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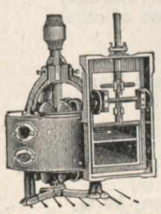

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WEEKLY

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TORONTO, CANADA, APRIL 2, 1909.

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AN ACT TO MAKE CIVIL ENGINEERING A CLOSED PROFESSION IN PENNSYLVANIA.

During the past few months several of the American States have been considering the question of making engineering a closed profession. The Bill before the Pennsylvania Assembly is typical of Bills being considered by other States.

The terms "civil engineer" and "civil engineering" as employed in these Bills are very wide in their interpretation, and mean that branch of engineering which relates to the construction or care of roads, bridges, railways, canals, aqueducts, harbors, drainage, and sewage works. It does not appear to be so wide, though, as the term used in Canada, which also includes the mechanical and elecrical engineer.

Should this bill become law, the Lieutenant-Governor-in-Council will have power to appoint a civil engineering council, which shall supervise and pass upon the official actions of the board of examiners, and shall issue all licenses for civil engineers, prefer charges for dismissal for incompetency, dishonesty, etc. The board will be under the control of the Government, and shall be composed of men recognized in the profession as having had at least seven years' standing as engineers or holding positions as professors in an engineering college.

Each applicant for license as a civil engineer shall be examined in writing upon such subjects as the board of examiners may deem necessary, and, upon a favorable report from the board of examiners and the council of civil engineers, the license shall be granted allowing him to practise within the State. It will be noted that persons holding certificates of proficiency in civil engineering from any college or university within the State and recognized by the council shall not be required to take the examinations. Suitable regulations and penalties for the enforcement of the Act are provided.

Although this Act will make engineering within the State a close corporation, it does not place the control of the membership in the hands of the profession. That will remain with the State. The great weakness of the measure, as we see it, is not that it does not protect the profession, but rather that it will build up a large number of separate organizations, and make very limited, indeed, the number of men of experience and training from which a selection may be made by those requiring the services of an eminent engineer. It would be an unhappy day for the profession in Canada and for the community at large were it ever to transpire that the engineers in a Province should be compelled to confine their efforts to the work within the Province, or to be under the necessity of belonging to nine separate organizations.

The working out of these new measures in the American States will be watched with considerable interest by the profession in Canada.

THE McCHARLES PRIZE.

As yet, in Canada, the prizes for research work have been very limited, both in number and value. As the country becomes more wealthy, the process of methods more refined, and the competition keener, the necessity for greater improvement and greater refinement will become apparent, and it is to be expected that corporations and individuals, both from selfish motives, and

because of the love they have for the work in which they are interested will be more generous in their encouragement and more liberal in their reward to those who seek to perfect present processes or invent and devise new appliances, or who in any way add to the scientific knowledge of the country.

The most important reward that will be made during 1909, of general interest, will be the McCharles prize, valued at one thousand dollars. The late Æneas McCharles was most liberal in his scheme, and has made it possible for not only students of our colleges, but also self-trained men who, through years of experience, have schooled themselves to observe carefully. The one who invents or discovers a new or improved process for the treatment of Canadian ores or minerals, and can prove that his invention has special merits on a practical scale, will have first claim on the award. Should the committee on award not be satisfied with the suggestions that come under this class they may devote the money to the inventor of a device which will lessen danger or loss of life in connection with the use of electricity in supplying power and light. Or it may be used as their recognition of a specially meritorious scientific research in any useful, practical field.

It is to be hoped that this prize will be so awarded, and the results from these inventions or suggestions of such practical value that others will be encouraged to make similar endowments. It is all very well to work for the love of working, but this is an expensive pastime, and frequently the man who brings forward the most useful suggestions finds himself robbed not only of the financial efforts which his efforts should command, but also of the honor which all delight in attaining, of having brought forward something that will better the condition of his fellows.

This prize will assist in singling out those who, because of their meritorious work, are entitled not only to reward, but recognition.

CHARLES HENRY CHALLENOR WRIGHT.

Some people are so unfortunately constituted that they do not seem able to remember pleasant, agreeable things. The uncharitable and disagreeable so dominate their lives that the happy experiences are forgotten or crowded out.

Not so with the body of men, the past presidents of the Engineering Society of the Faculty of Applied Science of Toronto University, who met in Toronto this week to do honor to C. H. C. Wright, B.A.Sc., Professor of Architecture in the Faculty of Applied Science of Toronto University. In their college days they recognized, and have since remembered, the man who, with unfailing good temper, willing always to do his share of the work, and more, ever ready with a word of congratulation, encouragement or "ginger," inspired, and, by his kindly interest, made pleasant and profitable their year of responsibility as presidents of the students' organization.

Charles Wright was born on shipboard in Chelsey Harbor, Massachusetts, in 1864, and spent his boyhood days in the fishing town of Digby, Nova Scotia. From here he moved to Kingston, Ont., where he spent three years in the public schools. In 1880 he entered the Pickering College, and under its principal, J. E. Bryant, received his mathematical inspiration.

In the fall of 1885 he registered in the department of civil engineering at the School of Practical Science, Toronto. As a student he was successful both in the athletic field and in the examination hall, securing more first places than any other two men of his year.

With his classmates he was popular, and was elected to the highest position in the gift of the Engineering Society. His field experience, since graduation, was secured with a Boston firm of building contractors, with whom he rose to the position of chief of the estimating staff.

But his work seemed to be academic, and in 1890 he joined the staff of the School of Practical Science as lecturer in architecture. By constant thought, continual study and unfailing industry he became an authority on materials of construction and on design.

It was not to Wright, the student or the college professor, that these men assembled to do honor, but to Wright, the man and the friend of every graduate of the Faculty of Applied Science. For eighteen years he has planned a work and organized. He has studied methods, and studied men, and studied the situation. He has made himself familiar with the conditions in the schools below, in faculty, in the university at large, and in the profession; has weighed carefully the situation, and, having decided on the proper course, has the sand and the staying power to maintain his stand.

All these labors and preparations were undertaken not for selfish reasons, but because he had vision and faith in the future of his profession and of this young country, that conditions were changing rapidly, and that new policies must be devised to meet the new problems.

The honor done Mr. Wright struck a responsive point of contact among the graduates of his alma mater and in the public mind, and many kindly thoughts and messages will be sent in his direction, for men realize that, removed from the grinding routine and petty annoyances of clerical work, he is a bigger man; he grows.

EDITORIAL NOTES.

The building permits issued in Toronto for last week amounted to $454,500 in value. They consisted of 120 dwellings, to cost $374,500, an average of $3,120 each; 20 stores, or composite stores and dwellings, $63,000; one apartment house, $17,000.

* * * *

With the opening of spring and the likelihood of a busy year in construction and building, materials of construction are much firmer in price than they were a month ago. In fact, in almost every instance prices have advanced, and a further advance is imminent. We would suggest to the buyer that he very quickly get close to the salesman, for it is a rising market.

* * * *

To assist in securing complete and reliable information the Forestry Branch of the Department of Interior, Ottawa, are sending out circulars, expecting the limit owners and mill men to return careful estimates of the lumber manufactured or pulp-wood used. They also are seeking returns from the railway companies as to the number of ties used annually. The publication of the compiled results will draw attention to our timber resources, and will educate the public to the necessity of actively supporting Federal and Provincial Forestry Departments.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

Notice is hereby given that under the provisions of the Dominion Lands Surveys Act, the Board of Examiners for Dominion Land Surveys will meet on Saturday, the first day of May, 1909, and hold examinations of candidates for admission as articled pupils or for commissions as Dominion Land Surveyors, at Ottawa, Toronto and Kingston, in the Province of Ontario, at Montreal, in the Province of Quebec, at Winnipeg, in the Province of Manitoba, and at Calgary and Edmonton, in the Province of Alberta.

F. D. HENDERSON,
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RAILWAY EARNINGS AND STOCK QUOTATIONS

NAME OF COMPANY	Mileage Operated	Capital in Thousands	Par Value	EARNINGS Week ending Mar. 27		STOCK QUOTATIONS TORONTO				MONTREAL				
				1909	1908	Price Mar 26 '08	Price Mar. 18 '09	Price Mar. 25 '09	Sales Week End d Mar25	Price Mar 26 '08	Price Mar. 18 09	Price Mar. 25 '09	Sales Week End d Mar25	
Canadian Pacific Railway	8,920.6	$150,000	$100			149	148½	167	166½ 15	149	148	167¾	167⅛ 168	167½ 805
Canadian Northern Railway	2,986.9													
*Grand Trunk Railway	3,568.7	226,000	100							*1st. pref.105½. 3rd pref. 47⅜, ordinary 19¾				
† T. & N. O	305	(Gov. Road)		27,567	15,091									
Montreal Street Railway	138.3	18,000	100	66,275	63,996					185½	184⅞	206½	206¼ 208	207 403
Toronto Street Railway	114	8,000	100	66,739	62,024		120	120⅝	261	98½	97⅛	119½	118½ 120¾	120¼ 735
Winnipeg Electric	70	6,000	100			146	144	169	166 2	145½	145			

* G.T.R. stock is not listed on Canadian Exchanges These prices are quoted on the London Stock Exchange. † One week late.

STATEMENT OF RECEIPTS AND EXPENDITURE PER MILE FOR PROVINCIAL RAILWAYS COMPARED WITH THE INTERCOLONIAL RAILWAY.

Name of Railway.	Mileage.	Total Receipts and Expenditures, 1908. Receipts.	Operating Expenses.	Net Receipts.	Receipts and Expenditure, per mile, 1908. Receipts.	Operating Expenses.	Net Receipts.
Provincial.							
Cape Breton Ry. Co.	31	$ 7,997 91	$ 17,126 21	*-$ 9,128 30	$ 258 00	$ 552 46	*-$294 47
Cum. Ry. & Coal Co.	32	96,061 60	68,501 69	27,559 91	3,001 92	2,140 68	861 24
Halifax & S. W. Ry.	372	387,185 06	384,981 15	2,203 91	1,040 82	1,034 90	92
Inverness Ry. & Coal Co.	61	210,112 94	114,565 96	95,546 98	3,444 47	1,878 13	1,566 34
Mar. Coal, R. & Power Co.	12	36,640 01	23,843 97	12,796 04	3,053 34	1,987 00	1,066 34
N. S. Steel Co.'s Railway.	12.5	5,033 69	11,841 90	*- 6,808 21	402 70	947 35	*- 544 65
Sydney & Louisburg Ry.	39	418,692 08	405,888 28	12,803 80	10,597 12	10,273 05	324 07
Intercolonial Railway	1,448	9,173,558 80	9,157,534 53	16,122 27	6,332 62	6,321 49	11 13

*Indicates deficit.

THREE NEW RAILROADS

Seek Incorporation in Nova Scotia—Grand Trunk Pacific Cost and Construction to Date.

(The Monetary Times.)

The bill for incorporation of the Yarmouth and Digby Electric Railway has received its second reading in the Nova Scotia House. It seeks power for the construction, acquiring, maintaining and operating an electric tramway or railway from the northern limit of the town of Yarmouth, through the County of Yarmouth and through the County of Digby to the village of Bear River.

The incorporators are: Blake G. Burrill, Bowman B. B. Law, Israel M. Lovett, Irvine A. Lovett, of Yarmouth; Jas. A. Dickey, F. Blanchard McCurdy, Hon. Benjamin F. Pearson, and Hon. Ambrose H. Comeau, of Meteghan River.

The Sydney and East Bay Railway Company seeks incorporation in Nova Scotia. The incorporators are: Thomas Cozzlino, J. C. Larder, and J. B. McCormack. The objects of the company are for the construction, acquiring, owning, maintaining and operating an electric tramway, or a tramway or railway operated by any other motive power, from the limits of the City of Sydney to the headquarters of East Bay in the County of Cape Breton, with power to extend the road through Districts No. 8 and 13 in the Cape Breton County, with power also to build branches or spur lines.

Proposed Capital is $500,000.

The capital stock of the company will be $500,000, divided into 5,000 shares of $100 each, with power given to directors of the company to increase the capital stock to a sum not exceeding $1,000,000.

The municipality of the County of Cape Breton may give aid to the railway not to exceed the sum of $2,000 per mile for a mileage not to exceed seventeen miles, and the County of Cape Breton may further assist the company by paying one half the cost of the right-of-way paid by the company for lands over which the railway will run other than the public highway.

The company shall not commence business until 50 per cent. of the stock has been subscribed and 25 per cent. of such subscription paid up.

Incorporation of the Yarmouth and Eastern Railway Company is sought in the Nova Scotia Legislature. The bill asks for power to lay out, construct, build, equip, own and operate a line of railway, either by steam, electricity, or any other motive power, from a point, in or near the town of Yarmouth, in the County of Yarmouth, thence to a point at or near Tusket Wedge, in the County of Yarmouth, and such other branch lines as may become necessary as feeders for the main line above described. That portion of the company's lines within the limits of the town of Yarmouth shall be built and operated only by permission of, and agreement with the Yarmouth Street Railway Company, Ltd., a company at present operating within the town of Yarmouth.

Company Have Wide Powers.

The capital stock of the company will be $100,000, divided into shares of $100 each. The directors will have power to increase the capital stock to any sum not exceeding $250,000, by the issue of new shares, such increase and issue to be subject to the consent of a majority vote of the shares of the company, represented in person or by proxy, given at a meeting called for that purpose, or at any annual general meeting of the shareholders and the approval of the Governor-in-Council.

The company may make or construct roads, railroads or tramways, under and across any road, railroad, and may furnish electric lighting and power to any towns or villages along the line of the propsed railway not now supplied with electric lighting by any person or company.

The incorporators are: Blake G. Burrill, broker; Bowman B. Law, merchant; both of Yarmouth; and James A. Dickie, civil engineer, Halifax.

C.T.P., Cost of Construction to Date.

For the nine months ended December 31, 1908, the total expenditure on the Winnipeg-Moncton section of the National Transcontinental was $18,866,212, or a total expenditure to that date of $45,924,156. Miles of grading completed was 668, and the total miles of track laid 309; 6,905 tons of steel structures, such as bridges and viaducts, have been completed. Contracts for 80-pound steel rails awarded were 174,318 gross tons. Of these contracts 105,695 gross tons went to the Dominion Iron and Steel Company, and 69,123 to the Algoma Steel Company. The section between Winnipeg and Fort William, branch line of the G.T.P., Company, has been nearly completed, and the line will permit of operation in September next. This section will likely be in readiness to assist in moving this year's crop to the lakeboard. There are vast tracks of arable land along the line of the railway.

West of Winnipeg the following lines have been constructed:—Winnipeg to Battle River, 683 miles; grading and bridging complete; track laid over whole distance with suitable sidings at each station. 92 miles having a full lift of ballast, 502 with first lift and 89 miles a skeleton track with no ballast.

On the mountain section, 100 miles from Prince Rupert easterly, is under contract. Fair progress is being made, the grading being composed of solid rock; 1,850 men and 90 horses are employed. The force will have to be increased if the work is to be finished in reasonable time.

The C.P.R. will place orders at the Esquimalt shipbuilding yards, for two and possibly three modern steamers for the Pacific coast trade. Their speed and capacity will suit them for any route between Seattle and Alaska.

Bonded Debt of Radials. ..

When the bill respecting the South-Western Traction Company came up before the Ontario Railway Committee of the Legislature this week a clause therein was found to give power to issue bonds to the extent of $33,000 per mile. Hon

Dr. Reaume stated that the Ontario Government has decided that $25,000 per mile is quite enough bonded debt for any radial railway to incur.

Sir James Whitney on Wednesday told a deputation from Northern Ontario that the Ontario Government recognized that the Canadian Northern is not a speculative enterprise. "It is in existence, in operation. Whether we will consider it our duty to do something to aid in bringing on the bona find development of the great North is a matter upon which I am not yet prepared to make a statement. I may say that it is not a case of policy alone, but consideration upon its merits."

Mr. William Mackenzie, in an interview this week, stated that he has had before the Ontario Government for some time a proposition to secure 7,500 acres and $3,000 a mile for constructing the Canadian Northern from Sudbury to Port Arthur. The Government, he added, want the clay belt to the north between Sudbury and Lake Superior opened up.

ENGINEERING SOCIETIES.

ALBERTA ASSOCIATION OF ARCHITECTS.—President, R. Percy Barnes, Edmonton; Secretary, H. M. Widdington, Strathcona, Alberta.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS (TORONTO BRANCH).—W. H. Eisenbeis, Secretary, 1207 Traders Bank Building.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, H. L. Holman; Secretary, Calvin W. Rice.

ARCHITECTURAL INSTITUTE OF CANADA.—President, A. F. Dunlop, R.C.A., Montreal, Que.; Secretary, Alcide Chaussé, P.O. Box 259, Montreal, Que.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.—President, E. Grandbois, Chatham, Ont.; Secretary, W. A. Crockett, Mount Hamilton, Ont.

CANADIAN CEMENT AND CONCRETE ASSOCIATION.—President, Peter Gillespie, Toronto, Ont.; Vice-President, C. F. Pulfer, London, Ont.; Secretary-Treasurer, Alfred E. Uren, 62 Church Street, Toronto.

CANADIAN ELECTRICAL ASSOCIATION.—President, N. W. Ryerson, Niagara Falls; Secretary, T. S. Young, Canadian Electrical News, Toronto.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION.—President, J. F. Demers, M.D., Levis, Que.; Secretary, F. Page Wilson, Toronto.

CANADIAN MINING INSTITUTE.—Windsor Hotel, Montreal. President, W. G. Miller, Toronto; Secretary, H. Mortimer-Lamb, Montreal.

CANADIAN RAILWAY CLUB.—President, L. R. Johnson; Secretary, James Powell, P.O. Box 7, St. Lambert, near Montreal, P.Q.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, Geo. A. Mountain; Secretary, Prof. C. H. McLeod. Meetings will be held at Society Rooms each Thursday until May 1st, 1909.

QUEBEC BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, L. A. Vallee; Secretary, Hugh O'Donnell, P.O. Box 115, Quebec. Meetings held twice a month at Room 40, City Hall.

TORONTO BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—96 King Street West, Toronto. Chairman, J. G. G. Kerry; Secretary, E. A. James, 62 Church Street, Toronto.

CANADIAN SOCIETY OF FOREST ENGINEERS.—President, Dr. Fernow, Toronto; Secretary, F. W. H. Jacombe, Ottawa.

MANITOBA BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, H. N. Ruttan; Secretary, E. Brydone Jack. Meets first and third Friday of each month, October to April, in University of Manitoba.

CANADIAN STREET RAILWAY ASSOCIATION.—President, J. E. Hutcheson, Ottawa; Secretary, Acton Burrows, 157 Bay Street, Toronto.

CENTRAL RAILWAY AND ENGINEERING CLUB.—Toronto. President, C. A. Jeffers; Secretary, C. L. Worth.

DOMINION FORESTRY ASSOCIATION.—President, Thomas Southworth, Toronto; Secretary, R. H. Campbell, Ottawa.

DOMINION LAND SURVEYORS.—Ottawa, Ont. Secretary, T. Nash.

ENGINEERS' CLUB OF TORONTO.—96 King Street West. President, A. B. Barry; Secretary, R. B. Wolsey. Meeting every Thursday evening during the fall and winter months.

MANITOBA LAND SURVEYORS.—President, Geo. McPhillips; Secretary-Treasurer, C. C. Chataway, Winnipeg, Man.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, J. H. Winfield; Secrttary, S. Fenn, Bedford Row, Halifax, N.S.

ONTARIO LAND SURVEYORS' ASSOCIATION.—President, Louis Bolton; Secretary, Killaly Gamble, 703 Temple Building, Toronto.

WESTERN CANADA RAILWAY CLUB.—President, Grant Hall; Secretary, W. H. Roseberry, Winnipeg, Man.

WESTERN SOCIETY OF ENGINEERS.—1735 Monadnock Block, Chicago, Ill. Andrew Allen, President.

BRIDGE TENDERS.*

In asking for tenders there is certain information which should be given, in order that bridge companies may be in a position to prepare their estimates properly and on a uniform basis. Much confusion of tenders results through lack of definite requirements and specifications, without which a proper comparison of tenders is impossible. An advantage is thus apt to be given to the company tendering for the weakest and least durable bridge. The following particulars should be given as fully as possible:—

(1) The specifications in accordance with which the bridge is to be erected.

(2) The length of bridge or of each span from centre to centre of bearings, or from face to face of abutments or piers.

(3) The clear width of roadway required.

(4) The live loads for which the trusses and flooring system are to be designed.

(5) The kind of floor to be used.

(6) The nearest railway stations, and length of haul to the site of the bridge.

(7) The character of the river bed, depth of water, speed of current, and height from bed of river to floor of the bridge.

(8) The style of bridge to be erected if there is any preference in respect of kind and height of trusses, riveted or pin connections.

(9) If the bridge is skewed, the necessary angles should be given.

(10) The number and size of piers, if any.

(11) Number and width of footwalks, and kind of handrails.

(12) When the work is to be completed.

(13) Time to which tenders will be received, and to whom they must be addressed.

* From the Ontario Highway Commissioners' Report for 1909.

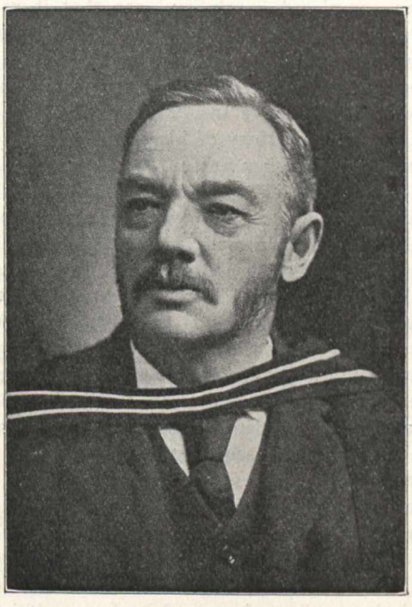
The average cost per train mile in 1907-8 not including interest, just wages and material, on the leading railways of Canada, was as follows:—

	1907.	1908.
All Canada	1.381	1.364
Canadian Pacific Railway	1.45	1.493
Canadian Northern Railway	1.551	1.480
Grand Trunk Railway System	1.267	1.154
Temiskaming & Northern Ont. Ry.	1.599	1.592
Intercolonial Railway	1.193	1.295

THE ENGINEER AND HIS WORK.*

John Galbraith, M.A.

Custom in this Society demands of the retiring president, whether wisely or otherwise it is not for me to say, an address at the close of his term of office. Fortunately for him no by-law exists governing either the form or matter of his essay. He is not required to confine himself to the third person, and has all the freedom implied in the declaration, printed in every volume of the "Transactions," that "the Society will not hold itself responsible for any statements or opinions which may be advanced in the following pages." Answerable thus to no one and confined only by my natural limitations, I jotted down from time to time, by way of gathering material, ideas as they occurred to me. When a sufficient number had accumulated to enable me to form a judgment of their suitability for the purpose in view, I was dismayed to find that my stock was shopworn, and that it would not be an easy task to work it into presentable shape. However, it was then too late to throw it away. After a period of severe reflection I convinced myself that it might



John Galbraith, LL.D.

be of some value to the younger members of the profession, and that even the seniors might be interested in the viewpoint of an engineering teacher, differing as it does in many respects from their own. I decided, therefore, to form my material into a paper under the somewhat hackneyed title of "The Engineer and His Work."

It will be unnecessary to recite to an audience of engineers in any minute detail the various fields of activity now open to the profession. It may be useful, however, to attempt a classification of the functions of the engineer irrespective of the special branch in which he may be engaged. They may be roughly analyzed as follows:—

1. Design—the preparation of the drawings, specifications and estimates of cost for works not yet in existence—the study of the problem, the devising of ways and means; in short, the consideration of all questions affecting the construction and efficiency of the contemplated work.

2. Survey and inspection—making the examination of existing works or ground for the purpose of determining necessary extensions and changes, laying out new work, measuring work done, inspection of materials and workmanship, and generally, the superintendence of construction.

3. Superintendence of the operation and maintenance of works in running condition.

4. Determining and estimating costs of various kinds.

5. Reporting upon various physical and financial features of existing or proposed works.

To successfully perform these functions the engineer must have knowledge, training, experience, judgment, resourcefulness, business capacity and ability to deal with men; in fact, the qualifications which are necessary for success in any line of life. It goes without saying that he should be an educated man in the best sense of the term. It has sometimes been said that the engineer should be forty per cent. engineer and sixty per cent. man; one might better say that he should be one hundred per cent. engineer and one hundred per cent. man, the terms engineer and man not being, it is to be hoped, mutually exclusive. It is necessary that he should have a thorough grasp of the objects and methods of the promoters and proprietors of the works on which he is engaged, and be quick to discern where expense may be saved, keeping the necessary efficiency in view. It is not requisite that he be an expert mathematician, chemist, physicist, geologist, biologist, metallurgist, mechanic, accountant, lawyer or political economist, but it is desirable that he be an expert engineer. For this purpose he should have a sound acquaintance with the principles and possibilities of various branches of specialized knowledge in so far as they bear upon his own work. In other words, he should have a clear perception of how and how much these branches may aid him in his own problems, and be able to determine at any time to whom he should go when his own knowledge is insufficient. He must know the limitations of his own profession, and, therefore, should know something of the fields which surround his own. Often it happens that some particular fence has almost disappeared, and it becomes difficult to determine where the engineer ends and the neighboring proprietor begins. Indeed, it may be said that the fences are continually changing, so that the engineer never can hope to be in the position of not requiring to study non-engineering things. The training to be given in the engineering schools should deal more with subjects which are not engineering than with those which are, the reason being that the time for such training is short, whereas that to be devoted to engineering is long. Above all, the curriculum should be educative, the student should be trained in clear thinking and in clear expression. When he graduates he should have acquired a sufficient knowledge of his geography to have some idea of where he is in the world in general and in the engineering world in particular. It is now recognized that the study of the applied sciences has all the educational advantages usually attributed to that of the pure sciences. They involve the same principles, exercise the same faculties and produce the same educational results as the pure sciences. The fact that their objects are wholly economic does not detract from their educational value, but provides an additional stimulus to scientific effort. The term "applied science," at one time suitable, is now rather misleading in connection with the science taught in the engineering schools. It suggests the idea that the business of the teachers in these schools is to train their students in the application to practical purposes of pure science. This is far from being the truth. The necessities of the practical world have developed great bodies of science with which the investigators in pure science are more or less unacquainted, and are unable to take part in, either in the way of investigation or teaching, on account of the natural limitations of time, opportunity and taste. The term "practical" better described the engineering and technical sciences, and the term "applied" should be discontinued in this connection. The practical sciences are taught in the engineering schools, and are applied by the engineer in his work. The teachers of practical science should keep in touch with the requirements of engineers and manufacturers, and not develop merely into laboratory investigators, following their own lines of thought, indifferent to where these may lead. This is right and proper in the region of pure science, but those engaged in practical science must deny themselves the pleasures of unrestricted freedom. They cannot afford to soar too long in the clouds, but must return again and again to earth. They must never

* Abstract of an address by Dean Galbraith, retiring president of the Canadian Society of Civil Engineers, delivered at the annual meeting of the Society in Toronto, January 27th, 1909.

forget that their only reason for being is the assistance they give as educators or investigators to the actual workers in the industrial fields. It is essential for the success of their be profitably taught in a school, but in order that they may work that they should be officially independent of the teachers in pure science in the university organization. They should have experience in engineering work, not for the purpose of teaching it, for there is little engineering which can be able to properly direct their true work, the teaching and investigation of practical science.

The engineer is not simply an applier of the sciences. He comes into contact with men as well as with things. He should understand the principles underlying commerce and finance, company organization, cost keeping and accounts. A financial statement ought not to be a mystery to him, nor a railway report past understanding. He should have, at least, as clear a conception of the meaning of a contract as the lawyer who drafted it. He should be able to write a report in clear and expressive English. The engineering schools are beginning to understand that these subjects are not altogether above and beyond them, nor yet beneath them. It is true that an expert business man cannot be trained in a school; no more can an expert engineer. Business science, however, can be taught just as successfully as chemistry or physics. Business men are said to have a prejudice against academic training in business. Engineers once had a similar prejudice against engineering schools. With a better understanding of their field on the part of the schools will come a better appreciation on the part of the business man. The schools should devote their energies to the teaching of principles. The teaching of practical methods should be chiefly for the purpose of making the connection between theory and practice, thus clarifying and impressing the principles on the student's mind.

One of the most difficult subjects in the curriculum is English. It should not be taught as are French and German for the purpose of giving the student access to its literature, engineering or otherwise. Students can, as a rule, get the information they want from English books without the aid of a professor of English. The object in teaching English in the engineering school should not be to give the student a grasp of the principles underlying the formation of words and sentences. It should be assumed that his high school training in grammar is sufficient for this purpose. The instruction most necessary under present conditions is training in the use of the language. However, there may be a better way. There does not seem to be any good reason why the course of instruction in English in this country should not be turned end for end. Why should not the secondary school teach the boy to use his mother tongue and the university teach grammar?

One of the dangers to be avoided in the academic course of the engineer is over-specialization. It should be remembered that the graduate does not always find work in the branch to which he has devoted his four years of academic life. If his course, therefore, has not included a reasonable number of subjects more or less common to all branches of engineering he will have good cause of complaint against the educational authorities. A properly educated graduate ought to be able by his own reading to adapt himself to any situation wherein he may be placed. A broad education is the best preparation for specialization in after life.

The academic requirements for young men entering the profession would be better determined by the discussions of practising engineers than of any other body of men, and yet they seem to have little or nothing to say on the subject. There seems to be something in the work of the engineer which suppresses talk, even useful talk. This is very well in a way, but may be carried too far. Engineers ought not to hide their light under a bushel and expect the world to reward them for their silent work's sake. The world is too busy a man to study engineering, and would, perhaps, take more interest in engineers if they were to take the trouble to explain things. However, this disability is probably on the decrease, owing to the influence of the engineering schools; and engineers are not as silent as they once were. They show signs of awakening, and will not long be content to act simply as advisers or scientific hired men, indifferent to the big world as long as they get their pay. The engineer of the future will force his ideas of engineering education on the public and force them more effectively than his predecessors of the past and present.

The engineer should have a thorough knowledge of the materials with which he has to deal. The laboratory investigations of the chemist, the physicist and the biologist have added greatly to the store of knowledge at his disposal. Laboratory results, however, often require modification, inasmuch as the artificial conditions surrounding them may differ essentially from the conditions of practical work. Thus it is not sufficient to accept materials of construction simply because they have passed the specified short time tests. The engineer should know in addition as much as possible of the history of his materials, their sources, methods of manufacture, modes of growth, etc.; without this knowledge the rapid examinations in the laboratory and testing-room may altogether fail in their purpose of excluding unsuitable materials. Similarly in construction, it is not sufficient to examine the completed work and see that it complies with certain specified final conditions. It is necessary to watch the whole process of manufacture and construction from the beginning to the end. In other words, no short-time tests or inspection will relieve the engineer from the necessity of knowing the whole history of his materials and construction. It is this fact which has forced on the profession what one may call standardized materials and methods of construction developed from experience. New materials and new processes are wisely looked upon with distrust, and can achieve success only after a long period of trial. The life of a structure or machine is not only shortened by imperfections of material and workmanship and the corroding action of the elements, but by being subjected to heavier service than was anticipated in the original design. The engineer must, therefore, combine the functions of the prophet and the actuary and decide to what present expense it is worth while going in view of future contingencies.

There is more or less doubt in the minds of engineers as to the degree to which details of workmanship, manufacture, modes of construction, materials, etc., should be covered in their specifications. The only answer is, "that depends." Where in these respects standardization has taken place and the engineer knows that the results are good, the task of specifying is comparatively simple. Much may be left to the contractor and manufacturer. Where, on the contrary, customary methods and materials are not appropriate to the work, the specifications of the engineer must be given in greater detail. Thus, between the extremes of simply specifying the results desired, leaving methods and materials to those who do the work, and specifying how everything is to be done and the actual materials to be used there is wide latitude, and the medium to be adopted in every case depends largely on the general conditions of available manufacturing and contracting skill and capacity. Whatever may be the degree of detail to which he may carry his specifications the engineer cannot be relieved from the obligation of being well acquainted with the current practice of manufacturing and contracting firms and with the materials with which he has to deal, whether they be materials of construction or obstruction. The young graduate can have no better position in which to gain experience than that of contractor's engineer.

It would be well for specifications to cover not only the work to be performed by the contractor, but also the data and assumptions underlying the engineer's project. While not absolutely necessary for the prosecution of the work, such information would be useful to the profession and for future reference, not to speak of its effect upon the engineer himself in increasing his sense of responsibility. The different classes of drawings referred to in the contract should be carefully defined in the specifications, otherwise ambiguities and uncertainties in interpretation will arise. Drawings may be looked upon as a species of shorthand, invented to save words, time and expense, and the engineer should be an expert in reading drawings, and in writing them in

such a way as to convey his exact meaning. Correct drawings and correct English both imply a competent knowledge of the subject of which they are the expression.

The engineer should know the cost of the work done under his supervision, not merely the cost to the proprietor, for that goes without saying, but also, as far as possible, the cost to the contractor. Not only should he keep in touch with the labor market, but he should take an interest in the physical and social welfare of the men under his charge. They should look upon him as a friend and not as an impersonal being, concerned only in the results of their work. As between the contractor and the proprietor he must occupy the position of an impartial judge, and not that of an advocate. The more thoroughly he knows his work the better able will he be to do his duty in this respect, and to retain the confidence of both parties. His knowledge of law and business should be sufficient to enable him to act harmoniously with those in charge of the legal and commercial interests connected with his work. In fine, he must be a many-sided man, thoroughly acquainted with his own side of the work and able to co-operate with all sorts and conditions of men.

Engineers are naturally divided into classes according to the special nature of their work. For the purpose of mutual improvement in their specialties these classes form societies, of which the main features are the reading of papers, the interchange of ideas and the extension of personal acquaintance. While these societies do a vast amount of good within their own spheres they are not capable of dealing with the question of the improvement of the engineering profession as a whole. The Canadian Society of Civil Engineers was formed in 1887 with this object. The charter reads: "The Canadian Society of Civil Engineers having for its objects and purposes to facilitate the acquirement and interchange of professional knowledge among its members, and more particularly to promote the acquisition of that species of knowledge which has special reference to the profession of civil engineering; and further, to encourage investigation in connection with all branches and departments of knowledge connected with the profession," etc.

The second by-law reads: "The term Civil Engineer as used in this Society shall mean all who are or have been engaged in the designing or constructing of railways, canals, harbors, lighthouses, bridges, roads, river improvements or other hydraulic works, sanitary, electrical, mining, mechanical or military works, or in the study and practice of navigation by water or air, or in the directing of the great sources of power in nature for the use and convenience of man."

It must be confessed after an existence of twenty-one years that the Canadian Society has not succeeded in gaining recognition by the various classes of engineers in the country as the representative and authoritative engineering society. Even in England the term "civil engineering" has not gained full recognition as embracing all branches of the profession.

The "New English Dictionary," edited by Sir James Murray, and recognized as one of the greatest authorities on the language, gives among others the following definitions of the word engineer:—

"2b. One who designs and constructs military works for attack or defence.

"3. One whose profession is the designing and constructing of works of public utility, such as bridges, roads, canals, railways, harbors, drainage works, gas and waterworks, etc. From 18th century also civil engineer, not in Johnson 1775 or Todd 1818. The former has only the military sense, to which the latter adds 'a maker of engines,' citing Bullokar.

"In the early quotations the persons referred to were probably by profession military engineers, though the works mentioned were of a 'civil' character. Since 2b. has ceased to be a prominent sense of engineer the term 'civil engineer' has lost its original antithetic force, but it continues to be the ordinary designation of the profession to which it was first applied, distinguishing it from that of mechanical engineer. Other phraseological combinations, as electric, gas, mining, railway, telegraph engineers are used to designate those who devote themselves to special departments of engineering."

The same tendency to restriction of the term "civil engineer" exists in Canada and the United States not only among the public, but in the profession as well. In all the great engineering schools this tendency is reflected.

The question now arises, Is it worth while to expend further energy in resisting what appears to be a natural tendency? The only reason for the introduction of the term "civil" was that the word "engineer" had previously been monopolized by those engaged in military works; now that this distinction has lost its importance, would it not be better to drop the term "civil" as applied to the whole profession and confine it to the special applications justified by modern custom?

The profession as a whole should be represented in Canada by a single authoritative body, somewhat after the pattern of the Medical Council or the Benchers of the Law Society in Ontario, to which should be entrusted the subjects of engineering education, qualifications for professional standing, professional ethics, etc.; in short, all questions of general professional interest. It is only by the hearty co-operation of the various classes of engineers that such a movement could succeed. The Canadian Society of Engineers, with its council, would thus exercise functions which are necessary for the strengthening of the profession in its relations with the public, and which lie outside the province of the special engineering societies.

As a rule, the engineer does not come immediately into contact with the public. At the same time there are questions of public interest in which he, in common with the chemist, the metallurgist, the biologist, the medical practitioner, the forester and others, is regarded as an authority. The public expects the engineer to aid by his advice in the improvement of transportation, the prevention of railway accidents, the abatement of smoke, the preservation and improvement of public health, transmission of power, the irrigation of arid lands, the economical management and conservation of forests and mines, the improvement of agricultural soils, the conservation of river flow, etc. Such questions are matters of municipal and governmental policy, and cannot be properly controlled by money-making corporations or individuals. Before a move can be made in these matters a strong body of enlightened public opinion must be formed, and who should be better qualified for the task of stimulating and guiding this public opinion than the engineer? If he is too busy or too backward to undertake this duty of his own accord, what about the editor of the engineering newspaper? The latter is never hampered by modesty, and should write not only for his subscribers, but for the public as well. He need not fear that his work will be lost; the lay press will print his good articles and give him due credit for them.

The future of electric processes in iron and steel production in Canada will depend more upon the cost of hydro-electric power than on any other factor. Closely connected with the conservation of the iron and timber resources of America is the great Portland cement industry, which has sprung into importance within the last twenty years. The Canadian production in 1907 amounted to 2,400,000 barrels, the United States production to 49,000,000 barrels. Concrete and ferro-concrete will replace steel and wood in construction in ever-increasing quantities. As in the case of the electro-metallurgy of iron, the cost of hydro-electric power is a large item in the manufacture of cement.

The conservation and regulation of river-flow for water power alone, to say nothing of transportation and irrigation, is a necessity for the future industries of the country. The regularity and volume of river-flow in its turn is dependent upon the preservation of forest growth, especially in the mountainous and upland regions. Forest conservation, in fact, is one of the fundamental conditions of future prosperity. And so one might go on and enumerate one after the other, various sources of wealth and well-being now ex-

travagantly exploited which demand for their wise development the knowledge and skill of the engineer. It is to be hoped that the conferences initiated by President Roosevelt to consider the conservation of natural resources will bear fruit in pointing the way to practical solutions of these national problems. Canada has already made a good beginning, both in collecting information regarding our resources and in passing legislation.

One of the most striking illustrations of modern economic tendencies is the increase which has taken place in the voltage of power transmission lines. Within the last twenty-five years the practicable voltage has been increased from 1,000 to 110,000 volts, thus immensely extending the possible area of distribution from the hydro-electric power plant.

In the machine shop, complex machine tools, largely the inventions of the mechanic, high-speed tool steels, electric motor drives and high class organization have immensely increased the output and decreased unit costs. The steam turbine, the improved hydraulic turbine, electric lighting, electric traction, the gas engine, the great ocean and lake freighters, the monster liners, and that concentrated essense of power, the modern battleship, have all come within the present generation, and we cannot predict what changes in the application of power and machinery will take place before it passes away. It would not be surprising if the automobile were to displace electric transportation in cities and be replaced for purposes of pleasure by the aeroplane and the dirigible balloon. In the future, electric transportation may be confined to underground tunnels in the cities and largely replace steam power on railway lines through the country. Evidently the end of the work of the engineer is not yet at hand. The inventions of the present day, under the stimulus of science and the ever-increasing complexity of life, crowd so closely upon us that it is impossible to form a just estimate of their relative values. That must be left to the judgment of posterity looking backward through the long perspective of the years.

One of the first duties of a country is to work up within its own limits its raw materials into the forms in which they are to be finally used by individual consumers. Only in so far as this end is successfully accomplished will the manufacturing population of a country be increased and the cost of transportation of its products to a foreign country, in comparison with their value, be diminished. One effect of overproduction or decreased profits is to stimulate invention for the purpose of reducing the cost of production and transportation. As a rule the first effect is to throw labor out of employment, but this is no argument against invention. Wages will fall in any case, owing to the failing market for the product, and can be maintained only by the discovery of new markets. The decrease of cost due to labor-saving inventions leads to the extension of the markets, without which production must be checked and labor seek new fields, or be reduced to a lower standard of living. Thus, a country depends for material prosperity as much upon the brains of its scientific men, inventors and engineers as upon its natural resources. Money spent upon unproductive enterprises means waste of labor and the stoppage before long of the wheels of industry. Capital knows no country; it ever flows to the land of promise; let it be our endeavor to make Canada no mere land of promise, but a land of fulfilment as well. Fortunate in possessing vast agricultural resources, without which no nation can be self-sustaining, Canada can afford to take time in developing its mines. The mines are our treasure houses, which once emptied, can never again be filled; while the scattered gold, silver, copper and iron that remain in the country may to some extent be recovered after having fulfilled their first uses, the coal, oil, and gas once used are gone forever.

The preservation of our fisheries and forests demands our first attention. Their cultivation must begin and their mining must cease, if we are not to lose them altogether. Nor need the engineer fear that under such a policy his opportunities would be deferred or his field narrowed. The conservation of our resources will introduce many new problems, will stimulate research and invention, cheapen production, open up new markets, and enable the country to sustain a much larger and more permanent population than we have any right to expect from a continuance of our present ill-regulated and short-sighted practice of extravagant consumption and waste.

In conclusion, I have to thank the members of the Society for the honor they conferred upon me a year ago in electing me to the highest office within their gift, an honor altogether undeserved on the score of previous service. I have also to thank my colleagues of the outgoing council for the kindly assistance which I have in many ways received from them in the performance of my special duties. I am sure that they join me in wishing the new council an increased measure of success in promoting the interests of the Society.

THE PEAT FUEL INDUSTRY IN CANADA.

On February 23rd, 1909, a memorandum prepared by the Superintendent of Mines was presented to the House of Commons by the Hon. the Minister of Public Works, giving the following information with respect to the peat fuel industry of Canada and its possibilities:—

The high prices of imported coal in the middle provinces of Canada, the depletion of our forests, together with the increasing value of the forests for other purposes and the suffering induced on account of scarcity of fuel in recent years consequent upon labour conditions, are causes which have again prominently brought forward the question of utilizing our peat bogs and lignite deposits for the production of marketable fuel and other purposes.

The estimated area so far reported distributed over the different provinces of the Dominion is 37,000 square miles. The following table shows the areas covered by peat bogs in the different provinces:—

	Square miles.	Depth feet.
Nova Scotia	250	8 to 10
Prince Edward Island	10	8 to 10
New Brunswick	250	8 to 10
Quebec	500	8 to 10
Ontario	10,450	5 to 8
Alberta and Saskatchewan	25,000	5 to 10
British Columbia & Yukon Territory.	No data.	
Approximately	37,000 sq. miles.	

Further investigation will undoubtedly prove that this estimate represents but a fraction of the total area of available peat.

Although several attempts have been made to manufacture peat fuel, especially in Ontario, they have, as a rule, resluted in failures, due principally to lack of knowledge. The successful working of peat bogs and manufacture of the raw peat into marketable fuel depends on:—

1st. The proper classification of the different peat bogs, since the peat occurring in one bog might be suitable for peat fuel manufacture, while that from another might not be.

2nd. The treatment of the raw material and the apparatus used for its combustion either for domestic or industrial purposes.

These facts, upon which the whole success of the industry depends, can be determined only by experiments carried out on a commercial scale and in an intelligent manner.

In several European countries, peat and lignites are largely used both for domestic and industrial purposes with satisfactory and economical results, and as conditions in Canada are quite as favorable for the manufacture of peat fuel and the use of lignite, there is no reason why, with the employment of proper methods and latest ideas, peat fuel manufacture and the use of lignite cannot be successfully introduced into Canada.

The memorandum recommended the establishment of a Government testing and experimental plant, where the values of these fuels could be demonstrated and investigated. An outline was also given of the assistance rendered to the peat industry by the different European governments.

SPECIFICATIONS FOR A STANDARD 35-FOOT POLE LINE.

The following specifications for a 35-foot pole line are used by the American Union Telephone, which now includes the Consolidated Telephone Companies of Pennsylvania.

General Description.

Ultimate Capacity.—The line shall have an ultimate capacity for forty (40) wires hard-drawn copper, as hereinafter specified.

Route.—The pole line shall be located along the most direct and practicable system of highways. The pole line shall only cross private property to avoid abrupt turns, detours, trees, or other obstacles that may make same necessary..

Locate poles in a straight line as far as practicably possible. Make all necessary turns on one pole, except as hereinafter specified, guying pole on which said turn is made by a double head guy, taking strain from each direction in line with route, said guying to be of the most suitable standard method as per prints.

Right of Way.—Permanent rights of way are to be obtained for every pole, including wires and attachments to be placed thereon. All rights of way so obtained shall be drawn up on regular printed forms of this company, unless specially authorized to the contrary by the general manager.

Materials.

Poles.—The standard poles shall be of the best quality live red cedar or chestnut wood, squared at both ends, reasonably straight and well proportioned from butt to top, free from wind shakes and rotten knots, to be butt cut, peeled, knots trimmed close, and of the following dimensions:—

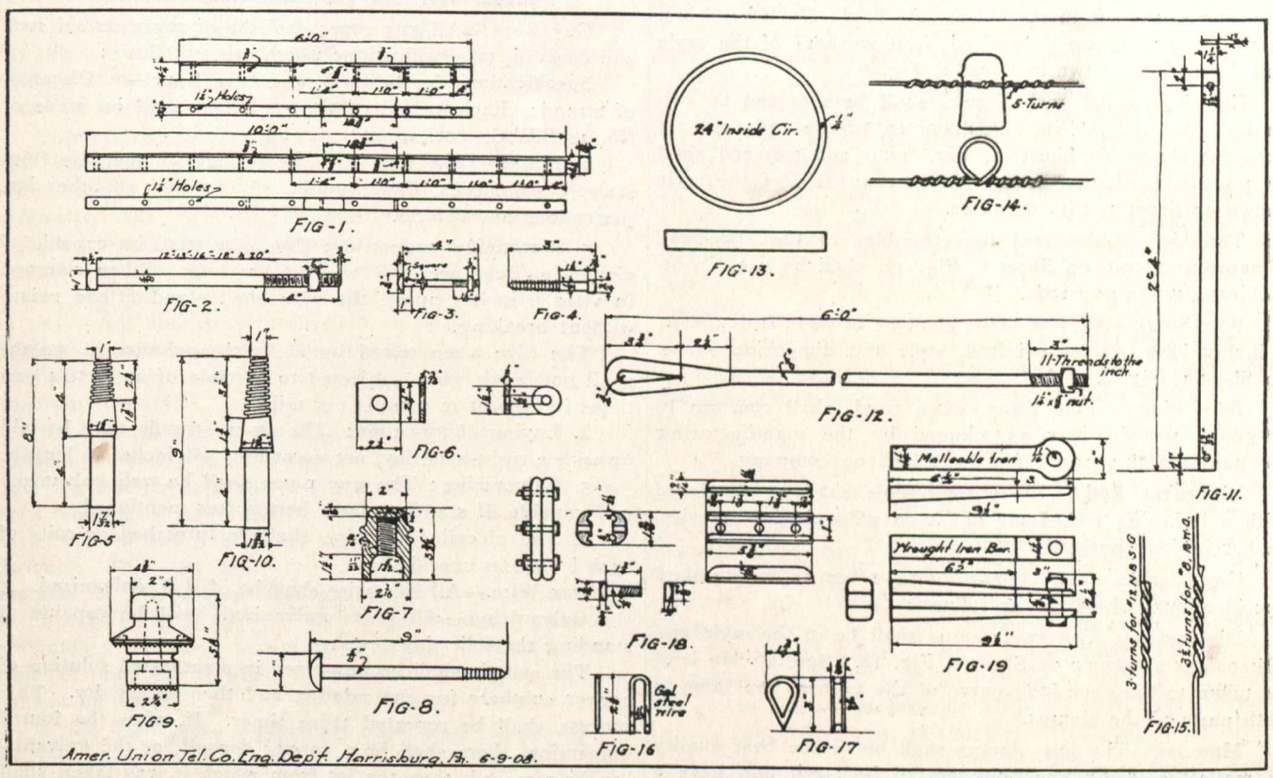
Red Cedar.

Length	Circumference at top	Circumference 6 in. from butt
25 ft.	25 in.	33 in.
30 ft.	25 in	36 in.
35 ft.	25 in.	38 in.
40 ft.	25 in.	43 ft.
45 ft.	25 in.	47 in.
50 ft.	25 in.	50 in.

Chestnut.

Length	Circumference at top	Circumference 6 in. from butt
25 ft.	25 in.	33 in
30 ft.	25 in.	35 in.
35 ft.	25 in.	37 in.
40 ft.	25 in.	41 in.
45 ft.	25 in.	45 in.
50 ft.	22 in.	48 in.
55 ft.	22 in.	51 in.
60 ft.	22 in.	54 in.
65 ft.	22 in.	53 in.
70 ft.	22 in.	61 in.
75 ft.	22 in.	64 in.

The above measurements are the minimum at which any pole shall be accepted, and poles are to be delivered at such location as directed, and to be inspected at point of delivery.



Dimensions of Pole Hardware, Insulators, Pins, Guy Clamps, Etc., from American Union Telephone Company's Specifications Sheet No. 1.

Any pole failing to meet the requirements of the specifications will be rejected.

Guy Stubs and Anchor Logs.—The quality of material for guy stubs and anchor logs shall conform to the requirements for poles. Guy stubs shall not be less than 25 inches circumference at top.

Anchor logs shall not be less than 22 inches in circumference and not less than 5 feet in length.

Pole Braces.—Single braces shall conform to specifications covering poles. Double braces shall not be less than 18 inches circumference at top.

Cross Arms.—All cross arms shall be thoroughly seasoned, straight-grained. Norway or yellow pine, free from such sap wood and knots as would weaken them. They shall be 10 feet long, 3¼ inches thick, 4¼ inches deep, and otherwise as shown on Fig. 1, Sheet 1.

No cross arms shall be painted except such as are required by law to be painted. In such cases, they shall be thoroughly painted with two (2) coats of metallic paint, mixed in the ratio of seven (7) pounds of dry paint to one (1) gallon of pure linseed oil, to be applied with a brush.

All pins shall be of good quality, sound, clear, split locust, free from sap and knots. The standard pin shall be 1¼ inches in diameter and otherwise as in Fig. 5, Sheet 1.

Insulators.—The standard insulator shall be that known as the Hemingray Long Distance Regular. (Shown on Sheet 1, Fig. 7.)

Iron and Steel Fittings.—All iron and steel fittings shall, unless otherwise specified conform to standard specifications adopted by bridge builders and be galvanized in such manner as to withstand test hereinafter specified.

Cross Arm Braces.—Each cross arm brace shall be ¼ × 1¼ × 28 inches, iron and galvanized, said galvanizing to stand tests hereinafter specified.

A pair of cross arm braces shall consist of two braces ¼ × 1¼ × 28 inches, one three-inch galvanized fetter drive screw, two galvanized ⅜ × 4-inch carriage bolts, and one galvanized washer to each carriage bolt. (Sheet 1, Figs. 3, 4 and 11.)

Cross Arm Bolts.—Each cross arm shall be fastened to the pole by one galvanized iron bolt ⅝-inch in diameter, and of a proper length to go through arm, pole and washers, allowing all threads in the nut to take hold. Each bolt shall be provided with two galvanized iron washers of the style and dimensions shown in Sheet 1, Fig. 6.

Guy Rods.—All anchor guys shall be attached to galvanized iron rods, ⅝-inch in diameter, of the style and dimensions shown on Sheet 1, Fig. 12. ach guy rod shall be provided with two galvanized iron washers of the style shown on Sheet 1, Fig. 6 and 12.

Thimbles.—Galvanized iron thimbles of the style and dimensions shown on Sheet 1, Fig. 17, shall be used in attaching guys to guy rods.

Pole Steps.—All pole steps shall be of ⅝-inch diameter, 9 inches long, galvanized iron, style and dimension shown on Sheet 1, Fig. 8.

Pole Rings.—Pole rings, when used, shall conform to standard specifications as adopted by the manufacturing companies and accepted by the telephone company.

Lightning Rods.—Every tenth pole shall be furnished with a lightning rod, made of No. 9 galvanized steel wire, as hereinafter specified.

Guy Clamps.—Guy clamps shall conform to the standard specifications, which are as follows:

Dimensions: The guy clamps shall be of the style and dimensions as shown on Sheet 1, Fig. 18. Special care is to be taken to have the long curve of the grooves the same in both parts of the clamps.

Material.—The guy clamps shall be of the best quality of malleable iron. The bolts are to be steel, and have a breaking strength of not less than 80,000 lbs. per square inch.

Finish: The castings shall be smooth and free from imperfections. The threads upon the bolts are to be carefully recut after galvanizing.

Galvanizing: The guy clamps, bolts and nuts shall be galvanized and capable of standing tests hereinafter specified.

Bolts for Guying to Rock.—The bolts shall be of style mensions shown on Sheet 1, Fig. 12. Each guy rod shall and dimensions shown on Sheet 1, Fig. 19, and shall be of commercial wrought iron well galvanized.

Staples.—All staples shall be of No. 12 B.W.G. galvanized steel wire. They shall be 2⅛ inches long and of the style and dimensions shown on Sheet 1, Fig. 16.

Line Wire.—All line wire shall be hard-drawn copper and conform to the following specifications:

Finish: Each coil shall be drawn in one continuous length, free from scales, flaws, splints and other imperfections.

Inspection.—An inspector appointed by this company shall have the privilege of testing each coil and may cut out any part. He shall also have the privilege of overseeing, cutting and packing of samples, and of being present during manufacture of the wire.

Test.—All tests shall be made with apparatus satisfactory to this company.

Packing for Shipment.—Each coil shall be securely bound with at least four pieces of strong twine, and then so protected by wrappings of burlap that there will be no damage from mechanical injury in transportation.

The diameter of the eye of the coil shall not be under 20 inches nor more than 22 inches.

Weight.—Each coil is to have its weight and corresponding length plainly and indelibly marked upon two strong tags, one of such tags being attached to the coil inside, and the other outside of burlap.

Cook Sleeves.—All joints in the line wire shall be made with Cook sleeves or their equivalent.

Tie Wire for H. D. Copper.—The wire shall be of soft copper of the same size as line wire. For No. 12 B. & S. they shall be 19 inches in length, for No. 10 B. & S. they shall be 20 inches in length, and for No. 8 B. & S. they shall be 24 inches in length.

Mechanical and Electrical Requirements.

Guy Rope.—All guy ropes shall be of seven strand steel and conform to specifications which are as follows:

Specifications for Seven-Strand Guy Rope.—1. Diameter of strand: Each strand of the guy rope shall be made of No. 12 B.W.G. steel wire.

2. Finish: The wire shall be cylindrical and free from scales, inequalities, flaws, sands, splints, and all other imperfections and defects.

3. Mechanical properties: The wire shall be capable of elongating four per cent. without breaking. When clamped in vises 6 inches apart, the wire shall stand fifteen twists without breaking.

The wire when tested by a direct appliance of weight shall not break when subjected to a strain of at least 4 3-10 times its weight in pounds per mile.

4. Laying of guy rope: The seven strands shall be laid up with a right-hand lay, not exceeding 3½ inches in length.

5. Galvanizing: The guy ropes shall be well galvanized and capable of standing tests hereinafter mentioned.

6. Size of coil: The rope shall be furnished in coils of such length as specified.

Iron Wire.—All iron wire shall be of B.B. galvanized.

Galvanizing.—All parts galvanized shall be capable of standing the following tests:—

The sample shall be immersed in a saturated solution of copper sulphate for one minute, and then wiped dry. This process shall be repeated three times. If, after the fourth immersion, there shall be a copper deposit, or the galvanizing be removed, then the lot from which it was taken shall be rejected.

BOILER TESTS.

The testing of the new boiler for Truro, N.S., by evaporation, February 28th, 1908, gave the following results:—

150 horse-power Water Tube Boiler.

Kind of coal used	Acadia round.
Duration of test	10 hours.
Total coal consumed	7,868 lbs.
Total ashes	850 lbs.
Percentage of ashes	10.8.
Average coal burned per hour	786.8 lbs.
Average steam pressure	133 lbs.
Temperature of feed water	36 degrees.
Total water pumped into boiler	49,000 lbs.
Water evaporation per lb. of coal	6.22 lbs.
Water evaporation per lb. of coal from and at 212°	7.63 lbs.
Water evaporation from and at 212° per lb. of combustibles	8.56 lbs.
Average horse-power developed based on 34½ lbs. from and at 212°	174.18-h.p.

No feed water heater was used in connection with the test.

INDUSTRIAL EDUCATION.

By William M. Towle, B.S.*

Industrial education is receiving much attention at the present time, and far more than at any previous period in the history of educational movements. Great changes in public opinion are also taking place in regard to our general need, as a manufacturing nation, of such an education.

There is a growing demand for this type of training as a part of any worthy system of public instruction, inasmuch as the old-time system of apprenticeship has been largely superseded. Modern methods of manufacturing tend to develop machine-tenders out of workmen instead of making all-around artisans.

The wish of all those interested in the betterment of mankind is to give everyone an education and a training whereby each may be fitted to earn a living and become a good citizen of the Republic.

The Governors of several of the States have mentioned this subject in their inaugural addresses, and the state departments of education and the legislatures are also seeking some means of reaching the heart of the problem.

Universities, colleges, and technical schools have each in their way aided in training men who have power to originate new methods of doing work, and of solving, more or less satisfactorily, the scientific, industrial, and engineering problems of the day. These institutions, however, are not organized to meet the increasing demands for training skilled leaders and craftsmen in the several trades; for in carrying on any great industrial enterprise it requires thoroughly trained subordinates and skilful workmen, as well as captains of industry and other organizations for executive and constructive work.

Many of the present-day captains of industry have come up from the ranks, as it is called. Their training has come from the intense application and concentrated thought and work required of them, and from the hard knocks which they have received and profited by in the school of practical experience. This they had to acquire without the helpful suggestions of sympathetic instructors. How much easier it would have been for them, if they could only have had some preliminary education and training in the elementary principles of their line of work, is the commonly expressed opinion among them.

A few far-sighted individuals have been advocating industrial education for many years, and some of them have been able to put it into practice in a limited way. A few industrial and trade schools, for instance, have been established, and, all things considered, have been doing excellent work. A little over two years ago several of these parties interested in the forward movement organized a National Society for the Promotion of Industrial Education. Quite a number of prominent people have joined with them in their efforts, and assured a success for its undertaking. The Society has held several meetings and much interest has been aroused and an effective propaganda is maintained.

There is a strong movement against requiring all pupils in the public schools to take the same studies and training after the primary grades have been passed. To-day the disciplinary and cultural studies do not fully meet the demands of every educator. It is an axiom that all who can should get as liberal an education as possible. Many are so constituted, however, that they can not profit by an extended course of study, nor so circumstanced as to be able to avail themselves of it.

Parents are beginning to realize, at last, that it behooves them to fit their children for some useful vocation. A large proportion of the children do not attend school beyond the district or grammar grades. Even if they enter the high school they find there very few studies that promise to help them, if this period is to be the end of their schooling.

* Superintendent of Shops, Thomas S. Clarkson Memorial School of Technology, in the Clarkson Bulletin.

Governor Draper, of Massachusetts, in his inaugural address, criticized sharply the educational system of the state, on the ground that it tended much more to academic attainments than to industrial training.

There is an almost unlimited amount of knowledge in the world, knowledge of facts and things, of the phenomena and processes of nature. It is only a very small part of this, in any branch, which can be presented to the youth in the schools. It is as of old, a question, therefore, of what knowledge is of most worth for life and its insistent duties.

There are, no doubt, certain things about which everyone might have some knowledge which will be more useful in after life than the knowledge of other and more remote relations. If courses of study can be arranged so that those who will receive in any event only a limited amount of schooling may yet be able to get these important and essential facts, they will then be very materially helped. The schools will then accomplish what Stella V. Kellerman has said: "Only by teaching honestly what the world needs, and can use, may the schools accomplish their lofty aims."

Manual training was established about a quarter of a century ago, and at first chiefly through the instrumentality of private benefactions. It has since been adopted in many schools, principally those in or near large cities, and with very good results when wisely directed. President Jordan, of Stanford University, has well said: "The development of manual training of some sort for all boys and girls will represent the greatest immediate forward step in secondary education."

He qualifies it, however, by saying: "But the purpose of this training must be intellectual, not to teach a trade, and only secondarily to fit for engineering courses of the university."

This is all well and good, in its way, and to the extent indicated. But manual training, in its various possible forms, should be introduced in all of the lower grades of school work, and carried up into the grammar grade, at least, without a break. It then will effectively develop mind and hand co-ordinately, and strengthen the trend of the pupil's grasp of the knowledge of facts and things and help him to decide what line of work he may wish to follow in after life. Should he desire to secure a liberal education, or follow some one of the learned professions, then the high school course, as now generally given, will fit him for college.

On the other hand, if the pupil wishes to follow industrial pursuits, there should be another course of study arranged. Possibly this course should begin in the grammar grade, but it should certainly begin in the industrial school, or in the industrial course in the high school. About half of the time of such a course may very profitably be spent in learning the use of tools, and of the different applications of the same, in the practical parts of a trade. The remaining half of the time may then be devoted to such studies as will best fit pupils for their chosen work.

These industrial students, as we may now designate them, would receive more thorough and effective intellectual training than the purely academic studies now afford them, while they would be learning the rudiments of some useful trade, and become better fitted for the duties of citizenship. Such courses would keep many young people in school who now leave because they wish to earn money, or because it seems necessary that they should do so, whether from their point of view or that of their parents. Often pupils leave school because they and and their parents can not see that further instruction as now given will be of any help to them in their future work. Generally speaking, they are not fitting themselves for any trade, and thus additional schooling seems to them a waste of time. Physically they are not able to do much hard labor for a few years; and in all but rare cases they can only be useful as helpers and errand boys. If there were thoroughly established courses in industrial training, such would appeal both to the parent and the boy. It would then be worth while for them to continue in school, and to

be systematically trained to do something which will be useful to them in after life. When the time arrives they will have the knowledge, training and physical strength necessary for them to go to work, and to work in a thorough and workmanlike manner at their chosen vocation.

Furthermore, some of these students while taking the course in industrial training, will begin to realize that they would like to become engineers. They will then fit themselves for the technical schools and colleges. Many young men who now enter these institutions and who are not able to continue, through financial or other reasons, would yet be very much better prepared for life's work by having gone through the industrial school.

There have been many attempts made to solve all of these and kindred problems. Some of the best intentioned workers have started trade schools which are not in any way connected with manufacturing establishments. Some manufacturers have apprentice courses, requiring various studies in connection therewith, and for which they make due allowance of time from work. Several of the larger cities have manual training schools. Some of them operate in connection with these schools largely attended evening classes for apprentices who work in shops during the day. A few cities, also, are working the half-time school courses, in connection with their high schools. Half of the students taking such courses work in the manufacturing shops in the city, every other week, and then in school, thus changing about with the other half.

A few schools have special classes for workmen who desire instruction in the higher branches of their trade. These seem to approach more nearly the desired end of continuation schools, than any thing else in this country. Modern methods of manufacturing do not give a very wide range of work to any one person. There is not much chance for a workman to advance, or perfect himself in another or higher line of work, unless he diligently apply himself by special study at home or in an evening school. Continuation and correspondence schools, therefore, seem to be a corollary of any comprehensive system of industrial training, whereby a workman may certainly fit himself for better positions, and become more useful to himself and the community.

A number of private correspondence schools have also been established to meet the demand for specially trained men. That these schools have grown up outside of the public school system shows that there is a demand for such training which might have been earlier met by the state. In the line of preparatory industrial training, several of the states are trying to solve this problem, each in its own way, and more or less adapted to its particular industrial needs, as now anticipated or understood. The demand for industrial training will no doubt, cause many experiments to be thoroughly tried out, in manufacturing, industrial, and continuation schools, for resident instruction; and in correspondence schools for the non-resident. In any event, if manual training is effectively introduced in the earlier grades and judiciously followed up by industrial, continuation, and correspondence schools, in a thorough and systematic manner, the industrial position of our country will be placed upon a firm and lasting basis, and that general prosperity will then ensue which can only be assured by diversified industries intelligently, that is, scientifically, developed.

In the compressing of air high mechanical efficiency for the pumps is secured at the Plymouth Cordage Co., Plymouth, Mass., by the following means: The regular compressed air supply is taken from a power-driven pump which, at 140 r.p.m., has a capacity of 310 cubic feet per minute. This compressor is driven by a high-duty mill engine, and has an unloading device by which the work of compression is thrown off when the required pressure in the mains is reached. A steam-driven compressor, which at 75 r.p.m., has a capacity of 145 cubic feet of air per minute, furnishes air when the main engines are not running.

THE McCHARLES PRIZE.

In view of the great interest now being taken by Canadians in all developments in the natural resources of the Dominion, the bequest of the late Æneas McCharles providing a fund for the purpose of recognizing the inventions or discoveries of special merit made by Canadians will be welcomed by all.

The following extract from the will of Mr. McCharles and the accompanying regulations drawn up by the Board of Governors of the University of Toronto governing the award as set forth below, give full details concerning the prize, which will be offered for the first time this year:—

"In connection with the bequest of the late Æneas McCharles of Provincial Government bonds of the value of $10,000, on the following terms and conditions, namely, that the interest therefrom shall be given from time to time, but not necessarily every year, like the Nobel prizes in a small way; (1) To any Canadian, from one end of the country to the other, and whether student or not, who invents or discovers any new and improved process for the treatment of Canadian ores or minerals of any kind, after such process has been proved to be of special merit on a practical scale; (2) Or for any important discovery, invention or device by any Canadian that will lessen the dangers and loss of life in connection with the use of electricity in supplying power and light; (3) Or for any marked public distinction achieved by any Canadian in scientific research in any useful, practical line. The following conditions, as passed by the Board of Governors, determine the method of award:—

(1) The title shall be the McCharles Prize.

(2) The value of the prize shall be one thousand dollars ($1,000) in money.

(3) The term "Canadian" for the purposes of this award shall mean any person Canadian-born who has not renounced British allegiance; and for the purposes of the award in the first of the three cases provided for by the bequest, domicile in Canada shall be an essential condition.

(4) Every candidate for the prize shall be proposed as such in writing by some duly qualified person. A direct application for a prize shall not be considered.

(5) No prize shall be awarded to any discovery or invention unless the same shall have been proved to the satisfaction of the awarding body to possess the special practical merit indicated by the terms of the bequest.

(6) The order of priority in which the three cases stand in the wording of the bequest shall be observed in making the award; that is, the award shall go caeteris paribus to the inventor of methods of smelting Canadian ores; and, failing such inventions, to the inventor of methods for lessening the dangers attendant upon the use of electricity; and only in the third event, if no inventors of sufficient merit in the fields of metallurgy and electricity present themselves, to the inventor distinguished in the general field of useful scientific research.

(7) The first award shall not be made before June, 1909."

A committee to make the award of the prize has been appointed by the Board of Governors of the University of Toronto.

It will be seen from these conditions that the Committee of Award is given a wide scope in making its selection, as the prize is open to candidates in every part of the Dominion and is not necessarily confined to those who have made discoveries or inventions in recent years.

All communications in connection with this award should be addressed to the secretary of the McCharles Prize Committee of Award, University of Toronto, Toronto.

There has been constructed in the Province of Nova Scotia an average of about 30 iron and steel bridges per year for the last 25 years, or an average of about forty-three in each county, or about one for every twenty-three miles of road in the Province, and as these bridges are scattered all over the Province, practically every main highway crossing a stream of any size has an iron or steel span of from 30 feet upwards.

THE

Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

THE CITY OF VANCOUVER: "ITS SEWERAGE SYSTEM."

The city has recently resolved to adopt what is known as the "combined system" of sewerage. This, only after prolonged discussion and visits to other coast line cities.

With the growth of Vancouver city there have been developed three systems of drainage, respectively, dealing with basement or cellar water, surface storm water, and sewage proper. Technically speaking, these three systems are known as the "Separate System" of drainage.

A commencement some time back was made to treat the sewage proper in septic tanks before discharging it into the sea. This plan has, however, been abandoned, as the sewers now will, under the "combined system," be made to discharge three times the dry weather flow below low water level, while a storm overflow only will discharge above this level.

No doubt the sewerage conditions in Vancouver have presented many defects. We find evidence that there has been intercommunication between all three systems by means of leakey conditions and wrong connections, but what is exactly the justification for the adoption of the "combined" system in lieu of the "separate" is not apparent, as the hygienic defects inherent to the former are well known.

In closing his report the city engineer states: "I wish to draw your attention to the fact that sewers on the "combined" system are much larger than those of the "separate" system. I should like the members of your committee and the council, and also the citizens, to be convinced that a wise course is being pursued if the suggested changes are adopted." In consequence of the above the council sent a deputation to visit cities on the coast presenting similar conditions to those in Vancouver, viz., Seattle, Tacoma, Portland, Oakland and San Francisco. The report concludes:—

"First—The system of sewering generally adopted and favored in the large cities of the coast is the combined.

"Second—The general method of disposal is by discharging in large bodies of water without first subjecting the sewage to any form of purification.

"Third—In order to avoid the creating of a nuisance on the foreshore it is necessary to carry the outlet of sewers to a point where the discharge may be carried away by tidal currents."

In the face of the fact that the "combined system" of drainage is almost being universally abandoned in favor of the "separate" in Great Britain and in Europe, we find it possible to read the above three conclusions and yet not agree with the conclusions that the city council draw from them.

No doubt, in the case of tidal discharges, where sewage purification may not be required, one of the main objections to the "combined system" is removed. It has storm water and sewage in conjunction by methods of biological sewage treatment, so great is the variation of been found almost impossible to satisfactorily deal with flow; hence, the preference for separate sewers for sewage purposes as distinct from road and storm water.

The main hygienic objection, however, to the "combined" system lies in the fact that in times of drought the sewers are not self-cleansing. It is necessary, as the city engineer says, to make the sewers of large diameter, capable of taking excessive torrential rains, and so prevent roadways and cellars from flooding. No doubt, during such rains the sewage is rendered less offensive by dilution and the sewers are well flushed out and cleansed. On the other hand, so great is the difference in volume between the amount of dry weather domestic sewage and storm water, and the subsequent difference in sizes of pipes producing self-cleansing velocities in each case that it is impossible to keep the larger sized sewers flushed during dry weather. In fact, with the "combined system" during drought the large sized pipes, especially in flat gradients, present channels through which the sewage flow is a mere trickle, the consequence being that the solids are left stranded in the sewers, there to putrefy and generate sewer gases. The huge interior surfaces of the large sewers also present a scum-covered area, which, as the sewage falls in level, dries and gives off particles of matter, which are carried with the sewer gases by means of vent-pipes and defective fittings into contact with food, milk and water, and so generate the infection of excremental diseases.

This is a point which has been strongly urged lately in connection with the prevalence of typhoid in Montreal, the winter outbreak being put down to the result of want of flushing during frostbound weather in connection with the combined systems of drainage there.

The ideal system of sewerage is found where the sizes of pipes are just sufficient to take, running one-third full, the dry weather flow of sewage, giving a velocity of at least two feet per second. Extra flushing at the head of sewers can always be obtained by means of admitting part of the storm water in regulated amounts and discharging it by means of automatic flushing tanks so as never to fill the pipes above two-thirds full.

In Montreal and Toronto and large cities in the United States and the older countries where the "combined systems" are in vogue, the nuisances from the smells from manholes etc., in the higher reaches of the towns is so marked and objectionable that such cities, if it were not for the enormous expense entailed, would gladly at once resolve on the "separate system" of sewerage.

The fact of visiting several towns and finding the "combined system" in vogue presents little or no argument in its favor. Most towns begin by adopting one service of sewers for all purposes, and Vancouver is quite an exception to this rule.

With reference to discharging the raw sewage into tidal waters without any preliminary treatment it may be pointed out that such is not thought advisable where there is a foreshore used for bathing or pleasure purposes. The incoming tide, always with wind blowing towards the shore, has a tendency to strew the beach with fouling matter, such as excrement, etc., which is left by the receding tide. We can see this at any time by the amount of drift which is always left stranded on a foreshore under conditions of landward breezes.

Seaside resort places are generally finding it incumbent to provide some method, at least of screening out the solids, before discharging a sewage even below low-water mark.

Of course, there may be conditions at Vancouver of which we are not aware which may be an answer to the points we have raised. Such points apply only to the broad question at issue, and we have no doubt are and will be taken fully into consideration by the able city engineer, Mr. Clement, in charge of the work.

THE SEPTIC TANK.

Its Advantages.

III.

Considering septic tank treatment of sewage as a preliminary part of purification, we must conclude that the work which it does is mainly in connection with the removal of suspended solids. The chief advantages of this system of removal of solids as compared with ordinary sedimentation are:—

1. The sludge can be allowed to remain in the tanks for months.

2. The liquefaction and gasification of part of the sludge retained.

3. The concentration of the sludge retained in the form of fine particles, which is weakened by putrefaction, and is easily disposed of by burying.

Removal of Sludge.

There is no doubt that the greatest difficulty authorities have to face in connection with sewage disposal is the sludge problem. All other systems of "removal of solids," apart from the septic tank system, depend upon the daily, or almost daily, removal of the precipitated sludge when in a fresh condition. This constant removal requires constant attention, and, therefore, increased maintenance. No satisfactory automatic method has yet been devised by which fresh sludge can be automatically removed and dealt with.

In the above respect the advantage for small towns, institutions and private houses, where constant attendance is not desirable, is apparent. We have seen that, before the conscious adoption of septic action, it was often allowed to take place in ordinary sedimentation tanks by simple neglect or accident. In this light its advantage has been generally made use of.

As to how often a septic tank should be cleaned out depends entirely on the character of the sewage and the amount of suspended matter in it. A tank should never be allowed to have a greater depth of sludge at its outlet or shallow end than one-third the hydraulic depth. Given a tank 60 x 20 x 10 ft. at deep or inlet end and 6 ft. at shallow end, capable of holding 60,000 gallons of sewage, representing twenty-four hours' flow, the sludge should not be allowed to stand more than 2 ft. deep at outlet end, giving a depth of 6 ft. at inlet end and 4 ft. average depth. This depth leaves a clear four feet of supernatent liquor, and if the scum-boards are fixed two feet below the surface of the sewage, the tank liquor will be drawn off two feet above the sludge level and two feet below the surface. This level will present the clearest liquor from the tank.

The above depth of sludge allows for half the tank capacity, viz., 30,000 gallons. With a sewage containing 40 parts of suspended solids to 100,000, about 100 gallons of sludge would form per day, containing 80 per cent. of moisture. With no digestive processes of liquefaction or gasification it would take about 300 days for the sludge to obtain this level, or, with a 25 per cent. reduction due to digestive process, about 375 days.

As, however, previously pointed out, the effluent from a septic tank must be carefully watched, especially if the purification after treatment is by means of biological filtration, because of the tendency for the amount of solids to increase in the tank liquor the longer the period that septic digestion is carried on.

In sludging out a septic tank it is a wise precaution to always leave part of the sludge in the tank. If this is not done it will take some time (perhaps weeks) before septic action is set up in the fresh sewage. It is most important when removing septic sludge that this be done in dry weather, and that when it is buried in ground it be covered up as quickly as possible.

The Liquefaction and Casification of Sludge.

Although it has been shown that the claim in respect to the digestion of sludge has been very much exaggerated, it must, however, be admitted that any digestion, no matter how small, must be, and is, a material advantage. This is especially the case when sewage works are situated in localities where it is difficult to dispose of sludge by land burial. If it is a case of carting the sludge to some distance or taking it out to sea, the annual saving from a 25 per cent. reduction will be considerable in the case of large cities. At Manchester, England, for instance, since the septic process has been introduced in lieu of the chemical, 100,000 tons less sludge has annually been conveyed to sea than formerly. At Birmingham six men are only employed on sludge disposal, whereas twenty-six were so employed before septic treatment was introduced, and $20,000 a year is saved by not using chemicals. These figures, however, only bear a comparison between septic sedimentation and chemical sedimentation, with the latter a much larger percentage of solid matter is precipitated along with the chemicals, which in the case of the use of lime amounts to more than the sewage solids.

As compared with ordinary continuous flow sedimentation, in the case of sufficiently large sewage works where it is necessary to have permanent labor, it is questionable whether the advantage of septic digestion is sufficiently pronounced to warrant its adoption. As previously stated, it depends to a great extent on the means of disposing of the sludge. It may be taken that the same amount of solids is deposited in either case, and it becomes, as far as the sludge elimination is concerned, a question of the assumed 25 per cent. reduction.

Where sludge-pressing machinery is adopted the Royal Commission give some comparative figures as to the cost of pressing, including all charges for both fresh and septic sludge, containing in each case 90 per cent. of water and 55 per cent. after pressing. Fresh sludge per ton of pressed cake costs from 68 to 83 cents as against 93 cents to $1.73 for septic sludge.

Another point to be taken into consideration in the case of large works is that it may be more convenient to remove the sludge in small quantities continuously rather than provide a gang of men intermittently for that purpose at stated periods.

Concentration of Sludge.

Sludge which is allowed to remain in tanks for considerable periods becomes concentrated and divided up into fine particles. Fresh sludge contains about 90 per cent. of moisture, while septic sludge contains about 80 per cent. This means that the dry residue in the one case amounts to 10 per cent. as against 20 per cent. in the latter, one cubic yard of septic sludge containing twice as much solid matter as a cubic yard of fresh sludge.

This concentration, entirely due to gravitation, is of great advantage if the sludge can be removed without adding water to make it flow from the tank. In order to remove the sludge effectually a floating valve outlet should be provided to remove the supernatent liquor as carefully as possible, and the sludge pushed with wood or other scrapers to the outlet channels.

The sludge is mainly of a slimy nature, and it is this quality which makes it so difficult to treat in sludge presses. The process which takes place in the tank, however, converts the solids into a crumbly product, with less affinity for water than fresh sludge. It is more easily drained, quickly becomes inoffensive if exposed to the air, and can more readily be used for filling in waste land.

We must, therefore, conclude that in adopting septic action there are certain specific advantages, and, to quote the words of the Royal Commission: "In certain circumstances the adoption of this system, as a preliminary process, is efficient and economical."

Just where the above points may be freely taken advantage of is difficult to determine, so much depending on local conditions and the facilities for disposing of sludge. Generally speaking, however, we may come to the following conclusions:—

1. Septic action is advantageous where works are so small that it would be a distinct saving to allow the sludge to remain for long periods. This applies particularly to institutions and private installations.

2. Septic action is advantageous where there is insufficient amount of land for lagooning.

3. Septic action is desirable where it is necessary to convey the sludge to sea or to some distance, because of the reduction by digestion and concentration.

4. Septic action tends to produce a more constant liquor as regards strength than ordinary sedimentation or chemical precipitation.

5. The sludge, apart from machine pressing, is in a better condition for burying in land, and is to a large extent already decomposed, and may more readily be used for filling up waste lands.

On the other hand:—

1. In the neighborhood of dwelling houses the accumulation of putrefying substances should be avoided.

2. The sewage liquor from a septic tank tends more readily to choke a biological filter than the liquor from fresh sewage.

3. The solids contained in septic liquor are more stable and less easily oxidized than the solids contained in fresh liquor.

4. Septic liquor contains more bacteria, either pathogenic or otherwise, than the liquor of fresh sewage.

The above generalizations must be taken broadly. Special conditions require special consideration. For instance, where there is plenty of good filtering media easily at hand, the sludge elimination may be taken advantage of for all it is worth, apart from considering the tank liquor. On the other hand, where filtering media is expensive and difficult to obtain and a high-class effluent is required by means of fine filtering media, then the septic process may be out of the question, or else watched with the exactitude and care of a laboratory experiment.

OZONE.

R. M. Leggett, C.E.

This marvellous oxidizing agent can now be produced in any quantities desired, and no doubt experiments in the fields of industry, sanitation and therapeutics will demonstrate that we have in this gas an economical and efficient means of producing results, which without it are costly, cumbersome, and in some cases impossible.

Ozone may be produced both chemically and electrically, but as stated by M. and Mde. Curie, the transformation of oxygen into ozone requires the expenditure of active energy.

As the chemical production of ozone is as yet only a laboratory experiment, we will not consider that phase of the subject, but deal with its generation by electricity, the method of producing it commercially.

The neutralization of two charges of electricity of opposite sign produces an electric discharge, and when this discharge takes place through a separating body of atmospheric air a variety of phenomena are produced, viz., luminosity, heat, chemical, mechanical and magnetic. In the production of ozone, only the chemical action is sought, the other effects being accidental, and often undesirable.

There are several different types of apparatus used for the electrical production of ozone. An ozonizer consists of two metallic electrodes, separated from each other by a short gap across which a current of electricity may be passed in the form of a blue flame silent discharge. The air is electrified by being passed through this discharge, and molecular changes take place, resulting in the conversion of of O_2 into O_3.

The different methods used to determine the ozone content of a given body of gas make a comparison of the different types of ozonizers somewhat unreliable, but generally speaking, 20 grams of ozone per K.W. hour has been considered a fair output.

The Bridge ozonizer, being of recent invention, may be specially noted.

The silent blue flame discharge may be conceived as a hollow cone of light. In all other types of ozonizers, the air is directed against or around these cones of light in a plane at right angles to them. The electrification of air surrounding the point of discharge of an electric current, is a well-known fact, and being of the same electric sign, repulsion takes place. These currents of air may be felt by the hand, or seen by the deflection of the flame of a candle. It is, therefore, obvious that when air is passed into the influence of a discharge, and at right angles to same, it is instantly forced away from the discharge, and any effect the discharge may have upon it, is but momentary.

The Bridge ozonizer overcomes this by using a perforated electrode so arranged that the air passes in fine streams through the discharge taking place on its surface. The air is forced to travel first upwards with the discharge while completely surrounded by it, and then forced through the luminous walls of the discharge. This brings every particle of air into intimate contact with the blue flame, and early tests of the apparatus gave 80 grams of ozone of high concentration per K.W. hour.

The treated air is instantly led away from the deozonizing effects of the heat of contiguous discharges by withdrawal through an opposing electrode, and so passes at once out of the influence of the discharges of the anode, through the cathodic perforations. This, of course, is only possible where no dielectric is used, arcing and sparking being prevented by interposing suitable resistance in the circuit.

Ozone as Applied to Water Purification.

Ozone is applied as a bactericidal agent in the purification of public water supplies. Slow sand filtration, coagulation and sedimentation no doubt go a long way toward reducing the dangers from impure water, but efforts should not cease until absolute purity is secured.

The belief that this end can be reached by means of ozonization is concurred in by such experts as Dr. M. Thoinot, Professor of the Paris Medical College; Dr. P. Miguel, Prof. Weyl, of Berlin; Dr. A. E. Johnson, Dr. H. G. Van't Hoff, Ernest Moreau, Ambroise Rendu, Dr. C. Fiestmantel, Military Physician and Director of the Garrison Laboratory at Budapest and many others of equal note.

The destruction of pathogenic bacteria in water by means of the oxidizing properties of ozone is so simple and inexpensive, that this method will undoubtedly become one of the accepted means of purifying water supplies.

Successful municipal plants treating from one to five million gallons per day are in use at Paderborn, Munich, Astrakan, Marseilles, Dinard, Nice, Chartres, Indret, Chantenay, St. Servain, Avranches, Cosne, and Sulina, with many others in process of construction, notably one for the city of Paris to have a daily capacity of twenty-four million gallons. There is also a plant under construction for purifying the water supplied to the suburbs of Baltimore with a daily capacity of eight million gallons, and smaller plants at other points, as well as one with a one and a half million gallon capacity in Lindsay, Ont.

Ozone purification was delayed for many years owing to the difficulty and high cost of producing the gas, but with the apparatus now available, it is the most efficient and cheapest method of purification. In the Lindsay plant, an example in Canada using the Bridge system, the current consumption is a little under one K.W. per ten thousand gallons of water treated, or about ten K.W. per million gallons. The cost of current is the total cost of treatment, exclusive of

fixed charges for interest, etc. No extra labor is required, the engineer in charge of the pumps also having charge of the ozone plant.

The exclusion of expert attendance and labor, and the absence of all charges for cleaning, maintenance and repairs, makes the cost of ozone purification seem ridiculously low when compared with slow sand filtration, coagulation and sedimentation.

That there is an absolute destruction of all pathogenic bacteria, with a concentration of 0.5 gram of ozone per cubic metre of air, has been established, not only in water containing average dangerous contamination, but in water in which an excessive number of bacteria were introduced for experimental purposes. As an example of the purification of highly infected water, where the infection was intentionally introduced, the writer desires to call attention to the following tests:—

Royal Institute of Infectious Diseases (Koch).
(Proskaüer-Schüder).

Date.	Bacteria per cubic centimeter before ozonization.	Bacteria per cubic centimeter after ozonization.	Species of bacteria treated.
12-3-'02	600,000	0	Cholera.
14-3-'02	600,000	0	Cholera.
18-3-'02	600,000	0	Coli.
25-3-'02	600,000	0	Typhus.
2-4-'02	600,000	0	Typhus.
27-3-'02	600,000	0	Dysentery.

Koch's Institute.

Date.	Bacteria per cubic centimeter before ozonization.	Bacteria per cubic centimeter after ozonization.	Species of bacteria treated.
12-7-'02	600,000	0	Coli.
16-7-'02	600,000	0	Vibrios.
17-7-'02	600,000	0	Vibrios.

It therefore stands to reason that if there is a total destruction of the bacteria in water so highly infected, there will be no difficulty in disposing of the few thousands in water of average contamination.

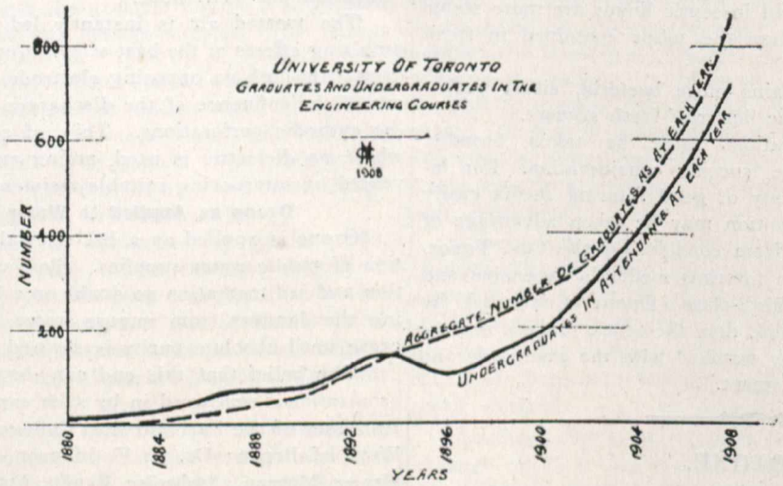
THE ENGINEERING GRADUATES—A RETROSPECTION.

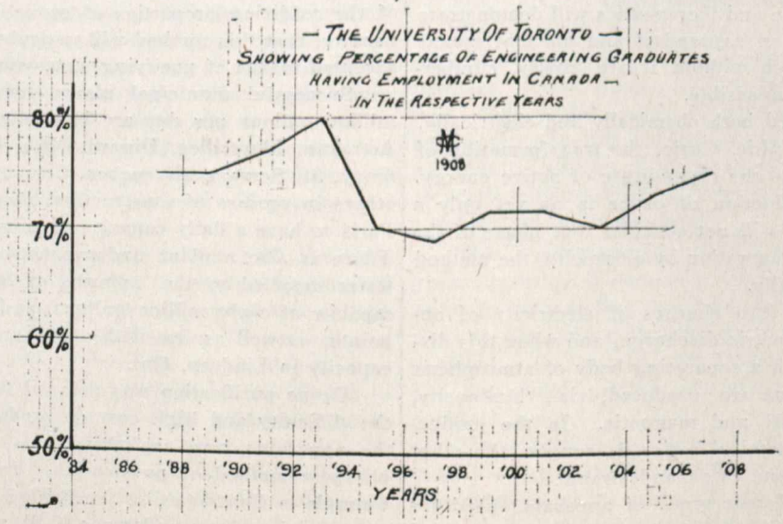
Charles H. Mitchell, C.E. (Tor.), '92.

The reunion of graduates of the School of Practical Science and of the University in engineering at a recent banquet was an occasion to afford considerable retrospection. After twenty-five years the sifting process is well advanced, the sizing and the classification of the various experiences being so complete that one so inclined could begin to find real mathematical laws, and in some cases almost actual formulæ, by which the various graduates' work could be represented. That sounds academic, perhaps, but there is "but little here below" that modern engineers cannot reduce to a science, even if they are such vague matters as the wanderings of the peripatetic graduate, his various tastes for work and his probable earning power.

It was with some half-formed notions along these lines that I set myself the task of trying to represent the characteristics and movements of our graduates by graphical means.

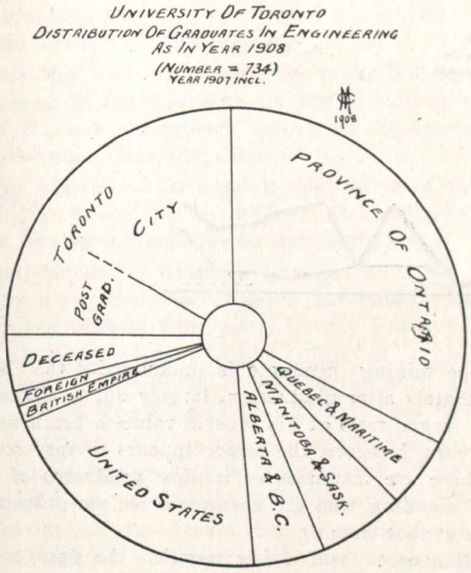
If an apology is needed for presenting the various graphical productions which follow, I can only repeat that I believe this method of representation will more readily than any other bring home to the university authorities and to ourselves the growing importance of the engineering courses in the University of Toronto and the very intimate connection between its graduates and the vast country which we are all so busily engaged in developing.





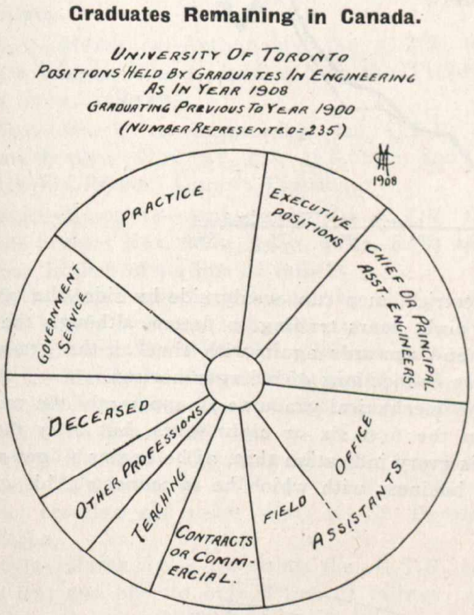
The Relation of Graduates to Undergraduates.

The broken line shows the aggregate number of graduates up to any year, while the full line shows the number of undergraduates in attendance in that particular year. The former is always increasing, the latter may vary. Note



the extraordinary coincidence of the increase of students in attendance at the same rate and number as the graduates. This shows the rapid growth of the faculty.

Graduates Remaining in Canada.



The percentage of graduates finding employment in Canada as the years progress. The curve is obtained by finding the percentage of graduates as registered in the School calendars from year to year, commencing in 1884. The financial depression of 1893 in the United States is clearly shown by the large percentage (80) of graduates who returned home to Canada, and as the better times came the percentage remaining rapidly decreased until late years, when it is increasing in a very marked manner, due to the large works now in progress in this country.

Geographical Distribution in Canada.

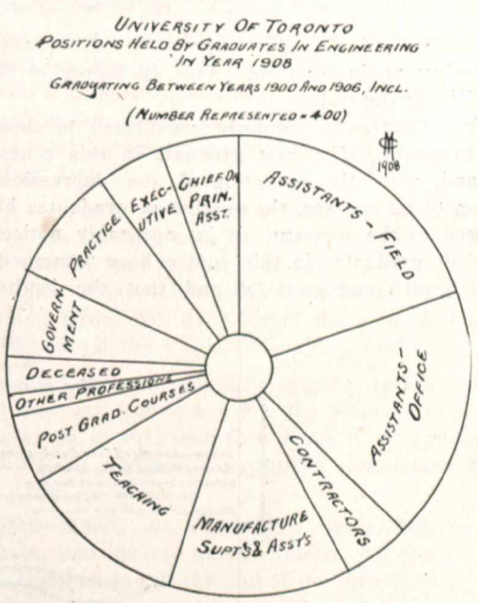
Based on the graduates' list in the calendar of 1908, comprising the 734 graduates up to and including those of 1907.

Positions Held in 1908 by Graduates of previous to 1900.

Based on the list in calendar of 1908, representing 235 graduates. Note that half the number of these older graduates were engaged in Government service, practice, executive positions and as chief or principal engineers, while those who were assistant engineers were less than a quarter of the whole.

Positions Held in 1908 by Graduates of Years since 1900.

Based on the list in calendar of 1908 comprising about 400 graduates between 1900 and 1906, inclusive. In this the

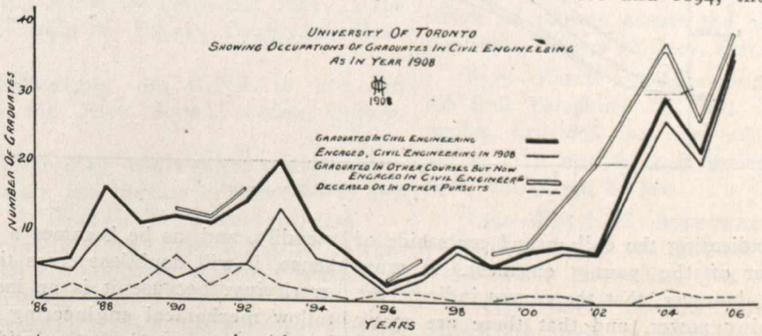


four divisions named in Diagram No. 4 constitute only a quarter of the whole, while the assistants are over a half.

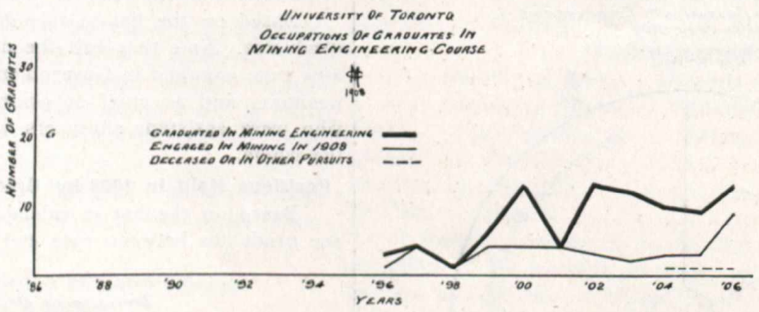
This diagram represents a concise history of the graduates in civil engineering year by year. The heavy full line shows the number of graduates in civil engineering in each year. The light full line shows the number of those of each year who, in 1908, were still engaged in civil engineering work, the remainder (i.e., represented by the space between these two curves) being either deceased or in other pursuits than engineering. The broken line shows the number of those deceased or in other pursuits. The double line, or rather the space between the double line and the heavy line. represents those graduates who were educated in other courses than civil engineering, but who in 1908 were engaged in that branch of work; note this large increment between 1900 and 1905.

The fairly uniform number graduating in the civil course between 1888 and 1894, the small number between 1896 and 1902 and the rapidly increasing number since 1902 are to be noted as indicating development of the country.

This is drawn on similar lines to that of civil engineering. This course was instituted in the early 90's. It is to be noted, however, that there has been a very remark-



able departure of graduates in mining from their specialty between 1899 and 1905, most defections being to the civil engineering as indicated in diagram No. 6. This fact reflects the conditions of the country at that time. There had been a mining boom previous to 1900, which quickly died out, and only within the past few years has activity in this branch of engineering again occurred. This is shown in the rapidly rising line at the end.



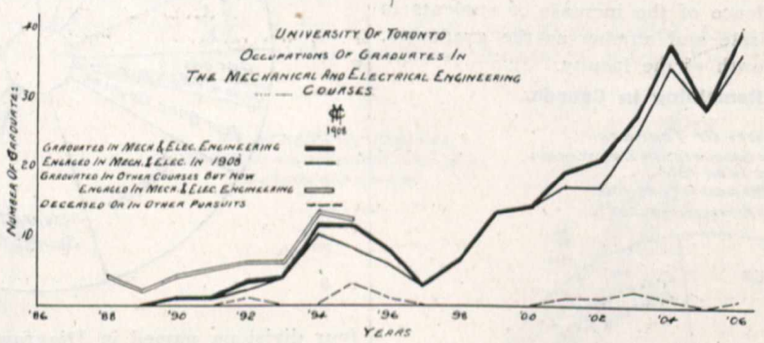
This diagram is similarly constituted to those of the other branches. The first graduate in this course was in 1890, and, with the exception of the depression in 1897, common to all courses, the number of graduates has rapidly increased to the present. It is agreeably noticeable that nearly all graduates in this course have remained engaged in this branch and specialty, and that the deaths and departures to other pursuits have been very small. The increment from other courses between 1888 and 1895 is due to the fact that in these earlier years there was no course in the School in mechanical and electrical engineering, and this increment is composed of men who graduated in civil engineering.

This diagram is offered for criticism and discussion with some misgivings. It will probably appear to be a very audacious method of indicating the dollars and cents side of the professional career of the young engineer. It must always be remembered, however, that the curves indicate the probable average earning power, and that there are many exceptions to them, exceptions in the matter of high salaries and other emoluments which are well known amongst the graduate body.

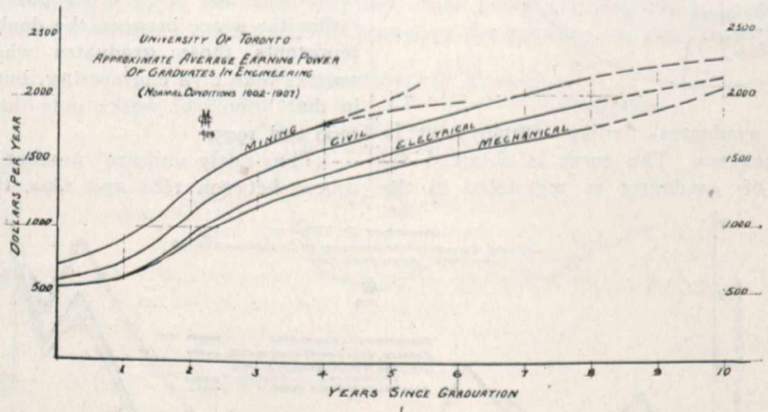
These have been compiled having regard to the approximate earning power of the man and the money value of the position which he fills. Consultation with numerous graduates of different periods who are well acquainted with their fellows has formed the basis of the general trend of these curves, but at best they are, of course, the merest approximations, as no definite law can be deduced, especially after five or six years out of college.

The mining graduate is undoubtedly the better pai' immediately after graduation, largely due to his location and to the larger ratio of his muscle value to brain value. After four years, however, the miner appears to vary considerably, and there are instances of mining graduates of five or six years' standing who are earning twice the amount indicated herein at that time.

All courses run fairly parallel the first two or three years, with a rapid rise in all in the second year. The civil and electrical men run evenly side by side, the curves after six or eight years tending to flatten, although the electrical may trend upwards again with time as the graduate gets business connections of a larger horizon.



The mechanical graduate is apparently the most poorly paid in the first six or eight years, but after that period there is every indication that, as he begins t get an interest in the business with which he is connected, his curve rises steadily, and, as he becomes a "manufacturer" in the broad sense, it will doubtless cross the other two curves. This is gratifying, because it is an incentive to the young men to follow mechanical engineering pursuits in order to become manufacturers, and thus provide what this country is most in need of.



It is hoped that this diagram will bring out considerable discussion, and, if the truth is to be told, it was largely with this in view that it was prepared.

ORDER OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer for a small fee.

6500—March 9—Authorizing the C.P.R. to construct, maintain, and operate branch line to and into the premises of the Montreal Gas Co., now leased to the Montreal Light, Heat and Power Co., Montreal, Que.

6501—March 12—Granting leave to the Winnipeg Electric Co. to cross at rail level with its line of railway the line of the C.P.R., now constructed across the highway known as Logan Avenue, Winnipeg, Man.

6502—March 12—Dismissing application of the Toronto and Niagara Power Co. for approval of location of its transmission line from Cainsville to Brantford, Ont.

6503—March 11—Granting leave to the C.N.O.R. to permanently divert the sideroad lying between Lots 13 and 14, Con. 1, Township of Gloucester, County Carleton, Ont.

6504—March 9—Authorizing the N. St. C. and T.R. to connect its tracks with the tracks of the T.H. and B.R. in Lot 27, Con. 6, Township of Crowland, County Welland, Ont.

6505—March 12—Directing the Montreal Light, Heat and Power Co. to remove certain power wires across the tracks of the C.P.R. in the vicinity of Lachine Canal, Que.

6506—March 12—Authorizing the C.P.R. to use and operate bridge No. 37 A on the Webwood section, Soo Branch, of its line of railway.

6507—March 12—Authorizing the C.P.R. to use and operate bridge at mileage 27.34, and at the highway crossing at Nelson Street, Sudbury, on the Cartier section of its line of railway.

6508—March 12—Authorizing the C.P.R. to use and operate bridges Nos. 5.5 and 27.6 on the Teeswater section of its line of railway.

6509—March 12—Authorizing the C.P.R. to use and operate bridges Nos. 2.2, 6.8, 23.8, 27.3 and 30.1 on its Orangeville Branch, Ontario Division.

6510—March 12—Authorizing the C.P.R to use and operate bridges Nos. 86.14, 49.23, 58.23, 82.89 and 106.37 on the Soo Branch of its line of railway.

6511—March 12—Authorizing the C.P.R. to use and operate briges Nos. 24, 10.8 and 7.17 on the Port Burwell Branch, Ontario Division, of its line of railway.

6512—March 12—Authorizing the C.P.R. to use and operate bridges Nos. 0.9 and 1.8 on the North Toronto Branch of its line of railway.

6513—March 12—Granting leave to the Manitoba Government Telephones to cross the tracks of the G.T.P.R. at public crossing 4½ miles east of St. Boniface Station, Manitoba.

6514—March 12—Authorizing the G.T.R. to construct, maintain, and operate branch line of railway, or siding, to and into the premises of Shirback, Connor & McLachlan, on Lot No. 1, Con. 18, of the Township of Himsworth, Ont.

6515—March 13—Granting leave to the Wood Products Co., of Canada, Limited, of Toronto, Ont., to erect, place, and maintain certain wires across the lands and tracks of the G.T.R. at Donald, Township of Dysart, County of Haliburton, Ont.

6516—March 12—Authorizing the C.P.R. to use and operate six bridges on the Owen Sound section, Ontario Division, of its line.

6517—March 12—Authorizing the Central Ontario Railway to construct, maintain and operate branch line to and into the premises of R. J. Graham Co., Frankford, Ont.

6518—March 9—Granting leave to the C.N.O.R. to construct its railway across six highways in the Township of Gloucester, County Carleton, Ont.

6519—March 12—Granting leave to the Saraguay Electric Light and Power Co. to maintain wires across the tracks and roadbed of the C.P.R. at Prudhomme Avenue and Cote Street, Lud Road, in the municipality of Notre Dame, County of Hochelaga, Que.

6520—March 15—Approving plans of the C.P.R. for proposed rearrangement of the interlocking plant at Richmond Street, London, Ont., where the same cross the tracks of the London Street Railway Co. at Richmond Street.

6521—March 12—Granting leave to the Chemin de Fer de Colonization du Nord to construct its railway across the highways and divert certain portions of the said highways between Nominingue and a point ten miles north-west in the Province of Quebec.

6522—March 16—Granting leave to the rural municipality of Hamiota, Man., to erect, place, and maintain its wires across the track of the C.P.R. at public crossing two miles south-east of Hamiota, Man.

6523—March 13—Granting leave to the G.T.R. Co. to build a bridge and construct approaches thereto for vehicular traffic for the purpose of a farm crossing over the tracks of the G.T.R. at M.P. 125.12 on the farm crossing of Anthony M. Dickie, Township London, County Middlesex, Ont.

6524—March 16—Authorizing the municipal corporation of the Township of Wainfleet, Ont., to lay and thereafter maintain a culvert under the tracks of the Buffalo and Lake Huron Division of the G.T.R. Co. where the same crosses the sideroad between Lots 23 and 24, Con. 1, Township of Wainfleet, Ont.

6525—March 16—Granting leave to the Essex Terminal Railway Co. to join with its line or track the line or track of the Ontario and Quebec Railway Co. (C.P.R.) at or near McDougal Street, Township Sandwich West, Ont., and amending Order No. 5204, dated the 20th of August, 1908, by striking out the words, "On the gravel road."

6526—March 16—Authorizing the G.T.R. Co. to construct a branch line to and into the premises of C. A. Larkin on Lots 156 to 161, inclusive, north of Longfellow Avenue, and Lots 169, 170 and 171 south of Longfellow Avenue, Toronto, Ont.

6527—March 16—Authorizing the C.P.R. to construct, maintain, and operate branch line in the city of Stonewall, Man., commencing at the end of the spur already constructed for Messrs. Williams & Co. at Balmoral Road, and extending thence in a south-easterly direction to and into the premises of A. Patterson & Co., at Stonewall, Man.

6528—March 16—Granting leave to the Bell Telephone Co. to erect, place and maintain its aerial wires across the tracks of the St. Guillaume Branch of the C.P.R. at public crossing 1½ miles east of Farnham, Que.

6529—March 16—Approving location of the proposed new station and freight shed at Weston, Ont., of the Toronto, Grey and Bruce Railway (C.P.R.)

6530—March 17—Approving location of the C.N.O. Railway Co. through the Township of Roberts, in the District of Algoma, Ont.

6531—March 17—Directing the G.T.R. to construct, maintain, and operate a spur to and into the premises of Messrs. Christiem Henderson & Co., County York, Toronto, Ont.

6532—March 17—Granting leave to the C.P.R. to construct its railway across the highways in the Township of Bentinck, County of Grey, Ont.

6533—March 17—Approving temporarily agreements of the Bell Telephone Co. with various rural telephone companies, provided that the tolls charged by same are not higher than was charged immediately previous to 13th July, 1906, authorized by law.

6534—March 18—Approving location of the new stations at Sorel, Que., of the Quebec, Montreal and Southern Railway; also at Pierreville, Que.

6535—March 18—Rescinding Order No. 6490, dated March 8th, 1909, in regard to engines weighing 100,000 pounds or over being equipped with steel-tire wheels on or before the 1st December, 1909, and in the event of failure to comply with such Order on and after said date a penalty of $100 be imposed.

CONSTRUCTION NEWS SECTION

Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand and projected, contracts awarded, changes in staffs, etc. Printed forms for the purpose will be furnished upon application.

TENDERS.

New Brunswick.

MONCTON.—Tenders will be received up to April 3rd, for changing opera house in the City of Moncton into offices, council chamber, etc. J. Edington, City Engineer.

Quebec.

QUEBEC.—Tenders will be received up to the 12th of April for iron castings, brass castings, lead pipe and pig lead, cement, brick and drain pipes, required by this department for the years 1909-1910. Jer. Gallagher, W. W. Engineer.

KNOWLTON.—Tenders for fittings for Post Office will be received until Tuesday, April 13, 1909. Plans and specifications may be seen on application to Mr. H. Hunt, Clerk of Works, Public Building, Knowlton, Que., and at the Department of Public Works, Ottawa. Napoleon Tessier, secretary, Department of Public Works.

Ontario

FONTHILL.—For erecting church of brick, with stone basement. Address George C. Brown, clerk, up to Monday, April 12th.

NEW DUBLIN.—The undersigned will receive tenders up to Monday, the 5th of April, 1909, for crushing 1,000 cords of stone. Address, J. B. Barry, Township Clerk.

NORTH BAY.—Tenders addressed to the undersigned for additions to fittings, North Bay Post-office, will be received until Tuesday, April 13, 1909. Plans and specifications may be seen on application to Mr. L. A. Gauthier, caretaker, Public Building, North Bay, Ont., and at the Department of Public Works, Ottawa, where all necessary information can be obtained. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

OTTAWA.—Tenders will be received at the office of the Commissioners of the Transcontinental Railway until the 8th of April, 1909, for the construction and erection of a steel and concrete bridge and approach spans over the Red River between Winnipeg and St. Boniface. Plans may be seen and full information obtained at the office of the Chief Engineer at Ottawa and also at the office of the district engineer at St. Boniface, Man.

OWEN SOUND.—Tenders addressed to the undersigned for fittings, post-office customs and inland revenue offices at Owen Sound will be received until Tuesday, April 13, 1909. Plans and specifications may be seen on application to Messrs. Forster and Clark, architects, Owen Sound, and at the Department of Public Works, Ottawa, where all necessary information can be obtained. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

TORONTO.—Tenders will be received up to noon on April 30th, 1909, for supply of Underground Cable. Address, Joseph Oliver, (Mayor), Chairman, Board of Control.

CORNWALL.—Tenders will be received until May 15th, 1909, for steel spans and concrete abutments for bridges. Address—Township Clerk of Charlottenburg, Cornwall, Ont.

OTTAWA.—Tenders will be received up to the 15th of April for supplying and delivering the coal required for the Dominion Government steamers at St. John, Halifax, Pictou, Sydney, and Louisburg, and also the coal for the Sorel Shipyard and certain fog alarm stations in the Strait of Belle Isle, Gulf of St. Lawrence, River St. Lawrence, Nova Scotia, and New Brunswick, all in accordance with specifications prepared by the Department. Specifications and detailed information can be obtained here and from the agents of this department at Montreal, Quebec, St. John, Halifax, Pictou and Charlottetown. G. J. Desbarats, Acting Deputy Minister of Marine and Fisheries.

Manitoba.

BRANDON.—Tenders for cement will be received until April 16th for the supply of one thousand to two thousand barrels of Portland cement. W. H. Shillinglaw, City Engineer; Harry Brown, City Clerk. (Advertised in the Canadian Engineer.)

WINNIPEG.—Tenders will be received until April 13th for the supply of forms, material and labor involved in the construction and placing of concrete footings required for the steel towers of the city of Winnipeg transmission system from Point du Bois to Winnipeg. The successful tenderer will be required to commence work about May. Address: Lamport & Ferguson, solicitors, Canada Life Building, Toronto, Ont.

WINNIPEG.—Tenders will be received up to Thursday, April 15th, 1909, for the manufacture and delivery at Winnipeg of two testing transformers, viz.: One 30 k.w. at 80,000 volts, and one 200 k.w. at 200,000 volts, also for control equipment therefor. Copies of the instructions to bidders, specifications and forms of tender may be obtained at the power engineer's office, Carnegie Library building, Winnipeg, Manitoba. These specifications may also be seen at the office of Smith, Kerry & Chace, Confederation Life Building, Toronto, Ontario. M. Peterson, secretary, office of the Board of Control, Winnipeg, Man.

BRANDON.—Tenders for cement will be received until Friday, April 16, 1909, for the supply of one thousand to two thousand barrels of Portland cement, for the City of Brandon for the coming season. Specifications and form of tender may be obtained on application to W. H. Shillinglaw, city engineer, Brandon. Harry Brown, city clerk.

WINNIPEG.—Tenders for supply of from 70 to 80 Portable Voting Compartments constructed of either wood, iron or steel for use in municipal elections, will be received up to April 5, 1909. M. Peterson, secretary, Board of Control Office.

Saskatchewan.

BELLE PLAINE.—Tenders will be received up to April 15th, 1909, for the construction of the Stony Beach Rural Telephone Company's telephone lines. All material will be supplied, and the poles distributed. Address, John Poyser, Secretary-Treasurer.

SASKATOON.—Tenders will be received until Tuesday, April 13th, 1909, for all labor necessary for laying water mains and sewer pipes, and furnishing certain materials therefor. Plans and specifications may be seen at the office of the Chief Engineer. J. H. Truesdale, Esq., City Clerk, Saskatoon; Willis Chipman, C.E., 103 Bay Street, Toronto.

WEYBURN.—Tenders will be received until April 7th, 1909, for pipe-laying, water tower, cast iron pipe, and fire hydrants and valves for the town of Weyburn. Geo. Hess, secretary-treasurer; Willis Chipman, chief engineer. (Advertised in The Canadian Engineer.

Alberta.

LETHBRIDGE.—Tenders will be received up to April 10th, for the whole of the work required in the erection of a fireproof hospital for the trustees of the Galt Hospital. Address, C. B. Bowman.

MEDICINE HAT.—Tenders for drilling a gas well will be received until April 30th. W. P. Morrison, City Engineer. (Advertised in the Canadian Engineer.)

British Columbia.

PRINCE RUPERT.—Tenders will be received up to the 27th April, 1909, for the erection and completion of a reinforced concrete wharf with timber superstructure at

Prince Rupert, B.C. Plans at the offices of the Government agent, Prince Rupert; of the Government agent, New Westminster; of the provincial timber inspector, Vancouver, and at the Public Works Department, Victoria, B.C. Edward Mohun, Assistant Engineer, Public Works Department, Victoria, B.C.

CONTRACTS AWARDED.

New Brunswick.

MONCTON.—The following tenders were submitted to the Water and Light Committee for two electric turbo pumps: Canadian Crocker Wheeler Co., Montreal, P.Q., f.o.b. Moncton, $3,660; Goulds Manufacturing Co., Syracuse, N.Y., f.o.b. Moncton, $4,200; R. H. Buchanan, Montreal, P.Q., f.o.b. Moncton, $3,993; Canadian Buffalo Forge Co., Montreal, P.Q., f.o.b. Montreal, $3,180; Peacock Bros., agent English firm, f.o.b., Montreal, $3,435; Canadian Fairbanks Co., Montreal, P.Q., f.o.b. Montreal, $4,768; Canada Iron & Foundry Co., Toronto, f.o.b. Moncton, $4,127; Canada Iron & Foundry Co., Toronto, Ont., erected, $4,500; Drummond McCall Co., Montreal, erected, $5,789.40; The John McDougall Caledonian Iron Works Co., Montreal, erected, $5,440. They are to be analyzed by the City Engineer.

Nova Scotia.

AMHERST.—Rhodes Curry & Company, of Amherst, have lately secured a contract for two parlor cars from the Halifax and South Western Railway.

Quebec.

MONTREAL.—The Montreal and Southern Counties Railway have given the contract for paving Common, Grey, Nun and Youville Streets, to the Sicily Asphaltum Paving Company.

Ontario.

DUTTON. — James A. Bell, township engineer, has awarded the contract for digging the Douglas drain to Wm. Stidwell, of Dutton, and Thomas Everiste, of Wallacetown, whose contract price is $200.

NORTH TORONTO.—Tenders were opened for the 140 foot timber bridge at Lawrence Heights. Bridge was 24 feet high and bents rested on concrete piers. Tenders were as follows:—

No.	Name and Address.	Amount.
*1st.	Mr. D. M. McLennan, Weston	$3,955 00
2nd.	Messrs. McKenzie, Lansing,	4,400 00
3rd.	Messrs. Farrell & McCarthy, Toronto	4,700 00
4th.	Messrs. Green & Sinclair, Toronto and Owen Sound	4,797 00
5th.	Messrs. Gale & Co., Oshawa and North Toronto	5,000 00
6th.	Mr. Kirby, Toronto	5,382 00
7th.	Mr. Peter Arnot, Toronto	5,682 00
8th.	W. S. Oliver & Co., Toronto	6,064 00
9th.	R. MacMannus & Co., Hamilton	6,736 00
	Engineers' approximate estimate	4,850 00

Walter Scott Brooke, Assoc. M. Inst. C.E., etc., Engineer.

*Accepted.

TORONTO.—The Property Committee of the Board of Education accepted the following tenders in connection with the enlargement of Riverdale High School: Mason work, H. Lucas & Sons, $21,500; carpenter work, W. Williamson, $11,572; plastering, T. Blackburn & Son, $2,180; painting, Hughes & Company, $1,800; plumbing, Keith & Fizsimons, $885; roofing, A. B. Ormsby & Company, $1,767; heating and ventilating, Fred Armstrong Company, $4,600; steel fireproofing, Expanded Metal Company, $911; heat regulation, Johnston Temperature Regulation Company, $567; electric wiring, Bennett & Wright, $86; structural steel, Reid & Brown, $783—total, 46,651.

Tenders in connection with the enlargement of Kent School were accepted as follows: Masonry, H. Lucas & Son, $46,200; carpentering, Frank Armstrong, $24,487; plastering, T. Blackburn & Son, $3,150; painting, R. J. Wray, $2,590; plumbing, Bennett & Wright, $1,520; roofing and tinsmithing, Flowers & St. Leger, $2,198; structural steel, Reid & Brown, $4,172; heating and ventilating, Fred Armstrong, $4,105; reinforced steel, Expanded Metal Company, $1,818; heat regulations, Johnston Temperature Regulation Company, $1,049; electric wiring, Bennett & Wright, $25—total, $97,709.

The tenders of the Expanded Metal Company for reinforced steel for the Fern Avenue School and the Girls' Home, at $236 and $562, respectively, were accepted.

TORONTO.—The following is a statement of the prices submitted by the Canada Foundry Company, of Toronto, to City of Toronto, for a supply of cast iron water pipe. Tender No. 1 was accepted:—

Tender	3-inch pipe per length	4-inch pipe per length	6-inch pipe per length	8-inch pipe per length	10-inch pipe per length	12-inch pipe per length
No. 1	$4.15	$4.63	$6.60	$ 9.90	$13.90	$18.70
No. 2	4.20	4.70	6.66	10.08	14.16	19.20
Approximate weight per length—	150-180	250	360	519-540	749-810	1,050

TORONTO.—The Board of Control awarded the contract for the construction of the first section of the trunk sewer to the Godson Contracting Company for the sum of $138,528, this including $10,000 for the cost of the vitrified brick invert. The cost per foot for the concrete sewer, exclusive of the brick lining for the lower half, is $19.97 per foot for the 6,386 feet to be laid. The section of the sewer to be constructed is from the corner of Duchess and Jarvis Streets to the east end of Mark Street on the Don Esplanade, and will consist of 1,972 feet of tunnel, 7 feet 6 inches in diameter; 2,419 feet of tunnel, 7 feet 9 inches in diameter; 1,556 feet of 8-foot tunnel and 437 feet of 8-foot 6-inch tunnel.

PORT ARTHUR.—The E.R.L. and T. Commissioners awarded the contract for rails to the Dominion Equipment & Supply Company, of Winnipeg, and for spikes and bolts to the Marks Clavet Debie Company, Limited, of Port Arthur.

Manitoba.

WINNIPEG.—At a special meeting of the School Board the tender of Saul & Irish to erect the La Verandrye school in Fort Rouge, using Manitoba pressed brick, for $69,920 was accepted. The building committee was authorized to call for tenders for the installation of a heating and ventilating system.

WINNIPEG.—On account of the recommendation of the city engineer in favor of Mexico asphalt, the tender of Alloway & Champion for E grade Ebano asphalt has been recommended by the Board of Control. The price is $28.09 per net ton, being the lowest in price per square yard of pavement of the several tenders received. From 2,500 to 3,500 tons will be required and delivery will begin on May 15, the daily deliveries to run from 120 to 180 tons.

Alberta.

CALGARY.—Contracts have been let for the excavation of 600 miles of canals and ditches, which when completed and added to the already extensive irrigation system in operation will serve the entire western section of the C.P.R. irrigation block. Foley, Welsh, & Stewart were successful in securing the contract, and will commence work on April 15. The contracts involve the handling of over 2,500,000 yds. of material. The main distributary of this portion of the system to be forty feet in bed width, carrying 6½ feet of water. The tract to be served lies east of Calgary to the Edmonton branch between Rosebud and the Berry River, the total acreage being in the neighbourhood of 250,000.

MEDICINE HAT.—In connection with the construction of the huge irrigation ditch of the Southern Alberta Land Company, near Medicine Hat a number of tenders were entered, and it is understood that the figures of J. D. McArthur are the lowest. The contract calls for the construction of 45 miles of ditch to carry water for the irrigation of 400,000 acres of land. A short distance beyond the point where the water is taken from the Bow River is one huge piece of excavation which calls for the handling of over

1,300,000 cubic yards of earth. At that point is a high cliff or hill 8,100 feet in length, and with an average height of 50 feet, which must be cut through and the material carried away where it will not interfere. The whole of the work calls for the excavation of over 3,000,000 cubic yards of material. It is understood that Mr. McArthur is getting his outfit together, and will be ready to ship it next week. The start will be made with teams and scrapers, but at least six steam shovels will be put on later.

British Columbia.

VICTORIA.—The City of Victoria has awarded a contract for 55 gate valves to Prior & Company, of Victoria, as follows: 15 12-inch, $44.15 each; 20 8-inch, $19.41 each; 20 6-inch, $10.63 each. For rough lumber, J. A. Sayward, Victoria, $10 per 1,000 ft.; for paving blocks, J. A .Sayward, 3 x 8 x 3½, $8.75 per thousand; 3 x 8 x 4, $10 per thousand; 3 x 8 x 5, $12.50 per thousand.

NELSON. — The Allis-Chalmers-Bullock Company will be given the contract for putting in the turbine and generator at the city power plant to complete the second unit at Bonnington Falls. The cost is about $75,000.

VICTORIA.—Tenders for crushed rock and for rock, uncrushed, but delivered at the city crusher were as follows: George Oliver, uncrushed rock, delivered at the Esquimalt and Nanaimo Railway depot on cars, at $1.70 per cubic yard ready for the crusher; Luny Brothers, crushed rock, delivered in various localities, $1.90, $2, and $2.08 per cubic yard; Lineham-Scott Sand and Gravel Company, delivered to crusher, 84c. per yard, the city crusher to be stationed at Mount Tolmie. This amount included royalty and delivering to any part of the city, the city to do the necessary blasting and crushing; John Haggerty & Company, $2.25 delivered to any part of the city. A bid for hauling alone was also made by the same firm at 99c. per yard. A tender, which was not signed by the tenderers, was also received at a figure of $1.50 per yard delivered at the crusher. The committee will recommend to the council that the tender of the Lineham-Scott Sand and Gravel Company be accepted. Tenders for the supply of teams and men for street sprinkling purposes were also received. The city supplies the carts and water. The tenders were as follows: E. E. Hazen, 70c. per hour for man and team for day work, and 75c. per hour for night work; George Burt, 55c. per hour per team; James Richards, 57½c. per hour per team; Haggerty & Company, 58½c. per hour per team; W. Simmons, 70c. per hour per team for day work and $1 for night work. The committee will recommend to the council that the tender of George Burt be accepted.

RAILWAYS—STEAM AND ELECTRIC.

Quebec.

MONTREAL.—The Montreal Street Railway contemplates making several extensions to its lines.

Ontario.

DUNNVILLE.—The by-law to grant $5,000 bonus to the Dunnville, Wellandport & Beamsville Railway in Moulton township was defeated.

NEW HAMBURG.—The People's Electric Railway $20,000 by-law was carried here March 29 by 99 majority.

HAMILTON.—The street railway company has made formal application to the city for permission to start the work of laying the new tracks on James Street, from Herkimer to Barton Streets.

NIAGARA FALLS.—The construction of a new railroad to connect Canadian railway systems with the Lehigh Valley is contemplated. Interests co-operating with the Niagara, Lockport and Ontario Power Company in the proposed road are said to be the Grand Trunk and the Pere Marquette systems. The plan proposes a third-rail double-track road in an almost direct line from Niagara Falls, at a point near Devil's Hole, to Lockport. The railroad, as now planned, will be built to Batavia and ultimately may be extended to Rochester.

OTTAWA.—The Cobalt Range Railway Company's bill was reported by the Commons Railway Committee this week. The company is authorized to construct the following lines: From Haileybury to Elk Lake via Bucke, Firstbrook, Barr or Hudson, Lundy, Auld, Cane or Henwood, Barber, Tudhope or Bryce and James, thence to Gow Ganda Lake. From Ville Marie, Que., to Opasilica Lake, and thence to the N.T.R. The company must begin to build within two years, and must complete construction within five years.

PORT ARTHUR.—Extensive improvements will be made this summer to the Duluth extension of the C.N.R. Ry. Among other changes to be made, the track will be re-tied and ballasted and put in good shape generally. The bridges will also be repaired.

TORONTO.—A new lease was given the Toronto Suburban Railway by the railway committee this week. It proposes to continue its line at present built to Weston, up to Brampton and along through Peel, Wentworth and Welland Counties, to Port Colborne. It also proposes to continue its line at present built as far as Lambton Mills along to Hamilton, and on through Wentworth and Lincoln Counties to Niagara Falls. It was decided to give the company two years in which to start and five to finish the work.

Manitoba.

WINNIPEG.—The building of the new St. Boniface depot for the Canadian Pacific Railway will be commenced at once on the site a short distance off Provencher Avenue. The new building will be up to date in every respect.

Saskatchewan.

PRINCE ALBERT.—The C.N.R. have a force of men building the big approaches to the traffic part of the bridge on the north side of the river. The ground is being blasted with dynamite so that the piles can be driven; the traffic part of the bridge will be ready for use when the ice goes off. The false work is now all out from under the bridge, but it will take some time to complete the work of riveting the superstructure. The completion of the swing portion is being hurried so that the bridge can be opened as soon as navigation is possible.

British Columbia.

VANCOUVER.—Mr. H. E. Beasley, who was formerly superintendent of the C.P.R. Pacific division, has been appointed chief official on Vancouver Island, and will have charge of all the lines there. Mr. R. Marpole, chief executive assistant, Mr. H. E. Beasley and Mr. H. J. Camble, special engineer, will make a tour of inspection of the various lines and construction work that is being done on Vancouver Island.

VANCOUVER.—In the near future it is expected the Canadian Pacific will cease running steam locomotives into the city, and that the trains will be hauled into the station from Vancouver Junction by electric power. The possibility of the change being made was confirmed by Sir Thomas Shaughnessy, but no definite decision has yet been reached

VANCOUVER.—Grading on the Alberni branch of the E. & N. railway between Nanaimo and French Creek is about completed. The contractors are now engaged on a heavy piece of rock work. It is expected that the rails on this section will be laid before the end of June, when train service will be inaugurated. No decision respecting work on the extension beyond French Creek to Alberni has been reached. The plans of the revised survey have been sent for approval to Winnipeg and Montreal.

Foreign.

CUBA (HAVANA).—President Gomez signed a contract giving the Cuba Railway Company a subsidy of $6,000 per kilometre for the construction of a branch from the main line at Martí to Manzanillo by way of Bayamo.

LIGHT, HEAT, AND POWER.

Quebec.

MONTREAL.—With the view to the appointment of Mr. R. S. Kelsch, of Montreal, to be consulting engineer for the City of London, Ont., the Mayor of London, accompanied

by Ald. Stewart, of that city, visited Montreal last week. It is understood that Mr. Kelsch has practically accepted the offer, though the final details of the appointment have not yet been settled. Mr. Kelsch is at present consulting engineer, with the Montreal Light, Heat and Power Company. The new work at London involves the expenditure of over $1,000,000, and includes the erection of a new light and power plant.

SHERBROOKE.—A new schedule of electric light rates has been submitted to the ratepayers. The most important changes are the following: Consumers will be charged at the rate of 5c. per kilowat instead of 10c. as heretofore. There will be no rent charged for meters, and to make up for this, each person will have to furnish his own globes.

Ontario.

BROCKVILLE.—The Beach Company, of Iroquois, have valuators out arranging to purchase a pole route for an electric power line from Iroquois to Brockville.

BROCKVILLE.—At a meeting of the Town Council, Board of Trade, Trades and Labor Council, and Light and Water Commissioners, a resolution was passed that Mitchell Bros., consulting engineers, of Toronto, be requested to make a report relative to the cost of extensions, requirements and working economies of the light and water plant.

LISTOWEL.—The by-law for an electric light plant will be voted on, April 19. The sum is now fixed at $12,500.

PORT ARTHUR.—The Ontario Cabinet are expected to give a decision shortly regarding an application by Port Arthur for a lease of the water power at Kakabeka Falls, where the Government are having a large dam constructed. If their application is granted, the City of Port Arthur intend erecting a power plant.

TORONTO.—A proposal was made this week to the Hydro-Electric Power Commission by gentlemen concerned in the electric railway project which is designed to connect Guelph and Stratford. Branches are also planned to Fergus and Elora and from New Hamburg to Woodstock via Plattsville. Eventually the road will come down to Toronto from the north-west. The system as at the present outlined covers some 150 miles, and the proposal made to the Commission is that the company should distribute Niagara power in such districts as the Hydro-Electric Power Commission does not penetrate. New Hamburg is prepared to bonus the company to the extent of $20,000 with the stipulation that it will undertake this work, thus bringing Niagara power into new fields. The company would use power obtained from the Hydro-Electric Power Commission for its own service.

Foreign.

EL PASCO (TEXAS).—Headed by Dr. B. Franklin Pearson, a Canadian syndicate has secured a concession from the Mexican Government for the construction of two dams on the Conchau River, at a cost of approximately $8,000,000, and will produce gold. The upper dam, for the purpose of generating electric power for lighting and manufacturing, will cost two and a half millions, and will produce power for Santa Rosalia, Parral and neighbouring towns. The lower dam will cost between five and six million dollars and will be devoted to flood water irrigation for three hundred thousand acres of farming land in Concha valley. Construction on this dam is to start this year, and will be completed in three years.

SEWERAGE AND WATERWORKS.

Ontario.

GUELPH.—The main trunk sewer will be finished, so far as the brick work is concerned, in three weeks. The sewer is now being built along Queen Street at a depth of 22 feet, and five hundred feet from the end of the brick work.

NEW TORONTO.—The township of Etobicoke on Wednesday last presented a special bill before the Ontario Legislature Private Bills Committee. The bill comprised special powers required by the township to assess a portion of the township with "East Toronto," for the purposes of main sewerage, sewage disposal and water supply. The council were represented by the reeve and members and Mr. I. Montgomery, who presented the bill. Mr. Phelan represented resident ratepayers, while Mr. Keith represented non-resident ratepayers, and Mr. McKinnon the manufacturers. Mr. T. Aird Murray, acting as engineer to the council, explained the scheme to the committee. Considerable opposition was raised to the method of apportionment of cost as between the householders and manufacturers, but an amendment was accepted to the terms of the bill giving full power to the Council and Engineer of Railways Board to fix the portion of cost payable by the manufacturers. The bill, as amended, was passed. New Toronto is in a fair way now to possess a complete sewerage scheme and water supply, and the district should, with its new proposed sanitary conditions, get rid of many of the objectionable features which have prevented it from becoming a popular residential suburb.

OWEN SOUND.—Owen Sound is considering an expenditure of $100,000 to augment its water supply by drawing on the Sydenham River at a height of 300 feet above the level of the city. This will afford a gravity system, giving pure water with plenty of pressure for purposes of fire protection. The engineer believes that the filtration plan is feasible in this case and his report to the Owen Sound Council will embody a recommendation to that effect.

PETERBOROUGH.—This week the electors voted on by-laws to raise $120,000 to construct a waterworks concrete dam, which carried by 169, and for $15,000 to build a power house, etc., to develop power in connection with the dam, was defeated by 47 majority. The new dam will be paid for by surplus revenue from the waterworks.

TORONTO.—Dr. Sheard, the Medical Health Officer, has recommended to the Board of Works that two crematories be erected in the city, one near Huron Street, north of the C.P.R. tracks, and the other near Dufferin Street, north of the C.P.R. tracks, at a cost of $90,000 or $100,000.

Manitoba.

WINNIPEG.—The civic board of works have granted the request of the National Transcontinental Railway for permission to lay a sewer emptying into the Red River. The length of the outlet is about 400 yards and it will cost $20,000. The cost of the sewer, five miles in length, which will be laid by the commission to the shops at Transcona, will be about $170,000.

Alberta.

CALGARY.—Throughout the entire Bow River Valley a series of test wells are about to be driven by the Canadian Pacific with a view to determining the depth necessary to go to secure good water. Careful records will be compiled so that those acquiring land will be in a position to determine that most advantageous routine for the sinking of wells.

British Columbia.

VICTORIA.—The Alberni Waterworks Company has been incorporated to supply water for domestic uses to the town of Alberni, B.C.

TELEPHONY.

Ontario.

BRANTFORD.—The Canada Automatic Machine Telephone Co. will be operating by May 1st, according to the announcement of General Manager Mackay. The rates will be $25 for business and $15 per year for residential telephones.

ST. THOMAS.—The Bell Telephone Co. will ask for tenders for the construction of its new office building, the erection of which is to be commenced by May 1st.

FINANCING PUBLIC WORKS.

GLACE BAY.—At a recent meeting the Water Committee recommended that $7,000 be borrowed for repairs to the town reservoir; also $13,000 for building a road to Sand Lake, putting in a stiltzer scheme, and necessary repairs to the water system. The Street Committee asked council to

authorize the borrowing of $4,200 for the installation and repairs to sewer culverts in various parts of the town. The reports were adopted by council.

TORONTO.—The City Engineer's Department will require $190,000 to extend the city water service along St. Clair, Danforth, Riverdale and Carlaw Avenues, and along Gerrard Street East from the present terminus of the existing main. The money will be provided by an issue of debentures.

CURRENT NEWS

Quebec.

QUEBEC.—A move is being made for the construction of a modern union station for the Ancient City against the time when the National Transcontinental enters, some two or more years hence. It is proposed to acquire the Champlain Market Hall and square as a site for the projected terminus, which will be used not only by the new Transcontinental, but by all railways entering the city. A conference was recently held between the National Transcontinental Commission and representatives of the city council, at which the question of the transfer of the site for the proposed new Union Station was discussed at length, and it was finally decided that the Finance Committee would hold a meeting at once, and decide upon what terms the necessary property would be transferred.

Ontario.

BROCKVILLE.—The town of Brockville is considering a proposition to place two electric 'buses on the route between Brockville and Prescott.

Foreign.

DENVER, COL.—Recently orders for analytical balances with the Ainsworth improved multiple rider carrier have been received by Wm. Ainsworth & Sons, Denver, Col., U.S.A., from the United States Food Inspection Laboratory, Denver, Col.; the United States Mint, San Francisco, Cal., and the Watertown Arsenal, Watertown, Mass.

MISCELLANEOUS.

Ontario.

TRENTON.—It is expected that work on the local section of the Trent Canal will be resumed about the middle of April, or a little before. Walls and piers built last summer stand firm, and the work so far in connection with the canal seems satisfactory. The temporary bridge at Glen Miller, carried away by the heavy rain, has been removed and replaced by a new steel bridge, which is a fine piece of work. Contractors have just completed about twenty new dumping cars, and a great deal of other repair work has been going on all winter. Work on Dam No. 2 stands firm, and appears as if it would do so for a good many years. Teams have been hauling stone from Dam No. 1 to 2, getting ready to feed the big stone crusher. Messrs. Cameron and Murphy, assistant engineers, have been busy up the line all winter, and report everything in good shape.

British Columbia.

PRINCE RUPERT.—The Provincial Government is considering putting in a substantial public wharf at Prince Rupert. The intention is to have the wharf put on concrete piles, so as to overcome the damage from teredos. The work is expected to cost about $60,000, and it will be commenced with as little delay as possible.

PERSONAL.

MR. J. HUTCHEON has been appointed city engineer of Guelph, Ont.

MR. JOHN M. WILSON has been appointed general manager at Toronto for the W. H. Oliver & Company, engineers and machinery sales agents.

MR. A. HERDT was appointed to the professoriate of electrical engineering in the faculty of applied science at a meeting of the Board of Governors of McGill University, Montreal, last week.

MR. H. E. M. KENSIT, Mem. Inst. E. E., of Smith, Kerry & Chace, Toronto, is this week in Lethbridge, Alta., in connection with the awarding of tenders for the municipal light, heat and power plant.

MR. T. W. SHEFFIELD, A.M.I.E.E., has been appointed general manager of the Toronto Electrical Maintenance Company, 24 Adelaide Street West, Toronto, Ont. This new company will undertake the inspection and maintenance of electric light and power plants as well as all kinds of electric repairing.

MR. W. F. SIMMONS, for seventeen years general superintendent of the Kingston Light and Power Company, of Kingston, Ont., and for the past four and a half years general superintendent of the Peekskill Lighting and Railroad Company, of Peekskill, N.Y., will represent R. W. Marshall & Company in the Dominion of Canada.

MR. S. B. CLEMENT. B.Sc., who has recently been appointed chief engineer of the Temiskaming and Northern Ontario Railway, with head offices at North Bay, Ont., is a graduate in civil engineering of McGill University and received the degree of M.Sc. from the same university for experimental research work in the hydraulic and testing laboratory. Mr. Clement has had practical experience in the waterworks department, London, Ont., with the Canadian Electric Company, Chaudiere Falls, P.Q.; the Canadian Niagara Power Company, Niagara Falls; Canadian Pacific Railway, Location Surveys and Resident Engineer on Construction; Temiskaming and Northern Ontario Railway, Location Surveys. On the formation of Hydro-Electric Power Commission he was appointed assistant engineer, but resigned in July, 1906, and returned to T. & N. O. Railway as assistant to G. A. McCarthy, chief engineer, which position he held until appointment as chief engineer. Mr. Clement is also an associate member of the Canadian Society of Civil Engineers.

OBITUARY.

MR. EDWARD S. PIPER for many years head of the Piper Railway Supply Company, Toronto, died March 24th, 1909. Mr. Piper was 67 years of age, and spent his life in business in Toronto. He invented several devices that had to do with railways, and had the satisfaction of seeing many of them adopted.

THE HADSEL MIXER.

In giving a description of the Hadsel mixer in a recent issue an error occurred in stating that the drum which is supported on four 28-in. chilled cast iron rollers, was geared on steel 1-in. beam, this should have been I-beam instead, also that instead of discharging one yard of concrete per minute should have read that the drum in four revolutions mixes a half yard of concrete in thirty seconds.

PATENTS.

Below will be found a list of patents recently granted to Canadian inventors in Canada and United States which is furnished by Messrs. Fetherstonhaugh & Co., Patent Barristers, Solicitors, etc. Head Office, Royal Bank Building, Toronto.

Canadian Patents.

J. Muir, Brantford, Ont., concrete mixers; W. Campbell, Cobourg, Ont., device for gripping articles to be sli ed; C. R. Marks, Hamilton, Ont., hot water or steam radiators; W. J. Graham, Toronto, Ont., junction boxes; W. S. Atwood, Montreal, Que., side stake for cars; J. McCluskey, North Bay, Ont., cattle-guard.

MARKET CONDITIONS.

Montreal, April 1st, 1909.

Nothing serves to show the general trend of industrial affairs more than the disposition which is now manifesting itself in the iron and steel trades to reduce wages. Some little time ago it was said that no reduction in wages was contemplated as a result of the reductions being made in the price of iron. During the past few weeks, however, a different tune has been played. Several instances of reductions were reported, and it is now stated that a general decline is about to take place. Some time around the beginning of the month is the time mentioned as likely, but it is also stated that the decline may be delayed until the month is well advanced. The extent of the reductions are said to be from 15 to 20 per cent. in the iron trade, 5 to 10 per cent. in the sheet trades, and about 2 per cent. in tin plate. It is added, however, that these reductions will not have much effect on the selling price of goods, as freights and values of ore in the ground are the prime factors in cost. However, prices of pig are now dropping steadily, if slowly, and buyers are holding off in the matter of making purchases in order to get the low point. Iron is being melted right along but practically none is being sold, so that the situation is anything but strong. At the moment, the feeling throughout the trade is one of pessimism almost although many express the view that such a feeling is not justifiable.

The pig-iron market in Great Britain is very flat and prices are generally lower. Stocks of warrants are increasing at the rate of about 5,000 to 6,000 tons per week. Pessimistic advices from the United States and from Germany are not improving the sentiment in the home trade.

In Canada, the situation seems to be better than anywhere else, from all that can be learned. The representative of one of the most prominent firms in the trade said recently:—"I consider that Canada is more fortunate than any other of the commercial countries, just now. There are none of the unsettling problems to face here which are disturbing other countries. Tariff matters are all settled, for the time being, at least, and no strikes are looming up, so far as can be seen, while the question of war is never seriously discussed. The finances of the country are on a sound basis and if disturbing factors in other countries were only removed there would seem to be no obstruction to an active business developing right away. It looks as though Canada would continue for many years to be in the best position of any country in the world."

At the present time, business is naturally uncertain and on the dull side. However, it is not at all discouraging. Each day brings its little grist of orders from those who cannot any longer put off making purchases, and while this is not the most satisfactory reason in the world for business, it is better than not getting it at all.

Prices are steady all round, no changes whatever being noticeable during the past week.

Antimony.—The market is steady at 9 to 9½.

Bar Iron and Steel.—Prices are steady all round, and trade is dull. Bar iron, $1.00 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $2.00; sleigh shoe steel, $1.00 for 1 x ⅜-base; tire steel, $1.05 for 1 x ⅜-base; toe calk steel, $2.40; machine steel, iron finish, $2.10; smooth finish, $2.75.

Boiler Tubes.—The market is steady, quotations being as follows:—2-inch tubes, 8½c.; 2½-inch, 10c.; 3-inch, 11½c.; 3½-inch, 14½c.; 4-inch, 19c.

Building Paper.—Tar paper, 7, 10, or 16 ounces, $1.60 per 100 pounds; felt paper, $2.40 per 100 pounds; tar sheathing, No. 1, 35c. per roll of 400 square feet; No. 2, 35c.; dry sheathing, No. 1, 45c. per roll of 400 square feet, No. 2, 28c. (See Roofing; also Tar and Pitch).

Cement.—Quotations are for car lots, f.o.b., Montreal. Canadian cement is $1.55 to $1.65 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½c. extra, or 10c. per bbl. weight. English cement is $1.65 to $1.85 per 350-lb. bbl. in 4 jute sacks (for which add 8c. each) and $2.20 to $2.40 in wood. Begian cement is $1.60 to $1.65 in bags—bags extra—and $2.10 in wood.

Chain.—The market is steady as follows:—¼-inch, $5.30; 5-16-inch, $4.05; ⅜-inch, $3.65; 7-16-inch, $3.45; ½-inch, $3.20; 9-16-inch, $3.15; ⅝-inch, $3.05; ¾-inch. $3; ⅞-inch, $2.95; 1 inch, $2.95.

Copper.—The market is about steady at 14½ to 15c. per lb. Demand continues limited.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 18c. in single case lots, Montreal. Blasting powder, 25-lb. kegs, $2.25 per keg. Special quotations on large lots of dynamite and powder. Detonator caps, case lots, containing 10,000, 75c. per 100; broken lots, $1. Electric blasting apparatus:—Batteries, 1 to 10 holes, $15; 1 to 20 holes, $25; 1 to 30 holes, $35; 1 to 40 holes, $50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strentgh, per 100 fuses:—4-ft. wires, $3.50; 6-ft. wires, $4; 8-ft. wires $4.50; 10-ft. wires, $5. Double strength fuses, $1 extra, per 100 fuses. Fuses, time, double-tape, $6 per 1,000 feet.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's eHad, $4.40; Comet, $4.25; Gorbal's Best, $4.25; Apollo, 10¾ oz., $4.35. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge. American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge.

Galvanized Pipe.—(See Pipe, Wrought and Galvanized).

Iron.—Prices are rather higher, and the outlook is steadv. The following prices are ex-store: Canadian pig, $18.50 to $19.50 per ton; No. 1 Summerlee, $21 to $22; No. 2 selected Summerlee, $20.50 to $21.50; Carron soft, $20.25 to $20.75; No. 3 Clarence, $19 to $20 per ton.

Laths.—See Lumber, etc.

Lead.—Trail lead is firmer, at $3.75 to $3.85 per 100 pounds, ex-store.

Lead Wool.—$10.50 per hundred, $200 per ton, f.o.b., factory.

Lumber, Etc.—Prices on lumber are for car lots, to contractors, at mill points, carrying a freight rate of $1.50. At the moment, the market is exceptionally irregular and prices are uncertain. Red pine, mill culls out, $18 to $22 per 1,000 feet; white pine, mill culls, $22 to $25. Spruce, 1-in. by 4-in. and up, $16 to $18 per 1,000 ft.; mill culls, $14 to $16. Hemlock, log run, culls out, $14 to $16. Railway Ties; Standard Railway ties, hemlock or cedar, 35 to 45c. each, on a 5c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, $1.35 to $1.50 each; 30-ft., $1.75 to $2; 35-ft., $2.75 to $3.25 each, at manufacturers' points, with 5c. freight rate to Montreal. Laths: Quotations per 1,000 laths, at points carrying $1.50 freight rate to Montreal, $2 to $3. Shingles: Cedar shingles, same conditions as laths, X, $1.50; XX, $2.50; XXX, $3.

Nails.—Demand for nails is moderate, but prices are steady at $2.30 per keg for cut, and $2.25 for wire, base prices.

Pipe.—Cast Iron.—The market continues steady at $33 for 8-inch pipe and larger; $34 for 6-inch pipe; $34 for 5-inch, and $34 for 4-inch at the foundry. Pipe, specials, $3.10 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

Pipe.—Wrought and Galvanized.—The market is steady, moderate-sized lots being: ¼-inch, $5.50 with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 59 per cent. off for black and 44 per cent. off for galvanized. The discount on the following is 69 per cent. off for black and 59 per cent. off for galvanized; ½-inch, $8.50; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-nch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50; 3½-inch, $95; 4-inch, $108.

Rails.—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of $31.50 to $32.50 is given for 60-lb., 70-lb., 80-lb., 85-lb., 90-lb., and 100-lb. rails, per gross ton of 2,240 lbs., f.o.b. mill. Re-laying rails are quoted at $27 to $29 per ton, according to condition of rail and location.

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 64c. per roll; three-ply, 86c. per roll of 100 square feet. (See Building Paper; also Tar and Pitch).

Rope.—Prices are steady, at 9½c. per lb. for sisal, and 12c. for Manila. Wire rope, crucible steel, six-strands, nineteen wires; ¼-in., $2.75; 5-16, $3.75; ⅜, $4.75; ½, $6; ⅝, $7.25; ¾, $8.50; ⅞, $10; 1-in., $12 per 100 feet.

Spikes.—Railway spikes are in dull demand and prices are steady at $2.30 per 100 pounds, base of 5½ x 9-16. Ship spikes are also dull and steady at $2.85 per 100 pounds, base of ⅝ x 10-inch, and ⅝ x 12-inch.

Steel Shafting.—Prices are steady at the list, less 25 per cent. Demand is on the dull side.

Steel Plates.—The market is steady. Quotations are: $2.15 for 3-16; $2.25 for ⅛, and $2.15 for ¼ andthicker; 12-gauge being $2.30; 14-gauge, $2.15; and 16-gauge, $2.10.

Telegraph Poles.—See lumber, etc.

Tar and Pitch.—Coal tar, $4 per barrel of 40 gallons, weighing about 500 pounds, roofing tar, $3.15 per barrel; roofing pitch, No. 1, $1 per 100 pounds; and No. 2, 50c. per 100 pounds; pine tar, $8.50 per barrel of 40 gallons, and $4.75 per half-barrel; pine pitch, $4 per barrel of 180 to 200 pound. (See building paper; also roofing.

Tin.—Prices are 32c. to 32½c.

Zinc.—The market is steady at 5¾ to 5¾c.

* * * *

Toronto, April 1st, 1909.

An improvement in the general tone of business is evident, and much more material is being placed. This applies to metals and hardware as well as to bricks and lumber. This week's advices as to copper, tin, lead, antimony, are that they all show more firmness. Steel is slightly firmer in the British market, makers having more orders, though at the same time (20th March), there was a break in price of Cleveland pig-iron caused by absence of demand, and manufactured iron was selling "from hand to mouth."

New York advices of Monday last contain some curious contrasts as to steel prospects. "More orders in sight," say the display headings of a daily, and also "March affords record structural orders." But in the next column the reader is informed of the extremely low prices for both material and erected work, and told that "the lowest prices for structural and fabricated steel in five years have come out during the week,"—meaning the Gimbel Building contract, at $40 per ton erected. The American rail mills are operating but about 30 per cent. of their capacity.

The following are wholesale prices for Toronto, where not otherwise explained, although for broken quantities higher prices are quoted:—

Antimony.—The market more active; price continues at 9¾c.

Axes.—Standard makes, double bitted, $8 to $10; single bitted, per dozen, $7 to $9.

Boiler Plates.—1-4-inch and heavier, $2.20. Boiler heads 25c. per 100 pounds advance on plate.

Boiler Tubes.—Orders continue active. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per foot; 2-inch, $8.75; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $12.10; 3½-inch. $15; 4-inch, $18.50 to $19 per 100 feet.

Building Paper.—Plain, 30c. per roll; tarred, 40c. per roll. A moderate demand can be now reported, for shipment about 1st April.

Bricks.—An active demand is now reported for common, and the market is firmer at $9.50 to $10. Pressed also selling freely. Red and buff pressed are worth, delivered, $18; at works, 17.

Cement.—Price in 1,000-barrel lots $1.70 per barrel, including bags, or $1.30 without bags. Smaller quantities, $1.55 to $1.60 per barrel, in load lots delivered in town, and bags extra. No marked activity.

Coal Tar.—Nothing doing, price maintained at $3.50 per barrel.

Copper Ingot.—Outside market firmer and quite active. Price here unchanged at 13¾ to 14c., with more enquiry.

Detonator Caps,—75c. to $1 per 100; case lots, 75c. per 100; broken quantities, $1.

Dynamite, per pound, 21 to 25c., as to quantity.

Roofing Felt.—Some little requests of late, principally for repairing. Price maintained at $1.80 per 100 lbs.

Fire Bricks.—English and Scotch, $30 to $35; American, $27.50 to $35 per 1,000. The demand has become quite active.

Fuses.—Electric Blasting.—Double strength, per 200, 4 feet, $4.50; 6 feet, $5; 8 feet, $5.50; 10 feet, $6. Single strength, 4 feet, $3.50; 6 feet, $4; 8 feet, $4.50; 10 feet, $5. Bennett's double tape fuse, $6 per 1,000 feet.

Galvanized Sheets.—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.05; 12-14-gauge, $3.15; 16, 18, 20, $3.35; 22-24, $3.50; 26, $3.75; 28, $4.20; 29, $4.50; 10¾, $4.50 per 100 lbs. Fleur de Lis—28-gauge, $4.30; 26-gauge, $4.05; 22-24-gauge, $3.50. Queen's Head—28-gauge, $4.50; 26-gauge, $4.25. Sheets continue in active request.

Iron Chain.—¼-inch, $5.75; 5-16-inch, $5.15; ⅜-inch, $4.15; 7-16-inch, $3.95; ½-inch, $3.75; 9-16-inch, $3.70; ⅝-inch, $3.55; ¾-inch, $3.45; ⅞-inch, $3.40; 1-inch, $3.40.

Bar Iron.—$1.95 to $2, base, from stock to wholesale dealer. Market well supplied.

Iron Pipe.—Black, ¼-inch, $2.03; ⅜-inch, $2.26; ½-inch, $2.63; ¾-inch, $3.16; 1-inch, $4.54; 1¼-inch, $6.19; 1½-inch, $7.43; 2-inch, $9.90; 2½-inch, $15.81; 3-inch, $20.76; 3½-inch, $26.13; 4-inch, $29.70; 4½-inch, $38; 5-inch, $43.50; 6-inch, $56. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.31; 1-inch, $6.19; 1¼-inch, $8.44; 1½-inch, $10.13; 2-inch, $13.50. Makers are holding prices stiff, and talk of an advance.

Lead.—Prices steady outside. This market still held at $3.80 to $3.90, and more doing.

Lime.—Retail price in city 35c. per 100 lbs. f.o.b., car; in large lots at kilns outside city 22c. per 100 lbs. f.o.b., car. Small but steady consumptive demand.

Lumber.—We quote dressing pine $32 to $35 per thousand; common stock boards higher at $26 to $30.00; cull stocks, $20; sidings, $17.50. Norway pine is neglected in favor of Southern, which is much stronger in fibre and the price well maintained. Hemlock continues to sell pretty freely, and in car lots brings $16.50 to $17.00. Spruce flooring is worth $22.00 in car lots with stiffer feeling. Shingles firmer, price for British Columbia, $3.20. Lath higher at $4.25 for No. 1 and $3.75 for No. 2 waite pine 48-inch; the 32-inch were in market at $1.30, but that is absurdly low, and they are likely to bring much more; spruce laths are no longer seen here. The general building movement in the city stimulates demand

(Continued on Page 43).

TENDERS CALLED FOR

CITY OF SASKATOON

PROVINCE OF SASKATCHEWAN.

TENDERS FOR EXCAVATING AND PIPELAYING.

Sealed Tenders will be received by the City Clerk until 8 p.m. on Tuesday, April 13, 1909, for all labour necessary for laying water mains and sewer pipes, and furnishing certain materials therefor according to plans and profiles dated April 1st, 1909.

Plans and specifications may be seen at the office of the Chief Engineer, 103 Bay Street, Toronto, or at the office of the City Clerk, Saskatoon, on and after April 1st, 1909.

WILLIAM HOPKINS, Esq.,
Mayor, Saskatoon.
J. H. TRUESDALE, Esq.,
City Clerk, Saskatoon.
WILLIS CHIPMAN, C.E.,
103 Bay Street, Toronto, Ont.

CITY OF MEDICINE HAT

TENDERS FOR GAS WELL.

TENDERS for the drilling of a well for the City will be received at the office of the undersigned up to April 30th, 1909.

Tenders to be given as follows:

The contractor to furnish all labor, pipe, machinery and material, anchor and shut in well in a practical manner, the City to pay for all pipe which it is necessary to leave in the well, or the contractor may tender to furnish labor only, anchor and shut in well in a practical manner.

Specifications may be obtained by applying to the undersigned.

W. P. MORRISON,
City Engineer and Commissioner.

(Continued from Page 473).

for lumber and some good-sized bills are being filled, largely of hemlock, spruce, and southern pine. Prices are well maintained.

Nails.—Wire, $2.25 base; cut, $2.70; spikes, $3. The usual demand.

Pitch.—A little demand is perceptible; price continues at 70c. per 100 lbs.

Pig Iron.—Business continues quiet; prices are fairly well maintained. Clarence quotes at $20.50 for No. 3; Cleveland, $20.50 to $21.00; in Canadian pig, Hamilton quotes $19.50 to $20.

Plaster of Paris.—Calcined, wholesale, $2; retail, $2.15. Trade quiet.

Putty.—In bladders, strictly pure, per 100 lbs., $2.25; in barrel lots, $2.05.

Rope.—Sisal, 9¼c. per lb.; pure Manila, 12¾c., Base.

Sewer Pipe.—

	4-in.	6-in.	9-in.	10-in.	12-in.	24-in.
Straight pipe per foot	$0.20	$0.30	$0.65	$0.75	$1.00	$3.25
Single junction, 1 or 2 ft. long.	.90	1.35	2.70	3.40	4.50	14.65
Double junctions	1.50	2.50	5.00	....	8.50	.....
Increasers and reducers	....	1.50	2.50	....	4.00	.....
P. traps	2.00	3.50	7.50	....	15.00	.....
H. H. traps	2.50	4.00	8.00	....	15.00	.....

In steady demand; price 73 per cent. off list at factory for car-load lots; 65 per cent. off list retail.

Steel Beams and Channels.—Quiet. We quote:—$2.50 to $2.75, according to size and quantity; if cut, $2.75 to $3; angles, 1 1-4 by 3-16 and larger, $2.50; tees, $2.80 to $3 per 100 pounds. Extra for smaller sizes of angles and tees.

Steel Rails.—80-lb., $35 to $38 per ton. The following are prices per gross ton, for 500 tons or over: Montreal, 12-lb. $45, 16-lb. $44, 25 and 30-lb. $43.

Sheet Steel.—Market steady, at the former prices; 10-gauge, $2.50; 12-gauge, $2.55; American Bessemer, 14-gauge, $2.35; 17, 18, and 20-gauge, $2.45; 22 and 24-gauge, $2.50; 26-gauge, $2.65; 28-gauge, $2.85. Quite a quantity of light sheets moving.

Tank Plate.—3-16, $2.40 100 lbs.

Tool Steel.—Jowett's special pink label, 10½c. Cyclops, 16c. "H.R.D." high speed tool steel 65c.

Tin.—Market more steady, with moderate activity. The price is maintained at 30¾ and 31c.

Wheelbarrows.—Navvy, steel wheel, Jewel pattern, knocked down, $21.35 per dozen; set up, $22.35. Pan Canadian, navvy, steel tray, steel wheel, per dozen, $3.30 each; Pan American, steel tray, steel wheel, $4.25 each.

Zinc Spelter.—Business quiet; market firm at $5.25 to $5.50, outside market improved.

* * * *

Winnipeg, March 29th, 1909.

The building situation in Western Canada seems to grow brighter as the days go by, and the dealers are, without exception, feeling elated at the prospects. Many of them seem to think that the price of cement, which has been cut down very low, will advance in the near future, but no advance has yet been quoted. Other quotations remain steady and the demand for all small lines is very great for this time of the year. Business in lumber and ornamental wood-work is also reported to be picking up, as many buildings which had been stopped for the winter are now being pushed forward again.

The prices on the local markets are as follows:—

Anvils.—Per pound, 10 to 12½c.; Buckworth anvils, 80 lbs., and up, 10¼c.; anvil and vise combined, each, $5.50.

Bar Iron.—$2.50 to $2.60.

Beams and Channels.—$3 to $3.25 per 100 up to 15-inch.

Building Paper.—4½ to 7c. per pound. No. 1 tarred, 84c. per roll; plain, 60c.; No. 2 tarred, 62½c.; plain, 56c.

Bricks.—$11, $12, $13, per M, three grades.

Cement.—$2.25 to $2.50 per barrel, in cotton bags.

Chain.—Coil, proof, ¼-inch, $7; 5-16-inch, $5.50; ⅜-inch, $4.90; 7-16-inch, $4.75; ½-inch, $4.40; ⅝-inch, $4.20; ¾-inch, $4.05; logging chain, 5-16-inch, $6.50; ⅜-inch, $6; ¼-inch, $8.50; jack iron, single, per dozen yards 15c. to 75c.; double, 25c. to $1; trace-chains, per dozen, $5.25 to $6.

Dynamite.—$11 to $13 per case.

Hair.—Plaster's, 80 to 90 cents per bale.

Hinges.—Heavy T and strap, per 100 lbs., $6 to $7.50; light, do., 65 per cent.; screw hook and hinge, 6 to 10 inches, 5¼c. per lb.; 12 inches up, per lb., 4¼c.

CONTRACTOR'S SUPPLIES

NEW INCORPORATIONS.

Welland County.—Welland Stove Works, $40,000; W. S. Davis, Ann Arbor, Mich.; E. A. Payfair, Buffalo; B. J. McCormick, Welland.

Winnipeg, Man.—Wilkinson, Mompass & Hawkey, $40,000; H. L. Wilkinson, P. A. Kompass, Hamilton; L. T. Pemberton, Toronto. Modern Electric Co., $20,000; M. Piemeau, F. F. Dier, J. A. Potter. Van Deventer & Rider Co., $20,000; N. G. Van Deventer, G. P. Rider, Chicago; A. Monkman, Winnipeg.

Iron.—Swedish iron, 100 lbs., $4.75 base; sheet, black, 14 to 22 gauge, $3.75; 24-gauge, $3.90; 26-gauge, $4; 28-gauge, $4.10. Galvanized—American, 18 to 20-gauge, $4.40; 22 to 24-gauge, $4.65; 26-gauge, $4.65; 28-gauge, $4.90; 30-gauge, $5.15 per 100 lbs. Queen's Head, 22 to 24-gauge, $4.65; 26-gauge English, or 30-gauge American, $4.90; 30-gauge American, $5.15; Fleur de Lis, 22 to 24-gauge, $4.50; 28-gauge American, $4.75; 30-gauge American, $5.

Lead Wool.—$10.50 per hundred, $200 per ton, f.o.b., Toronto.

Pipe.—Iron, black, per 100 feet, ¼-inch, $2.50; ⅜-inch, $2.80; ½-inch, $3.40; ¾-inch, $4.60; 1-inch, $6.60; 1¼-inch, $9; 1½-inch, $10.75; 2-inch, $14.40; galvanized, ½-inch, $4.25; ¾-inch, $5.75; 1-inch, $8.35; 1¼-inch, $11.35; 1½-inch, $13.60; 2-inch, $18.10. Lead, 6½c. per lb.

Picks.—Clay, $5 dozen; pick mattocks, $6 per dozen; clevishes, 7c. per lb.

Pitch.—Pine, $6.50 per barrel; in less than barrel lots, 4c. per lb.; roofing pitch, $1 per cwt.

Plaster.—Per barrel, $3.

Roofing Paper.—60 to 67½c. per roll.

Lumber.—No. 1 pine, spruce, tamarac, British Columbia fir and cedar—

Nails.—$4 to $4.25 per 100. Wire base, $2.85; cut base, $2.90.

Tool Steel.—8½ to 15c. per pound.

Timber.—Rough, 8 x 2 to 14 x 16 up to 32 feet, $34; 6 x 20, 8 x 20, up to 32 feet, $38; dressed, $37.50 to $48.25.

Boards.—Common pine, 8-inch to 12-inch wide, $38 to $45; siding, No. 2 white pine, 6-inch, $55; cull red or white pine or spruce, 6-inch, $24.50; No. 1 clear cedar, 6-inch, 8 to 16 ft., $60; Nos. 1 and 2 British Columbia spruce, 6-inch, $55; No. 3, $45.

NEW INCORPORATIONS.

Edmonton, Alta.—Pioneer Coal Co.

Lethbridge, Alta. — Standard Lethbridge Collieries.

Pilot Butte, Sask.—American-Canadian Rural Telephone Co.

Sorel, Que.—Compagnie Industrielle de Sorel, $100,000.

L'Assomption, Que.—La Cie Bedard, $95,000; T. Bedard, J. D. Martineau, R. Labreche.

Gladstone, Man.—Galloway Brothers, $50,000; A. H. Collins, R. Diamond, I. J. Collins.

Grandview, Man.—Grandview Stooking Machine Co., $20,000; J. Homan, R. A. Bruce, D. Downie.

Kemptville, Ont.—Leach & Sons Co., foundry, $40,000; Z. Leach, E. A. Leach, G. A. Leach.

Sidney, Man.—Sidney Brick & Tile Co., $50,000; H. E. Hamilton, A. E. Hilder, G. Stenhouse.

St. Catharines, Ont.—St. Catharines Ice & Fuel Co., $40,000; W. H. McCordick, C. B. Dawson, S. S. Radcliffe.

Toronto. — Canadian Telegraphones, $1,000,000; R. H. Bowes, C. Swabey, G. R. Sweeny. Motor Bus Company, $2,000,000; J. C. Hallamore, A. F. Caldwell, T. W. McCraken. Gow Ganda Belle Mining Co., $2,000,000; R. S. Hodgins, Cobalt; W. E. Stanley, Lucan; H. Ferguson, Toronto. Emerald Lake Iron Co., $10,000; F. Denton, H. L. Dunn, J. McEwen.

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