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THE CANADIAN ENGINEER

ESTABLISHED 1893

Issued Weekly in the interests of the Civil, Mechanical, Structural, Electrical, Marine and Mining Engineer, the Surveyor, the Manufacturer, and the Contractor.

Index to Volume 19

JULY-DECEMBER, 1910

The volume of editorial matter has increased to such an extent that it has been found necessary to issue indexes every six months. Henceforth a new index will appear in June and December.

THE CANADIAN ENGINEER

Head Office, 62 Church St., TORONTO

MONTREAL WINNIPEG

AUTHORS

BOOK REVIEWS

PERSONAL AND OBITUARY

CONTRACTS

SANITARY REVIEW

Water Supply—Sewage Disposal—Sanitary Engineering Generally.

GENERAL

The Canadian Engineer

WEEKLY

ESTABLISHED 1893.

VOL. 19. TORONTO, CANADA, JULY 7th, 1910. No. 1.

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CIVIL, MECHANICAL, STRUCTURAL, ELECTRICAL, MARINE AND MINING ENGINEER, THE SURVEYOR, THE MANUFACTURER, AND THE CONTRACTOR.

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Index of this issue will be found on page 21.

INTELLIGENT FIRE-FIGHTING.

Every great catastrophe has its lessons and points of reform and improvements. Happy the individual or the community that is alive enough to make the most out of disaster by acting upon the suggestions that come out of consideration of the evidence and causes that lead up to such losses.

The enormous annual loss of life and property as the result of fire has led to a large number of people to work upon fire-prevention schemes and methods of fire-fighting.

The recent disaster which befell the "Herald" building in Montreal suggested to the Montreal "Daily Witness" the advisability of placing in the hands of the fire chiefs more definite information as to the layout of the large buildings in Canadian cities.

The "Witness" prepared a suggestive card, upon which may be sketched the location of stairs, elevators, water and gas mains, and, in fact, everything that particularly interests the firemen in the case of fire. Duplicate cards may be made, and not only the fire chief, but the fire captains will have in their possession diagrams or charts, which may be conveniently arranged, so that when the brigade arrives at the scene the captain can have in his possession at once a diagram that will indicate the best position for the brigade to take up. The suggestion of the "Witness" is a good one. The diagram proposed is simple, yet full enough to give the necessary information. It is convenient in size, and, if properly filled out by factory inspectors, fire chiefs and building owners, will lead to the saving of much valuable property and frequently the saving of human lives.

The suggestion should be followed up both by the property owners and the fire chiefs, for when a brigade arrives at a building so thick with smoke that the fireman's lantern enables him to see but a few feet, a voyage of discovery is out of question, and the haphazard way of fighting fire under these difficulties does not lead to good results.

OVER-CLASSIFICATION ON THE NATIONAL TRANSCONTINENTAL.

The question of over-classification on the National Transcontinental Railway has been one of the most bitterly contested of the Parliamentary discussions during the last three sessions.

The Government had to defend the charge that the National Transcontinental Commission and the engineering staff of the National Transcontinental have greatly over-classified the material along the line, thus causing the Government to pay to contractors large sums of money which should not have been paid.

Recently, the board of arbitration, consisting of Collingwood Schreiber, Consulting Engineer of the Department of Railways and Canals; B. B. Kelliher, Chief Engineer of the G.T.P., and Gordon Grant, Chief Engineer of the National Transcontinental, have been considering

the claims of over-classification, and have reported upon Sections E and F. It is expected that the report will show that in Section E the over-classification did not amount to over $25,000, and that in Section F, in contracts aggregating over $15,000,000, the over-classification was under $2,000,000.

The classification of material where rock and earth are badly mixed is difficult, and it is almost impossible for two men to exactly agree. At the same time, a clear understanding at the outset should have prevented much of the adverse criticism which has been levelled at the resident engineers on construction. In odd cases they may have been careless in their work and indifferent as to the result, and it is gratifying to find that the Board of Arbitration exonerate the engineers.

This will not, however, end the discussion. The opportunities for political capital are great, and the politician will not miss them. It would be unfortunate for public ownership of these large enterprises were to be so badly handled as to destroy confidence in the public handling and public control of large undertakings.

SPECIFICATIONS.

A specification is defined as a definite, particularized, and complete statement—the written document in which engineers and architects describe those portions of proposed work which they cannot clearly show by diagrams. In addition, they are expected to specify the material and quantities required, and, with this, the manner of carrying out the work.

How many specifications drafted by engineers come up to these requirements? Frequently they are not worth the paper they are written upon, being so one-sided that they could not stand in a court of law, and being so unreasonable that even the engineer himself would not think of requiring the "pound of flesh" which might be exacted under the letter of the law.

The specifications should be both definite and exact; then the engineer not only fully understands what he requires, but where, in addition, he expects to enforce its carrying out. Engineers fancy that they are able to shield themselves behind a host of unreasonable clauses should a mistake be made. The client must pay for these unreasonable requirements, and the engineer who inserts them places himself in an unfavorable light before the contractors—the men who do the work and are in a position to judge of the necessity of each and every clause.

The insertion of such a clause as "All works are to be done to the entire satisfaction of the engineer. He is to be the **sole judge,** and the work or material, both of quality and quantity, and his decision only on all questions of dispute with regard to work or material, or as to the meaning or interpretation of plans and specifications, is to be considered final and binding on all parties," are among the most difficult to understand. Why the engineer who prepares specifications, and who is a client's representative, shall be the sole judge or referee or arbitrator in matters of dispute between himself and the contractor it is difficult to understand.

The engineer requires certain work to be done. The contractor, for a price, is willing to do the work. They both are agreed with the drawings and specifications covering the work required. It is unreasonable to expect the contractor to be content with any matters of dispute between himself and the engineer that the engineer should be the only referee. We would be surprised if such a clause would hold in a court of law, and we cannot understand why engineers persist in inserting such clauses in the specifications. Their only purpose seems to be to make ridiculous the other well-framed and necessary clauses. Such a clause as this places the men who make the drawings, prepare the specifications, the contract and issue the progress estimates the arbitrator in matters of dispute. Is this fair to either engineer or contractor?

It cannot be, since no contractor has any idea of abiding by this stipulation, should dispute arise.

But this clause undoubtedly keeps a number of contractors from tendering on work where they are not personally acquainted with the engineer. This reduces the number of tenders considerably, and places the work practically in the hands of the friends of the engineer, which is frequently not good business, either for the client or the engineer.

The wording of specifications and the preparation of drawings and designs for the purpose of securing what is required and the statement of what the contractor is expected to perform should be prepared in such a way as to place all contractors upon the same footing. Nor should they be so stringent as to eliminate competition.

CONCERNING ONE APPOINTMENT.

(J. C. Murray, B.Sc., in The Canadian Mining Journal.)

The appointment of Mr. H. E. Haultain to the position of Professor of Mining Engineering at the University of Toronto affords satisfaction to the mining public. During the past two sessions Mr. Haultain's position was that of associate professor. The translation, though necessarily tardy, is most welcome. The university is still far behind McGill and Queen's in its mining engineering department. Professor Haultain, vigorous though he may be, cannot do justice to the increasing number of students of mining. Toronto University is the largest and richest in the Dominion. The Province of Ontario derives more income from the mining industry than most of the other Provinces put together. It should not require a surgical operation to convince both the Government and the university that a larger staff is required. Mining, ore-dressing, and metallurgy are totally distinct subjects of instruction. Were it not consumingly irritating, it would be laughable to observe **that mineralogy and geology, two entirely subordinate sciences, are given far more attention than the industry that they are supposed to subserve.** (The heavy type is our own.—Ed. Can. Eng.)

THE CANADIAN ELECTRICAL ASSOCIATION.

This week the Canadian Electrical Association are holding their annual meeting at the Royal Muskoka, Lake Rosseau. Last week we gave in full the programme. Already a number of the papers have been distributed and the discussions upon the same should be of great value to the electrical engineers.

In next week's paper we purpose giving in full such sections of the programme as would interest the engineer whose work is general.

EDITORIAL NOTES.

At last, the Province of Ontario has undertaken to investigate the "Workmen's Compensation Act" and its workings Sir William Meredith has been appointed a Commissioner to prepare legislation and report to the Government-in-Council. Ontario is among the last of the Provinces to give this matter consideration, and it is to be expected that the Act, when framed, will be a model, both as to fair dealings and simplicity of the settlement of claims.

* * * *

The upper berth and the sleeping-car rates have been under discussion by the Railway Board. The railways, as is usual, when they show the difficulties under which they are laboring, have managed to figure that they are operating their Pullman cars at a loss. No one imagines for a moment that with proper auditing this department of the railway service will show a loss. There is a difference of service furnished by the upper berth, and this should be provided for by a different rate. The question of the desirability or undesirability of the occupant will be little affected by the rate. Some of the most undesirable travellers ride in Pullman cars.

* * * *

Calgary is planning for a university. True, this is the growing time in the West, but it would be well for our Western cities to consider conditions in our Eastern Provinces, where universities find it difficult to finance their departments, before dividing the energies and revenue of fair Alberta between what are, as yet, small colleges. For some time to come well-equipped High schools will take the place of small universities.

* * * *

The building statistics for Ontario for the month of June show an increase of a quarter of a million over June 1909. The approximate value of buildings for June, 1909, was $22,001,545, and for June, 1910, $2,302,550. From January 1st to June 30th, 1909, the value of buildings was approximately $8,829,375; for the same period in 1910, $9,840,648.

* * * *

We are especially pleased at one of the birthday honors conferred by His Majesty in the celebration of the official birthday. Sir Henry Newell Bate, chairman of the City Improvement Commission of Ottawa, is the title conferred upon the leader of the Commission, which is doing so much to make our capital city attractive Sir Henry is not a member of the engineering profession, but he is closely associated with the work of the engineer, and it is pleasing to know that in the passing around of these honors the men who do things are recognized.

THE BUILDING IN CALGARY.

The building permits, both for the month of June and the first six months of the year, show an increase of more than 100 per cent. over the corresponding period of the last twelve months. The permits issued in 1909 were 64; value, $202,710; 1910 permits, 142; value, $573,846. For the first six months of 1909 the value of the permits was $949,110; 1910, $2,394,942.

The Board of Railway Commissioners has arranged the itinary of the western trip as follows:—Victoria, Sept. 1; Vancouver, Sept. 5; Nelson, Sept. 12; Lethbridge, Sept. 15; Calgary, Sept. 17; Edmonton, Sept. 19; Regina, Sept. 21; Winnipeg, Sept. 22.

CONFLICTING TESTIMONY ON CEMENT FACTS.

The difficulty of determining what are the facts in any question on which there are contrary opinions, is well shown by the two following replies from New York paper mills to questions asked by the Aberthaw Construction Co., of Boston, about the effects of granolithic floor surfaces on operatives.

"My experience has been in the past forty years," says the superintendent of mill No. 1, "that a paper mill operative will go home more tired and more played out by working eight hours on a concrete floor than he would by working twelve hours on a plank floor."

On the contrary, mill No. 2 says:

"Nearly all the operatives we have consulted in the matter prefer the cement floor, and we cannot see in what respect it is bad for them."

In the face of such contradictions as these, the man about to build a new mill or factory may well feet all at sea on the choice of floor materials. The Aberthaw Co., however, in a report of its recent investigation on "Wearing Surfaces for Factory Floors," shows that the contradictions in the testimony of those who have used both wood and cement surfaces are more apparent than real. It is made clear in the report that the bad effects of cement floors on operatives are due to standing still in one place, as at a lathe or bench, and that the harm is due not to the "hardness," but to the "coldness" of the cement. Such a floor is a good heat conductor, and when a workman stands still on it for hours, the concrete draws off some of his bodily heat and particularly chills his feet and legs. A study of all the reports to the Aberthaw Co. shows that this is the real source of the harm to operatives.

COLLAPSED COAL TRESTLE.

One man was killed and two others seriously injured as the result of the collapse of a timber trestle at the East Toronto Yards of the G. T. R.

The trestle was made of cedar posts. For a number of years its whole length was supported by coal piled underneath it, which reached almost to the level of the elevated track. Recently the yards were removed to Mimico, and the coal was carted away. Recently the Grand Trunk decided to put some more coal there, and the crew and engine were doing the work.

In addition to being weakened by the removal of the coal it was found that the posts had rotted at the bottom.

The engine was shunting three loaded cars up the chute for the purpose of dumping them. When they had travelled almost to their destination, the trestle gave way, dropping engine, cars and men to the ground, a distance of 25 feet. Some 300 feet of the trestle fell. The trestle was made of cedar posts varying in size from 18 to 24 inches. The bents were put up at 20 foot centers.

Photo by Toronto Star.

TEST OF A GIRDERLESS REINFORCED CONCRETE FLOOR.

The following test, conducted by the Aberthaw Construction Co., Boston, on one panel of the girderless reinforced concrete floor in the Pierce Arrow Motor Car Co's. new storage building. This floor is supported by columns 20 ft. 6 in. on centres, the column heads flaring at the top to a diameter of 56 in. The slab is 8 in. thick, of 1.2.4 concrete, and is reinforced with strips 9 ft. wide made up of seventeen ½-inch rods running right angles, parallel, and diagonal to the lines of columns.

These rods extend well over the column heads, which are further reinforced with eight 1-inch rods extending 4 ft. down into the columns and radially out into the floor slab about 3 ft. 9 in., so that their ends are on the circumference of a circle about 8 ft. in diameter. The radial rods are bent over a 2-inch x ⅝-inch hoop at the column head, and are wired to 1-inch iron rods bent into circles, one about 4 feet and the other 8 feet in diameter.

On the test, which was made about 90 days after the concrete was placed, one panel was loaded with castings weighing 120,000 lbs., or 286 lbs. per square foot. Although this is nearly double the live load the floor was designed to carry it only showed a deflection of 3/32-inch at the centre of the panel.

STATEMENT OF ACCIDENTS DURING MAY, 1910.

Trade or Industry.	Killed.	Injured.	Total.
Lumbering	14	14	28
Mining	15	11	26
Building trades	3	20	23
Metal trades	9	32	41
Railway service	25	39	64
Navigation	11	13	24
General transport	3	18	21
Civic employees	6	19	25
Miscellaneous	10	10	20
Unskilled labor	9	9	18

THE

Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

WINNIPEG'S PUBLIC HEALTH.

We have before us the Annual Report of the Department of Public Health, city of Winnipeg, for the year ending 31st December, 1909.

Dr. A. L. Douglas, the Medical Officer of Health, deserves great credit for the strenuous and effective manner in which he has cleaned up the city during the past few years.

Each annual report produces results which are proof of effective health organization.

The year 1909 has produced a death rate of 11.9 per 1,000, or 1,454 deaths in a population of 122,390. The death rate for 1908 was 12.1 per thousand. The rate of infantile mortality for 1909 was 131.6 per 1,000 births as against 143.1 for 1908—a decrease of 11.5.

Figures such as the above speak for themselves, and give Winnipeg a most enviable position as a health resort. The average death rate for cities of a similar size is 18; and out of 76 of the great towns and cities of England and Wales we have no rate which attains below 16.

From a health point of view Winnipeg is fortunate in its water supply, which is obtained from deep wells, and is practically sterile. We find that the city bacteriologist made 388 tests of city water in 1909, all of which were good.

The history of the typhoid rate is extremely interesting. Apart from two exceptional cases, when river water was admitted to the mains, the water supply has played no part in typhoid causation. The year 1904 provided the alarming typhoid death rate of 248 per 100,000, while the years 1904, 1905 and 1906 averaged a rate of 177 per 100,000. The years 1907, 1908 and 1909 have averaged a rate of 42, with 49 in 1907 and 38 in 1909. The percentage reduction in the death rate for the last three years as compared with the three previous is 76 per cent.

Dr. Douglas states in his report: "The typhoid situation in Winnipeg is at present very hopeful, and the difference in our death rate for the past two years as compared with the eight years preceding them (when the city underwent a rapid growth without sanitation to keep pace with this) is one of the most striking object lessons of what can be done by applying proper remedies to obvious conditions that we are aware of."

Dr. Douglas very early recognized the part played by flies in spreading typhoid infection in the late summer and autumn. His first and principal raid was upon the open privy built level with the surface of the ground. Six thousand four hundred of these were spread over the surface of Winnipeg. Last year saw the last of these contrivances. Wherever it was possible proper water-carriage conveniences were substituted; otherwise, deep, concreted pits are made below the ground surface, the light being carefully excluded.

This raid on primitive structures was also accompanied by increased vigilance in following up every reported case of typhoid and obtaining all possible data relating to cause and effect. Of the 326 cases for 1909, 166, or 50 per cent., were contracted outside the city, as the patients had been resident less than one week when the disease made itself apparent. The true typhoid rate for Winnipeg as affecting residents is, therefore, represented by 160 cases accompanied by 32 deaths, providing a death rate of 26 per 100,000.

Winnipeg, representing, as it does, the portal of the West, has a large transient population, providing the most difficult of factors in the control of typhoid. Douglas states: "During the year there was one group of seven cases which we were able to trace to a "carrier"; that is, a person who, while well himself, harbors typhoid bacilli and is capable of conveying infection to others. The question of what we should do with carriers is, so far as we are aware at present, an unsettled problem. It would appear from observations made upon these individuals that they may remain carriers for very long periods of time, and that it is a most difficult matter to free them permanently from bacilli."

We agree with Dr. Douglas that what to do with the typhoid-carrier complicates the problem of prophylaxes, and makes it a most difficult one to deal with.

After we insist upon notification, isolation, protection of all food, solid and liquid, from flies and sources of contamination, little else in the way of effective preventive measures appears to remain.

To efficiently protect a community from the typhoid-carrier would appear to entail much irksome interference with the newcomer and passing traveller. To ensure that a person was not a carrier, it would not be sufficient to merely know whether the person had ever suffered from typhoid, but, in addition to this knowledge of fact, a thorough bacteriological examination of the person would have to be made, and the difficulty would yet remain as to what to do with positive cases.

An interesting feature of the report is the reproduction of spot maps for each month of 1909, showing just where each case of typhoid has occurred.

The question of sewage disposal receives passing notice only. We find this paragraph: "During the year there was considerable agitation about the condition of the outlets of the city sewers, which, in some cases, had become serious nuisances."

The city of Winnipeg discharges the whole of its crude sewage without any form of treatment direct into the river. It is recognized that with the ever-increasing city, this cannot go on. On the other hand, the city council appear to shrink from taking any steps of a practical nature. The report states: "The question of sewage treatment was taken up by your council and the Provincial Board of Health, but so far no definite policy has been adopted."

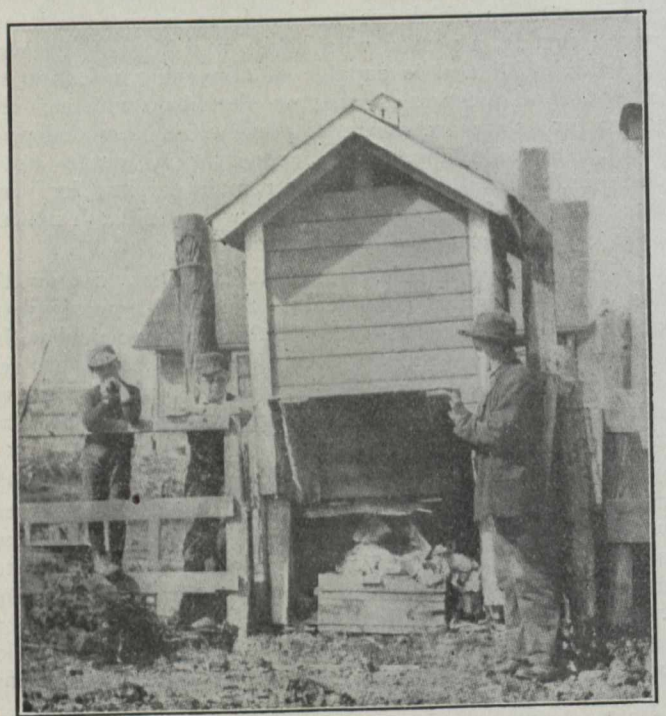
If Winnipeg wishes to hold its position as the first city in the West, it had better take some cognizance of the advanced work in sewage disposal at present being adopted by other Western cities. One would surely conclude that the question of screening, sedimentation and sterilization of sewage effluents was not too great a proposition for Winnipeg.

In closing this short review we wish to take the opportunity of stating our great appreciation of the high record of work accomplished by Dr. Douglas, assisted by a splendid and effective staff of inspectors, the working organization of which is a model to any city in the world.

THE TYPHOID DEATH RATE.

The annual typhoid death rate per 100,000 inhabitants for the period 1901-1905 was: In Scotland, 6.2; in Germany, 7.6; in England and Wales, 11.2; in Belgium, 16.8; in Austria, 19.9; in Hungary, 28.3; in Italy, 35.2; in the United States (estimated), 46.5.

The European countries now having relatively low rates formerly had high rates.



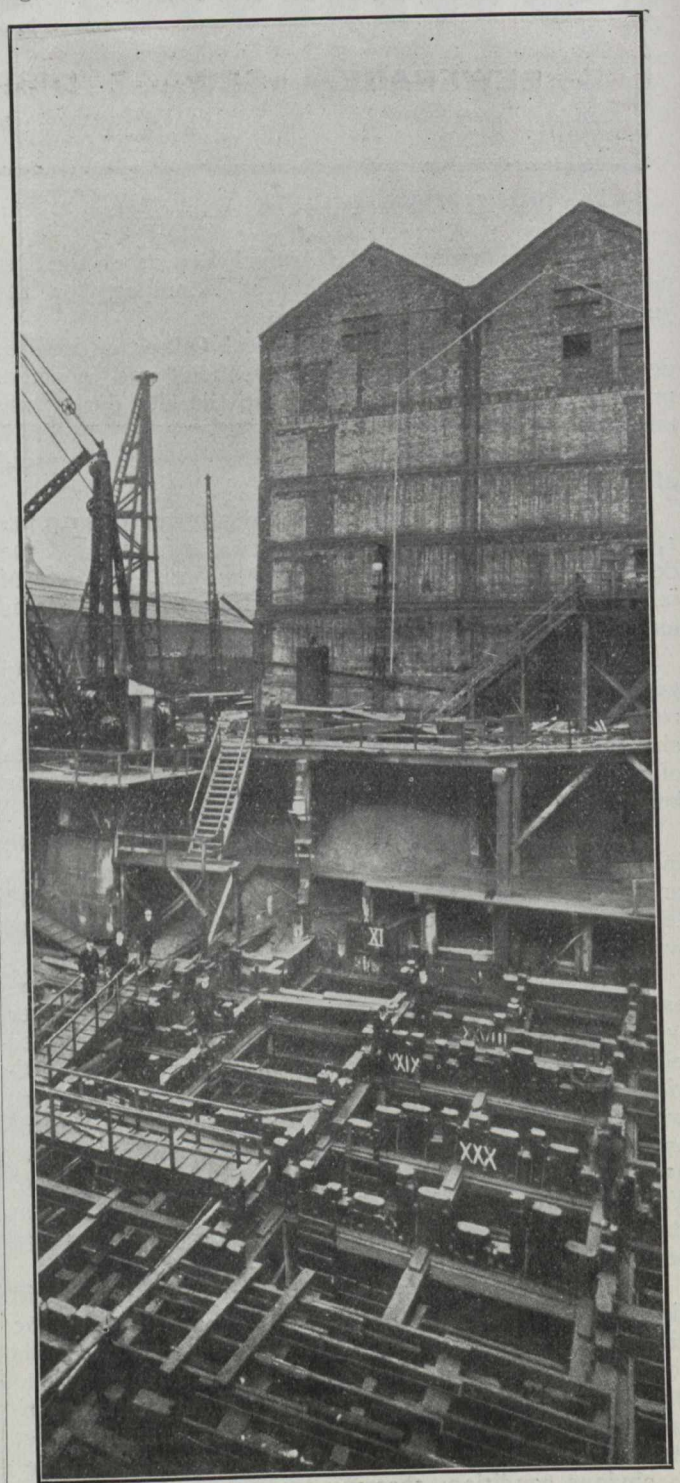
The compulsory extinction of open privies has been the principal factor in the reduction of the typhoid rate in Winnipeg from 248 per 100,000 in 1904 to 38 in 1909. The above open privy removed in 1909 represents the last of a bunch of 6,400 in existence in 1904.

GLASGOW MAIN DRAINAGE AND CHEMICAL SEWAGE PRECIPITATION.

By Mr. R. H. Murray, C.E.

The city of Glasgow, Scotland, enjoys a reputation for municipal enterprise. Its water supply and street car system, owned and controlled by the corporation, have already been the objective of many municipal deputations. This spring another big undertaking was added by the completion of the main drainage works.

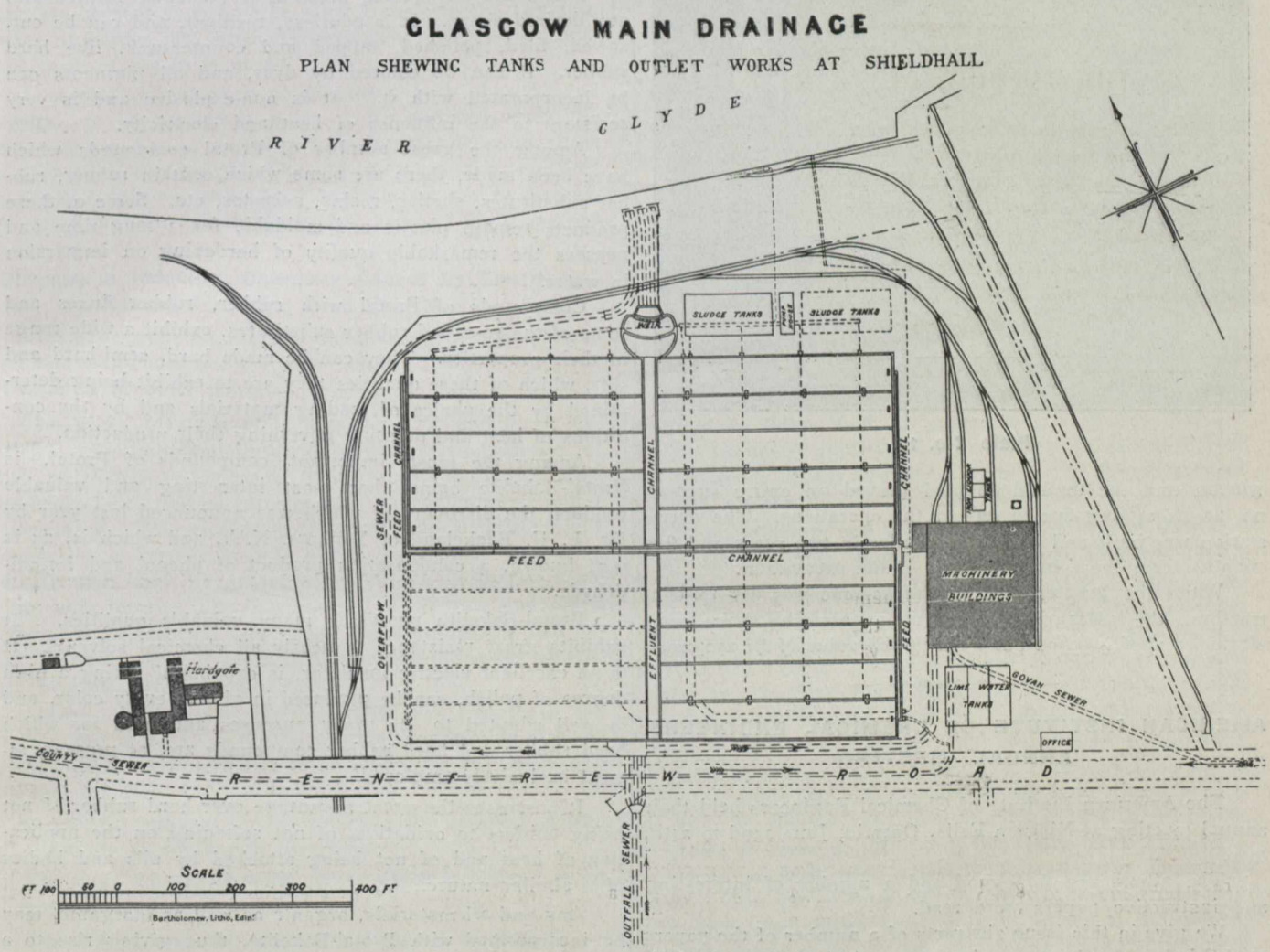
Glasgow has expended over $12,000,000 in collecting and disposing of its sewage, and the scheme is only second in magnitude to that of the London County Council.



Glasgow Main Drainage Substructure of Kinning Park Pumping Station.

In 1896 the first section of the work was comp'eted, and a drainage area of 11 square miles, giving a dry weather flow of 16 million gallons per day, was successfully treated. This represented but a small section of the total area to be dealt with, 42 sq. miles, but it served as a means of testing the principle on which it was proposed to treat the sewage, that of chemical precipitation. The resu'ts gave a very high

efficiency in removal of suspended matter, accompanied with a chemical purification (calculated on the albumenoid ammonia basis) of 50%. It was therefore decided to adopt this method of treating the entire sewage of the city. As the effluent is discharged into a tidal stream of fifty fold volume, the cost of further and more complete oxidization was considered unnecessary. Two entirely separate schemes were designed for the north and south sides of the river respectively. The sewage from the north side is intercepted and conveyed by gravitation to a point about seven miles below Glasgow by a large outfall and three intercepting sewers, two of these being pumped into the outfall and the



third pumped at the disposal works. On the southern section the features are very similar, but there is in addition a large overflow sewer running direct into the river which relieves the outfall during periods of storm. The sewers are designed on the combined system, but only a quarter-inch rainfall per day is allowed for, all junction chambers being so constructed that any quantity of storm water in excess of this is discharged by way of the existing sewers, direct into the river. The dry weather flow in each of these two sections is estimated at 48 million gallons per day, and the necessary collection and disposal of this 96 million gallons involved the construction of thirty miles of sewers varying from 2 ft. 6 in. to 10 ft. diameter at elevations of from 4 ft. above to 60 ft. below surface, also four separate pumping stations and two disposal areas.

A slight variation from the practice formerly employed in precipitation has been adopted. As a substitute for sulphate of alumina, the precipitating agent used is ferric sulphate, and it is giving very satisfactory results. An oxidizer plant has been installed for its production. The sludge gravitating into underground channels is pumped into storage tanks and conveyed to sea daily in specially designed sludge steamers.

Considerable engineering difficulties were met with, particularly on the construction of the southern district works, recently completed. The strata through which the low level interceptor passed consisted of fine running sand, the elevation of high water on the river practically coinciding with the crown of the sewer. This sewer was almost entirely driven in iron tunnel built in 18-inch lengths under air pressure, with the aid of hooded shields. The spaces between the iron segments and the unexcavated ground were grouted, as each ring was built, with lime at a pressure of 40 lbs. per sq. inch, and the tunnels were then lined with concrete and finished with an inch of granolithic. The photograph shows the tunnel previous to being lined.

The construction of the substructures of the pumping station which raised this sewer to the outfall necessitated the excavation of an area 100 feet long, varying from 50 to 100 feet in breadth, and 52 feet below street elevation. The strata was dry sand for 19 feet and fine running silt down to 63 feet from the surface, where the bores indicated the presence of boulder clay. The whole area was first sheet piled, 50 ft. piles being driven from the top of the silt (Fig. XI in the photograph) into the boulder clay, and then cross-

piled, and each of the pockets, 34 in number, excavated and concreted. More than one expert expressed the opinion that the work would greatly endanger the neighboring properties, including a building 70 ft. in height immediately adjoining. The construction of the pumping station substructures was entrusted to the main drainage staff, under the resident engineer, and the method adopted proved an entire success, no claims arising due to any of the operations. The entire station was built and in working order in two years and five months from the commencement of the excavation.

Plate No. 1.

While the greater part of the scheme was let to contractors, the Glasgow Corporation, through their main drainage staff, carried out work to the value of $1,250;000.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, ANNUAL MEETING

The American Institute of Chemical Engineers held their annual meeting at Niagara Falls, Ontario, June 22nd to 24th, 1910.

The attendance was good and a number of interesting and instructive papers were read.

We give in this issue abstracts of a number of the papers read. Later, we hope to give some of the papers in full.

Underground Waters for Manufacturing Purposes

W. M. Booth, Syracuse, N.Y.

The paper gives reasons why underground water is, or should be sought, also what preliminary steps should be taken in locating the wells, well surveys and records. The cost of drilling is discussed and the employment of a drilling company is considered. The importance of the chemist as an aid in well-drilling and the quality of water to be expected from different strata is discussed. Examples are given showing methods and cost of pumping. The quality of water found in average wells at different depths and cost of treating well waters for manufacturing purposes is fully discussed.

A New Product for use in the Arts

Dr. F. G. Wiechmann

The base of this new material is vegetable-albumin, under which generic term, vegetable ivory, the vegetable caseins, glutens, hemi-celluloses, reserve-celluloses, horhy-albumins, etc., are included.

The vegetable-albumin, from whatever source derived, is treated with one or more substances which convert it into a new substance, a plastic, eminently well adapted for use in the arts and industries. To this new plastic, the name "Protal" has been given.

Any and all materials commonly used in the rubber industry may be incorporated with Protal. About one hundred different Protal compounds have been produced, and of course, the properties of these compounds vary with the ingredients employed.

Protal can be molded, pressed, or otherwise formed into any desired shape. It is odorless, resilient, and can be cut, sawed, filed, polished, tapped and countersunk, like hard rubber. It can be colored by dyes, and all pigments can be incorporated with it. It is non-explosive and is very resistant to the influence of heat and electricity.

Among the great number of Protal compounds which have been made, there are some which contain rubber, rubber substitutes, shellac, rosins, asbestos, etc. Some of these products remain plastic and moldable for a long time and possess the remarkable quality of hardening on immersion in water.

Compounds of Protal with rubber, rubber fluxes and some of the so-called rubber substitutes, exhibit a wide range in their properties. They can be made hard, semi-hard and soft, which of these qualities they are to exhibit being determined by the choice of loading materials and by the conditions of heat and pressure governing their production.

Among the most important compounds of Protal, is Protal-Bakelite being that most interesting and valuable product, the discovery of which was announced last year by Dr. L. H. Baekeland of Yonkers, N.Y., and which is, as is well known, a condensation product of phenol and formaldehyde.

Protal-Bakelite possesses many valuable qualities. It exhibits great resistance to nearly all chemical solvents. It is an excellent electric insulator, is capable of taking a high degree of polish, can be produced in almost every color, and is well adapted to the many purposes and uses for which hard rubber and hard rubber compounds are, at present, almost exclusively employed.

It possesses the great advantage over hard rubber of not being subject to oxidation, of not softening on the application of heat and of not being attacked by oils and bodies of a similar nature.

Any and all materials, organic as well as inorganic, may be incorporated with Protal-Bakelite, thus giving rise to a great number of compounds which possess very different qualities and properties and which are adapted to a great variety of uses.

Protal-Bakelite compounds have, as before said, great dielectric strength, ranging from about ten thousand volts to about twenty-six thousand volts per millimeter.

It would be practically impossible to specify all of the uses to which this new plastic may be put. It need only be borne in mind that this is a plastic which can be fashioned into any shape, which can be molded and pressed, which is capable of taking a high polish, which is not affected by water—cold or boiling—which is resistant to practically all chemical solvents, which can be tooled and machined with ease and which is produced in both flexible and rigid form.

In cost, this material compares very favorably with rubber and every day witnesses its introduction into new fields of industry.

The manufacture of Protal and of Protal-Bakelite is in the hands of a New York concern, Protal Company, the

works being located at Bridgeport, Conn., and at Yonkers, N. Y.

The Study of Materials as a Subject in a Course of Chemical Engineering

Dr. Chas. F. McKenna calls attention to the fundamental importance of a thorough knowledge of all the properties, both physical and chemical, of the materials available for human use. The extraordinary number of substances used in the arts is surprising. A careful list of those used by one company comprised no less than 850 definite and distinct classes or grades of materials.

The chemical engineer must study the properties of these materials because it is he who must transform the raw properties of nature into products possessing properties which make them of use to mankind.

A careful classification of the tests, both physical and chemical, to be applied is given. No material, even the most common, has as yet been fully investigated and all of its properties discovered. The adoption of the so-called standard or uniform methods of analysis are apt to discourage rather than encourage the investigation of the properties of materials

Changes in Industrial Chemistry Caused by Electricity

Edward R. Yaylor, Penn Yan, N. Y.

This paper calls attention to the advantages to be derived from the use of electricity with the object of stimulating the development of water powers.

The great advances already made in a number of industries, especially metallurgical and in the production of alkali and bleach is reviewed. It is shown that these industries could be carried on commercially only after water power is developed. The electric separations and determinations of metals now carried on only in the quantitative laboratory indicate what may be accomplished on an industrial scale in the near future. The manufacture of chlorine and ozone in small units indicate how many small industries can install their own plant for using chlorine and ozone for bleaching, cleaning, disinfecting, etc.

Among the new uses for electricity was mentioned the very marked increase in the quality and quantity of yield of various agricultural products when electricity was allowed to leak into the soil.

24 electric furnaces for the smelting and refining of iron and steel are at present in operation.

The large amount of water power which is allowed to go to waste at present was deplored.

The Development of Chemistry Industry in Canada

Judson A. DeCew, Montreal, Canada.

This paper treats of the various industries of a chemical nature that are established in Canada, and show where statistics or dates are available, the rapid development that has taken place in this field within the last 5 or 10 years.

An attempt is made to give the location of the various works and where possible the approximate capacity at the present time.

The industries mentioned and concerning each of which some facts are given, are as follows:—

Sulphuric acid and alkali. Coal tar and ammonia.
Explosives. Fine chemicals. Wool Distillation Products.
Petroleum, salt, milk, sugar, starch, rubber, glue.
Paints, fertilizers, glass, beveridges, soap and glycerine.
Calcium carbide and electro chemical products.
Wood cellulose products. Portland cements.

Reference is also made to several new projects that are still in the stage of development, but which may soon be classed amongst the established industries.

Notes on the Corrosion of Iron and Steel and its Prevention

Gustave W. Thompson, Brooklyn, N. Y.

This paper gives a most excellent summary of the facts which have been discovered with reference to the cause and prevention of the corrosion of iron and steel. The author leaves it to the reader to interpret these facts in the terms of any theory with which he may be familiar. The general conditions condusive to the formation of rust are first given. The opinion is given that facts do not warrant the conclusion that the tendency of iron to corrode is dependent on the composition of the metal and that the use of a poorer and more expensive metal as against a more impure and cheaper metal is not justified by the facts.

Practical suggestions with reference to the prevention of corrosion of iron and steel are given among which the following may be mentioned: The action of acids, moisture and oxygen. Cement prevents corrosion because it is alkaline. Protective coatings exclude moisture and oxygen. The cleaning of iron and steel before painting is of great importance. Specific rules for the cleaning of steel and iron are given as well as the value of the various methods in common use.

The principles which should guide in the selection or designing of the paint are given. Poor workmanship in the application of paint was given as responsible for most of the failures in the protection of iron and steel with paint. Linseed oil was condemned as a prime coat for iron and steel.

Nineteen different paints applied to the Harve de Grace bridge of the Penn. R. R. all proved equally effective because they were properly applied. Oxygen cannot be excluded from iron by means of any protective coating. In the absence of moisture, oxygen does not produce corrosion.

The Manufacture and Industrial Applications of Ozone

Mr. Oscar Linder, Western Electric Co., Chicago, Ill.

The properties and methods of formation of ozone were given. The amount present in pure air was given as about 1 part in 1,000.000. The commercial methods of manufacture of ozone are almost exclusively electrical, although ozone is formed by the ultra violet light and heat. The successful operation of the electrid ozonizers depends upon the rise of a high voltage (10,000-40,000 volts) and dry air maintaining a low temperature. Concentrations of ozone as high as 30 grams of ozone per cubic meter of air corresponding to 2 per cent. by volume have been obtained. Yields of 105 to 250 grams of ozone per kilo. watt hour have been obtained.

Ozone has been used industrially for a great many purposes. The purification of the air of theatres, schools, restaurants. and public halls is quite common in Europe. Ozonizers made especially for ventilating purposes are now on the market and are made either of portable or stationary type. Large installations for water purification are in successful operation.

Ozone is well adapted for sterilizing and disinfecting purposes. It is being tested in the Quaranteen Station in New York and at the Pittsburg Homeopathic Hospital. It is believed that ozone will ultimately supplant formaldehyde in disinfecting rooms and buildings. It has also been successful for the preservation of milk, cream, butter, eggs, fruits, meats, etc.

Ozone is also an excellent bleaching agent.

Plant Design

W. M. Grosvenor, New York.

In this paper a number of very practical suggestions are made with reference to plant design. Illustrations are given showing the advantage of handling materials by the gravity system. The installation of complicated systems of conveyors is declared to be generally poor policy on account of the usual high cost of maintenance.

The importance of careful management of materials in construction work is emphasized. A loss of $10,000 work of material was reported in one case on account of poor storage facilities during construction.

Nitric Acid

Schuyler Frazier, Chicago, Ill.

This paper gives a few notes with reference to the manufacture of nitric acid. The various important advances which have been made in recent years are reviewed, and the advantages secured by each improvement is noted. Tables giving the yield and purity of acid obtained as well as rate of distillation are appended.

Problems in Chemical Industry

By John T. Baker of Phillipsburg, N. J.

The number and complexity of the factors involved in chemical operations are so great that many operations are still carried on under the rule of thumb guidance and have not been reduced to a science. On the other hand the trained scientific man is very prone to believe that the matter with which he deals will follow the laws which he has learned and for this reason he often overlooks valuable facts which the untrained observer sees. The untrained observer ignores laws and systems; tries any suggestion that comes along and therefore loses much valuable time and labor. The investigator who is successful follows a mean between these paths. A number of practical illustrations of these principles were given.

Commercial Calcium Hydrate—Its Manufacture and Uses

By Lucius E. Allen of New York. Read by N. L. Turner.

This paper gives an outline of the method of manufacture of this product and calls attention to the many cases in which it can be used to better advantage than the unslacked line. It is well adapted for water-proofing Portland cement. Its keeping qualities are excellent.

Coal: Its Deterioration in Storage

A. Bement, Chicago, Ill.

Results of experiments given in this paper are the termination of a long period of study with the two coal seams of Illinois, which from the standpoint of production are the most important ones. The experiments show changes in heating power, in quality of the fuel, and disposition to slack down to smaller size during storage.

EDGE TOOLS AND CONCRETE FLOORS.

Nicking or breaking of edge tools and machined castings by falling on a concrete floor is one of the objections to granolithic floor finish reported to the Aberthaw Construction Co., of Boston, which has lately made an investigation into the question. That company has just issued a report on its investigation, entitled, "Wearing Surfaces for Factory Floors," in which some of the replies to its inquiries are quoted. The following from a car builder, not included in the report, is of some interest:

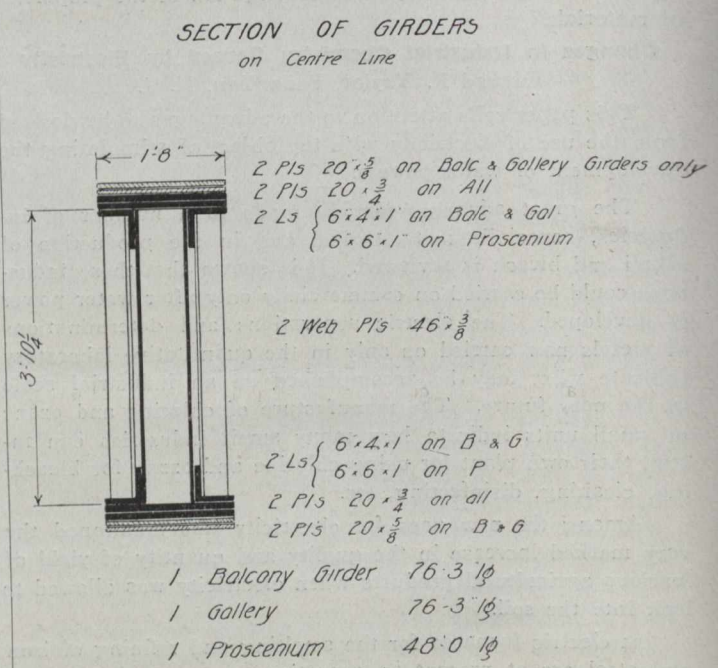
"I have found ,especially in wood-working shops, or in machine shops, where castings and machined parts are made, that when a tool with a sharp cutting edge is dropped on a concrete floor it is almost invariably so much chipped that it is practically ruined. This is also true of the machined edges of different irons. Castings dropped on a cement surface very often break. Wood floors involve no such inconveniences; tools, particularly, cut into wood, without damage to themselves.

THE SHEA THEATRE FROM AN ENGINEERING POINT OF VIEW.

A. C. Oxley.

The construction of a modern theatre of the first rank is of sufficiently rare occurrence in Canada as to be worthy of some notice on the part of engineers. The Shea Theatre, now nearing completion on Victoria Street, in Toronto, is perhaps the most recent example.

The present generation of theatre-goers have now come to demand as a sine quâ non that there shall be no pillars in evidence to in any way obstruct the view, and this is the problem which presents itself, namely, to construct an auditorium capable of seating several thousand persons, all of whom must be both close at hand and at the same time have an absolutely clear view. Work of this nature is of as yet too seldom occurrence to have given Canadian architects much opportunity to develop. The design was accordingly entrusted to the firm of Leon H. Lempert & Sons, of Rochester, who were the architects for the Shea Theatre in Buffalo.



The work was of a sufficiently large nature to make the methods of construction somewhat interesting, and after a general description of the theatre some space will be devoted to this.

The general dimensions of the Shea Theatre are as follows:—Front width, 82½ feet; depth, 168 feet; height, 70 feet 3 inches. It will be seen that this height is too little to make the general use of steel columns advisable, particularly as wall columns would have no lateral bracing. This being the case the roof trusses and proscenium girder are carried on brick piers, while the balcony and gallery girders only are supported on columns reaching to the foundations. The brick piers were also necessary for the architectural effect so that nothing was lost by their use.

The by-laws of Toronto are particularly strict with reference to large public halls, and only the most thoroughly fireproof construction is allowed.

Roof and all floors are of reinforced concrete slab construction with the single exception of the stage floor, where 2-inch plank is used owing to the occasional necessity of temporary openings. The unit floor loads were taken as

follows: Auditorium, 85 dead and 125 live load per square foot; stage, 50 dead and 250 live load; lower mezzanine, 90 dead and 100 live load; balcony, 85 dead and 125 live load; upper mezzanine, 8 dead and 100 live load; gallery, 85 dead and 125 live load; ceiling, 20 dead only; stage ceiling. 50 dead and 100 live load; roof, 45 dead and 60 live load. All partitions are either of brick or of steel lath and studding, and all plaster, much of which is cast and very heavy, is fastened on expanded metal or more solid steel. The several parts of the building being necessarily so different in construction, we will now proceed to take up the building more in detail.

Walls.—These vary in thickness from 31-inch in the basement to 18-inch in the hollows of the false arches, just below the roof. The foundations are of concrete 51-inch by 20-inch deep, and are carried down about fifteen feet. As the soil is a very firm blue clay it was only necessary to carry them down clear of the basement floor slab. For architectural purposes, a handsome red pressed brick was used, the common Toronto yellow brick being used elsewhere, a total of nearly 18,000,000 being required. Owing to the large area of the walls it was possible to somewhat systematize the laying of these. The scaffolding entailed labor as the sloping floors were of little assistance and it was necessary to carry the falsework immediately adjacent to the walls to the base of the trusses, nearly sixty feet up. Two hoists, one at each end of the building, were used, and one gang devoted their entire time to the shifting of scaffolding, enabling thirty or more masons to continue at work without loss of time.

Front Lobbies.—These are altogether five storeys in height, there being both a lower and an upper mezzanine, giving two storeys of lounging rooms available for both balcony and gallery. Six-foot iron stairways are located at each side for the use of the gallery only, the balcony audience entering by the auditorium. Omitting the stair wells at the sides, the lobbies are some 50 feet by 20 feet, with some deductions for toilet rooms. The floors are of hardwood, resting on 4-inch concrete slab, reinforced with No. 10 expanded metal, the slabs being carried by 12-inch at 40 I-beams, spaced 7 feet apart, and resting on front and auditorium walls.

Auditorium.—This is some 74 feet in width by 99 feet in depth with a height of sixty feet. The rear wall is curved to a radius of about 140 feet. The floor itself is level only at the entrance, where it is less than two feet above the street, thence it drops sharply at a decreasing bevel, the remaining distance being divided into five segments of 15 ft., with drops of 3 feet, 2½ feet, 2 feet, 1 foot, and 0 feet, respectively.

Balcony and Gallery Girders as Erected.

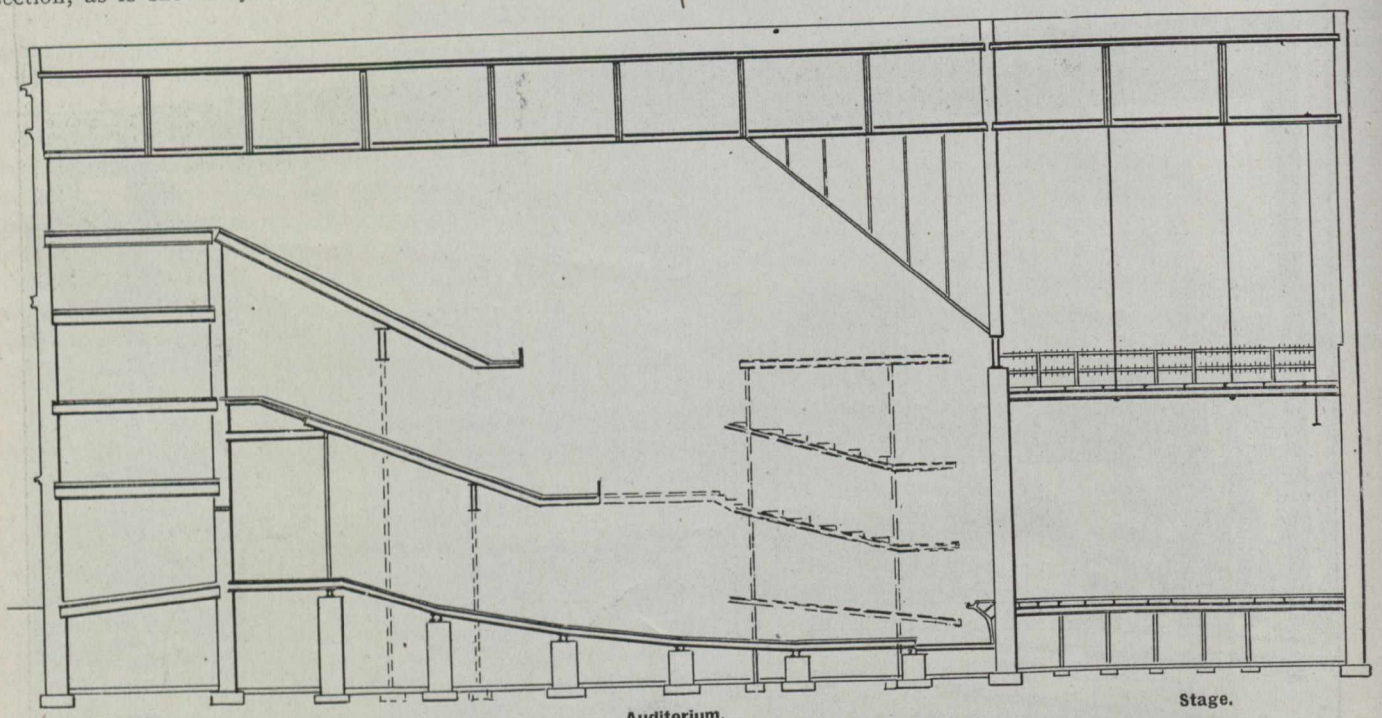
Each segment, like balcony and gallery, is part of a cone whose point of generation is at the rear wall of the stage, and whose height such as to give the proper slope. Like the lobbies, the floor will be surfaced with wood fastened to sleepers embedded in cinder concrete. Seven-foot centres and 4-inch slab are used throughout, the 12-inch I's resting on double 10-inch I's laid transversely, these again resting on brick piers. Owing to these piers and the great variation in height (12 feet down to 4 feet), the basement is useful only for storage and heating purposes, the positive heating fans being installed here. Access is obtained from here to a smoking room under the entrance, making in all five lounging rooms.

Balcony.—It is here that the more specialized construction becomes evident. With the exception of a small level passage at the rear the whole balcony is a cone, sloping at a bevel of 4½ inches per foot. The balcony is some 74 feet from wall to wall and 47 feet deep. Below it, 12 feet from the

curved wall, is a row of columns, and the foremost 6 feet of the balcony is level and of light construction. Between this, spaced radially at about 7 foot centres, are the beams, supported almost entirely by the balcony girder, at a point so near their centre that there is a cantilever effect. The head-room being very limited, it was necessary to limit the depths of the beams to 15 inch, and to carry their weights as high as 80 pds. per lineal foot. Each beam rests on the girder at a different angle, and the intersection of the cone of the balcony with the plane of the girder is a hyperbola. These bevels are taken up by irregular cast-iron shoes, some forty in all being required averaging about three hundred pounds in weight and no two being made from the same pattern. With the exception of a small portion to the rear the entire balcony is carried by the girder. The girder is limited in depth to four feet, and must accordingly be of very heavy section, as is shown by the sketch.

Twenty-six feet up are the fly-galleries, each some 12 feet wide and 42 feet long. Their slab is supported by 8-inch I's resting on the wall at their rear, and on 10-inch I's at their front, the span of which is divided into thirds by 2-inch rods hung from the stage trusses above, some 33 feet higher up. The railing for these galleries is somewhat peculiar, being designed to take the belaying pins for all the stage ropes. It is made of two 5-inch pipes, several feet apart, drilled with large holes, and being made so as to be capable of taking a great tensile stress. Between the two galleries is the paint bridge for painting the scenery. It is designed as two halves, each of some 30 feet span, the centre point being hung by a 1½ in. bar to the truss above.

Proscenium Wall.—The stage opening in this is 42 feet wide by 34 feet high. It is spanned by a girder 4 feet deep of similar section to those in the balcony and gallery. This is supported by piers in the walls 36 inches thick. Above it,



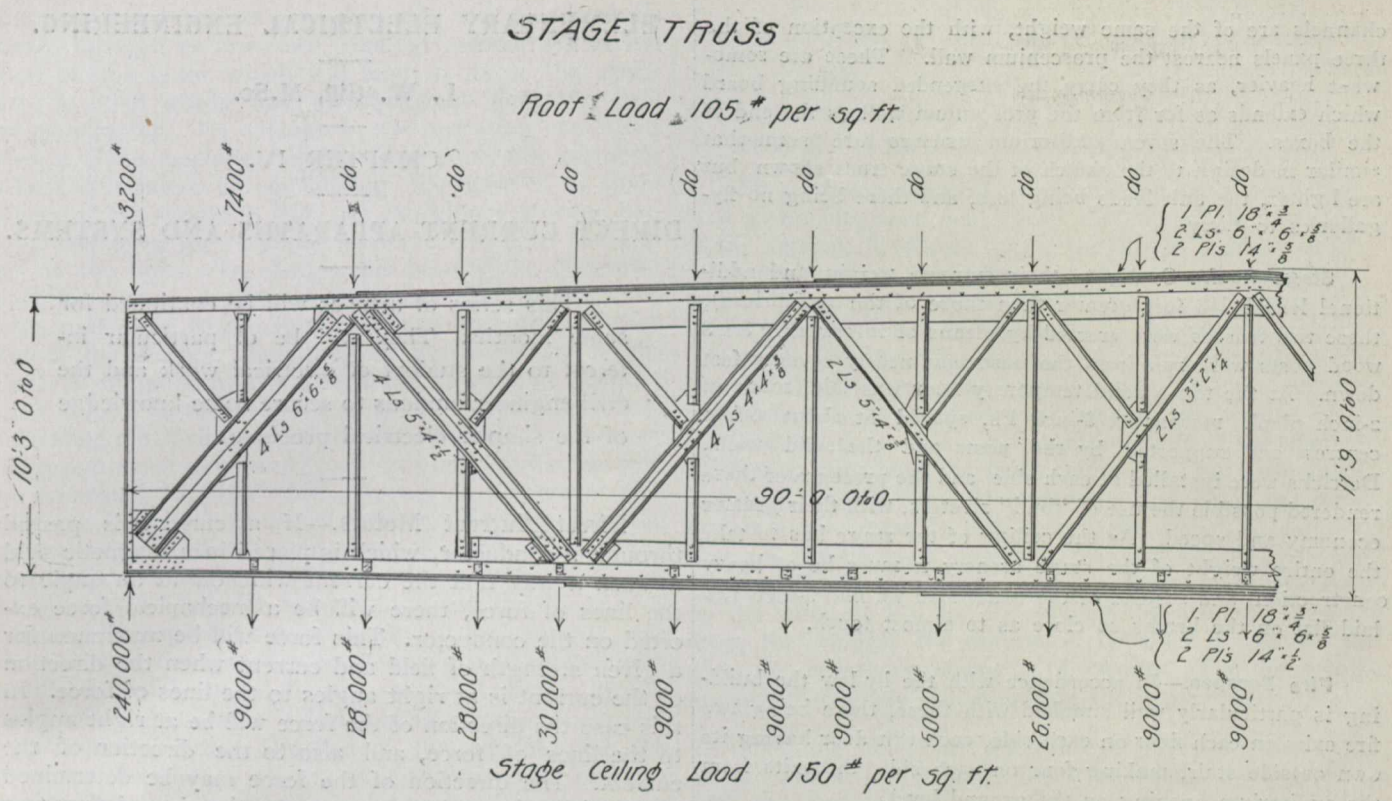
Section Through Centre of Building.

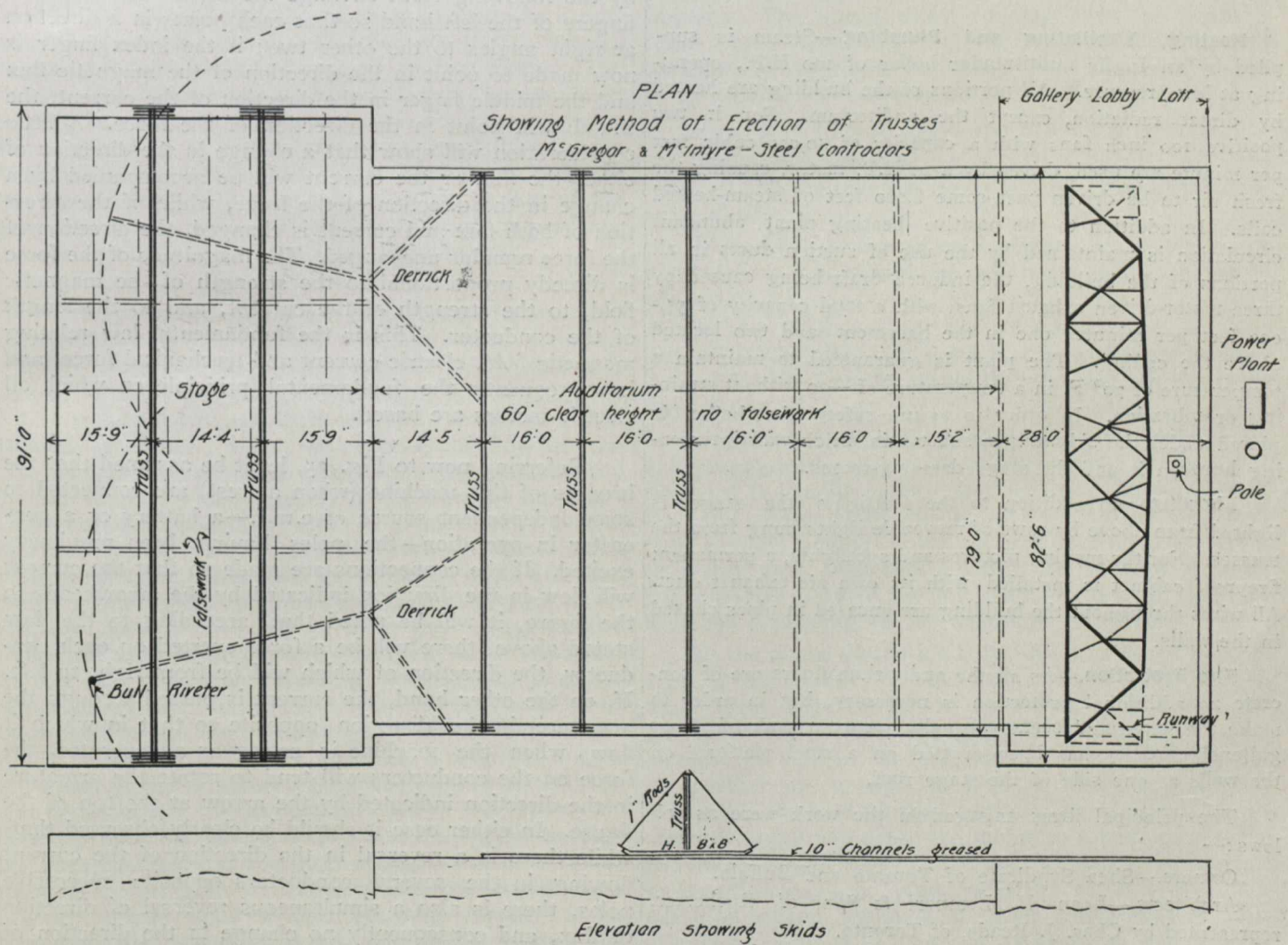
Gallery.—The construction of this is much similar to that of the balcony but the pitch is steeper, 6½ in 12. Like the balcony the front railing has a steel skeleton on which the steel lath and heavy ornamental plaster is easily carried. Owing to the fact that the curved rear wall is not carried above the gallery floor line the cantilever beams require to be anchored to the wall below; this is done by W. I. straps, reaching some ten feet down into it. Head room being now relatively less important, 20-inch I's at 65 pds. were allowed.

Boxes.—These are on three main levels, each row varying in height, and consisting of eight boxes. They are supported by small columns which are however placed so far back that no vision is obscured, the cantilever being again used. The slab of each box rests on 5-inch channels, and these on double 9-inch I's. Access is had to the boxes both by the balcony and by their own stair, which runs from the auditorium level.

Stage.—The basement is used for dressing-rooms, all partitions being of brick. The stage floor is supported by 5-inch C.I. columns, and by double 9-inch and single 7-inch beams. The floor itself is of heavy plank, only the foot-light apron being of concrete. The stage is clear except for a two-storey set of dressing-rooms set close to the south side. in accordance with the by-law, the brick is laid as an arch, C.I. skew-backs bolted to the girder, causing it to take up the tensile stress.

Roof.—This consists of nine trusses, two in the lobby, five over the auditorium, and two over the stage. Of these nine, falsework was required for the two heaviest only, those over the stage. Some idea as to the total weight of the steel in the roof may be gained from the fact that of a total weight of steel in the building of about 1,000,000 pounds, some forty per cent. of it was in the roof trusses and purlins alone. Reference to the sketch will show the method of erection of the other trusses which worked out very economically. The lobby at the west or front of the building was fortunately some three feet wider than the auditorium. Each truss was riveted together lying on its side in this loft only twelve feet below its final level. The end hips, however, were omitted until the truss had been righted and they were then temporarily reinforced by I beams clamped to their side, as it was necessary to make use of their lateral strength during the process of sliding them in place. They were lifted to the height of the wall by a gin pole, power for it and for the compressed air plant being supplied by the usual hoist engine on the ground below. When raised to the level of the wall they were





securely bolted to skids as shown in the sketch, and were then moved by hand tackle along greased channels to their own anchor bolts. Owing to the great span each auditorium truss rested on triple 8-inch I's, and those of the stage on triple 15's. The 3-inch reinforced concrete roof slab is carried on 9-inch channels or E's about 6 feet apart. The ceiling

channels are of the same weight, with the exception of the three panels nearest the proscenium wall. These are somewhat heavier, as they carry the suspended sounding board which extends as far from the proscenium wall as the end of the boxes. The seven auditorium trusses are somewhat similar in design to the sketch of the stage truss shown but are lighter, the unit loads being less, and there being no fly-galleries to carry.

Stage Roof.—Owing to their extreme weight and additional length, (8 feet greater than those of the auditorium), these two trusses were erected by means of falsework. 8 x 8 wood posts were run from the basement nearly seventy feet down. At the top a solid temporary floor was laid, made of 2-inch plank resting on 8-inch I's, spaced at about 6-foot centres and supported by the posts and the solid walls. Derricks were installed at each side and the presence of these rendered possible the use of "bull" riveters, with their greater economy and speed. As the ceiling of the stage has to take the entire weight of the stage scenery it must be of heavy construction, and instead of the usual slab we find 4-inch L's laid flat on the beams so close as to almost touch.

Fire Escapes.—In accordance with the by-law the building is particularly well supplied with these, there being two fire exits on each floor on each side, each exit door having its own outside stair, making four on each side, the exits from the auditorium opening on the ground level.

Heating, Ventilating and Plumbing.—Steam is supplied by an Inglis multitubular boiler of 100 H.P., operating at low pressure. All portions of the building are heated by direct radiation, except the auditorium. For it two positive 100 inch fans with a capacity of 40,000 cubic feet per minute are used, driven by a 20 H.P. motor, causing the fresh air to be driven past some 6,000 feet of steam-heated coils. In addition to the positive heating plant abundant circulation is maintained by the use of suction ducts in all portions of the building, the induced draft being caused by three motor-driven exhaust fans, with a total capacity of 55,000 feet per minute; one in the basement and two located above the ceiling. The plant is guaranteed to maintain a temperature of 70° F. in a temperature of —20 without straining or vibration. In order to assure safety the boiler is placed under the sidewalk, a substantial brick wall intervening between it and the stage dressing-rooms.

Lighting.—In addition to the footlights the stage is lighted from above by rows of moveable lights hung from the trusses. For the moving pictures and spotlights, a permanent fireproof cabinet is installed with its own air exhaust duct. All wires throughout the building are encased in pipes chased in the walls.

Fire Protection.—As all the auditorium floors are of concrete no additional protection is necessary, but in order to make the stage and scenery equally secure a tank of 18,000 gallons' capacity has been erected on a steel platform on the walls at one side of the stage roof.

The principal firms engaged in the work were as follows:—

Owners.—Shea Syndicate of Toronto and Buffalo.

Architects.—Leon H. Lempert & Son, of Rochester, represented by Chas. J. Reade, of Toronto.

General Steel Contractors.—McGregor & McIntyre, Ltd.

Mason Contractors.—Fred. Holmes & Sons.

Plastering.—Geo. Marshall & Company.

Heating and Ventilating.—Fred. Armstrong & Company.

ELEMENTARY ELECTRICAL ENGINEERING.

L. W. Gill, M.Sc.

CHAPTER IV.

DIRECT CURRENT APPARATUS AND SYSTEMS.

This series of articles will be continued for some months. They will be of particular interest to the student of electrical work and the civil engineer anxious to secure some knowledge of the simpler electrical problems.

Direct Current Motors.—If a current is passed through a conductor, which is placed in a magnetic field in such a way that the current will flow at an angle to the lines of force, there will be a mechanical force exerted on the conductor. This force will be maximum for a given strength of field and current when the direction of the current is at right angles to the lines of force. In this case the direction of the force will be at right angles to the lines of force, and also to the direction of the current. The direction of the force may be determined by the following rule: Arrange the thumb and first two fingers of the left hand so that each points in a direction at right angles to the other two; if the index finger is now made to point in the direction of the magnetic flux and the middle finger in the direction of the current, the thumb will point in the direction of the force. A little consideration will show that a change in the direction of either the flux or the current will be accompanied by a change in the direction of the force, while, if the direction of both flux and current is changed, the direction of the force remains unchanged. The magnitude of the force is directly proportional to the strength of the magnetic field, to the strength of the current, and to the length of the conductor. This is the fundamental law relating magnetic field, electric current and mechanical force, and is consequently the fundamental principle on which all electric motors are based.

Referring now to Fig. 35, let it be assumed that the brushes of this machine (when at rest) are connected to some independent source of e.m.f.—a battery or a generator in operation—the poles having been previously excited. If the connections are made so that the current will flow in the direction indicated by the arrowheads in the figure, it will be noted that, according to the law stated above, there will be a force exerted on each conductor, the direction of which will be from right to left. If, on the other hand, the current is passed through the armature in the direction opposite to that in which it flows when the machine is acting as a generator, the force on the conductors will tend to rotate the armature in the direction indicated by the arrow at the top of the figure. In either case it should be clearly observed that, while there is a reversal in the direction of the current flowing in the several conductors opposite successive poles, there is also a simultaneous reversal of direction of flux, and consequently no change in the direction of the force. The direction of the latter is thus the same for every conductor.

From the above it is clear that if the poles of any

direct-current generator are excited, and a current is passed through its armature winding, a force will be exerted on the latter which will tend to rotate the armature; in other words, **any direct-current generator will act as a motor.** The change in the operating conditions when a given machine changes from generator to motor is best illustrated by considering the case of a shunt generator (as shown in Fig. 32) charging a storage battery. Suppose, for example, that the e.m.f. of the battery is 100 volts. To charge this battery the generator must force current through it against its e.m.f. of 100 volts, and must consequently generate more e.m.f. than that of the battery. Suppose, for illustration, that the e.m.f. of the generator is 110 volts. The net or effective e.m.f. acting in the circuit will be 110 — 100 = 10 volts. Assuming the resistance of the circuit (including battery and armature of generator) to be .2 ohm, the current will be, according to Ohm's law, 10/.2 = 50 amperes. This indicates that the amount of current flowing into the battery depends directly on the difference between the e.m.fs. of the battery and generator. If the e.m.f. of the generator is diminished by adjusting its rheostat or lowering its speed, the strength of the current will diminish and become zero when the e.m.f. of the generator is exactly equal to that of the battery. If the e.m.f. of the generator is lowered any further there will be a reversal in the direction of the current, and the generator becomes a motor, with the direction of rotation unchanged. In this case the battery forces current through the armature of the machine against the e.m.f. which is generated therein; in other words, the battery discharges and gives out energy to the motor. The change from generator to motor is thus accompanied only by a change in the direction of armature current. **When operating as a generator the current flows in the direction of the e.m.f., and when running as a motor the current flows in the opposite direction to that of the generated e.m.f.** In construction and general appearance the motor differs very little from the generator.

If the poles of a motor are excited and the armature is connected to some source of constant e.m.f., a current will flow through the winding, which will produce a torque, tending to rotate the armature; and if the latter is free to turn it will rapidly accelerate. The rotation will generate an e.m.f., which will oppose the flow of current, and, as the armature speeds up, the current and driving torque—which depends directly on the current—will consequently diminish until the latter is exactly equal to the retarding torque; i.e., the load. If the friction could possibly be eliminated, the armature of an unloaded motor would speed up until the e.m.f. generated in its armature would be exactly equal to the voltage applied to its brushes, and no current would flow in its armature. In this case no current would be necessary to keep the armature running, for by assumption there would be no retarding torque, and consequently no driving torque would be necessary. When, however, a retarding torque is applied to the armature, the speed at once diminishes, and consequently the generated e.m.f. The speed will decrease until the difference between the applied voltage and the generated e.m.f. is large enough to force a current through the armature of sufficient strength to produce a driving torque equal to the retarding torque. If Ea represents the generated e.m.f. and E the voltage applied to the brushes or terminals, E — Ea represents the net or effective voltage; and if Ra represents the resistance of the armature, the current will be

$$I = \frac{E - Ea}{Ra} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (16)$$

and by transposing—

$$Ea = E - I\,Ra \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (17)$$

Since the mechanical force exerted on a conductor in a given magnetic field varies directly as the strength of the current, it follows that if the flux in a given motor remains constant, the current flowing in the armature will be proportional to the driving force; and, since the latter must be equal and opposite to the retarding force (or load), the armature current will vary directly with the retarding torque But from equation (16) the current varies directly as the difference between the applied voltage and the generated e.m.f. Consequently, if the applied voltage is constant, the generated e.m.f. must diminish in proportion as the load increases; and since the generated e.m.f. depends directly on the speed, it follows that the speed must decrease proportionately with increase of load. The amount of this decrease will depend on the value of Ra, for the smaller the armature resistance, the smaller the difference between E and Ea to give the necessary strength of current The following numerical example will illustrate these points:—

Example 12.—The resistance of the armature of a certain motor is .06 ohm, and it is designed to operate with 200 volts applied to its terminals and to carry 200 amperes. The speed when running light (no load) is 1,000 r.p.m. Assuming that the magnetic flux remains constant, to determine the speed when the load is such as to require 100 amperes to rotate the armature.

$Ea = E - I\,Ra = 200 - 100 \times .06 = 194$ volts.

Since the generated e.m.f. varies directly with the speed, it follows that the speed will be $1{,}000 \times 194/200 = 970$ r.p.m.

If the load were such as to require 200 amperes, the generated e.m.f. would be 188 volts and the speed 940 r.p.m.

If the resistance of the armature were .12 ohm instead of .06, the generated e.m.f. with 200 amperes flowing in the armature would be 176 volts and the speed 880 r.p.m.

In the actual motor the value of Ra is usually small, and consequently the value of the term I Ra in equation (17) is usually small compared to E. The value of Ea, and consequently the speed, will, therefore, vary only a small amount from no load to full load. **It is thus clear that, with constant flux, the speed of a motor will diminish a small amount with increase of load, the decrease depending on the armature resistance.**

In the above discussion it has been assumed that the flux in the motor remains constant. If the flux is diminished, when the motor is carrying a fixed load, the generated e.m.f. will decrease. The result will be an increase of current, as indicated by equation (16); and an increase of current will give an increase of driving torque. If the load remains constant, as assumed, the increased torque will cause the motor to speed up and thus increase the generated e.m.f. and diminish the current to its original value. **Any variation of flux will thus cause an inverse variation of speed.** Advantage is taken of this to regulate or vary the speed of motors in commercial work. For this purpose a rheostat is placed in series with the exciting coils, by means of which the exciting current may be varied.

ENGINE HOUSE PRACTICE.*

Or the Handling of Locomotives at Terminals to Secure Continuous Operation.

By F. H. Clark, Chicago.
Member of the Society.

The topic assigned me is so comprehensive as to embrace nearly all features of engine house practice. In order to get the matter clearly before the meeting, therefore, it may be desirable to describe briefly such features of design and equipment as are considered good practice in the United States.

Arrangement of Locomotive Terminals.

2. The engine house and its appurtenances should be located, when possible, at a point near the yard or station where the engines are released or required, though the plan must usually be adjusted to meet existing conditions of topography or space. In Fig. 1 is shown a plan which may serve as a basis of the paper. It has no unusual features, but it may be considered a fair example of engine house practice. Some space might be saved by the use of a different design of cinder pit, and considerable space by a different coaling station. Other modifications would naturally suggest themselves in considering the application of the plan to any specific case.

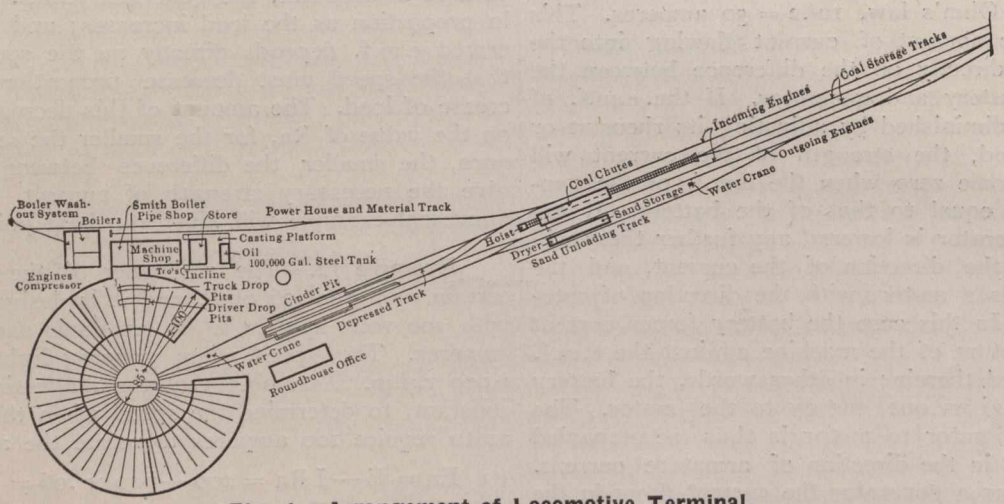


Fig. 1.—Arrangement of Locomotive Terminal.

3. The approach to the engine house provides two tracks for incoming engines, one on either side of the coaling station, and one track for outgoing engines; though connections are provided by which the movement may be varied if necessary.

4. The coaling station indicated on the plan is of a design frequently employed in locations where space permits. Fig. 2 shows its general construction, but with the tracks at right angles with the entire line of the structure, instead of parallel to it, as in Fig. 1. The coaling station illustrated is of 700 tons capacity. The coal is elevated in cars by means of a hoist which pulls the loaded cars up a 20 per cent. incline at a rate of about forty feet per minute. The coal is shoveled or dumped out of the car directly into bins or pockets, if breaking is unnecessary; or on a grating of breaker bars spaced four to six inches apart, through which the coal drops when broken. The station delivers coal to six tracks, five underneath and one at the end. The hoist may be operated by steam or gasoline engines, or by electric motors, motors being usually considered preferable where electric current is available.

5. Another type of coaling station is shown in Fig. 3. This station has an overhead storage capacity of 1,200 tons, and the construction is entirely of steel and concrete. The coal is hoisted in a pair of Hunnen counterbalanced buckets, and distributed in the bin by means of a special automatic tram car. The coal is received at one side of the bin and is delivered to five coaling tracks, four underneath the pocket and one adjacent. To facilitate the handling of cars of coal during the winter, three additional receiving hoppers are provided, so that coal frozen in the bottom of the cars may be removed without interrupting the main hoist. The coal is then transferred from the three hoppers to the main hoist for elevation to the overhead pocket. This plant is operated by electricity.

6. Various other types of coaling plants are in successful use, the coal being elevated by belt conveyers or small bucket conveyors, or handled by cranes of various types, with clam shell or similar buckets. The cost of operation ranges from two to ten cents per ton, depending upon various factors.

7. The sand-drying apparatus shown in Fig. 1 is placed opposite the coaling station, though frequently a part of the coaling plant is used for that purpose. One of the most common methods of drying sand is by coal stoves, which differ considerably in design. The moist sand is delivered from a hopper to a casing surrounding the stove, from which it escapes as it becomes dry. Some of the more modern sand-drying houses use exhaust or high pressure steam from the power house. After drying, the sand is usually hoisted, by means of compressed air or by some form of conveyer, to a storage bin, from which it is drawn by locomotives when needed. Rotary sand-dryers, in which sand is fed into an inclined tube through which a current of hot air passes, are not commonly used, but could no doubt be used to advantage if a considerable amount of sand were required.

8. The water supply for locomotive use is usually stored in overhead tanks of various capacities. Fig. 4 shows two steel tanks of 100,000-gal. capacity recently erected. The body of the tanks is unprotected from the cold, but the connection between tank and water mains is usually enclosed, as shown, in places where freezing is likely to occur. Standpipes, or water cranes, are so placed that water may be taken without backward movement. Ten-inch cranes are frequently found in modern installations. These will deliver 2,000 to 3,000 gal. of water per min. under usual conditions.

*Paper to be read before the American Society of Mechanical Engineers, held in London, Eng., July 25-30, 1910.

9. Cinders and clinkers from incoming engines are handled in various ways. An arrangement in common use which has proved very satisfactory is shown in Fig. 5. The contents of the ash pan are dumped on a platform about four feet below the top of the rail, with a slight incline toward a depressed pit into which cars are run for loading. In Fig. 5 the rails are shown supported on wooden piles, the upper ends of which are surrounded by cast-iron pipes, with

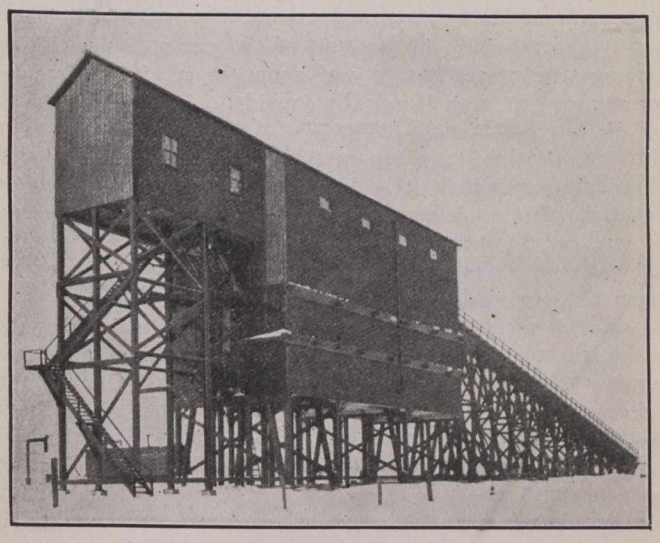


Fig. 2.—Coaling Station with Trestle.

insulating material packed between the pipe and the pile. The use of concrete piers is considered preferable where foundation conditions will permit. The cinders and clinkers removed from the ash pan are wet down and shoveled into an open coal car standing in the depressed pit. With engine tracks on each side of the pit, several engines may be accommodated at a time, and the plan affords considerable storage capacity, so that, with a pit of moderate length, a day force of shovelers is sufficient to take care of the accumulation.

10. In some modern plants the slope from the outer rail delivers the refuse from the ash pan into a concrete pit about eight feet in width and depth and filled with water. In this case the material is removed by means of a travelling gantry crane with clam shell or similar buckets, and delivered to cars standing on the side of the pit opposite the engine.. In other cases pits are provided between the rails, in which buckets are placed, and the buckets are lifted out and the contents deposited in open cars by a gantry or ordinary overhead electric-driven crane with elevated runway.

11. The engine houses of the United States, usually being circular in form, require turntables for the delivery of engines to and from the house. A common length of table for new installations is 80 feet, though a great many shorter tables are still in service, and working satisfactory where the length of engines is not too great. Turntables are frequently moved by hand, though a more economical method, where a considerable number of engines are turned, is by tractors driven by gasoline engines or electric motors. The tractor has a heavy steel frame of triangular shape attached to the turntable by means of hinges at two points, the weight being balanced on the single tractor wheel travelling on the circular rail in the pit. On this frame are mounted the motor, gearing, bearings, shaft and brake, comprising the driving mechanism. Above the machinery, and entirely covering it, is mounted the operator's cab, in which the operating mechanism is located. Electric motors are generally considered preferable where current can be provided uninterruptedly, and on such installations a collector device is applied to the turntable center. This maintains a connection with the feeder line, which is brought underground to the center of the pit, though, in case the pit is subject to flooding, an overhead collector may be used.

The Engine House.

12. Fig. 1 shows the plan of an engine house with thirty 100-ft. stalls and an 80-ft. turntable, on a circle having a maximum provision for forty-seven stalls, including inlet and outlet tracks. This plan shows fire walls separating the house into three rooms of ten stalls each. The two center stalls are provided with drop pits, by means of which driving and truck wheels may be removed and replaced without jacking up the engine. The engines in this house are intended to be headed in and backed out.

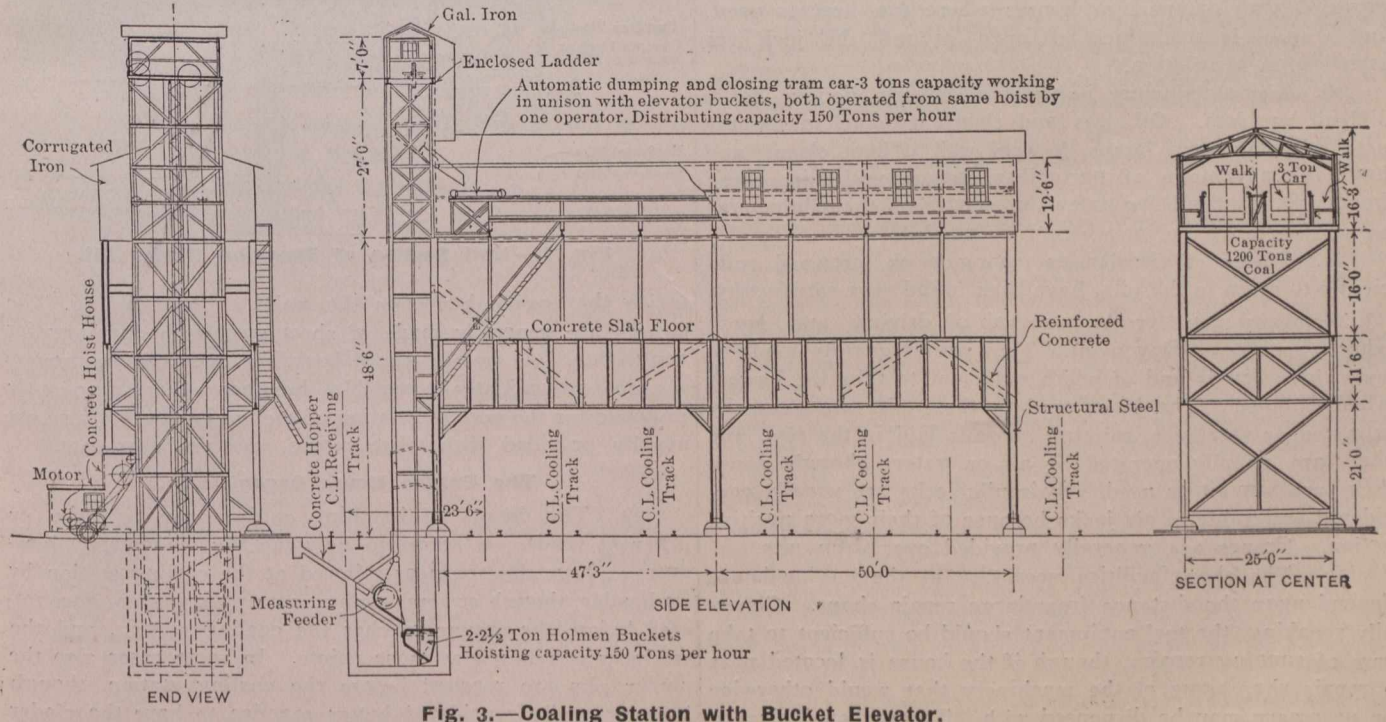


Fig. 3.—Coaling Station with Bucket Elevator.

13. Reinforced-concrete framing is frequently employed, though the roofs are generally of wood and covered with tar and gravel. The use of exposed iron or steel in roof construction is generally avoided because of the rapid corrosion. The pits are connected at the inner ends by a drain from which the water escapes through an outlet sewer emptying into a large catch basin, or sump, where the sediment is deposited.

14. The pits in this case are recessed for steam-pipes, though the use of fan blast for heating engine houses is becoming more and more general, and it is usually found that better results are obtained by the use of vitrified tile ducts laid underground and discharged into the sides of the pits

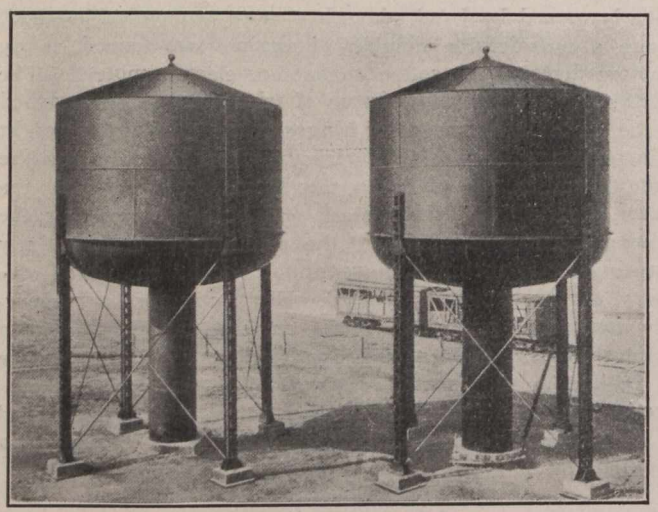


Fig. 4.—100,000 Cal. Steel Water Tanks.

than by the use of galvanized pipes above ground, which generally need frequent renewal. An important advantage of the fan blast is that it assists in ventilating the house, changing the air in from eight to thirty minutes, as usually installed and operated.

15. There are a great variety of smoke jacks in use. The type which seems to be coming into favor is conical in shape and is frequently made of wood, lined with sheet asbestos or similar material. Smoke jacks are generally provided with dampers in houses where fan heat is used, and a space is sometimes left open around the jack for assisting in ventilation.

16. The satisfactory lighting of engine houses is a difficult problem. Oil, gas and electricity are commonly used. Incandescent lamps do very well if kept clean, and have the advantage of portability, separate circuits being frequently provided for extension cords, so that light may be carried to any point where it is needed.

17. Floors of vitrified or paving brick, crowned sufficiently to drain to the pits, have been found very satisfactory.

18. Drop pits for the removal of driving and truck wheels are very convenient. They are frequently made to span three tracks and of width sufficient to take the largest wheel handled. The jacks used in these pits are generally mounted on carriages, running on rails laid in the pits, and they are usually operated by air or water, though screw jacks are sometimes used. Hydraulic jacks are usually considered preferable to air jacks because of their more positive action. Cranes are generally provided over drop pits.

19. The shop facilities necessary at the engine house depend upon the distance from large repair shops. Generally speaking, the tool equipment should be sufficient to take care of running repairs, though if the house is located near a repair shop some of the machinery that would otherwise be necessary may be dispensed with. There should also be a tool room, conveniently located with respect to the machine shop and engine house, in which small tools of all kinds can be conveniently kept and drawn as required. The storehouse should be similarly located and should carry a sufficient amount of material to handle the repairs frequently necessary.

20. There is nothing of particular interest to be said about the power plant of the average engine house. Boilers, engines and other equipment may be of any type desired. It seems to be the custom to figure on about ten boiler horsepower per stall and, on account of the common use of air tools, a compressor capacity of about 20 cu. ft. of free air per minute per stall is usually provided.

21. Oil houses are generally of fireproof construction, with the oil stored in a separate room from the place of distribution, from which it is drawn or pumped from tanks as required. The oil is usually stored in tanks in the basement, the size and number of the tanks depending upon the amount and variety of oils used. Self-measuring pumps are extensively used in modern installations.

22. Of recent years there has been considerable demand for better and quicker methods of boiler washing, and as a result several systems have been introduced. One of the earlier arrangements consists of an open cistern of perhaps 100,000-gal. capacity, located near the engine house. In this the steam blown off from locomotives is used for heating water to wash out the boiler, and in some cases also for heating fresh water with which to refill it. Recent installations are the National, which is of the closed-heater type, in which the steam and water blown off are used for washing out and for heating fresh water; and the Raymer system, which is of the enclosed-heater type and performs similar functions. Blowing-off, washing and filling connections are generally provided between alternate stalls in the engine house

23. Locker rooms are generally provided for engine men, and fitted with a sufficient number of expanded metal lockers to accommodate their clothing and small tools. These are located in a building near the engine house office. Lockers are also provided for shop men, and are frequently located

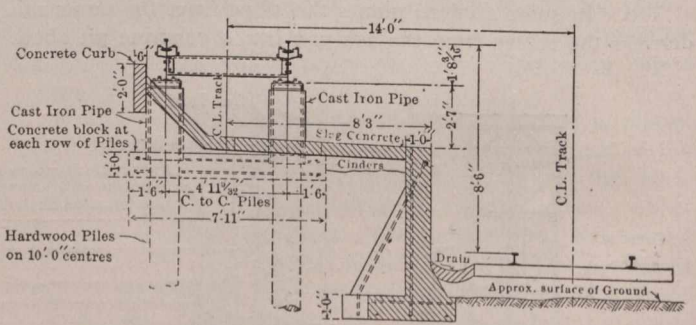


Fig. 5.—Half Section of Elevation Cinder Pit.

inside the engine house on the walls of the building. The lockers are generally made of sheet steel with openings for ventilation. At points where boarding and lodging houses are not conveniently accessible, bunkhouses are frequently provided for the accommodation of the enginemen. These are usually provided with toilet rooms, shower baths, etc.

The Engine House Organization.

24. The details of handling engines vary greatly on different roads. It seems to be generally customary, however, to have the engineer relieved at the coaling station by an hostler, though at some plants inspection pits are encountered before the engine reaches the coaling station, and the engineer is relieved at those points. In some cases also the cinder pits are reached before the coaling station, though it is generally considered better practice to have the cinder pits next to the engine house, so that if the fire is dumped

the engine will have but a short distance to travel and encounter but little delay before reaching the house. The hostler, however, takes coal, water and sand, and moves the engine to the turntable and thence across to the house.

25. The engineer makes out a statement on arrival, commonly called a "work report," on which he indicates the condition of the engine and any work which he may know to be necessary. The engine usually receives an independent inspection, however, and notes are made of any work required which has escaped the attention of the engineer. The foreman, or his assistant, distributes the work and is responsible for its performance.

26. Especially at large terminals, engines are frequently stored outside and do not enter the house except for boiler washing or heavy work of some kind. Switch engines, especially those that work night and day, are usually so handled.

27. The organization varies with the requirements, but the engine house and its plant are generally in charge of a foreman who has general supervision over the inside and outside operation. He reports to the master mechanic or general foreman, and attends to locomotive repairs and service including the assignment of enginemen to their runs. He usually has an assistant who attends to the distribution of work, including the supervision over such foremen of the various classes of work as may be required. Efforts are usually made to keep the night work as low as is consistent with the prompt handling of engines coming in for service or repairs.

28. The cost of service varies greatly at different points. Most roads do the greater part of their work at the more centrally located engine houses and comparatively little at outside points. This naturally causes a considerable difference in the cost of service, but in addition to this, various local conditions, such as the quality of boiler water available, the condition of track, the general condition of the power, and the available help and wage scales, have a considerable effect upon the cost of service. On one road with which the writer is familiar, the cost of service per locomotive varies from 50 cents, or even less, at outside points, to about $3 at one or two important central points where a considerable amount of heavy work is done. The average cost by months for all engines housed during the eight months from July 1909, to February 1910, ranged from $1.50 to $1.73. These figures include service only. The average cost per engine for the eight months is shown in the table.

Average Itemized Cost of Engine House Service Per Month Per Engine.

Passenger Engines.

Hostling	$0.12
Calling	0.08
Wiping	0.41
Cleaning	0.26
Headlight cleaning	0.07
Boiler washing	0.87
Tank washing	0.11
Flue cleaning	0.10
Inspecting	0.15
Firing-up	0.16
Engine house laborers	0.16
Turning table	0.04
Clinkering	0.24
Supply men	0.12
Coaling engines	0.10
Sanding Engines	0.11
Watching engines	0.18

29. The cost of service rendered freight engines on the same road during the year ended June 30, 1909, was 8.4 cents per thousand ton-miles.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

10778—June 4—Authorizing the C.P.R. to construct the following bridges on its line of railway:—1. No. 77.82, Chapleau Section, Lake Superior Division; 2. No. 116.78, Chapleau Section, Lake Superior Division; 3. No. 69.3, Boundary Section, Pacific Division.

10779—June 4—Authorizing the C.N.O.R. to construct its railway across the public road between Lots 28 and 29, Concession A., Township of Haldimand, County Northumberland, at Station 330.30.

10780—May 23—Granting leave to the C.N.O.R. to construct an overhead bridge to carry the Don Mills Road over its line of railway at Station 26.85.

10781—June 4—Authorizing the C.N.O.R. to construct its railway across the public road between Lots 21 and 22, Concession A., Township of Haldimand, County of Northumberland, Ont.

10782—May 23—Directing that the G.T.R. and C.P.R. provide gates and watchman at the crossing at Royce Avenue, in city of Toronto, Ontario.

10783—June 2—Authorizing the C.P.R. to use natural gas for lighting passenger cars on its line of railway, subject to terms and conditions made, and a penalty of $100 for failure to comply therewith.

10784—June 2—Dismissing application regarding protection to be provided at the highway crossing on the G.T.R. west of Stanfold Station, Que.

10785—June 4—Extending the time provided in Order No. 9114, within which the C.P.R. was required to complete the construction of the subway at Iberville Street, Montreal, until the 15th of July, 1910; and rescinding Order No. 10571, dated May 16th, 1910.

10786—June 4—Authorizing the C.P.R. to construct its railway across the highways on its Lethbridge to Aldersyde Branch at mile 5.10, 8.90, 11.20, 17.60, and 19.60.

10787—June 6—Authorizing the C.N.O.R. and the C.P.R. to operate their trains over the crossing at mileage 56.6, west from Hawkesbury, without their first being brought to a stop.

10788—May 23 and 25—Dismissing application of the town of Brampton for an Order directing the G.T.R. to provide commutation tickets between Brampton and Toronto, similar to those granted to persons travelling between other suburban points and Toronto, such as Oakville, Streetsville, Whitby and Oshawa, Ontario.

10789—June 6—Approving location of the Vancouver, Fraser Valley and Southern Railway Company's lines of railway within the limits of the city of New Westminster, B.C.

10790—June 6—Authorizing the city of Brantford to construct a temporary level crossing over the canal of the Western Counties Electric Railway Company, and the tracks of the Brantford & Hamilton Electric Railway Company, and the G.T.R., pending the construction of the proposed bridge on South Market Street, Brantford, Ontario.

10791—June 6—Authorizing the Montreal Light, Heat and Power Company to erect its wires across the track of the G.T.R. at 16th Avenue, Lachine, Quebec.

10792—June 6—Authorizing the Hydro-Electric Power Commission of Ontario to erect transmission lines and wires across the wires of the Bell Telephone Company at Lot 127, Township Thorold, County Welland, Ontario.

10793—June 7—Directing that the M.C.R. divert the crossing between Concessions 6 and 7, along the north side of the railroad to the Town Line Road between Townships of Tilbury East and Raleigh; said Town Line Road crossing to be protected by a Whyte Signal Electric Bell, to be installed by the Railway Company.

10794—June 7—Approving location of the C.N.O.R. Company's line of railway through the townships of Ledger, Purdom, Booth, and Nepigon, District of Thunder Bay, mile 480 to 500 from Sudbury Junction.

10795—June 7—Authorizing the C.P.R. to construct an extra track across the road allowance between Sections 1 and 2, and between Sections 12 and 11, Township 21, Range 1, west 5th Meridian, near Erskine Station, McLeod Branch of said railway, Alberta.

10796—June 6—Recommending to the Governor-in-Council for sanction, the by-law of the shareholders of the Bedlington and Nelson Railway Company, re spitting in cars, etc.

10797—June 6—Authorizing the C.P.R. to construct Bridge No. 84.1, over Little Creek, on the Ontario Division, Windsor Section, of its line of railway.

10962—June 20—Directing that within ninety days from date of this Order the C.P.R. install a Whyte Signal Electric Bell at the crossing of Norman Street, near mile 2, Kenora Section.

10963—June 21—Directing that within ninety days from date of this Order the G.T.R. shall install a Whyte Signal Electric Bell at the crossing of Ottawa Street, immediately west of the Jockey Club Racetrack, Hamilton, Ont.

10964—June 21—Directing that within ninety days from date of this Order the C.P.R. shall install a Whyte Signal Electric Bell at the crossing of highway on the north half of Section 5, Township 3, Range 5, Morden Station, Manitoba.

10965—June 21—Authorizing the C.P.R. to construct three additional tracks across King Street, Virden, Man.

10966—June 21—Authorizing the city of Port Arthur to lay a water main under the track of the C.P.R. at 2nd Avenue, Port Arthur, Ont.

10967—June 21—Amending Order No. 6750, dated March 30th, 1909, which directed the Columbia and Western Railway Company to protect the crossing at Riverside Avenue, Grand Forks, by adding the following clauses:—"That the Railway Company remove the small bushes on the North side of its track and right-of-way, and on the highway between the bridge and said crossing" "That if for any cause the bell installed at said crossing under said Order No. 6750, shall become disabled or out of order, the Railway Company protect the crossing by a flagman during such time or times as said bell may not be in use."

(Continued on next page.)

RAILWAY EARNINGS; STOCK QUOTATIONS.

Figures for the Past Week and from Beginning of Year, with Comparisons and Stock Prices.

The following table gives the latest traffic returns it is possible to obtain at the time of going to press:—

Road	Wk. Ended	1910	Previous Week	1909
C. P. R.	June 30	$2,735,000	$1,926,000	$1,971,000
G. T. R.	June 30	1,350,612	931,844	1,195,366
C. N. R.	June 30	372,400	299,600	460,600
Mtl. St.	July 2	72,416	90,778	66,940
Hlfx. Elec.	June 30	5.464	4,539	5,799
T. & N. O.	June 30	35,465	23,821	34,957

Figures showing the earnings of Canadian roads since January 1st, this year and last, are appended:—

Road.	Mileage.	Jan. 1st to	1910.	1909.
C. P. R.	10.326	June 30th	$43,982,000	$6,401.000
G. T. R.	3,536	June 30th	21,656.136	18,219,863
C. N. R.	3.180	June 30th	5,955,700	35,353,000
Mtl. St.	141.79	July 2nd	2,006,514	1,746,327
Hlfx. Elec.	13.3	June 30th	95,535	85,285
T. & N. O.	264.74	June 30th	584,517	502,589

Stock quotations on Toronto, Montreal and London exchanges, and other information relative to the companies listed in the above tables, are appended. The par value of all shares is $100.

Co.	Capital 000's omitted	Price June 30 1909.	Price June 23 1910.	Price June 29 1910.	Sales last week.
C. P. R.	$150,000	183-	.....	188¼-	....
Mtl St.	18 000	218¼-216	243½-243	240-234¼	1192
Hal. El.	1,400	.....	124-121¾	123-121	....
Tor. St.	8,000	-123¾	118½-	118½-	210
G. T. R.	226,000	1st pfd. 108¼ ;	3rd pfd. 57¾ ;	com. 26¾.	

CANADIAN PACIFIC RAILWAY

Following are figures relating to the operation of the Canadian Pacific Railway from July 1st, 1909:—

	Earnings. $	Expenses. $	Net Profits. $	Net Increase over 1908-9. $
May	8,378,115.00	5,821,850.00	2,556,265.00	629,405.00
April	7,985,230.00	5,004,119.00	2,981,111.00	837,604.00
March	7,796,337.00	5,085,164.00	2,711,173.00	907,465.00
February	5,992,052.14	4,505,032.90	1,487,019.24	724,874.46
January	6,104,426.90	4,787,830.51	1,316,596.39	926,846.56
December	8,214,758.04	5,099,334.94	3,115,423.10	918,671.53
November	9,075,963.93	5,383,625.98	3,692,337.95	1,471,258.60
October	9,744,596.87	5,358,299.68	4,386,297.19	1,731,030.48
September	8,323,178.03	4,891,288.86	3,431,889.17	1,317,281.40
August	7,426,984.62	4,462,926.75	2,964,057.87	385,159.16
July	7,140,029.93	4,660,159.20	2,479,870.73	205,297.48
Totals	$74,832,446.46	$49,237,781.82	$28,465,775.64	$9,425,488.67

CANADIAN NORTHERN RAILWAY

The following table gives the earnings, working expenses, etc., of the Canadian Northern Railway since July 1st, 1909:—

	Earnings. $	Expenses. $	Net Earnings. $	Net Increase over 1908-9. $
May	1,224,900	856,300	368,600	185,700
April	1,153,100	821,900	331,200	107,300
March	934,100	661,800	272,300	67,800
February	698,900	567,400	131,500	38,100
January	792,200	669,700	122,500	22,200
December	1,160,300	825,900	334,400	49,300
November	1,517,600	970,100	547,500	134,000
October	1,384,200	903,500	480,700	60,600
September	1,076,800	765,300	311,500	60,400
August	807,100	602,700	204,400	18,300
July	843,500	613,900	229,600	26,700
Totals	$10,367,700	$7,402,200	$2,966,500	$585,500

Mileage:—1910, 3,180; 1909, 3,094.

C. P. R. EARNINGS

Show an Increase of $18,272,000 for Year Ending June 30th.

The gross earnings of the C.P.R. for the year ending June 30th were $94,585,000, an increase of $18,272,000 over the previous year. This is the total of the earnings for the eleven months, and adding the estimated figures for June.

Estimating the net earnings at about the same level for May, the net earnings for the year total $33,722,000, an increase of $10,767,000. This year's results exceed anything in the history of the road in the way of gains. The June earnings were $8,404,000, a gain of $2,050,000.

Canadian Pacific Railway earnings for May and for the first eleven months of the year ending June 30th, compare as follows:—

	1910.	1909.	1908.
May	$ 8,378,115	$ 6,420,640	$ 5,392,570
Working Expenses	5,821,850	4,493,780	3,711,075
Net profits	2,556,265	1,926,860	1,681,495
Gross earnings for 11 months end May 31	86,181,673	69,763,167	65,828,339
Expenses	55,059,633	48,696,019	45,711,469
Net profits to May 31	31,122,040	21,067,148	20,116,870

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

(Continued from page 19).

10968—June 21—Extending until July 20th, 1910, the time within which the C.P.R. was required by Order No. 10273, dated April 21st, 1910, to install an electric bell at crossing of Martin Street, Milton, Ont.

10969—June 20—Authorizing the Department of Public Works of Ontario, to construct the Sudbury Soo Trunk Wagon Road across the track of the Soo Branch of the C.P.R. at grade, Lot 7, Concession 11, Township Long, Ontario.

10970—June 20—Authorizing the Department of Public Works to construct a grade crossing over the C.P.R. (Soo Branch) by the Sudbury Soo Trunk Wagon Road at Lot 9, Concession 6, Township of Lorne, Ontario.

10971—June 20—Directing that the M.C.R. divert the crossing of the highway ¾ mile west of Fletcher Station, Township Tilbury East, and when diversion is completed the company to be relieved of the necessity of keeping a watchman at said crossing.

10972—June 22—Directing that, temporarily and pending the final determination of the matter, permission be granted the M.C.R. to pass over the crossing of Malden Road .71 miles west of Woodslee Station, at a greater speed than ten miles an hour, provided that during such period it place and maintain a watchman at said crossing.

10973—June 22—Authorizing that the C.N.R. connect the lines and tracks of its Maryfield Extension with the lines and tracks of the Moose Jaw Branch, in south-west quarter of Section 24, Township 6, Range 18, west 2nd Meridian, Sask.

10974—June 18—Approving location of the C.N.O.R. station grounds at Brighton, Ontario.

10975—June 22—Authorizing the C.P.R. to construct two additional tracks across Lacrosse Street, Virden, Man.

10976—June 22—Approving plans of proposed new station to be constructed at Nixon, Ontario.

10977—June 22—Approving location and detail plans of the proposed new station at Hepworth, Ontario, and the new location of track crossing the highway just south of said station.

10978—June 21—Authorizing the G.T.R. to construct a branch line to the premises of Goldie and McCulloch Company, Limited, Galt, Ontario.

10979—June 21—Authorizing the G.T.R. to construct a branch line of railway to the premises of John Dick, Limited, Toronto, Ont.

10980—June 20—Amending Order No. 10752, dated May 19th, 1910, which directed the G.T.R. to divert a short distance to the south the highway between Concessions 1 and 2, Township King, Ontario, and to construct an overhead bridge at the said crossing, by providing that the said overhead crossing be maintained by the Railway Company, and the roadway and fences on each side of the approaches maintained by the municipality.

10981—June 22—Authorizing the Hamilton Cataract Power, Light and Traction Company to erect power and light wires across the lines of the Bell Telephone Company at Lots 14 and 15, Concession 6, Township Barton, County Wentworth, Ontario.

10982-83—June 23—Authorizing the Esquimalt and Nanaimo Railway Company to construct its railway across the highway at Station 7039.50, mile 133.2, from Victoria, B.C.; and across the highway at Station 7010.00, mile 132.62, from Victoria, B.C.

10984 to 10987 Inc.—June 23—Authorizing the Esquimalt and Nanaimo Railway Company to construct its railway across the highway at Station 7086.50, mile 134.10, Argyle Street, Port Alberni, from Victoria, B.C.; across highway at Station 6051.00, mile 131.5 from Victoria, B.C.; across highway at Station 6920.70, mile 131 from Victoria, B.C.; and across highway at Station 6985.50, mile 132.18 from Victoria, B.C.

10988—June 23—Authorizing the Vancouver, Victoria & Eastern Railway and Navigation Company to construct a spur line to the premises of the Prudential Investment Company, Vancouver, B.C.

ENGINEERING SOCIETIES.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, Col. H. N. Ruttan; Secretary, Professor C. H. McLeod.

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—
96 King Street West, Toronto. Chairman, A. W. Campbell; Secretary, P. Gillespie, Engineering Building, Toronto University, Toronto. Meets last Thursday of the month.

MANITOBA BRANCH—
Chairman, J. E. Schwitzer; Secretary, E. Brydone Jack. Meets first and third Fridays of each month, October to April, in University of Manitoba, Winnipeg.

VANCOUVER BRANCH—
Chairman, Geo. H. Webster; Secretary, H. K. Dutcher, 40-41 Flack Block, Vancouver. Meets in Engineering Department, University

OTTAWA BRANCH—
Chairman, W. J. Stewart, Ottawa; S. J. Chapleau, Resident Engineer's Office, Department of Public Works.

MUNICIPAL ASSOCIATIONS.

ONTARIO MUNICIPAL ASSOCIATION.—President, Mr. George Geddes, Mayor, St. Thomas, Ont.; Secretary-Treasurer, Mr. K. W. McKay, County Clerk, St. Thomas, Ontario.

UNION OF ALBERTA MUNICIPALITIES.—President, H. H. Gaetz, Red Deer, Alta.; Secretary-Treasurer, John T. Hall, Medicine Hat, Alta.

THE UNION OF CANADIAN MUNICIPALITIES.—President, W. Sanford Evans, Mayor of Winnipeg; Hon. Secretary-Treasurer, W. D. Lighthall, K.C., ex-Mayor of Westmount.

THE UNION OF NEW BRUNSWICK MUNICIPALITIES.—President, Mayor Reilly, Moncton; Hon. Secretary-Treasurer, J. W. McCready, City Clerk, Fredericton.

UNION OF NOVA SCOTIA MUNICIPALITIES.—President, Mr. A. E. McMahon, Warden, King's Co., Kentville, N.S.; Secretary, A. Roberts, Bridgewater, N.S.

UNION OF SASKATCHEWAN MUNICIPALITIES.—President, Mayor Hopkins, Saskatoon; Secretary, Mr. J. Kelso Hunter, City Clerk, Regina, Sask.

CANADIAN TECHNICAL SOCIETIES.

ALBERTA ASSOCIATION OF ARCHITECTS.—President, E. C. Hopkins, Edmonton; Secretary, H. M. Widdington, Strathcona, Alberta.

ASSOCIATION OF SASKATCHEWAN LAND SURVEYORS.—President, J. L. R. Parsons, Regina; Secretary-Treasurer, M. B. Weeks, Regina

ASTRONOMICAL SOCIETY OF SASKATCHEWAN.—President, N. McMurchy; Secretary, Mr. McClung, Regina.

BRITISH COLUMBIA LAND SURVEYORS' ASSOCIATION.—President, W. S. Drewry, Nelson, B.C.; Secretary-Treasurer, S. A. Roberts, Victoria, B.C.

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

CANADIAN CEMENT AND CONCRETE ASSOCIATION.—President, Peter Gillespie, Toronto, Ont.; Vice-President, Gustave Kahn, Toronto; Secretary-Treasurer, R. E. W. Hagarty, 662 Euclid Ave., Toronto.

CANADIAN CLAY PRODUCTS' MANUFACTURERS' ASSOCIATION.—President, W. McCredie; Secretary-Treasurer, D. O. McKinnon, Toronto.

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

CANADIAN FORESTRY ASSOCIATION.—President, Thomas Southworth, Toronto; Secretary, James Lawler, 11 Queen's Park, Toronto.

CANADIAN GAS ASSOCIATION.—J. Keillor, Secretary-Treasurer, Hamilton, Ont.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION.—President, W. Doan, M.D., Harrietsville, Ont.; Secretary-Treasurer, Francis Dagger, 21 Richmond Street West, Toronto.

CANADIAN MINING INSTITUTE.—Windsor Hotel, Montreal. President, Dr. Frank D. Adams, McGill University, Montreal; Secretary, H. Mortimer-Lamb, Montreal

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

CANADIAN STREET RAILWAY ASSOCIATION.—President, D. McDonald, Manager, Montreal Street Railway; Secretary, Acton Burrows, 157 Bay Street, Toronto.

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

CENTRAL RAILWAY AND ENGINEERING CLUB.—Toronto, President, J. Duguid; Secretary, C. L. Worth, 409 Union Station. Meets third Tuesday each month except June, July, August.

DOMINION LAND SURVEYORS.—President, Thos. Fawcett, Niagara Falls; Secretary-Treasurer, A. W. Ashton, Ottawa.

EDMONTON ENGINEERING SOCIETY.—President, Dr. Martin Murphy; Secretary, B. F. Mitchell, City Engineer's Office, Edmonton, Alberta.

ENGINEERING SOCIETY, TORONTO UNIVERSITY.—President, A. D. Campbell; Corresponding Secretary, A. H. Munroe.

ENGINEER'S CLUB OF TORONTO.—96 King Street West. President, C. M. Canniff; Secretary, R. B. Wolsey. Meeting every Thursday evening during the fall and winter months.

INSTITUTION OF ELECTRICAL ENGINEERS.—President, Dr. G. Kapp; Secretary, P. F. Rowell, 92 Victoria Street, London, S.W.; Hon. Secretary-Treasurer for Canada, Lawford Grant, Power Building, Montreal, Que.

INSTITUTION OF MINING AND METALLURGY.—President, Edgar Taylor; Secretary, C. McDermid, London, England. Canadian Members of Council:—Prof. F. D. Adams, J. B. Porter, H. E. T. Haultain, and W. H. Miller, and Messrs. W. H. Trewartha-James and J. B. Tyrrell.

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

NOVA SCOTIA MINING SOCIETY.—President, T. J. Brown, Sydney Mines, C.B.; Secretary, A. A. Hayward.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, S. Fenn; Secretary, J. Lorne Allan, 15 Victoria Road, Halifax, N.S.

ONTARIO PROVINCIAL GOOD ROADS ASSOCIATION.—President, W. H. Pugsley, Richmond Hill, Ont.; Secretary, J. E. Farewell, Whitby, Ont.

ONTARIO LAND SURVEYORS' ASSOCIATION.—President, H. W. Selby; Secretary, Killaly Gamble, 703 Temple Building, Toronto.

ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—President, F. S. Baker, F.R.I.B.A., Toronto, Ont.; Hon. Secretary, Alcide Chausse, No. 5 Beaver Hall Square, Montreal, Que.

ROYAL ASTRONOMICAL SOCIETY.—President, Prof. Alfred T. de Lury, Toronto; Secretary, J. R. Collins, Toronto.

UNDERGRADUATE SOCIETY OF APPLIED SCIENCE, McGILL UNIVERSITY.—President, H. P. Ray; Secretary, J. P. McRae.

WESTERN CANADA RAILWAY CLUB.—President, Grant Hall; Secretary, W. H. Rosevear, 199 Chestnut Street, Winnipeg, Man. Second Monday, except June, July and August, at Winnipeg.

AMERICAN TECHNICAL SOCIETIES.

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

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—President, John P. Canty, Fitchburg, Mass.; Secretary, T. F. Patterson, Boston & Maine Railway, Concord, N.H.

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—President, L. C. Fritch, Chief Engineer, Chicago G. W. Railway; Secretary, E. H. Fritch, 962-3 Monadnock Block, Chicago, Ill.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Secretary, C. W. Hunt, 220 West 57th Street, New York, N.Y. First and third Wednesday, except July and August, at New York.

AMERICAN SOCIETY OF ENGINEERING-CONTRACTORS.—President, George W. Jackson, contractor, Chicago; Secretary, Daniel J. Hauer, Park Row Building, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, Jesse M. Smith; Secretary, Calvin W. Rice.

WESTERN SOCIETY OF ENGINEERS.—1735 Monadnock Block, Chicago, Ill. J. W. Alvord, President; J. H. Warder, Secretary.

COMING MEETINGS.

CANADIAN ELECTRICAL ASSOCIATION.—July 6-7-8. Annual convention at Royal Muskoka Hotel, Muskoka Lakes, Ont. Secretary, T. S. Young, Confederation Life Building, Toronto, Ont.

AMERICAN SOCIETY FOR TESTING MATERIALS.—June 28-July 2. Annual meeting at Atlantic City, N.J. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

THE ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—August 24-27. Annual meeting at Winnipeg, Man. Alcide Chausse, Hon. Secretary, 5 Beaver Hall Square, Montreal, Que.

UNITED STATES GOOD ROADS' ASSOCIATION.—July 28-29-30-31, 1910, Niagara Falls, N.Y. President, Arthur C. Jackson.

THE AMERICAN PEAT SOCIETY will meet at Ottawa, Ont., July 25-26-27, 1910. Secretary and Treasurer, Julius Boodollo, Kingsbridge, New York City.

NEW ENGLAND WATER WORKS ASSOCIATION.—September 21-23. Annual meeting, Rochester, N.Y. Willard Kent, Secretary, Narragansett Pier, R.I.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—October 11-16. Seventeenth annual convention, Erie, Pa. Prescott Folwell, Secretary, 239 W. 39th Street, New York, N.Y.

NATIONAL MUNICIPAL LEAGUE.—November 14-18. Annual meeting, Buffalo, N.Y. Clinton Rogers Woodruff, Secretary, North American Building, Philadelphia, Pa.

UNION OF CANADIAN MUNICIPALITIES.—August 31st to September 2nd. Tenth annual convention, Toronto, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.; Assistant Secretary, G. S. Wilson, 107 St. James Street, Montreal, Que.

INTERNATIONAL MUNICIPAL CONGRESS AND EXPOSITION.—September 18-30, 1911, at Chicago, Ill. Curt. M. Treat, Secretary, 1107-8 Great Northern Building, Chicago.

TORONTO, CANADA, JULY 7, 1910.

CONTENTS OF THIS ISSUE.

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 PENDING.

In addition to those in this issue.

Further information may be had from the issues of the Canadian Engineer referred to.

Place of Work.	Tenders Close.	Issue of.	Page.
Girvin, Sask., telephone line	July 15.	May 20.	514
Calgary, Alta., electrical plant supplies	July 12.	June 16.	54
New Richmond, Que., wharf extension	July 11.	June 16.	626
Moose Jaw, Sask., drainage works	July 18.	June 23.	56
Swift Current, Sask., sewer tile	July 12.	June 23.	56
Swift Current, Sask., cast-iron water mains	July 12.	June 23.	54
Berlin, Ont., railroad grading	July 15.	June 23.	54
Swift Current, Sask., hydrants, valves, etc.	July 15.	June 23.	54
Toronto, Ont., new fire hall	July 12.	June 23.	659
Sorel, Que., breakwater	July 18.	June 23.	658
Quebec, Que., bridge	Sept. 1.	June 30.	56
New Hamburg, Ont., electrical apparatus	July 18.	June 30.	54
Yorkton, Sask., sewer construction	July 12.	June 30.	54
Toronto, Ont., sewer	July 26.	June 30.	53
File Hills, Sask., school	July 16.	June 30.	691
Fort William, Ont., bridge	July 15.	June 30.	690
Elora, Ont., post office	July 13.	June 30.	690
Fergus, Ont., post office	July 13.	June 30.	690
Toronto, Ont, Parliament building wing	July 9.	June 30.	690
Egmondville, Ont., telephone	July 9.	June 30.	690
Natashquan, Que., wharf	July 19.	June 30.	690

TENDERS.

Tracadie Harbor, P.E.I.—Tenders will be received until July 27th for the construction of a breakwater. R. C. Desrochers, Asst. Secretary, Dept. of Public Works, Ottawa, Ont.

Tenecape, N.S.—Tenders will be received until July 25th for the construction of an extension to the breakwater. R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa.

Montreal, Que.—Tenders will be received until July 7th for Portland cement. David Seath, secretary, Harbor Commissioners, 57 Common Street.

Montreal, Que.—Tenders will be received until July 8th for the construction of a sewer. L. N. Senecal, Secretary Board of Commissioners' Office, City Hall

Matane, P. Q.—Tenders will be received until July 26th for the construction of a breakwater. R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa.

Brockville, Ont.—Tenders will be received until July 25th for the erection of 75 feet steel warren truss highway bridge, two concrete abutments, pile driving. E. R. Blackwell, C.E. and Road Engineer. (Adv. in The Canadian Engineer.)

Brantford, Ont.—Tenders will be received until Aug. 8th for plumbing, gas piping and electrical work required at King Edward and Ryerson schools. Geo. W. Hall, F.R.A.I.C., Architect.

Cornwall, Ont.—Tenders will be received until July 18th for the construction of a reinforced concrete arch bridge. A. I. Macdonell, Clerk, County of Glengarry.

Egmondville, Ont.—Tenders will be received until July 9th for telephone extensions. Thos. G. Shillinglaw.

Kingston, Ont.—Tenders will be received until July 12th for furnishing the materials and labor necessary for rebuilding the Little Cataraqui Bridge on the Bath Road. J. W. Bradshaw, Clerk, County of Frontenac.

Lindsay, Ont.—Tenders will be received until July 11th for the laying of about 450 feet of 6-inch cast-iron water mains. Board of Water Commissioners.

New Liskeard, Ont.—Tenders will be received for the erection of a fence 7 wires high, of No. 9 wire, 48 inches high. W. Magladery, Chairman Property Committee.

Ottawa, Ont.—Tenders will be received until 26th day of July, for (1) Air, steam, water and oil piping system; (2) Yard water system; (3) Pipe tunnels and wiring ducts; required in connection with the Transcontinental Railway shops east of Winnipeg. Plans and specifications may be seen at the office of Mr. Gordon Grant, Chief Engineer of the Commissioners, at Ottawa, Ont., and in the office of Mr. S. R. Poulin, District Engineer, St. Boniface, Man. P. E. Ryan, Secretary. The Commissioners of the Transcontinental Railway.

Peterborough, Ont.—Tenders will be received until July 9th for the construction of concrete sidewalks. C. W. Bennett, Township Clerk.

Sault Ste. Marie, Ont.—Tenders will be received until July 23rd for the subgrading of a section of the Manitoulin and North Shore Railway. R. S. McCormick, Chief Engineer. (Adv. in The Canadian Engineer.)

Steelton, Ont.—Tenders will be received until July 13th for sewer construction. J. Robinson, Town Clerk

Toronto, Ont.—Tenders will be received until July 12th for light fixtures in connection with new fire hall. G. R. Geary (Mayor), Chairman, Board of Control, City Hall.

Toronto, Ont.—Tenders will be received until July 26th for the construction of approximately 1,340 lineal feet of reinforced concrete pipe sewer, 5 feet internal diameter. G. R. Geary, (Mayor) Chairman, Board of Control.

Toronto, Ont.—Tenders will be received until July 12th for the construction of asphalt pavements, bitulithic pavements, concrete pavements, concrete curbs, concrete walks and sewers. G. R. Geary (Mayor), Chairman Board of Control, City Hall.

Westport, Ont.—Tenders will be received until July 11th for the crushing, screening, hauling and spreading of about 575 cords of stone. E. R. Blackwell, C.E., Superintendent Good Roads, Court House, Brockville.

Arden, Man.—Tenders will be received until July 16th for the construction of a steel bridge with stone or concrete abutments. The Secretary, Dept. of Public Works, Winnipeg.

Somerset, Man.—Tenders will be received until July 11th for the instalment of a low pressure steam heating plant, ventilation and spiral fire escapes. J. A. DeCosse.

Winnipeg, Man.—Tenders will be received until July 6th for the erection of a manufacturing building for the Empire Meter and Engine Company. Wm. Wallace Blair, Architect, 400 The Nanton Building.

Winnipeg, Man.—Tenders will be received until July 18th for bank fittings. R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa.

St. James, Man.—Tenders will be received until July 9th for the erection of a plank sidewalk. Frank Ness, secretary-treasurer.

Fleming, Sask.—Tenders will be received until July 15th for the construction and installing of a telephone system and switchboard. S. H. Greenwood, secretary, Fleming Telephone Company, Limited.

Regina, Sask.—Tenders will be received until July 12th for the erection and installation of the following exchanges: Watrous, Outlook, Scott, Humboldt, Vonda, Davidson, Craik, Broadview, Whitewood, Carlyle. S. P. Porter, Deputy Minister, Railways and Telephones.

Saskatoon, Sask.—Tenders will be received until July 9th for the erection of a reinforced concrete and brick warehouse for the Sawyer-Massey Co., Ltd. W. W. Lachance, Architect, Yorkton and Saskatoon.

Saskatoon, Sask.—Tenders will be received until July 25th for the 250 horse-power water tube boiler. Geo. T. Clarke, City Engineer.

Swift Current Sask.—Tenders will be received until July 8th for the erection of an addition to school. Storey & Van-Egmond, Architects, Regina and Saskatoon.

Yorkton, Sask.—Tenders will be received until July 12th for the construction of sewage disposal works. F. T. McArthur, Town Engineer.

Edmonton, Alta.—The C.P.R. has called for tenders for the two and a half million dollar high level bridge between Strathcona and Edmonton over the Saskatchewan River.

Medicine Hat Alta.—A. K. Grimmer, city engineer, is in the market for sulphate of alumina.

New Westminster, B.C.—Tenders will shortly be invited for the Royal Columbian hospital whose construction is estimated to cost $150,000.

CONTRACTS AWARDED.

St. John, N.B.—The following contracts were awarded: For sewer on Old Westmorland Road, Robert Short, rock, $2; earth, 40 cents. Excavating for a water main in Germain Street, W. J. Cain, rock, $3.50; earth, 70 cents. Singleton, Dunn and Company, of Glasgow, cast iron pipe, their tender being the lowest. Starr and Co. were given the contract for supplying anthracite coal.

St. John, N.B.—A. & R. Loggie have been given a contract for dredging the Miramichi Bay at 11 cents a cubic yard.

St. John, N.B.—Tenders were opened for the construction of a sewer as follows: W. J. Cain, $3.50 for rock and 50 cents for earth; Robert Short, $2 for rock and 40 cents for earth. Mr. Short's tender was accepted. For the water main in Germain Street: W. J. Cain, rock $3.50, earth 70 cents, was given the contract. The next was for a sewer and water main in Murray Street from George McHarg—rock $3.50, earth 90 cents. Two tenders were received for the supply of cast-iron pipe. Singleton, Dunn & Co. quoted: 12-inch pipe, $28.06 per ton; 10-inch, $28.49 per ton; 8-inch, $28.91 per ton; 6-inch, $29.78. R. D. Woods, the American founder, quoted: 16, 14, 12, 8 and 6-inch pipe at $24.15 per ton and 4-inch $26.15. The engineer pointed out that $8 a ton would have to be added to these prices as that was the amount of the American duty. The tender of Singleton, Dunn & Co. was accepted.

Montreal, Que.—A contract for pig lead at $3.40 per 100 lbs., and tin at $33 per cwt. was awarded to the Canada Metal Co., of this city. The following are the bids received for coal: Lackawanna Coal Co., pt. steam coal at $4.60. Smith's coal at $5.25. E. Lemire, pt. steam coal at $4.40. Joseph Elie, pt. steam coal at $4. Andrew Baile, stove, $6.45; furnace, $6.20; egg, $6.45. Evans Brothers, chestnut, $6.48; and pea, $4.40.

Collingwood, Ont.—John Lockton, of Collingwood, was awarded a contract at $738 for the construction of a bridge over the Pretty River. Other bids: Wm. Alborough, $1,245; A. Cooper & Bro., $750; Frank Walker, $975; H. G. Wynes, $953.

Coldwater, Ont.—John F. Connolly, of Toronto, secured the contract for the installation of a cast-iron supply main and distributing system, and for the construction of a reservoir and collecting mains, as follows: Contract A, $17,877; Contract B, $3,500. Other tenders were: Contract A, $18,800, $19,878, $20,383; Contract B, $2,789, $3,500. The John Galt Engineering Co. of Toronto, have charge of the work.

Dunnville, Ont.—The following tenders were received for the construction of a sewerage system:

John F. Connolly, Toronto	$10,705
Bennett & Rourdon, Dunnville	11,140
Lorenzo & Marshall, St. Catharines	12,595

The award was deferred.

Exeter, Ont.—Goold, Shapley and Muir, of Brantford, were given the contract for the erection of a 40,000-gallon steel tank, elevated 100 feet, at $3,300, erected complete (without foundation.) This tank is to be used in connection with the waterworks system, designed by F. W. Farncomb, consulting engineer of London, Ont.

Galt, Ont.—The contracts for the Hydro-Electric distributing station have been let to the Packard Electric Co. and the Canadian General Electric Co. for $9,194. The commission will bring the line in from the transforming station at Riespeler. The incandescent system for street lighting, adopted, with the amount paid for poles and wires to the local electric company, will make the total cost to Galt for installing a service under Hydro-Electric auspices only $25,000.

Kingston, Ont.—The contract for building a quarantine steamer for the immigration department, to be located at Grosse Island, has been awarded by the Department of Agriculture, Ottawa, to the Kingston Shipbuilding Company. The vessel is to cost over $60,000, and will be ready for delivery in the spring of 1911. The shipbuilding company is organizing its staff and will hasten the work.

Lindsay, Ont.—At a meeting to consider the tenders for the paving of William Street, the tender of the Asphalt Block Paving Co., of Windsor, was accepted at $2.40 per yard. The following bids were considered: Westrumite Asphalt Pavement—Excavation and concrete foundation, complete, per square yard, 70 cents; bituminous surface, 3 inches thick, laid according to attached specification, and known as Westrumite asphalt pavement, specification "B" pavement, including maintenance for five years, per square yard, $1.30; 9-inch sewer pipe, laid complete, cement joints, 6 feet or under in depth, per foot, 80 cents. John Maguire Contract—Six-inch sewer pipe, laid complete, cement joints, 70 cents; concrete curb, 6-inch x 24-inch, straight, per foot, 45 cents; concrete curb, 6-inch x 24-inch, curved, per foot, 55 cents; concrete curb and gutter, curb 6-inch to 10-inch, gutter 12-inch curved, per foot, 60 cents; headers, per foot, 65 cents; concrete sidewalk, per square foot, 14 cents; catch-basin, brick, 2½ feet x 2½ feet x 5 feet, each, $28; catch-basins, greater or less depth than five feet, per foot of depth, $6; excavation and concrete foundation, complete, per square yard, 86 cents; bituminous surface, 2½ inches thick, laid according to specifications, and known as asphalt block pavement, including maintenance for five years, per square yard, $1.90. Asphalt Block Co.—Nine-inch sewer pipe, laid complete, cement joints, 6 feet or under in depth, per foot, 85 cents; 6-inch sewer pipe, laid complete, cement joints, 75 cents; concrete curb and gutter, curb 6 inches, gutter 12 inches, straight, per foot, 52 cents, curved, per foot, 55 cents; headers, per foot, 60 cents; catch-basin, brick, 2½ feet x 2½ feet x 5 feet, each, $25; catch-basins, greater or less depth than 5 feet, per foot of depth, $5.50; excavations and concrete foundation, complete, per square yard, 63 cents. If 4-inch concrete is used as per blue print enclosed, 54 cents. Bituminous surface, 2½-inch thick, laid according to specifications, and known as asphalt block pavement, including maintenance for five years, per square yard, $1.86.

London, Ont.—F. W. Farncomb, consulting engineer, has awarded to D. Witherspoon, of Ailsa Craig, a contract for the construction of a 35-foot concrete arch, at $960, and a steel bridge over the Sauble River, at $2,100, for the Township of Hay.

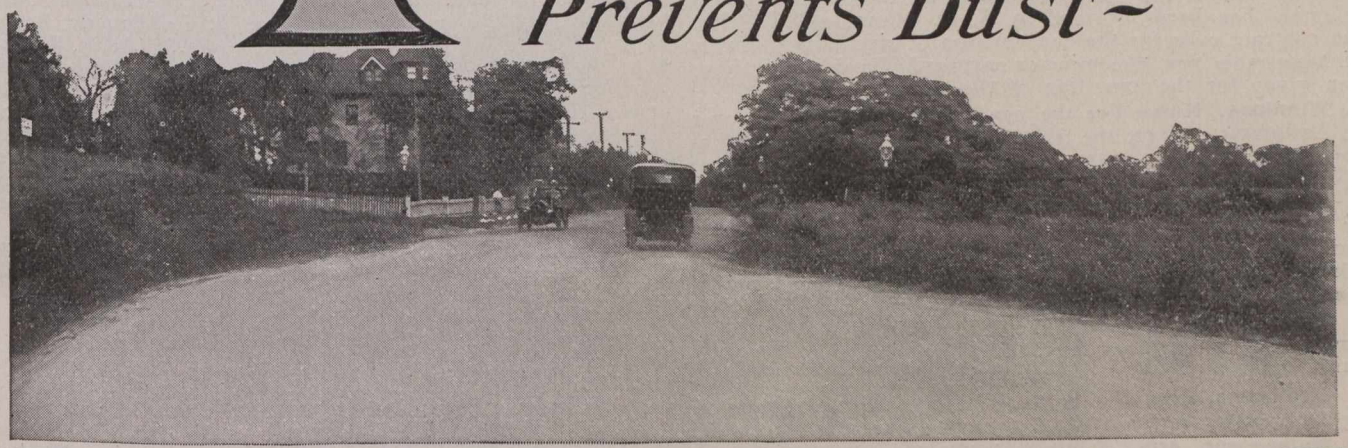
Ottawa, Ont.—The Transcontinental Commission has awarded a number of important contracts for workshops in Winnipeg, in every case the contract being awarded to the lowest tenderer. The Morgan Engineering Co., of Alliance, Ohio, secured the contract for one 140-ton electric travelling crane. Mussens, Limited, of Montreal, have been awarded contracts for eleven electric Booth cranes. George Anderson & Co., of Montreal, will supply one five-ton Gray iron foundry crane, five hand-power travelling cranes, and 15 gib cranes, while the contract for twenty gib cranes and twenty foundry equipment cranes goes to the Whiting Foundry Equipment Co., of Harvey, Illinois.

Ottawa, Ont.—The Garth Co. were awarded the contract for heating and plumbing at the Chateau Laurier. Contract price, $190,000. Ross & Macfarlane, architects, Montreal.

Toronto, Ont.—The Canadian Northern Railway Company have awarded to Foley, Welch & Stewart, the contract for the construction of the C. N. R. line from Virginia to Duluth, in Minnesota. The right-of-way has been secured for the entire distance, and while the cost in the open country was not great, it is understood the prices paid in and about the city of Duluth were very high. The company contemplates the erection in that city of independent terminals down by the waterfront. Part of their wharfage has already been secured. This piece of construction, which will give to Messrs. Mackenzie and Mann a through line from Winnipeg to Duluth and excellent connections with Chicago, is to be completed within a year. It will cost, roughly, $35,000

Tarvia

Preserves Roads Prevents Dust~



500,000 Gallons of Tarvia for Brooklyn Borough, Greater New York

The above photograph shows Cropsey Avenue, Brooklyn, where the first experimental tarvia work in Greater New York was done several years ago.

The results were so satisfactory that the authorities have been using more and more Tarvia each year culminating in the huge 1910 order for 500,000 gallons.

Tarvia solves the vexing problems of road maintenance on suburban, state, and county roads where the development of property does not justify brick, sheet asphalt or wood block pavement, yet where the traffic is too heavy for ordinary macadam.

Formerly there has been no middle ground, and the macadam was either maintained at great expense or allowed to rapidly disintegrate.

Tarviating solves the problem.

It gives to macadam a slight plasticity so that it does not break up even under automobile traffic.

The surface is clean, smooth, durable and dustless.

Tarvia greatly extends the life of the macadam and reduces maintenance costs so materially that frequently the entire expense of the treatment is saved.

Our illustrated booklet just issued, entitled "Good Roads—How to Build, Preserve and make them Dustless," will be mailed free on request to nearest office.

The Paterson Manufacturing Co., Limited, Toronto, Montreal, Winnipeg, Vancouver.

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a mile, which will mean an expenditure of more than two million and a half for the seventy-five miles.

Walkerville, Ont.—The Detroit Dredging Co. secured the contract for dredging the Little River drain—58,500 cubic yards for $5,640. Owen McKay is the engineer.

Winnipeg, Man.—Frank R. Evans, architect, has awarded to A. J. Bonnett, of Winnipeg, a contract for the erection of a business block. Following were the bids received:

A. J. Bonnett, Winnipeg	$25,000
Winnipeg Construction Co.	25,210
J. Barlow	25,619
Matheson & Gay	25,707
J. Dolmer	26,200
W. J. Harris	26,666

Winnipeg, Man.—The Vulcan Iron Works have secured contracts for all the iron and steel work in both the collegiate schools for the Winnipeg School Board amounting to $50,000.

Winnipeg, Man.—The contract for the first section of the main line of the Canadian Northern Railway in British Columbia has been awarded to A. C. Mann, of this city. The contract calls for the construction of sixty miles from a point opposite New Westminster eastward. Rush orders have been given for the execution of the work.

Winnipeg, Man.—For the construction of a bridge over the Assiniboine River, the Algoma Steel Bridge Co., of Winnipeg, were awarded a contract by the municipality of Ellice, at $4,885.

Winnipeg, Man.—The Board of Control let the contract for the Brown and Brant Street bridge over the C. P. R. tracks for a total of $259,800. The Cleveland Bridge and Engineering Company, of Darlington, England, got the contract for the superstructure at $205,160.

Prince Albert, Sask.—Goldie & McCulloch, of Galt, Ont., were given the contract for boilers for the electric light works.

Strathcona, Alta.—Hulbert & Wilson, at $13,847, secured the contract for sewer and waterworks extensions here.

Wainwright, Alta.—P. D. Laird & Son, of Wainwright, secured the contract for building a school here, at $15,000. Other bids were:—W. D. McKay, Wainwright, $15,777; Alberta Construction Co., Sedgewick, Alta., $14,400; Neil Stewart, Saskatoon, $17,950; T. E. Dolan, Wainwright, $16,500; T. J. Brocklebank, Melville, Sask., $13,790. (Not regular.)

Fernie, B.C.—Following is a list of tenders for the construction of 1910 extensions to the water supply system:—

Length material.	Depth in feet.	A.	B.	C.	D.
11440 feet 3 inches W. I. Pipe	4—6	.22	.30	.22	.34
500 feet 4 inches W. I. Pipe	4—6	.24	.30	.22	.34
6770 feet 6 inches Wood Pipe	4—6	.25	.30	.34	.34
37 Valves on 3-inch pipe line, each		3.00	1.00	2.00	2.00
1 Valve on 4-inch pipe line, each		3.00	1.00	2.00	2.50
6 Valves on 6-inch pipe line, each		5.00	1.50	5.00	3.00
12 hydrants, 15-foot wood pipe ..		15.00	3.00	20.00	8.00
Total of tender		$4,653.30	$5,696.00	$5,274.60	$6,551.90

The prices include making the necessary connections. A.—R. Potter, city engineer, (successful tender). B.—Hugh Macdonald, Victoria, B.C. C.—Depew, McDonald & McLean Company, Fernie. D.—Broley & Martin, Fernie.

Following is the list of tenders for construction of storm-water sewers:—

Size.	Concrete Pipe, Feet Deep.	Total Feet.	Per Foot. A.	B.	C.
30-inch	0—6	250	$ 2.15	$ 1.00	$ 1.75
30-inch	6—8	1050	2.30	1.50	2.25
24-inch	6—8	690	1.90	1.40	1.95
24-inch	8—10	240	2.00	2.25	2.25
24-inch	10—12	400	2.10	2.60	2.65
20-inch	0—6	850	1.40	.90	1.40
20-inch	6—8	175	1.50	1.30	1.80
20-inch	8—10	200	1.60	2.25	2.35
20-inch	10—12	320	1.70	2.40	2.60
15-inch	8—10	1440	1.40	2.25	2.00
15-inch	10—12	140	1.55	2.40	2.40
6-inch	0—6	700	.90	.60	.70
6-inch	Underdrain	6300	.10	.15	.10
Manholes, 20, each			50.00	70.00	55.00
Catch basins, 20, each			40.00	40.00	30.00
Timber left in ditch, 50,000 ft. B. M. per M.			10.00	15.00	12.00
Totals			$13,703.00	$14,716.50	$15,411.00

A.—I. I. Wood, contractor, Fernie, B.C. (successful tenderer). B.—Hugh McDonald, Victoria, B.C. C.—W. M. Dicken & J. P. Horn, contractors, Fernie, B.C.

Nanaimo, B.C.—For excavation work and laying vitrified sewer pipes for the first section of the sewerage system here, Macdougall & Co., of Vancouver, were awarded a contract at $48,641. Other bids were:

John W. Moore, Jr., Victoria	$53,751
Hugh Macdonald, Victoria	59,523
James C. Kennedy, Vancouver	71,205
Pacific Coast Construction Co., Victoria	74,945
City Engineer's estimate	50,000

Allan Waters, City Engineer.

Prince Rupert, B.C.—The Dominion Wood Pipe Co. were given a contract for water pipe at $1,118.

Vancouver, B.C.—Tenders for the cement lining of the Little Mountain reservoir were as follows: One 10,000 square yards of bottom lining; second, 9,000 square yards, reinforced lining; third, 6,000 square yards, rock surface finish; fourth, lump sum for installation of inlet and overflow pipes. The bids on the respective items were as follows: Wells Construction Company, $1.42, $1.88, $1.20; no figure for installation of inlet. Waugh & Milburn Construction Company, $2.05, $2.50, 20 cents and $250. J. C. Kennedy, $1.80, $1.90, 50 cents and $200. M. P. Cotton, $1.85, $2.85, $1 and $600. G. H. Webster, $1.55, $2, $1 and $475. The tenders were referred to the engineer for report. Tenders were opened for 3,800 feet of twenty-two-inch steel pipe which is demanded for a new main in connection with the regrading of Pender Street East, the bids being as follows: Evans, Coleman & Evans, $2.63 per foot; P. E. Harris, $2.84 per foot; J. C. & A. J. Macdonald, of New Westminster, $3.21 per foot.

Evans, Coleman & Evans offered a lot of eight-inch lap-welded pipe at $59.85 per 100 feet. The offer was accepted, the pipe to be taken as needed.

Victoria, B.C.—The contract for the repairing of the steamer "Yucatan," of the Alaska Steamship Co., was awarded to the Williamette Steel and Iron Works, of Portland, Ore., whose tender of $89,000, the work to be completed in 140 days, was by far the lowest of the eight bids submitted to the underwriters. The bids were: Union Iron Works, San Francisco, $170,000, 175 days; United Engineering Works, San Francisco, $153,000, 150 days; Wallace & Jenkins, Seattle, $133,250, 125 days; British Columbia Marine Railway Co., Victoria, $125,000, 130 days; More Iron Works, San Francisco, $122,500, 150 days; Moran Shipbuilding Co., Seattle, $120,000, 150 days; Heffernan Shipbuilding Co., Seattle, $119,460, seven months; Williamette Steel and Iron Works, Portland, $89,000, 140 days.

RAILWAYS—STEAM AND ELECTRIC.

Fredericton, N.B.—Surveying Party No. 3, on the St. John Valley Railway survey, reported on July 4th at Welsford, Queens County, under Prof. E. A. Stone, dean of the University of New Brunswick engineering school, and will immediately commence work on an alternative route for the railway between the river and Welsford for an entry to St. John.

Prof Stone, who has been appointed chief of the party, has had a long experience in railway work and will make a capable head for the party.

The personnel of the party as announced by Chief Engineer D. F. Maxwell, includes:—

Prof. A. E. Stone, Fredericton, chief of the party. J. W. Wilson, Clones, Queens Co., transitman. Leo. McInerney, St. John, leveller. Edward Lockery, St. John, topographer. Wm. H. Hoyt, McAdam, draftsman. Kenneth Vavasour, Fredericton, rodman for leveller. Norman J. Foster, Fredericton, head chainman. Blaine Pugh, Fredericton, rear chainman. Perley Hartley, Woodstock, rodman for topographer. James Inches, St. Stephen, tapeman for topographer.

Ottawa, Ont.—At Tuesday's meeting of the Cabinet Council the contract was let for the superstructure of the bridge across the Saskatchewan at the Pas, the first step in the construction of the Hudson's Bay Railway building, as it will afford a means for forwarding supplies across the river from the present end of steel at the Pas. Work on the bridge will be rushed this year in order to have everything in readiness for beginning work on the new railway early next year.

Toronto, Ont.—The Canadian Northern Railway awarded to Foley, Welch and Stewart a contract for the construction of their line from Virginia to Duluth, in Minnesota. It is

estimated that this line will cost about $35,000 a mile. The distance is 75 miles.

Regina, Sask.—The following report was submitted by the street railway commissioners to a meeting of the city council:—

Your commissioners have had an estimate made of the amount required to construct two and one-quarter miles of street railway track in pavement and one and one-quarter miles on unpaved streets. The estimate is based on using 80-pound steel rails with ties four feet apart, with concrete under the ties and rails four inches deep and the pavement completed for a width of eight inches on single track line and 20 inches included in the devil's strip on double track line. The estimate covers putting in a double track line on Albert Street from Dewdney Street south through the subway. On unpaved streets the estimate provides for single track line, ballasted with gravel to a depth of four inches under the ties with 60-pound rails and ties 30 inches centre to centre.

All the poles, cross-arms and other overhead work are provided for.

The following shows the amount of the estimate:—

2¼ miles on paved streets, $35,000 per mile	$78,750
1¾ miles on unpaved streets, $18,000 per mile	31,500
Engineering and overhead expenses	4,750
Total	$115,000

This estimate does not include the cost of cars, car barns or power plant.

Vancouver, B.C.—Construction work has been commenced on the Port Moody, Indian River, and Northern Railway, at Port Moody.

Vancouver, B.C.—The Northern Construction Co. have commenced work on the Canadian Northern Pacific Railway at Port Mann, opposite New Westminster. The Northern Construction Company was recently awarded the contract for the building of the sixty-mile section of the Canadian Northern Railway from Port Mann up the valley of the Fraser River. The surveys and location line of this section were completed some months ago. Owing to the comparatively light nature of the work to be done on the first section of sixty miles of the road it is expected that rapid progress will be made, so much so that within a month there should be a big showing of work performed.

Vancouver, B.C.—Asst. Chief Engineer Stewart, of the Great Northern Railway, has recommended the construction of a bridge at Broadway East. This is a large undertaking.

BY-LAWS AND FINANCE.

The following bonds were sold last week:

Crimsby, Ont.—$15,000.

Dauphin, Man.—$75,000, waterworks.

Wentworth Co., Ont.—$12,000, office.

Medicine Hat, Alta.—$125,000.

Summerland, B.C.—$110,000.

Cochrane, Ont.—$25,000 of sidewalk bonds are offered for sale by F. J. Bradley, clerk of this municipality.

London, Ont.—Ratepayers will vote on a $32,000 school by-law.

New Hamburg, Ont.—Tenders are invited until July 18th for $8,000 electric light debentures. Wm. Millar, clerk.

Souris, Man.—On July 8th ratepayers will vote on a $95,000 waterworks by-law.

Lethbridge, Alta.—The $75,000 school by-law was passed.

Raymond, Alta.—Ratepayers passed the waterworks by-law.

High River, Alta.—Voting on a by-law to spend $121,000 on a waterworks and sewerage system for High River resulted in 65 for and 43 against. As a two-thirds vote is required the by-law was defeated by a narrow margin, but there are prospects of the question being resubmitted shortly.

Prince Albert, Sask.—Council unanimously favored the construction of a filtration plant. A $12,000 by-law will be submitted to the ratepayers.

Pense, Sask.—P. F. Weiss offers for sale $7,000 permanent improvement debentures.

Lashburn, Sask.—$2,500 bonds for local improvements are offered by G. G. Morris, Secy.-Treas.

Yorkton, Sask.—The town council passed a resolution authorizing the preparation of a by-law to expend $35,000 on a municipal electric light plant.

Nanaimo, B.C.—The $25,000 waterworks improvement by-law was sanctioned.

Vancouver, B.C.—Ratepayers will vote on a $45,000 hospital by-law.

Vancouver, B.C.—The ratepayers voted on the by-law ratifying the proposed agreement between the city and the Great Northern Railway regarding the establishment of terminals at False Creek.

PERSONAL.

Readers are invited to forward notes of staff changes and new appointments for publication in this column.

Mr. H. T. Parker has been appointed city engineer of Cranbrook, British Columbia.

Mr. C. W. Power has been appointed resident engineer of the Grand Trunk Railway, at Toronto, in succession to Mr. E. L. Cousins.

Mr. Leonard Andrews, who represents the Key Engineering Company, Limited, London, England, which may open a branch in Canada, was in Toronto this week.

Mr. George McNicholl, formerly the purhasing agent for the Grand Trunk Pacific has been appointed superintendent of the Pacific division with headquarters at Prince Rupert.

MARKET CONDITIONS.

Montreal, July 5th, 1910.

Exceptionally low prices seem to have been made in the United States, in some instances, on pig-iron. The delivered price, eastern Pennsylvania districts, has ranged from $15.50 to $16.50 per ton, depending upon freight rates, and the full range at the furnaces is $14.75 to $15.75 per ton. Most businesses, however, seems to have been done at about $15 per ton. There was a fair degree of activity in foundry iron in Pennsylvania territory, and contracts are pending for further large lots. Pipe works seem to be the most active consumers, and there is considerable inquiry for low-grade northern iron. Quite a few orders for foundry iron for delivery New York State have been made for shipment over the third quarter, most business going to the Buffalo furnaces. Special machine foundries and pump manufacturers, as well as railway equipment manufacturers, who have been in the market recently, have again withdrawn inquiries. On the whole, the situation is not very encouraging in the pig-iron market.

In finished steel products, the volume of new business has fallen off considerably, but there is still a large number of specifications and shipments on contracts, especially for agricultural shops and plain structural and fabricating material. Railroads placed very few contracts for bridge material or rails lately, and it would seem as though interest was turning more and more to export business. Bolt mills are very busy, the June output having made a record, although, at the same time, orders are light. This is usual at this time of the year. Total contracts for iron products in June have been in excess of the average for that month, but prices are being shaded somewhat. It is hoped also that the two steamers for the Pacific, which are to be built at a cost of one and a half million dollars each, and the two boats for the Atlantic, will add considerable interest to the market.

In Great Britain, the feeling has improved somewhat, and prices have not changed. Producers generally, are not badly off for orders even though they may not have sold much iron lately. Hematite iron is rather easier. The position of the steel trade is not satisfactory. This is occasioning disappointment in view of the sanguine hopes that were entertained earlier in the year. The improvement which has taken place since the end of 1909 is about maintained. In the matter of shipbuilding, there is little change, inasmuch as while one class of shipbuilding is falling off, another is showing some increase, so that the situation remains about steady.

The local market is quiet, but a satisfactory business is being done. There is nothing worthy of comment taking place; prices continue steady, and so far as can be seen, little or no change is apt to take place until towards the close of navigation.

The market holds steady at recent prices:—

Antimony.—The market is steady at 8c. to 8¼c.

Bar Iron and Steel.—The market promises to advance shortly. Bar iron, $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $1.90; sleigh shoe steel, $1.90 for 1 x ⅜-base; tire steel, $2.00 for 1 x ⅜-base; toe calk steel, $2.40; machine steel, iron finish, $1.95; imported, $2.20

Building Paper.—Tar paper, 7, 10, or 16 ounces, $1.80 per 100 pounds; felt paper, $2.75 per 100 pounds; tar sheathing, 40c. per roll of 400 square feet; dry sheathing, No. 1, 30 to 40c. per roll of 400 square feet; tarred year will be the largest in the history of the country. Prices on foreign fibre, 55c. per roll; dry fibre, 45c. (See Roofing; also Tar and Pitch). (164).

Cement.—Canadian cement is quotable, as follows, in car lots, f.o.b., Montreal:—$1.30 to $1.40 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½ cents extra, or 10c. per bbl. weight.

Chain.—The market has advanced again, being now per 100 lbs., as follows:—¼-in., $5.30; 5-16-in., $4.70; ⅜-in., $3.90; 7-16-in., $3.65; ½-in., $3.55; 9-16-in., $3.45; ⅝-in., $3.40; ¾-in., $3.35; ⅞-in., $3.35; 1-in., $3.35.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, $6.75 per ton, net; furnace coal, $6.50, net. Bituminous or soft coal: Run of mine, Nova Scotia coal, carload lots, basis, Montreal, $3.85 to $4 per ton; cannel coal, $9 per ton; coke, single ton, $5; large lots, special rates, approximately $4 f.o.b., cars, Montreal

Copper.—Prices are strong at 13¾ to 14c.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 15c. 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 strength, per 100 fuses:—4-ft. wires, $3; 6-ft. wires, $3.54; 8-ft. wires, $4.08; 10-ft. wires, $5.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.10; Colborne Crown, $3.85; Apollo, 10¾ oz., $4.05. 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.—First boats are now arriving at Montreal, and importers are quoting prices, ex-wharf, about $1 per ton under prices ex-store. Following are the prices, on cars, ex-wharf, Montreal:—No. 1 Summerlee, $20.50 to $20.75 per ton; selected Summerlee, $20 to $20.25; soft Summerlee, $19.50 to $19.75; Carron, special, $20 to $20.50; soft, $19.50 to $20; Clarence, $17.25 to $17.50; Cleveland, $17.25 to $17.50 per ton.

Laths.—See Lumber, etc.

Lead.—Prices are easier, at $3.35 to $3.45.

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 of $1.50. Red pine, mill culls out, $18 to $22 per 1,000 feet; white pine, mill culls, $16 to $17. Spruce, 1-in. by 4-in. and up, $15 to $17 per 1,000 ft.; mill culls, $12 to $14. Hemlock, log run, culls out, $13 to $15. 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 carring $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 better and prices are firmer, $2.40 per keg for cut, and $2.35 for wire, base prices. Wire roofing nails, 5c. lb.

Paints.—Roof, barn and fence paint, 90c. per gallon; girder, bridge, and structural paint for steel or iron—shop or field—$1.20 per gallon, in barrels; liquid red lead in gallon cans, $1.75 per gallon.

Pipe.Cast Iron.—The market shows a steady tone although demand is on the dull side. Prices are firm, and approximately as follows:—$32 for 6 and 8-inch pipe and larger; $33 for 3-inch and 4-inch at the foundry. Pipe, specials, $3 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

Pipe.—Wrought and Galvanized.—Demand is about the same, and the tone is firm, though prices are 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; ½-inch, $8.50, with 69 per cent. off for black, and 59 per cent. off for galvanized. The discount on the following is 71½ per cent. off for black, and 61½ per cent. off for galvanized; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50; 3½-inch. $95; 4-inch, $108.

Plates and Sheets.—Steel.—The market is steady. Quotations are: $2.20 for 3-16; $2.30 for ¼, and $2.10 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.15; and 16-gauge, $2.10.

Rails.—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of 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, 70c. per roll; three-ply, 95c. per roll of 100 square feet. Roofing tin caps, 6c. lb.; wire roofing nails, 5c. lb. (See Building Paper; Tar and Pitch; Nails, Roofing)

Rope.—Prices are steady, at 9c. per lb. for sisal, and 10½c. for Manila. Wire rope, crucible steel, six-strands, nineteen wires; ¾-in., $2.75; 5-16, $3.75; ⅜, $4.75; ½, $5.25; ⅝, $6.25; ¾, $8; ⅞, $10; 1-in., $12 per 100 feet.

Spikes.—Railway spikes are firmer at $2.45 per 100 pounds, base of 5⅜ x 9-16. Ship spikes are 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.

Telegraph Poles.—See lumber, etc.

Tar and Pitch.—Coal tar, $3.50 per barrel of 40 gallons, weighing about 500 pounds; roofing pitch, No. 1, 70c. per 100 pounds; and No. 2, 55c. per 100 pounds; pine tar, $8.50 per barrel of 40 gallons, and $4.75 per half-barrel; refined coal tar, $4.50 per barrel; pine pitch, $4 per barrel of 180 to 200 pound. (See building paper, also roofing).

Tin.—Prices are firm, at $34 to $34.50.

Zinc.—The tone is easy, at 5¾ to 6c.

CAMP SUPPLIES.

Beans.—Prime pea beans, $2 to $2.25 per bushel.

Butter.—Fresh made creamery, 25 to 26c.

Canned Goods.—Per Dozen.—Corn, 80 to 85; peas, $1.05 to $1.15; beans, 85c.; tomatoes, 85 to 90c.; peaches, 2s, $1.65, and 3s, $2.65; pears, 2s, $1.60, and 3s, $2.30; salmon, best brands, 1-lb. talls, $1.87½, and flats, $2.02½; cheaper grades, 95c. to $1.65.

Cheese.—The market ranges from 11c. to 11½c., covering all Canadian makes.

Coffee.—Mocha, 20 to 25c.; Santos, 15 to 18c.; Rio, 10 to 12c.

Dried Fruits.—Currants, Filiatras, 5¾ to 6¼c.; choice, 8 to 9c.; dates, 4 to 5c.; raisins, Valentias, 5 to 6¼c.; California, seeded, 7½ to 9c.; Evaporated apples, prime, 8 to 8½c.

Eggs.—New laid, 20 to 22c.

Flour.—Manitoba, 1st patents, $5.60 per barrel; 2nd patents, $5.10; strong bakers, $4.90.

Molasses and Syrup.—Molasses, New Orleans, 27 to 28c.; Barbadoes, 40 to 45c.; Porto Rico, 40 to 43c.; syrup, barrels, 3½c.; 2-lb. tins, 2 dozen to case, $2.50 per case.

Potatoes.—Per 90 lbs., good quality, 45 to 50c.

Rice and Tapioca.—Rice, grade B., in 100-lb. bags, $2.75 to $2.80; C.C., $2.65. Tapioca, medium pearl, 5½ to 6c.

Rolled Oats.—Oatmeal, $2.20 per bag; rolled oats, $2, bags.

Sugar.—Granulated, bags, $5.05; yellow, $4.65 to $5. Barrels 5c. above bag prices.

Tea.—Japans, 20 to 38c.; Ceylons, 20 to 40c.; Ceylon, greens, 19 to 25c.; China, green, 20 to 50c.; low-grades, down to 15c.

Fish.—Salted.—Medium cod, $7 per bbl.; herring, $5.25 per bbl.; salmon, $15.50 per bbl., for red, and $14 for pink. Smoked fish.—Bloaters, $1.10 per large box; haddies, 7½c. per lb.; kippered herring, per box, $1.20 to 1.25.

Provisions.—Salt Pork.—$27 to $34 per bbl.; beef, $18 per bbl.; smoked hams, 16 to 20c. per lb.; lard, 16½ to 17½c. for pure, and 12½ to 14c. per lb. for compound.

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Toronto, July 7th, 1910.

Only a moderate business appears to be moving, there is no rush. Possibly the coming of the holiday time assists to account for the lessening of activity. This city is freer from labor strikes at present than some, Montreal, for instance; but there are street railway grievances settling, and railway labor demands actual, with prospects, however, of peaceful settlement.

Prices of iron and steel are starting to stiffen up, as a result in part of recent amalgamations. The ingot metals are all dull of movement at unaltered quotations, according to New York advices of yesterday. Accounts of excessive heat injuring the grain yield in our North-West provinces continue, with scattering reports of showers here and there. The news is, however, deemed sufficient to put up the price of flour still farther.

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

Antimony.—Trade is quiet, market easier at $8.50.

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

Bar Iron.—$2.05 to $2.15, base, per 100 lbs., from stock to wholesale dealer. Free movement

Bar Mild Steel.—Per 100 lbs., $2.15 to $2.25. Sleigh shoe and other take same relative advance.

Boiler Plates.—¼-inch and heavier, $2.20. Boiler heads 25c. per 100 pounds advance on plate. Tank plate, 3-16-inch, $2.40 per 100 pounds.

Boiler Tubes.—Orders continue active. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per 10 foot; 2-inch, $8.50; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $11 to $11.50; 3½-inch, $18 to $18.50; 4-inch, $19 to $20 per 100 feet.

Building Paper.—Plain, 27c. per roll; tarred, 35c. per roll. Demand is moderate.

Bricks.—In active movement, with very firm tone. Price at some yards $9 to $9.50, at others, $9.50 to $10 for common. Don Valley pressed brick are in request. Red and buff pressed are worth $18 delivered and $17 at works per 1,000.

Broken Stone.—Lime stone, good hard, for roadways or concrete, f.o.b., Schaw station, C.P.R., 75c. until further notice, per ton of 2,000 lbs., 1-inch, 2-inch, or larger, price all the same. Rubble stone, 55c. per ton, Schaw station, and a good deal moving. Broken granite is selling at $3 per ton for good Oshawa.

Cement.—Car lots, $1.75 per barrel, without bags. In 1,000 barrel lots $1.60. In smaller parcels $1.90 is asked by city dealers. Bags, 40c. extra. Demand good.

Coal.—The price of anthracite still remains at $6.50 per ton, net, and pea coal at $5.50 per ton. In the United States there is an open market for bituminous coal and a great number of qualities exist. We quote: Youghiogheny lump coal on cars here, $3.75 to $3.80; mine run, $3.65 to $3.70; slack, $2.75 to $2.85; lump coal from other districts, $3.55 to $3.70; mine run 10c. less; slack, $2.60 to $2.70; cannel coal plentiful at $7.50 per ton; cook, Solvey foundry, which is largely used here, quotes at from $5.75 to $6.00; Reynoldsville, $4.90 to $5.10; Connellsville, 72-hour coke, $5.25.

Copper Ingot.—A very large volume of business is being done, but the market is weaker at $13.50 to $13.75. Production goes on at a rapid rate.

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

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

Felt Roofing.—A very good volume of trade is going on at $1.80 per 100 lbs. as before.

Fire Bricks.—English and Scotch, $30 to $35; American, $25 to $35 per 1,000. Fire clay, $8 to $12 per ton.

Fuses.—Electric Blasting.—Double strength 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, per 100 count. Bennett's double tape fuse, $6 per 1,000 feet.

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, per 100 lbs.

Iron Pipe.—A steady request at former prices:—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch, $3.28; 1-inch, $4.70; 1¼-inch, $6.41; 1½-inch, $7.70; 2-inch, $10.26; 2½-inch, $16.39; 3-inch, $21.52; 3½-inch, 27.08; 4-inch, $30.78; 4½-inch, $35.75; 5-inch, $39.85; 6-inch, $51.70. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.43; 1-inch, $6.35; 1¼-inch, $8.66; 1½-inch, $10.40; 2-inch, $13.86, per 100 feet.

Pig Iron.—We quote Clarence at $20.50, for No. 3; Cleveland, $20.50; Summerlee, $22; Hamilton quotes a little irregular, between $19 and $20. The demand is moderate.

Lead.—A very fair demand exists, at an unchanged price of $3.75 to $3.85.

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 without freight. Demand is moderate.

Lumber.—An unusually brisk demand has characterized the month, and prices are fully maintained. Pine is good value at $32 to $35 per M. for dressing; common stock boards, $28 to $33; cull stocks, $20; cull sidings, $17.50. Southern pine dimension timber from $30 to $45, according to size and grade; finished Southern pine, according to thickness and width, $30 to $40; hemlock is in demand and held somewhat higher, we quote $17.50 to $18; spruce flooring in car lots, $22 to $24; shingles, British Columbia, are steady, we quote $3.10; lath, No. 1, $4.60; white pine, 48-inch, No. 2, $3.75; for 32-inch, $1.70 is asked.

Nails.—Wire, $2.35 base: cut, $2.60; spikes, $2.85 per keg of 100 lbs.

Pitch and Tar.—Pitch, unchanged at 70c. per 100 lbs. Coal tar, $3.50 per barrel. Demand moderate.

Plaster of Paris.—Calcined, New Brunswick, hammer brand, car lots, $1.95; retail, $2.15 per barrel of 300 lbs.

Putty.—In bladders, strictly pure, per 100 lbs., $2.25; in barrel lots, $2.10. Plasterer's, $2.15 per barrel of three bushels.

Ready Roofing.—An active demand; prices are as per catalogue

Roofing Slate.—Most of the slate used in Canada comes now from Pennsylvania or Maine, the Canadian supply being slender and mostly from the Rockland quarries of the Eastern Townships in Quebec. There is a great variety of sizes and qualities, so that it is difficult to indicate prices. But No. 1 Bangor slate 10 x 16 may be quoted at $7 per square of 100 square feet, f.o.b., cars, Toronto; seconds, 50c. less. Mottled, $7.25; green, $7, with a prospect of advance. Dealers are fairly busy.

Rope.—Sisal, 9½c. per lb.; pure Manila, 10½c. per lb., Base.

Sand.—Sharp, for cement or brick work, 90c. per ton f.o.b., cars, Toronto siding.

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	$3.2
Single junction, 1 or 2 ft. long	.90	1.35	2.70	3.40	4.50	14.6
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	.....
M. H. traps	2.50	4.00	8.00	....	15.00	.....

Business moderate; price, 73 per cent. off list at factory for car-load lots; 65 per cent. off list retail.

Steel Beams and Channels.—Active.—We quote:—$2.75 per 100 lbs., according to size and quantity; if cut, $3 per 100 lbs.; angles, 1¼ 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.—Current price for rails at the Soo, $32 to $34 for weights 60 to 100 lbs.

Sheet Steel.—American Bessemer, 10-gauge, $2.50; 12-gauge, $2.55; 14-gauge, $2.35; 17, 18, and 20-gauge, $2.45; 22 and 24-gauge, $2.55; 26-gauge, $2.65; 28-gauge, $2.80. A very active movement is reported.

Sheets Galvanized.—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.00; 12-14-gauge, $3.00; 16, 18, 20, $3.20; 22-24, $3.35; 26, $3.50; 28, $3.95; 29, $4.25; 10¾, $4.25 per 100 lbs. Fleur de Lis—28-gauge, $4.10; 26, $3.80 per 100 lbs.

Tank Plate.—3-16-inch, $2.40 per 100 lbs.

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

Tin.—Market irregular, with considerable business passing. We quote 34¼ to 35c.

Wheelbarrows.—Navvy, steel wheel, Jewel pattern, knocked down, $21.60 per dozen; set up, $22.60. Pan Canadian, navvy, steel tray, steel wheel, $3.30 each; Pan American, steel tray, steel wheel, $4.25 each.

Zinc Spelter.—The market can no longer be described as lively; a steady but limited movement goes on at $5.50 to $5.75 per 100 lbs.

CAMP SUPPLIES.

Butter.—Dairy prints, 18 to 20c.; creamery prints, 22 to 23c.; the creamery output is now increasing.

Canned Goods.—Peas, $1.15 to $1.75; tomatoes, 3s, 85c. to 95c.; pumpkins, 3s, 90 to 95c.; corn, 80 to 85c.; peaches, 2s, white, $1.50 to $1.60; yellow, $1.90 to $1.95; strawberries, 2s, heavy syrup, $1.50 to $1.85; raspberries, 2s, $1.50 to $1.95.

Cheese.—Moderately firm; old cheese, large, 13c.; twins, 13¼c.; new, 11½ to 11¾c.

Coffee.—Rio, green, 11 to 12½c.; Mocha, 21 to 23c.; Java, 20 to 31c.; Santos, 11 to 15c.

Dried Fruits.—Raisins, Valencia, 6 to 6¼c.; seeded, 1-lb. packets, fancy, 7¼ to 8c.; 16-oz. packets, choice, 7 to 7½c.; 12-oz. packets, choice, 7c.; Sultanas, good, 5 to 6c.; fine, 6 to 7c.; choice, 7 to 8c.; fancy, 8 to 9c.; Filiatras currants, cleaned, 6½ to 7c.; Vostizzas, 8½ to 9c.; uncleaned currants, 6¼ to 6¾c.

Flour.—Again higher; quotations at Toronto are: Manitoba flour, first patents, $5.50; second patents, $5.20; strong bakers', $5; Ontario flour, winter wheat patents, $4.50 per bbl.

Lard.—Tierces, 15c.; tubs, 15¼c.; pails, 15½c.

Molasses.—Barbadoes, barrels, 37 to 45c.; West Indian, 27 to 30c.; New Orleans, 30 to 33c. for medium.

Pork.—Not much doing, short cut, $29 to $30 per barrel; mess, heavy, $26 to $27.

Rice.—B. grade, 3½c. per lb.; Patna, 5 to 5¾c.; Japan, 5 to 6c.

Salmon.—Fraser River, talls, $2; flats, $2; River Inlet, $1.55 to $1.75.

Smoked and Dry Salt Meats.—Long clear bacon, 14½ to 15c. per lb., tons and cases; hams, large, 16½ to 17c.;; small, 18 to 18¼c.; rolls, 15 to 15¼c.; breakfast bacon, 19 to 20c.; backs (plain), 19 to 20c.; backs (peameal), 20 to 21c.; shoulder hams, 13½c.; green meats out of pickle, 1c. less than smoked.

Spices.—Allspice, 18 to 19c.; nutmegs, 30 to 75c.; cream tartar, 22 to 25c.; compound, 15 to 20c.; pepper, black, pure Singapore, 14 to 17c.; pepper, white, 20 to 30c.

Sugar.—Granulated, $5.30 per 100 lbs., in barrels; Acadia, $5.20; yellow, $4.90; bags, 5c. lower.

Syrup.—Corn syrup, special bright, 3½c. per lb.

Teas.—Japans, 20 to 35c. per lb.; Young Hysons, 16 to 35c.; Ceylons.

Potatoes.—Ontario, dull and weak; new, per bbl., $2.50 to $2.60; New Brunswick Delawares, 65 to 75c. per bag; onions by the sack, Egyptian, $2.50 to $2.75; cabbage, per crate, $1 to $1.50.

TORONTO HORSE MARKET.

Little is expected in the way of horse trade in Toronto during July and August, and little is doing. Receipts and demand are both light, but the prospects for autumn are of the very best. Prices will be high then and demand keen.

AMERICAN HORSE MARKET.

Trade in horses in the Chicago market shows signs of awakening. Buyers are more numerous and seem disposed to pay strong prices for anything that suits them. A few orders for saddle and harness horses are coming up and some coach and park horses are going to New Mexico and Central America.

Desirable drafters, 1,700 lbs. and over, are going from $250 to $400, chunks 1,350 to 1,500 lbs., $215 to $300, wagon horses $125 to $230, desirable farm mares $170 to $250, and choice heavy feeders $225 to $275.

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Winnipeg, July 2nd.

Great activity in all lines is reported this week from the dealers and all building operations are at their height. The labor market is well supplied locally, although there is a shortage of labor at country points and for railway construction work.

The towns and cities west of Winnipeg right out to Vancouver and Victoria report the same marked activity in the building trades, and the West this year will undoubtedly pass all previous records.

In Brandon, Man., in the business portion of the city the streets in many places are rendered almost impassable by reason of large parts of them being fenced in around excavations for buildings that are in course of erection for large retail and wholesale houses, there being under construction at the present time no less than four large hotels, including the splendid building being put up by the Canadian Northern Railway for hotel purposes at a cost of $350,000.

Market quotations remain steady with the demand very brisk, Winnipeg prices are as follows:—

Anvils.—Per pound, 11 to 12½c.; Buckworth anvils, 80 lbs., and up, 10¼c.; anvil and vice combined, each, $5.50

Axes.—Chopping axes, per dozen, $6 to $9; double bits $12.10 per dozen.

Barbed Wire.—4 point and 2 point, common, $3.15 per cwt.; Baker, $3.20; Waukegan, $3.30.

Bar Iron.—$2.50 to $2.60.

Bars.—Crow $4 per 100 pounds

Beams and Channels.—$3 to $3.10 per 100 up to 15-inch. (4, 30, 41, 50, 118, 119, 127, 132, 145, 176.)

Boards.—No. 1 Common Pine, 8 in. to 12 in., $38 to $45; siding, No. 2 White Pine, 6 in., $55; cull red or white pine or spruce, $24.50; No. 1 Clear Cedar, 6 in., 8 to 16 ft., $60; Nos. 1 and 2 British Columbia spruce, 4 to 6 in., $55; No. 3, $45.

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

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

Coal and Coke.—Anthracite, egg, stove or chestnut coal, $9.75 large lots to $10.50 ton lots, net; Alleghany soft coal; carload lots, basis, Winnipeg, f.o.b., cars, $6 per ton; cannel coal, $10.50 per ton; Galt coal, $3 f.o.b., carload lots, $9 single ton; coke, single ton, $7 at yard; large lots, special rates. American coke, $11 to $11.50 a ton; Crow's Nest, $10 a ton.

Copper Wire.—Coopered market wire, No. 7, $4 per 100 lbs.; No. 6, $4; No. 10, $4.06; No. 12, $4.20; No. 14, $4.40; No. 16, $4.70.

Cement.—$2.40 to $2.75 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; ½-inch, $8.50; jack iron, single, per dozen yards, 15c. to 75c.; double, 25c. to $1; trace-chains, per dozen, $5.25 to $6.

Copper.—Tinned, boiler, 26½c.; planished, 29½c.; boiler and T. K. pits, plain, tinned, 45 per cent. discount.

Dynamite.—$11 to $13 per case.

Hair.—Plasterers', 80 to 90c. 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.

Galvanized Iron.—Apollo, 10¾, $4.90; 28, $4.70; 26, $4.30; 22, $4.10; 24, $4.10; 20, $4; 18, $3.95; 16, $3.90; Queen's Head, 28, $4.90; 26, $4.70; 24, $4.30; 22, $4.30; 20, $4.10 per cwt.

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.—$10.60 per hundred, $200 per ton, f.o.b., Toronto.

Lumber.—No. 1 pine, spruce, tamarac, 2 x 4, 2 x 6, 2 x 8, 8 to 16 feet, except 10 feet, $29; British Columbia fir and cedar, 2 x 4, 2 x 6, and 2 x 8, 12 to 16 feet, $32; 2 x 20, 4 x 20, up to 32 feet, $42.

(Continued to Page 54.)