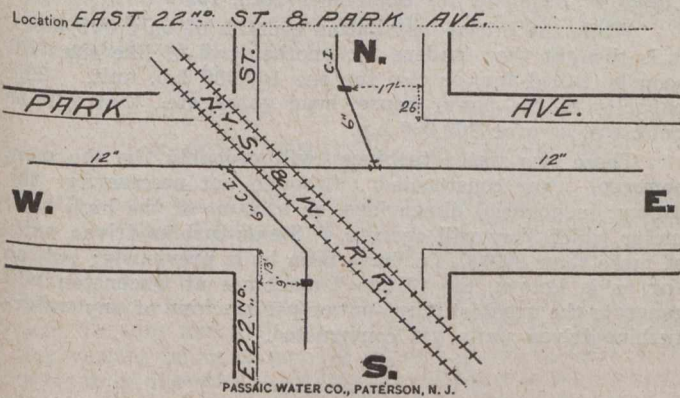
THE office records of the location of service pipes, valves, hydrants and distribution mains of the Passaic Water Co. are about as simple as can be devised, consistent with giving the information necessary and useful for the proper recording of such structures.

Service Pipes

Service pipes are given a serial number, which is also the number that goes with the account, and these numbers have been running continuously from "one" up since the business was started. Where there are several services pipes supplying one property which comes under one account, they have the same number.

The accounts are indexed on the ledger cards under the street number and name of the person paying the water rent.

The record of the service is entered on a No. 9518 Library Bureau card, which is practically 3 by 5 inches in size. The front of this card shows the serial number; street number; name; size of tap in main; size of service pipe; size of main; and gives a measurement of the location of the corporation cock, which refers to the lot line, the building or curb line. It has the date on which the connection was made;



REVERSE OF VALVE RECORD CARD

the kind of material; and the name of the foreman putting it in; whether there is a curb shut-off and how far laid.

The reverse side of this card has printed upon it a diagram of a city block with streets on four sides of it, on which is made a sketch of the property, indicating the building; the main in the street; and the service pipe. On this the reference measurements are entered again, showing to what point they refer. The four streets bounding the block are named so the property can be definitely located.

If the service pipe is renewed at any time, the detail of the renewal is entered upon the card, or, if necessary, a new card is made, giving the additional information required by the change.

When a service pipe is abandoned for any reason and is not at that time replaced with another service, the number formerly applying to that service is used for some other service, thus avoiding a lot of dead numbers.

It is very easy to get the proper information for entering on this card, because the company lays its own service pipes and has been doing so for the past twenty years. Where private plumbers are allowed to make service pipe connections, proper cards should be furnished them, on which to record the information desired to be kept for reporting to the water office.

For the purpose of recording the location of services not on rectangular blocks, cards are used with the reverse side

\*Read at the St. Louis Convention of the American Water Works Association.

blank, in order that a sketch showing the exact conditions may be made.

Valves

Valve cards are exactly the same size as the service pipe cards. The front of the card in this case, however, shows the sketch, which has four blocks with two streets between. The pipes are sketched in the streets in both directions. The cardinal points are marked with a rubber stamp. The location of the valve is indicated, and the measurements, refer-

Size 6" Location EAST 22<sup>ND</sup> ST. S. OF PARK AVE. No. 1852  
 13 ft. in S. from the S. Curb of PARK AVE. St.  
 9 ft. in E. from the W. Curb of EAST 22<sup>ND</sup> St.

Size 6" Location EAST 22<sup>ND</sup> ST. N. OF PARK AVE. No. 1853  
 26 ft. in N. from the N. Curb of PARK AVE. St.  
 17 ft. in W. from the E. Curb of EAST 22<sup>ND</sup> St.

Size..... Location..... No.....  
 .....ft. in..... from the..... Curb of..... St.  
 .....ft. in..... from the..... Curb of..... St.

Size..... Location..... No.....  
 .....ft. in..... from the..... Curb of..... St.  
 .....ft. in..... from the..... Curb of..... St.

FRONT OF VALVE RECORD CARD

ring in almost all cases to the curb, are entered on the sketch. The names of the streets are marked.

The cards are indexed according to streets and run consecutively in one direction on the street. They are cross-indexed by entering a card for the cross street on which is put only the name of the street. On the reverse side are printed locations for four valves.

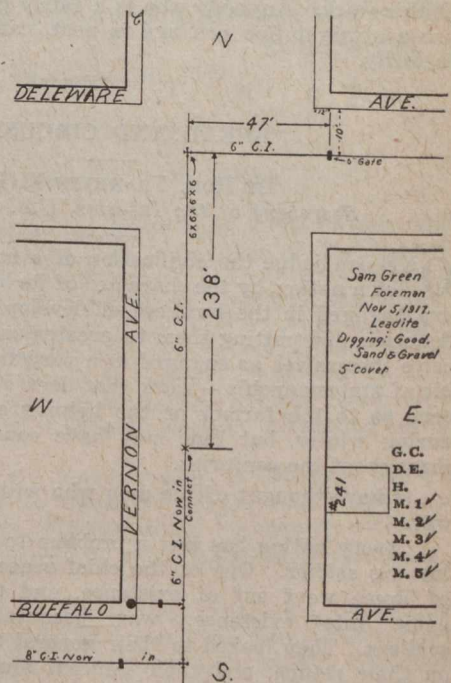
Locations are made by giving the distance north, east, south or west, from the curb lines.

As in the service pipe cards, for special locations, blank cards are provided on which the sketch can be made.

Valves are also given a number, which number is consecutive with their installation.

Hydrants

No special card is used for hydrants. The record of the hydrant is kept in a book, which gives the serial number of the hydrant; the street on which the hydrant is located, the street on which the hydrant faces being mentioned first; the date it was installed; make of the hydrant; and the water pressure; also whether the hydrant is gated or not. A card index is kept of this book by street intersections so that the book can be readily referred to.



PAGE FROM DISTRIBUTION FIELD BOOK

Distribution Mains

A field book with pages 5 by 7 1/2 inches is kept of all distribution main installations. This book is of the ordinary size used by engineers for notes, and is ruled in small squares.



The necessary information for this book is sketched in pencil when the installation is made. A complete sketch is made showing the street lines; location of pipe with reference to these lines and proper measurements; location of valves, hydrants, branches and specials is also indicated; dead ends; kind of material used; name of foreman making the installation; character of the digging; and depth to which pipe is laid.

There also appears on this page a symbol which shows, when checked, that the information given here has been recorded in its proper place; for example:—

G. C. means gate card, and when checked that the information has been placed on the proper card and filed.

D. E. means dead end, that the proper record has been made of the dead end on cards kept for this purpose.

H. means hydrant, and that it has been recorded in the proper hydrant book.

M. 1, M. 2, M. 3, M. 4, and M. 5 indicate that the information on this page has been recorded on Maps 1, 2, 3, 4, and 5. These maps are large maps on a scale of 400 ft. to the inch, which show the entire distribution system, with location of hydrants, valves and street mains indicated according to the nomenclature adopted. Maps of this kind are kept in various convenient places for reference, as in the working office and in the office of the superintendent and engineering department.

The book is indexed by streets with reference to the book number and page number on which the original sketch appears, and kept properly filed. No other detail record of main locations is kept. It has been found that all the records necessary or desirable can be kept in this way. As much or as little detail as desired can be entered in this book.

None of the records, either in the books or on cards, is drawn to scale.

Maps showing the distribution system as a whole, are usually made with the width of the streets exaggerated so that the piping system stands out as the main feature on the map. It does not take an expert draftsman to do any of this work. Anybody who is a fairly good letterer and can use a straight line pen and is neat, can do the work satisfactorily.

### "BREAD AND CIRCUSES"\*

BY HON. FRANKLIN K. LANE  
*Secretary of the Interior, U.S. Government*

ONE can judge the civilization of a nation, or of any part of a nation, by the character of its highways. Those who are engaged in the business of developing the highways of America, and putting them to greater use, may properly conceive themselves as engaged in a very far-sighted, important bit of statesmanship,—work that does not have its only concern as to the farmer or the helping of freight movement during winter, but that may have consequences extending throughout the centuries.

I have thought of the men who will come back from the war.

Every nation has had a problem to deal with in the returning soldier. One of the chief reasons why the republic of Rome went out of existence, and the empire of Rome came into existence, was because of the returned soldiers. They looked to their general to take care of them on their return, and their general found that the way to take care of them was to give them, as they said in those days, "bread and circuses."

So they reached over into Egypt, got the great wheat supply of that country, and provided the great circuses that are historical, for the amusement of the people.

Now that our men are beginning to come back, we ought to be able to say to these men:—

"Here is something that you can do at once. If your old position is not vacant, if you cannot go home to the old place and take up the work that you were in, then the government, in its wisdom, has provided something which you can do at wages upon which you can live well."

\*Abstract of article in the "Highway Magazine."

### CONTRACT FOR "HYDRO" TURBINES

Awarded to Wellman-Seaver-Morgan Co., of Cleveland, Ohio—Two Units in Initial Installation—Most Powerful Water Turbines Ever Built

ANNOUNCEMENT is made by F. A. Gaby, chief engineer of the Hydro-Electric Power Commission of Ontario, of the award to the Wellman-Seaver-Morgan Co., of Cleveland, Ohio, of contract for the construction of two vertical water turbines (each capable of delivering 52,500 h.p. at the generator coupling) and their erection in the proposed powerhouse at Queenston.

Two other tenders are known to have been received by the "Hydro," namely those from the Allis-Chalmers Co. and I. P. Morris Co., of Philadelphia. It is rumored that the Allis-Chalmers tender was high, but that both the Wellman-Seaver-Morgan tender and that of the I. P. Morris Co. were in the neighborhood of \$250,000 per machine, and the final decision was made entirely upon relative advantages in design.

Exclusive announcement was made in last week's issue of *The Canadian Engineer* that the Canadian Westinghouse Co. had secured the contract for the two generators for these units, and that the turbine contract would soon be awarded to either Wellman-Seaver-Morgan Co. or I. P. Morris Co.

A resumé of the turbine specifications appeared in *The Canadian Engineer* for September 26th, 1918.

While the initial installation consists of only two units, it is thought that tenders for another two of like size will soon be called for, or else for one 100,000 h.p. unit. The capacity of the powerhouse, head gates, etc., that will be built will be over 300,000 h.p.

These two water turbines will probably be the most powerful ever constructed, although not necessarily the largest in physical dimensions, on account of the high head under which they will operate. Steam-turbine-driven units of more than 50,000 h.p. have been built previously; but, so far as is known, the "Hydro" machines at Queenston will generate the greatest horse-power per machine of any water-turbine-driven units yet constructed.

New Brunswick sold \$450,000 bonds last week, the money to be spent in connection with the construction of the Valley Railway.

The construction of the dry dock at St. John, N.B., is being pushed by the St. John Dry Dock and Shipbuilding Co., who took over the contract of Norton, Griffiths & Co., Ltd. It is expected that the government will soon take up the completion of the piers on the west side of the harbor, upon which work was suspended during the war. The government has promised to proceed with the extension of the breakwater to Partridge Island.

The R. E. Cleaton Co., of Montreal, has been reorganized as Cleaton Company (Canada) Ltd., with R. Ewart Cleaton as president and F. W. Pennock, general manager. The firm will have a construction equipment department and mechanical equipment department, the latter department representing Diamond soot blowers, American steam ash conveyors, Precision boiler-room instruments and Ideal commutator resurfacers. The construction equipment department represents the Wyoming Shovel Works, of Wyoming, Pa., and the Cement-Gun Co., Inc., of Allentown, Pa.

Dick, Kerr & Co. Ltd., London, Eng., have recently secured a contract for the supply of a 3,000 k.w., 3,000 r.p.m. turbo-alternator set, together with condensing plant, to Cammell Laird & Co. Ltd. The turbine will be of the William-Zoelly type, to operate on steam at 160 lbs. pressure, superheated to 650° F., and the condensing plant of the surface type, with the Williams rotary system of air extraction, the circulating, ejector and extraction pumps being driven by an auxiliary turbine which will exhaust into a feed heater. The turbo alternator will supply three-phase current at 3,300 volts, 50 cycles, and will be fitted with an overhung exciter.



## TO DEVELOP DES QUINZE WATER POWER?

**K**ERRY & CHACE, LTD., consulting engineers, Toronto, are preparing tentative plans and securing estimates on the cost of plant for a large hydro-electric undertaking in Quebec Province, and it is rumored that their clients are M. J. O'Brien, Limited, and that the Des Quinze water power is the one that is under consideration.

This water power is variously estimated at from 150,000 to 250,000 h.p. and is one of the greatest single undeveloped powers in Quebec. Situated about 25 miles northeast of Cobalt, it is in the centre of a great mineral and pulpwood area and would provide power for a district where a vast supply of raw materials awaits only the necessary power and labor to create an important producing territory.

A staff of surveyors is at work around the site, but whether the survey is for immediate or future use is unknown, although the fact that estimating bids are being secured by Kerry & Chace lends color to the rumor that work may be started at an early date.

M. J. O'Brien, Ltd., is a \$20,000,000 corporation headed by M. J. O'Brien, of Renfrew, Ont., the millionaire promoter of the O'Brien and Miller Lake-O'Brien Silver mines. The head office of the company is in Montreal.

When interviewed by *The Canadian Engineer*, J. G. G. Kerry, of Kerry & Chace, admitted that his firm is making an important water power study for one of his clients, but stated that no information concerning it could be given out for publication at present.

## ONTARIO BUILDERS AT CHATHAM

**T**HIS week the seventh annual convention of the Provincial Builders' Exchange of Ontario is being held at Chatham, Ont. At 2 p.m. last Tuesday the first session was scheduled to be opened by an address by the mayor of Chatham. Other business meetings were scheduled for 8 p.m. Tuesday and 9:30 a.m. yesterday. At the latter meeting various topics of general interest to the building trades were to be discussed, including the relations of the exchanges to the newly-formed Association of Canadian Building and Construction Industries. A sight-seeing trip was on the program for 1:50 p.m. yesterday and a banquet at 9 p.m. Today at 9:30 a.m. was scheduled the election of officers for the ensuing year and final business.

## Letters to the Editor

## LINDSAY-STRATHMORE IRRIGATION FLUME

Sir,—I would like to point out an omitted decimal point on page 527 of Mr. Kieffer's article on the Lindsay-Strathmore Irrigation Flume in your issue for December 19th, 1918. The yardage per day should be 14.7 instead of 147.

This flume has now been in operation one irrigation season and has given no trouble. Not a single indication of failure has occurred in the six miles of its length, and we consider the cement-gun a marked improvement over the ordinary method of placing concrete for light structures.

We have a large reservoir and recently called for alternate bids on a 2" plain concrete lining and a 1" reinforced gunite lining. The prices on the two were practically the same and we have selected the 1" gunite lining, which we have already used on our canals and which has given complete satisfaction.

E. C. EATON.

Superintendent and Engineer, Lindsay-Strathmore Irrigation District.

Lindsay, Cal., January 29th, 1919.

## MOUNT ROYAL TUNNEL

Sir,—In your last issue there appeared a letter of comment from C. O. Thomas on my essay on the Montreal Tunnel, taking exception to the inference which might be drawn that this tunnel was the longest in the world next to the great Alpine tunnels and the Rogers Pass Tunnel of the C.P.R.

This was not my meaning, nor do I think the clause in question "that the Montreal Tunnel was 'completely dwarfed' only by the Alpine tunnels" will bear that interpretation. The list of English tunnels which are longer might very well be supplemented by the Hoosac tunnel in the United States, and the more recent Andean tunnel which connects Argentina and Chile, but none of these are so much longer as to completely overshadow the Montreal example.

The point of view of the writer was that of economy, and the shorter the tunnel was, the better would have been his argument, so that there was no temptation or intention to exaggerate its length or importance as an engineering work.

HENRY K. WICKSTEED.

Toronto, Ont., February 6th, 1919.

## WATER MILL BUILT IN 1607

Sir,—In your issue of January 30th, 1919, you published "Some Historical Notes on the Development of Water Power" by Arthur Surveyer. Mr. Surveyer is quoted as saying, "In Canada the first water-operated grist mill was erected at Montreal in 1668." In this connection Mr. Surveyer might be interested in a brief article prepared by the undersigned and published in *The Canadian Engineer* for August 31st, 1916, Vol. 31, page 176. This article deals with a water mill, apparently used for grain-grinding purposes, built in 1607.

K. H. SMITH.

Halifax, N.S., February 3rd, 1919.

## HALIFAX DIVING BELL

Sir,—Referring to the letter from John Taylor, which appeared in the January 16th, 1919, issue of *The Canadian Engineer*, with further reference to the mobile caissons used on the harbor works at Halifax and Hamilton, the writer is somewhat diffident in taking up further space, as the essential facts are already before the profession and it would appear that the discussion is becoming largely a matter of misquotation, confusion of terms and general bickering,—a consummation the most undesirable for a discussion between engineers.

For the sake of a higher degree of clearness, however, in connection with the issues raised, the writer would submit the following in enlargement of his former letter.

The matter at issue in this discussion is resolvable to the following:—

Mr. Taylor, in his first letter, stated that the principle and system of the Halifax caisson had been anticipated by a device invented and put into operation by him three years previous to the design of the Halifax apparatus, and that the Halifax caisson was virtually merely an infringement of his patents.

The facts re the relative dates have been stated.

Are the principles and systems of the two devices the same?

The Halifax caisson in actual work was the same as an ordinary bridge caisson, as Mr. Taylor has observed. In order to move this caisson from place to place in the harbor, it was necessary to float it at a comparatively shallow draft.

The buoyancy chamber was added for this purpose and not to give weight or ballast to the caisson; the caisson would have been heavier in its working load if the buoyancy chamber had not been there.



The function of the ballast chamber, on the other hand, was to handle the water ballast and to control the caisson in the submerged condition.

These chambers were not convertible or interchangeable in their functions, as Mr. Taylor tries to intimate; e.g., in actual operation the caisson could not be sunk by admitting ballast into the buoyancy chamber.

As stated in my last letter, the Halifax caisson, for work on the harbor bottom, had to be submerged or sunk completely below the surface of the water, except the air locks; this necessitated the controlling device which the writer called the "ballast chamber."

The Hamilton caisson, which "actually floated at all times," was designed so that its depth of flotation could be varied for a few feet by the regulation of water ballast. But it was not possible to submerge the device; i.e., to sink it with its deck or roof below the water surface.

If this requirement had entered into its design or operation, a new type of problem would have presented itself; viz., the disposition of the water ballast to give stability, and a means of controlling the rate of sinking after the deck was submerged.

It would not be sufficient, as Mr. Taylor states, to merely prolong the air shafts so that the lock would remain above the water surface.

Again, in the Hamilton device the buoyancy chambers were actually used as ballast chambers by elevating the water level in them above the outside water surface. Hence Mr. Taylor rightly calls them convertible ballast and buoyancy chambers.

This principle did not enter into the design or operation of the Halifax machine.

In other words, the Hamilton device was designed to work while afloat with its deck above the water surface. The depth of its draft and working plane was varied by admitting water into compartments or forcing it out as required, and weight to resist the air pressure in the working chamber was provided partly by actual water ballast; i.e., water in compartments above the outside water level.

The Halifax caisson was designed for work under its own weight as an ordinary caisson on the foundation bottom. While at work, water ballast, in the sense that Mr. Taylor used it, played no part. The machine was simply under water, or submerged, except the working chamber and air shafts.

To make the caisson mobile, it was necessary to provide for its flotation, submerging and raising. This was done by the adoption of a special arrangement of compartments or chambers for the handling of water ballast in a special way; i.e., the flotation, submerging and raising of the caisson had to be taken care of by distinctly separate compartments and processes.

The character of the work to be done and the conditions under which the plants were to operate being quite different, so also the problems of design for the two devices were inherently different, and so logically enough the two types of plants were developed.

Yet Mr. Taylor asserts that the "principle and system" of the two devices were the same and that only slight structural modifications were required in order to transform the Hamilton device into a caisson for use at depths up to 55 feet below the water level. The inference from this statement is that by using the same system of handling water ballast, his machine could have been increased in depth so that work could be done at this level with the plant still floating and the difficulties of tidal variation taken care of. This is possible, but the resulting machine would have been very different from the Halifax caisson in construction and operation.

It is amusing to note how Mr. Taylor considers the application of buoyancy and ballast chambers in the case of sliding gates for dry docks, etc., so different in principle from the application in his floating caisson, on account of differences in detail, etc., and how easily he would brush

aside the differences in application and detail of the systems of control by water ballast in the caissons of the two devices under consideration.

Re scows carrying construction plant in tidal waters, for Mr. Taylor's information I would cite the case of the scow used on the outer end of the dumping bridge used in the construction of the breakwater at the Halifax Ocean Terminals by the Cook Construction Co. and Wheaton. This breakwater was built by side dumping from a track carried by a steel span from the construction end of the fill to the scow. The tide variation here was from 5 ft. to 7 ft., and the track on the span was kept approximately level by the operation of the system referred to. This work was begun in 1913.

Mr. Taylor, in the second paragraph of his letter, states that my intimation that the means he used for the "regulation of draft" in his device were not novel, is incorrect. Then, in the third paragraph he states that Mr. MacDonald asserts that "any change in draft was impossible."

My letter was explicit in this connection, as I referred to "regulating or changing the depth of flotation." It is evident that Mr. Taylor was writing very hurriedly here.

As to the first statement, it would be interesting to know wherein Mr. Taylor claims novelty for this method of changing draft, and wherein it differs fundamentally from the method used in the case of a sliding gate for a dock or the scow cited above.

Mr. Taylor expresses doubt as to the basis for the writer's statement that the problem of flotation stability *while in the submerged condition was absent in the case of his (Mr. Taylor's) design*. Inasmuch as Mr. Taylor's device was designed to float at all times and could not be submerged, i.e. sunk, until the deck was under the water, this condition of its stability after submergence would scarcely require extensive calculations.

Again, Mr. Taylor states, "Mr. MacDonald says the use of water ballast was not an essential principle of the device used here." This is a misquotation. My statement was, "the use of water ballast was not an essential principle of the plant so far as its use as a floating caisson was concerned." In ordinary conditions, a heavier scow, or the use of movable kentledge, would have answered the purpose instead of water ballast. In this particular case, the circumstance that the device required an extremely shallow draft in order to get into position, made the use of water ballast advantageous, but Mr. Taylor will scarcely argue that this circumstance was a matter of fundamental principle for apparatus of this type. As a matter of fact, it would be necessary for Mr. Taylor to use iron weights, or similar ballast, in order to work his machine at a depth of 7 ft. (see his original article in the Engineering News of April 23rd, 1914.)

However, Mr. Taylor asserts that the use of water ballast was a prime necessity when in operation, but goes on to say that the writer was in error in stating that the use of water ballast was necessary to regulate the draft of the machine so that it would pass over the piling, and he divulges the secret that it was the absence of water ballast which was required;—and in several passages in his letter Mr. Taylor would fain accuse the writer of juggling with terms!

It may be of interest to note that my original statement was, "the real purpose of the water ballast in this case was to regulate the draft of the float," etc.

In conclusion, it appears to the writer that this controversy has arisen largely on account of misunderstanding and misinterpretation of terms, due perhaps to erroneous preconceptions. Perhaps the writer has been somewhat to blame for a lack of clearness of definition.

But between the Halifax and Hamilton caissons, plants of related types but independently evolved to suit their respective requirements, there is no real quarrel. Mr. Taylor is the claimant in this cause. It remains for him to prove his case.

J. J. MACDONALD.

Moncton, N.B., January 29th, 1919.



### HALIFAX DIVING BELL

Sir,—The writer has just received *The Canadian Engineer* of October 31st, 1918, in which are published extracts from a letter from John Taylor, of Hamilton, Ont., regarding a paper read by J. J. Macdonald on the floating caisson or diving bell used in preparing foundations for quay walls at Halifax, N.S. The writer has not yet seen Mr. Macdonald's paper or his statements, but Mr. Taylor's letter, and especially his concluding statement that "he feels it is only just that the facts should be made known to the engineers of Canada as a whole and he fully expects this to be done," causes him (the writer) to write in this matter, as he is probably the one best personally acquainted with all the facts.

The Halifax-Ocean Terminals quay walls were designed for the Canadian Government Railway by F. W. Cowie, of Montreal, as consulting engineer, and the writer, as superintending engineer, in 1912-1913. Many designs and schemes were studied before the type (of original design) finally adopted was decided upon early in 1913, and needless to say, much detailed consideration was given to the foundation work and to the new types of plant and appliances that would be required for the proposed works, including rock drilling, dredging and concreting plants, helmet and bell diving outfits, block setting cranes and lifting tongs, etc.

The writer had in 1911-1912, with Foley, Welch & Stewart as contractors, successfully used as diving bells, the large pneumatic foundation caissons designed by him for the river piers of the Skeena River bridge on the G.T.P. Railway in British Columbia, for removing large boulders and obstructions in fast flowing deep water on the sites of the piers, by working in the working chambers with the caissons grounded or afloat and made movable as desired by displacing or pumping out water. Other people, he believes, have done the same with other caissons.

The writer discussed this with Mr. Cowie, and together they developed and sketched out the floating caisson or large mobile diving bell idea for their foundation work. The doubtful elements of the scheme were cost and rate of progress. It was therefore decided that in letting the docks contract, the choice of methods should be left to the contractors, subject to stipulated rates of progress and qualities of finished work.

In November, 1913, the contract for the first unit of the Halifax docks was let to Foley, Welch, Stewart & Fauquier, who brought to Halifax as their superintendent, James Taber, a well-known Canadian expert with wide experience in deep foundation and compressed air work.

The floating caisson or diving bell method was then again taken up, and was thoroughly examined by R. B. Porter and Fauquier of the contracting company, Mr. Taber, Mr. Cowie, and the writer, further detailed sketches of the bell and estimates of cost of construction being made. It was felt by all these parties that better work could be done, with better inspection and more certainty, with the large diving bell than by other methods, though not at less cost.

The contractors, with a spirit and enterprise for which they deserve great credit, decided to adopt the diving bell method, and in view of the advantages to the work, the writer, with the approval of Mr. Gutelius, general manager, Canadian Government Railways, prepared the working drawings for the bell in his office at Halifax. Mr. Macdonald was then the writer's assistant and office engineer there, and he, along with the late Lieut. C. S. DeGruchy, M.C., and other assistants, did excellent work on the completion of the design and of the working drawings.

The tender scow with its air compressors, etc., and the air locks, etc., of the bell were designed and constructed, or supplied and fitted by the contractors, mostly under Mr. Taber's direction and supervision.

The general plan and details of the Halifax Bell were certainly original in that they were designed for a definite purpose on scientific first principles and from practical personal experiences, and were not copied from any other plans or plant. The designers, were, however, aware of, and were naturally supported in their decisions by the knowledge and precedents of the large bells or floating caissons that had

been successfully used in dock works in years past at Marseilles, Antwerp, Rotterdam, Bilbao, etc.

In the winter of 1913-1914, when the Halifax Bell was designed in its present form, none of those responsible had, so far as the writer knows, any knowledge of Mr. Taylor's scheme, plans or plant. Unlike Mr. Taylor's apparatus, the new Halifax Bell of new design and working under new conditions in fairly open tidal waters, for the first few days, as was to be expected, was the cause of some little anxiety and revealed some minor defects. The skill and energy, however, of J. P. Porter, who had then taken charge for the contractors, rapidly overcame these troubles, and the writer may safely say that the bell for two years without mishap did excellent work under his personal supervision and made steady progress and good time.

Writing from the field in France, the writer is at the disadvantage of having no notes or means of reference at hand, but the principles and applications of compressed air in working chambers of caissons, diving bells, etc., for subaqueous work must be familiar to many engineers, and he thinks that they will agree that Mr. Taylor unduly flatters himself if he claims to be the sole anticipator, originator or inventor of large diving bells of the Halifax type.

The writer regrets he has never had the privilege of seeing Mr. Taylor's plant, but he has a hazy recollection of having heard, probably in 1914, about an outfit, which he thinks may have been Mr. Taylor's, for cutting off and capping piles on the lakes a foot or two below water level in still water, subject to no rise or fall or range of tide; that is, for application to work and conditions quite different to those at Halifax.

JAMES MCGREGOR, Major.

3rd. Battalion, Canadian Railway Troops.

In the Field, B. E. F., France, December 3rd, 1918.

### AMERICAN ENGINEERING SOCIETIES IN CANADA

UPON receipt of a letter from Prof. Peter Gillespie of the University of Toronto, suggesting that the Engineering Institute of Canada should co-operate with the Canadian branches of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, the Council of the Engineering Institute of Canada at its last meeting discussed the matter fully and decided that there was no way in which the Canadian branches of the American societies could be affiliated with the Engineering Institute of Canada.

A committee consisting of Walter J. Francis, Julian C. Smith, H. H. Vaughan and Fraser Keith was appointed to meet A. D. Flinn, secretary of Engineering Council, this week at Ottawa, in order to discuss the question of Canadian branches of United States societies. It is officially stated that the question will also be discussed with Mr. Flinn of the possibility of the Institute's joining Engineering Council.

### ENGINEERS' CLUB OF TORONTO

AT the annual meeting last Tuesday the following officers were elected for 1919:—President, J. R. W. Ambrose; first vice-president, Melville P. White; second vice-president, Tracey D. le May; third vice-president, J. B. Carswell. Directors—William A. Bucke, A. B. Cooper, E. G. Hewson, Chas. H. Heys, Arthur L. Hull, J. H. McKnight, Walter R. McRae, L. V. Rorke, James R. Wainwright, Major Ward Wright and T. S. Young. Secretary-treasurer, R. B. Wolsey.

Through several American and Canadian bond houses, the Riordan Pulp and Paper Co. is selling \$4,000,000 bonds to finance its subsidiary, the Kipawa Fibre Co., which is erecting a 30,000-ton sulphite pulp mill on Lake Temiskaming.



**SEWAGE DISPOSAL AT MANCHESTER\***

**Activated Sludge Investigations—Results of Operation at Withington and Davyhulme Works—New Unit for Research**

THE Rivers Department of the City of Manchester have issued their report for the year ended March, 1918. The Rivers Committee control the admission of all trade effluents into the Manchester sewers, and a special inspector has charge of this work. The main activity of the committee is, however, connected with the disposal of the city sewage.

With the exception of the sewage from the Withington district, which receives treatment at the Withington works, Chorlton-cum-Hardy, the whole of the dry-weather flow of the city sewage was dealt with, during the year under review, at the main outfall works at Davyhulme. Only such portions of the Moss Side works at Urmston and the Gorton works at Gorton have been retained as are required for the treatment of exceptional flows of storm water.

At the Withington works the Emscher tanks were in continuous operation throughout the year, and dealt with 231,436,000 gallons of sewage, an average of 634,000 gallons per day, as compared with a daily flow of 580,000 gallons during the preceding year. Approximately 300 tons of refuse, etc., were removed from the screens and catchpits preceding the tanks. A total of 730 tons of sludge were discharged from these tanks on to the drainage beds provided. The air-dried sludge was used on the land under cultivation. No trouble was experienced with respect to the ebullition of the scum or of aerial nuisance, but the resultant sludge still contains a high percentage of water.

**Activated Sludge Plant at Withington**

As is well known, a large-scale continuous flow unit has been installed for the purpose of studying the activated sludge process as applied to the purification of the sewage received at the Withington works.

The total expenditure on this plant, which occupies one-third the area of one of the existing sedimentation tanks, was £2,172, inclusive of an item of £950, the cost of equipment supplied by Jones & Attwood, Limited—viz., air mains, distributing pipes, valves, diffusers, etc.—and also of certain further expenses incidental to the installation of the air compressing plant.

**Aeration Chamber**

The aeration chamber, which is 100 ft. long by 20 ft. wide and 6 ft. deep, is divided by four longitudinal walls so as to form a channel 4 ft. wide and 500 ft. in length. Its capacity is 55,000 gallons. The floor of this channel is constructed on the ridge and furrow system, the ridge having a slope of 35 degs. with the horizontal. Aeration is effected through rows of diffusers placed in the furrows, transversely to the flow of sewage.

The diffusers are each 1 ft. square over all, so that their total area is approximately one-seventh of the aeration tank area. The ratio of net diffusion area to total tank area is 1:10. An overhead system of air pipes is provided, and the air is admitted to the diffusers through a series of down pipes, which are arranged so that one pipe serves two diffusers. Valves are attached to the various distributing pipes so that the air supply may be regulated and distributed uniformly.

**Settlement Tank**

Separation of the activated sludge from the purified effluent is effected in a deep pyramidal tank, the dimensions of which are 23 ft. 6 ins. by 26 ft. 6 ins. in plan, with a depth from water level to apex of tank of 23 ft. 6 ins. The sides of the tanks are constructed with a slope of 60 degs. to the horizontal.

The mixture of effluent and sludge is admitted to the centre of the tank through a 15-in. pipe within a guard chamber 6 ft. square, and discharges into a deep wrought-iron bucket which is suspended from the top of the pipe.

This arrangement was designed by W. Clifford with the

\*From The Surveyor and Municipal and County Engineer, London, Eng.

view of dissipating the energy of the incoming flow by the creation of eddies within the guard chamber, and thus to produce, as far as possible, a quiescent condition at the bottom of the guard chamber, and so allow of efficient settlement of the sludge. The final effluent leaves the tank over four corner peripheral sills. The total capacity of the settlement tank is 27,000 gallons, or practically one-half that of the aeration chamber.

**Sludge Circulation**

The sludge is discharged by hydrostatic head from the apex from the tank through a 6-in. pipe to a separate chamber fitted with diffusers, from which it is returned by air lift to the aeration chamber. Surplus sludge is either pumped from the return sludge chamber on to drainage beds or is removed by syphon to the existing sludge well and discharged mixed with the sludge from the sedimentation tanks on to the land.

**Air Supply**

With the view of avoiding the purchase of new machinery, existing plant has been utilized for the supply of air required. For this purpose a belt-driven Reavell compressor, designed to deliver 500 cub. ft. per minute at anything up to 15 lbs. pressure, is employed. This machine is driven by a disused high-pressure air compressor, which has been converted into a steam engine by removal of the air piston and the provision of a new driving pulley.

This plant, which was brought into operation in September, 1917, was designed to treat 250,000 gallons of sewage per day, with an average aeration period of 4 hours.

It was soon found that with the average sewage received at the Withington works, an aeration period of considerably less than 4 hours was sufficient to produce an entirely satisfactory effluent.

In the following tables are given the average results of operation at varying rates. In each case the sewage before passing to the activated sludge plant was screened and received treatment in detritus chambers, where the heavier solids were removed. In general, the proportion of activated sludge employed varied from 15 to 25 per cent., measured by volume after one hour's settlement:—

**VOLUME OF SEWAGE TREATED=250,000 GALLONS PER DAY  
RESULTS IN GRAINS PER GALLON**

|   | Series I.  |          | Series II. |          |
|---|--|----------|------------|----------|
|   | Sewage   | Effluent | Sewage     | Effluent |
| 4 hours' oxygen absorption                          | 1.66   | .41      | 2.47       | .46      |
| Free and saline ammonia                             | 1.43   | .28      | 2.06       | 1.08     |
| Albuminoid ammonia                                  | .36  | .07      | .415       | .07      |
| Nitrite and nitrate (as NH <sub>3</sub> )           | —  | .77      | —          | .45      |
| Dissolved oxygen absorption (Royal Commission test) | —  | .92      | —          | .82      |
| Aeration period                                     | 4 hours.   |          |            |          |
| Air consumption                                     | 1.8 cubic ft. free air per gallon of sewage treated. |          |            |          |

**VOLUME OF SEWAGE TREATED=375,000 GALLONS PER DAY**

|   | Sewage   | Effluent |
|---|--|----------|
| 4 hours' oxygen absorption                          | 1.85   | .36      |
| Free and saline ammonia                             | 1.52   | .62      |
| Albuminoid ammonia                                  | .38  | .06      |
| Nitrite and nitrate (as NH <sub>3</sub> )           | —  | .46      |
| Dissolved oxygen absorption (Royal Commission test) | —  | .88      |
| Aeration period                                     | 3 hours.   |          |
| Air consumption                                     | 1.2 cubic ft. free air per gallon of sewage treated. |          |

**VOLUME OF SEWAGE TREATED=500,000 GALLONS PER DAY**

|   | Sewage   | Effluent |
|---|--|----------|
| 4 hours' oxygen absorption                          | 2.05   | .42      |
| Free and saline ammonia                             | 1.48   | 1.08     |
| Albuminoid ammonia                                  | .37  | .075     |
| Nitrite and nitrate (as NH <sub>3</sub> )           | —  | .24      |
| Dissolved oxygen absorption (Royal Commission test) | —  | .94      |
| Aeration period                                     | 2 hours.   |          |
| Air consumption                                     | 0.9 cubic ft. free air per gallon of sewage treated. |          |



As far as possible, a uniform flow of sewage was maintained throughout the 24 hours.

The figures given in the last table are the average results over a period of eight weeks' continuous operation.

It will thus be seen that if nitrification is not deemed essential, satisfactory effluents can be obtained when working at double the rate the plant was designed to operate.

Experience gained with this plant has shown, however, that the activity of the sludge is not maintained if this high rate is continued through prolonged periods of dry weather, and certain difficulties are experienced in such circumstances with regard to the effective settlement of the sludge.

It is quite evident, however, that the plant as constructed is easily capable of caring for 375,000 gallons of the Withington sewage per day.

Up to the end of the period covered by this report, little attention was paid to economy in air consumption. At the time of writing, this matter is receiving careful study, and for this purpose a pulsating gear similar in principle to the one previously in use at Davyhulme has been installed.

An outstanding feature of the highly clarified effluents obtained is their low bacterial content, which rarely exceeds 20,000 organisms per cc. (G.P.B.), showing a percentage removal of from 98 to 99, calculated on the sewage treated.

Attention is once more drawn to the valuable character of the resultant sludge (dry), an average analysis of which is as follows:—

|  | Percentage |
|--|------------|
| Loss on ignition .....                           | 75.2       |
| Mineral matter .....                             | 24.8       |
| <hr/>  |            |
| Total nitrogen (as N).....                       | 6.4        |
| Phosphate (P <sub>2</sub> O <sub>5</sub> ) ..... | 3.8        |

So far as it has yet been possible to determine the sludge produced by the activated sludge process, it amounts to approximately 38 tons per million gallons of sewage treated.

The sludge as it is removed from the tank contains, on the average, 98.5 per cent. water, so that it would appear that rather more than 0.5 ton dry sludge is obtained per million gallons sewage treated.

The sludge production obviously will vary considerably, dependent on the character of the sewage treated, and the above figures should be accepted with reserve and certainly taken as a minimum result so far as English practice is concerned.

The sludge as drawn from the tank can readily be reduced to about 40 per cent. of its bulk by simple sedimentation. The problem of the most economic method of dewatering and drying the sludge so that full advantage may be taken of its value as a fertilizer is receiving very careful consideration.

#### Research Work at Davyhulme

It was not found possible to carry out during the year any laboratory research work, as the routine analytical work necessary for the control of the purification plant, together with the work in connection with the operation and control of the new activated sludge plant at Withington works, kept the restricted chemical staff fully occupied.

The tank (dimensions 25 ft. by 16 ft. by 9 ft. deep to water level), employed for the investigation of the activated sludge process at Davyhulme, was kept in operation throughout the year.

Reference was made in the last report to the disturbance occasioned during the early portion of the period under observation by the presence of inhibitory trade waste and also of excessive quantities of oily matter. Normal conditions were established by reducing temporarily the quantity of sewage treated and increasing the aeration period. After July, 1917, the tank was in operation without any break, and no difficulty had arisen up to the time of writing the report.

During this period (July, 1917, to March, 1918, inclusive) the tank was operated on the "fill and draw" system according to the following time-table:—

#### July, 1917, to March, 1918

|                             |                            |
|-----------------------------|----------------------------|
| 8.00- 8.30 a.m.—Filling     | 9.00-11.00 p.m.—Settlement |
| 8.30-12.00 noon—Aeration    | 11.00-11.30 p.m.—Discharge |
| 12.00- 1.30 p.m.—Settlement | 11.30-12.00 mid.—Filling   |

|                           |                            |
|---------------------------|----------------------------|
| 1.30- 2.00 p.m.—Discharge | 12.00- 5.30 a.m.—Aeration  |
| 2.00- 2.30 p.m.—Filling   | 5.30- 7.30 a.m.—Settlement |
| 2.30- 9.00 p.m.—Aeration  | 7.30- 8.00 a.m.—Discharge  |

Working in this manner, the tank received three fillings of sewage per day, and has treated 45,000 gallons of screened sewage daily with the production of an entirely satisfactory effluent, as will be seen from the following average results:—

#### ACTIVATED SLUDGE TANK RESULTS IN GRAIN PER GALLON

|  | Sewage | Effluent |
|--|--------|----------|
| 4 hours' oxygen absorption....                             | 6.83   | 1.04     |
| Percentage purification .....                              | ---    | 85%      |
| Free and saline ammonia.....                               | 1.98   | 1.01     |
| Albuminoid ammonia .....                                   | .59    | .10      |
| Percentage purification .....                              | ---    | 83%      |
| Nitrite and nitrate (in terms of NH <sub>3</sub> ) .....   | ---    | .37      |
| *Dissolved oxygen absorption (Royal Commission test) ..... | ---    | .62      |

\*Standard recommended = 1.40

The air consumption up to September, 1917, when the pulsating gear was returned to the makers in part exchange for a new gear for the Withington activated sludge plant, was approximately 1 cub. ft. free air per gallon of sewage treated. Latterly, when employing a continuous air supply, the air consumption has averaged about 10 cub. ft. per sq. ft. tank area per hour, which is equal to 1.5 cub. ft. free air per gallon of sewage treated.

As the result of the satisfactory operation of this tank, in conjunction with the experience gained with the large scale plant at the Withington works, a scheme has been prepared for the construction of a working scale continuous flow unit for the treatment of the mixed trade sewage received at the Davyhulme works. This scheme having received the approval of the city council, and a license has been obtained from the Minister of National Service, is now being carried into effect. The plant is designed to treat a daily flow of sewage of 1,000,000 gallons. A new feature is embodied in the design of the aeration chamber by which it is hoped the cost of construction in relation to working capacity will be reduced without loss of efficiency.

#### FEDERAL AID FOR HIGHWAYS

Hon. Dr. Reid Makes Announcement at Eastern Good Roads Association Meeting—"First Class Roads" Will Receive "Fair and Reasonable Aid"—All the Money Provinces Can Spend

AT the annual meeting of the Eastern Ontario Good Roads Association held last week at Ottawa, Hon. Dr. J. D. Reid, Minister of the Department of Railways and Canals, said that the Dominion government would furnish its share of money to help the provinces in road construction, and that it will be up to the provinces to see that the best roads are built as quickly as possible.

"The Dominion Highway Department is under the Department of Railways and Canals," said Dr. Reid. "When we decided to take up the question seriously during the present session, I was instructed by the cabinet to get data and make recommendations. Before I could proceed, I had to organize a good roads branch in the department. I had to look for a good man qualified for the position, but I did not have to look far. Of course I appointed your good friend, A. W. Campbell. No better man could have been selected for the position. Since his appointment he has given me so much data that I have not been able to digest half of it."

"We are going to keep on with good roads till we can leave the capital and go anywhere on good roads such as are enjoyed in the neighboring republic."

#### Transport Problems

"Transportation has been a live question for years. What is produced on the farms or in the factories must be



transported in the best and cheapest way to the domestic and foreign market. We have been giving attention for years to railways and waterways. Much money has been spent in railways and while some mistakes may have been made in the railway policies, I feel that all the railways in Canada are needed, will all be used and that already they have been of great benefit in the development of Canada. In addition we have improved the waterway from Lake Superior to Montreal, the main channel for transportation from the great west to the eastern ports. From the money so spent the people of Canada are reaping benefits so large that it is impossible to estimate them.

#### System Must be Complete

"It is necessary to have a complete system of highways. We must transport produce of the farms for miles and poor roads increase the cost of transportation. Railways and waterways have cost a high price but much of the benefits of them are lost on account of the weak link, the poor roads between the farm and the railways and waterways. As far as the foreign market is concerned, if the cheapest transportation is not provided between the industries and the other transportation facilities, the profits will be so reduced as to not justify competition with the products of industries in the other countries.

#### Railway Problems

"As far as the Dominion government is concerned, it realized in 1912 the need of a complete system of railways, waterways and highways. A sum was placed in the estimates and was passed in the commons, but I regret to say it did not pass the Upper House. Had it passed we would have had several thousand miles of roadway which we have not. But we must look at the future, not at the past. I have been talking the matter over with the several provinces. It is easier to deal with the question now than it was in 1912. Then, if any man had gone into a rural constituency and advocated good roads for autos, he would have been drummed out. Now the farmers are just as anxious to have autos and trucks to transport their products and to give their families comforts enjoyed by those in urban centres.

#### 250,000 Miles of Roads

"In the Dominion there are 250,000 miles of roads. The so-called 'first-class roads' are between large centres and large markets, roads travelled most by the public, urban and suburban, and they should be of the permanent character to last almost for all time. Of this class, we have about 10,000 miles in Canada.

"The 'second-class' roads are those leading from large centres to smaller market places, the provincial or municipal road, not built of the same high class construction as the first-class road.

"Then there are 200,000 miles of concession roads leading from farms to first-class roads.

#### Bill Already Drawn

"Insofar as the first-class road is concerned, the Dominion government is agreed to pay an amount towards the cost of construction as would be fair and reasonable. It is the intention, and the bill has been drawn and is now before a sub-committee of council, to place an amount of money as the Dominion's share of as much as can be possibly expended in the next five years by the several provinces in Canada.

"We will have an estimate of what the provinces can spend in five years and will set aside an amount to be extended over five years so that every province will know that it has the Dominion government's share available for all the roads they can build. If the estimate falls short on account of a large number of roads by any province, the Dominion grant could be supplemented. I can not give you the amount but can assure you it will cover what our portion will be after taking the matter up with the provinces. I am not in a position to say what the proportion will be, but so far everything has been most amicable in the negotiations between the representatives of the Dominion and of the provincial governments. I am sure you will be satisfied with the results.

"The highway bill will be number one on the list and I will ask the senate to pass it with as little discussion as possible, so that it will be through before anything can happen to cause me to lose my seat.

#### Work of the Provinces

"The Dominion feels it the work of the provincial governments to construct the roads. We do not want to have anything to do with construction. All we ask of the local governments is that they submit plans and specifications with locations, so that our engineers may be satisfied that the money is spent for permanent roads, not for roads that will be useless in four or five years.

"We will have our inspectors look over the work and if we find it is not up to specifications, we will draw the attention of the provincial governments, which, I am sure, also want to give the people the best roads and to expend the money to the best advantage.

#### Remedy Unemployment

"Building good roads will give employment to many thousand men in the Dominion and we require some public works now to give employment. By proceeding with road work in every province the relief will be large. The great advantage of good highways to the rural population cannot be over-estimated. They will mean larger loads and will cause a big saving in wagons, machinery and other vehicles.

"There are 262,000 licenses for autos and motor trucks in the Dominion, costing two hundred million dollars. The extra depreciation on these, due to bad roads, would build many thousand miles of good roads each year.

"The people in rural sections are entitled to the same advantages as the people in cities and villages. They have phones, rural mails and other conveniences, but with autos and good roads, they can drive into Ottawa or another city in an hour and a half, with little cost, making a trip that would take a whole day to make driving over poor roads.

#### Bring Farms Nearer

"Good roads bring the farms nearer to the cities and give advantages of market centres. There is in Canada, an agitation for radial railways. With the steam railways and the very best highways, we will have a system of transportation that will render unnecessary the expenditure of many million dollars on radial railways which would then not be needed.

"Along every road where there is a good highway, up goes the value of farms. If we could collect this increased land values, we would want no more money to build improved highways throughout the Dominion. Then we will have the advantage of tourists who would not come without improved highways. Not only do they spend considerable money, but they learn the many advantages Canada offers, and we will get settlers who would not otherwise come. Thousands of lives in rural districts would also be saved by the facilities provided to get medical help quickly.

#### United States Ahead of Canada

"The U. S. is ahead of us in good roads. Between California and Boston you have a network of good roads. The various states for some time have been improving their road systems, and a few years ago the government at Washington saw the necessity for giving aid in the construction of highways and set aside \$75,000,000 for road work. Today I read that \$500,000,000 had been set aside for roads.

"Wait till we get started in Canada and you will see how we will go. I promise to continue on the work and do my best to see that all parts of the Dominion have assistance to the greatest extent that we should go to get good roads. You have not a better friend for good roads than I am."

Alfred Stansfield, chairman of the Metallurgical Section of the Canadian Mining Institute, proposes to introduce a resolution at the annual meeting of that Institute, which is to be held March 5th to 7th in Montreal, that the name of the Institute be changed to "The Canadian Institute of Mining and Metallurgy."



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## THE OHIO LIEN LAW

IN Ontario within the past few months there has been a certain amount of agitation in some quarters for the adoption by the Legislature of an Act similar to the law entitled "Mechanics' and Other Liens" that is in operation in the State of Ohio. The contractors are unanimous in their opposition to the passing of such a law by any Canadian parliament, Dominion or provincial. There are a number of objectionable clauses in the "Ohio Lien Law," as it is popularly known, but the one that arouses the greatest opposition is as follows.—

"The original contractor, in order to obtain any payments from the owner, must deliver to the owner, if he or his agent can be found in the country, a sworn statement showing the name of every laborer who has not been paid in full and of every sub-contractor in his employ, and of every person furnishing material, machinery or fuel, with the amount due or to become due to such person, which statement must be accompanied by a certificate, signed by every person furnishing material, machinery or fuel, showing the amount due or to become due, and also a similar statement of every sub-contractor and of every person furnishing machinery, material or fuel; the owner is entitled to retain all amounts due sub-contractors, laborers or material men as shown by such statements; and until the statements are furnished, the contractor has no right of action against the owner."

The contractors cannot be blamed for opposing such onerous and unfair legislation. It is generally admitted that manufacturers and supply dealers should have more protection, against both contractors and owners, than they now have in many provinces (and contractors need more protection against owners), but the Ohio Lien Law is entirely too cumbersome and hampering. To relieve injustice to one class of people by imposing greater injustice upon another class, is not wise legislation.

## THE JOINT COMMITTEE

IN the last official Bulletin of the Canadian Mining Institute, it is suggested that a conjoint committee be appointed representative of all the engineering professions and empowered to formulate "a comprehensive scheme of union for defence and offence."

There is already in existence a Joint Committee of Technical Organizations, but it does not appear likely that this joint committee will be allowed to be the conjoint committee proposed by the Canadian Mining Institute, in view of the following rather unusual paragraph which appears in the report of the last meeting of the Council of the Engineering Institute of Canada:—

"The consideration of Council was asked in connection with a suggestion received, that the Joint Committee of Technical Organizations was not worthy of further support or recognition. It was resolved that the principle of scattering the energies of the members of the branches was detrimental to their strength, and, consequently, further recognition or support of the Joint Committee of Technical Organizations was withdrawn. The secretary was instructed to so advise the branches."

## ENGINEERING LEGISLATION

AT a meeting of the Joint Legislative Committee of the Canadian Mining Institute and the Engineering Institute of Canada, the following resolution was adopted:—

"That in the opinion of this meeting, the question of legislation is of so great importance to engineers of all branches of the profession, that it should receive very careful consideration and should have the approval of the majority of Canadian engineers before being enacted as, otherwise, it may jeopardise the future of effective legislation and defeat the objects in view. The members of the Mining Institute will therefore recommend to their Council, that legislation be opposed until it has had more mature consideration, but that the Mining Institute join hands with the Engineering Institute of Canada, in endeavoring to frame an acceptable Act."

A draft having been submitted to the Council of the Engineering Institute of Canada of a bill which the Saskatchewan Branch proposed to introduce in the legislature of that province, the Council instructed the secretary of the Institute to telegraph the branch as follows:—

"At a special meeting of Council held at your request I was instructed to advise the Saskatchewan Branch that it does not lie within the power of the Council to approve an act for submission to a legislature without the mandate of the membership at large. My communication of October second was intended to convey to your branch that Council is sympathetic towards the endeavors of your branch to draft suitable legislation and would assist in framing and submitting a suitable Act for the consideration of the membership. The action of other branches in submitting to the Council drafts of proposed Acts and discussion of the general question subsequent to the submission of your first draft, strengthen the feeling of Council that action should be deferred until all the branches have had an opportunity of expressing their views."

## RESEARCH WORK IN GERMANY

WHEN considering the establishment of a Central Research Institute, the Dominion Government should bear in mind that Germany does not intend to stand still in the matter of research work, despite her failure to win the war by scientific (?) accomplishments. In a pamphlet issued by the Society of German Metallurgists and Mine Owners, for the translation of which we are indebted to the well-known English scientist, Sir Robt. Hadfield, the following paragraphs appear:—

The experiences of the war have shown most especially how necessary it is that our Fatherland be made as inde-



pendent as possible, so far as supplies of metals are concerned, which have been very badly hit and threatened by the economic war of our enemies. Our colleagues have been convinced for a long time that the attainment of this end would be best served by a large Institute of Research, in which, in the general interest, systematic investigation can be carried on and progress made in the domain of preparation, extraction of metal, and working-up processes from a technical and economic point of view.

"We considered it expedient to put this suggestion to the Kaiser Wilhelm Society, who, as is well known, has set itself the task, by the formation of Kaiser Wilhelm Institutes, of promoting and encouraging efforts in the domain of pure and applied science. Our suggestion, to which we attached a statement dealing with the sphere of the problems appertaining to such an Institute, had already been anticipated by the Kaiser Wilhelm Society, and as you are all aware, the matter has fortunately progressed so far that the early formation of a Research Institute for Metals may be looked for.

"As will be readily understood, our Society is taking a particularly active part in this formation, and a number of the members of our Committee of Management and of our Board of Directors is active on the preliminary commission appointed for this purpose. The co-operation of our Society will be effected by the right being referred back to us of nominating members to the Scientific Council and to the Board of Governors of the Institute. We will give expression to the hope that the Institute will achieve great results with its scientific research work in constant co-operation with actual practice, to the blessing of the whole of the German metal industry and with it of the German Fatherland."

#### PERSONALS

A. J. GRANT, formerly superintending engineer of the Trent Canal, now has his headquarters at St. Catharines, Ont., and is in charge of the work on the Welland Canal.

GEORGE H. OLNEY, formerly managing-director of the Eugene F. Phillips Electrical Works, Montreal, is again in charge of the company's affairs after two years' absence on account of ill health.

EDWARD MCGIVERN, master mechanic on the Chippawa-Queenston development of the Hydro-Electric Power Commission of Ontario, has resigned to accept a position as Superintendent of Works, Section 2, Welland Canal.

A. G. DALZELL, consulting engineer of Vancouver, has accepted a temporary appointment under Mr. Thomas Adams, to investigate town planning and housing schemes in the western provinces, starting at Victoria and working east.

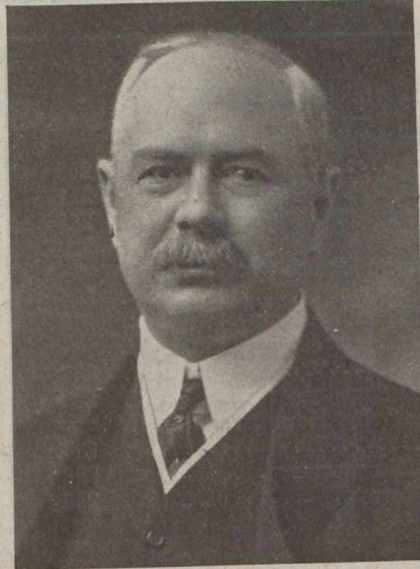
J. K. THOMAS and W. S. McDONALD, both of Calgary, Alta., have been nominated by the Calgary Board of Trade and Calgary Builders' Exchange as two of the four members who will represent Calgary on the National Council of the Association of Building and Construction Industries.

L. B. BEALE, formerly Eastern Lumber Commissioner for British Columbia, has been appointed H. M. Trade Commissioner for Western Canada by the Department of Overseas Trade (Development and Intelligence). Mr. Beale, who has been in England, will return to Canada within a month and in about two months will open offices in Winnipeg. His territory for the present will be from Fort William to the Pacific coast. Fred W. Field is trade commissioner in Ontario as far west as Fort William, and G. T. Milne is commissioner-general for Canada and Newfoundland, with headquarters at Montreal.

COL. C. H. MITCHELL will be Dean of the Faculty of Applied Science of the University of Toronto, according to an announcement made last Saturday by President Falconer. Col. Mitchell will succeed Dean Ellis, who is about to retire under the decision of the Board of Governors to pension professors at the age of 65. Senior member of the Toronto consulting engineering firm of C. H. & P. H. Mitchell, Col. Mitchell enlisted at the outbreak of war and soon became

head of the Intelligence Department of the second British army. After long service in France and Flanders, he was transferred to Italy, where he was in charge of similar work for the British Expeditionary Force to Italy. He has been mentioned in despatches a number of times and has been awarded the D.S.O., the French Legion of Honor, the Belgian Order of Leopold, the Croix de Guerre and the decoration of the Order of the Crown of Italy.

ARCHIBALD WILLIAM CAMPBELL, who is likely to be appointed by the Dominion government as Good Roads Commissioner to administer the Federal aid fund for the construction of highways, was born in 1863 in Wardsville, Ont., and was educated at the St. Thomas high-school. He afterwards studied surveying, acquiring the O.L.S. degree. From 1885 to 1891 he was engaged in surveying work in Western Ontario. In 1891 he became city engineer of St. Thomas,



Ont., which position he occupied for five years, during which time he carried on an aggressive agitation through the technical press for the betterment of country roads. In 1896 he was appointed Good Roads Commissioner of Ontario, and four years later became Deputy Minister of Public Works for the Province of Ontario. In February, 1910, Mr. Campbell went to Ottawa as Deputy Minister of Railways and Canals and chairman of the Government Rail-

way Management Board. While he was Deputy Minister of Public Works of Ontario, Mr. Campbell was a member of the Ontario Toll Roads Commission, and in 1909 was provincial delegate to the Good Roads Congress at Seattle. He became a member of the Canadian Society of Civil Engineers in 1888 and in 1910 was a councillor of that society. He is the author of many reports on roads and streets which have been quoted by the English press and reproduced by the German government. He has lectured on "Good Roads and Public Welfare," and was popularly known as "Good Roads" Campbell, as it was very largely owing to his untiring efforts that the good roads movement secured such an impetus in Ontario during the last few years of the past century. The "Ottawa Journal" recently said of Mr. Campbell that the good roads movement had suffered a serious loss when he was made Deputy Minister of Railways and Canals at Ottawa. "Better highways are for him almost a religion," says the "Ottawa Journal," "and in the field to which he has returned, he can serve the country better than anyone else we can think of. It is well that Mr. Campbell's exceptional experience and interest in the subject are to be turned to the advantage of the country as a whole. The good roads development must be carried out on an orderly and progressive program, and Mr. Campbell's appointment will insure this. Mr. Campbell is now preparing for submission to the government a report on the subject of highway construction in the Dominion. In it he will advise as to the best methods of obtaining the required co-operation between the federal and provincial authorities, and will recommend the adoption of legislation necessary to secure greater uniformity."

It is understood that the Canadian Pacific Railway contemplate making some improvements to their terminals at Vancouver. A new ocean pier will be constructed, and the necessary studies of the site are now being made, after which the work of dredging and filling will be immediately started.