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The Canadian Engineer

ESTABLISHED 1893

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

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TORONTO, CANADA, OCTOBER 9th, 1908.

CONTENTS OF THIS ISSUE.

HEIGHT OF THE QUEBEC BRIDGE.

A few years ago, when the design of the Quebec Bridge was prepared, the Boards of Trade and shipping interests along the St. Lawrence agreed that a height of one hundred and fifty feet above tide water was sufficient. It was thought at that time such a height would give clearance enough to allow the passage of the funnels of the largest vessels. The lowering of the top masts would be necessary in some cases.

The great increase in the height of masts and funnels of ocean-going ships during the last few years and the possibilities of increased traffic on the St. Lawrence has led to an agitation for more clearance under the new bridge.

The new C. P. R. steamers, the Empress of Britain and Empress of Ireland, from keel to truck measure one hundred and seventy-eight feet; deduct twenty-four feet draft allowance, and masts are still four feet higher than the old bridge clearance.

If we consider the large steamers running to New York, we find even larger dimensions. The height of the fixed masts above light-load water line of the vessels mentioned below is as follows:—

Lusitania, Mauretania	192 feet
Caronia, Carmania	185 feet
Campania, Lucania	170 feet
Ivernia, Saxonia	160 feet

While the funnels of ships of the type of the Lusitania and Caronia are one hundred and fifty-five feet above light-load water line or five feet higher than the Quebec Bridge clearance.

It is just possible that it may be many years before the one hundred and fifty feet limit would be so low as to prevent the navigation of the St. Lawrence by ships likely to sail this route, yet a bridge should not be built that would prove a permanent obstacle to the passage of larger steamships and thus restrict traffic.

What the height should be may be hard to determine. Certainly the one hundred and ninety feet asked for by the Montreal Board of Trade seems high. The question should be again considered by the Board of Engineers.

NORWEGIAN WATER POWER CONTROL.

Press despatches from Norway tell of the regulations made by the Norwegian Government in connection with the granting of water rights on the Tyin and Matre watercourses in West Norway to the German company, Badische Anilin und Sodafarbrik.

It is expected that the watercourses can be regulated so as to develop between 60,000 and 70,000 horse-power. Some of the conditions are of unusual interest. The company is to pay to the State 27 cents per horse-power for the horse-power developed beyond the 10,000 horse-power which the streams are supposed to supply

unregulated. They are also bound to supply 500 horse-power for public use at a yearly price of $8 per horse-power, and after the expiration of seventy-five years the whole plant shall be forfeited to the State. The regulation shall be commenced within five years and completed within twelve years, and for the former period the company is permitted to employ foreign engineers and workers to such an extent as they deem necessary, though the ordinary conditions as to Norwegian employees and Norwegian material are laid down as the essential rule.

FIRE RISKS AND FIREPROOF CONSTRUCTION.

Fireproof construction is a question for the engineer as well as for the architect.

Twelve million dollars every month is the fire loss in America—an enormous waste, due largely to faulty construction and faulty installation. The structural engineer should assist in an endeavor to lessen the fire risk, and thus prevent loss and reduce premiums.

Steel and concrete as building material are natural aids in this work. Wood has no longer a place in such work, and should be avoided. Building by-laws should be drafted prohibiting its use in congested districts; for it is almost useless to require fireproof walls and allow combustible material in floors and partitions.

A fireproof building may contain material for a large conflagration, and it is in connection with stored goods and raw material in the process of manufacture that poor installation increases the fire risk.

Hot bearings, where mechanical transmission is employed, is a most fruitful cause of factory fires. Belting-boxes make a splendid shaft for the flames to spread from floor to floor. Even the friction from enclosed and poorly centred pulleys increase the fire risk.

One wonders that electric power transmission through wires is not recognized as a safer and as better construction. Wires are fixed, flexible, and allow of more freedom in concentration of power on given points. The first cost of an electric system of power transmission may be greater than the cost of other systems, but there is greater safety and efficiency, providing the wiring is well done and regularly inspected. Crude repairing and poor connections add a large element of danger, and are frequently the result of a penny-wise-pound-foolish policy of setting a handy man to do the work of an expert electrician.

Good installation must be followed by regular expert inspection—inspection just as necessary as the inspection of steam boilers or elevators.

EDITORIAL NOTES.

In our issue of October 2nd, page 688, in referring to Mr. Richmond's article, "Theory of Matter," line twenty-seven should have read, "The motion or change of position from the normal," etc.

* * * *

The city engineer of Kingston is to be commended for the stand he has taken in reference to the new city building by-laws. Before he will undertake the enforcing of the by-law he has requested that all city buildings be first altered to comply with its terms. Too many municipalities require of the individual compliance with by-laws which they as a corporation violate.

* * * *

The increased competition requires increased productive power. The shop foreman, the master mechanic, nor the drafting-room superintendent cares to devote time to showing how. They now expect the man to do. To assist the young man in the shop the Central Branch of the Toronto Y.M.C.A. have opened two new departments in their winter evening class. Electricity and mechanical drawing, the two new subjects taught, will likely draw large classes, and should interest young men anxious to make their way in the business world.

PRECIPITATION FOR SEPTEMBER, 1908.

During September a severe drought occurred in nearly all portions of the Dominion, the Province of Manitoba proving the exception to the rule with a rainfall in most localities of from 3 to 19 per cent. more than the usual amount. In parts of Southern Alberta and more locally in Southwestern Saskatchewan the rainfall was nil; elsewhere from coast to coast, except in Manitoba as already stated, the quantity recorded was equivalent to about a third of the average. The table shows for twenty stations included in the report of the Meteorolgical Office, Toronto, the total precipitation at these stations for the month. Ten inches of snow is calculated as being the equivalent of one inch of rain:—

Station.	Depth in inches.	Departure from the average of twenty years.
Victoria, B.C.	0.60	—1.60
Kamloops, B.C.	0.10	—0.89
Calgary, Alta.	0.60	—0.51
Edmonton, Alta.	0.60	—0.88
Swift Current, Sask.	0.30	—1.04
Winnipeg, Man.	1.90	+0.31
Port Stanley, Ont.	0.50	—2.28
Toronto, Ont.	1.30	—1.43
Parry Sound, Ont.	2.70	—1.11
Kingston, Ont.	1.20	—1.50
Ottawa, Ont.	1.20	—1.47
Montreal, Que.	1.80	—1.91
Quebec, Que.	1.60	—2.11
Chatham, N.B.	0.90	—1.97
Halifax, N.S.	1.40	—2.44

THE THIRD RAIL.

At Berlin, Germany, on September 25th, two trains on the Berlin Elevated Railway collided. As a result eighteen persons are dead, while many sustained injuries. The accident was caused by a misplaced signal. One of the cars, which was crowded, was thrown to the street, forty feet below.

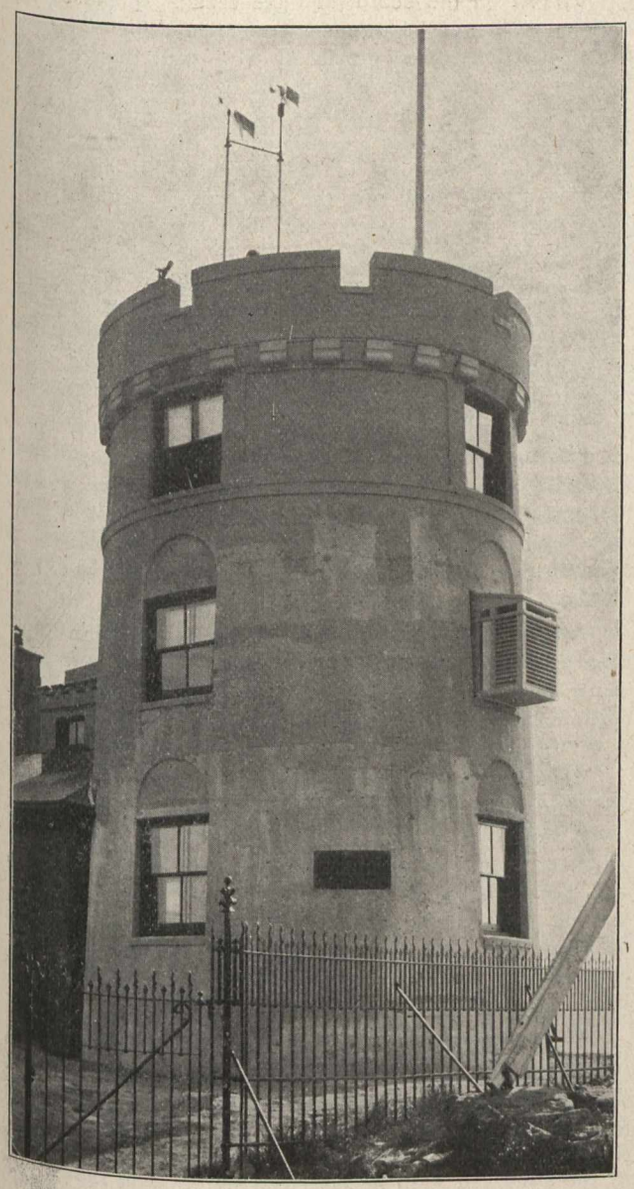
The collision occurred in the heart of the eastern commercial district upon what is known as "The Triangle," a notable piece of railroad construction, where three double-tracked lines cross. Most of the deaths resulted from contact with electrified rails.

GRAND TRUNK RAILWAY REPORT.

The half year report of the Grand Trunk Railway, the principal items of which have been received by cable, shows a decline in gross earnings of $2,300,000, the weekly returns having fallen off to the extent of $3,265,000. But the economies which had been promised have resulted in reducing expenditure by $1,746,000, principally in expenditure on maintenance of way and equipment. The ratio of working expenses has thus fallen from 72.33 to 71.08 per cent. The total train mileage—9,460,756—decreased by 621,057 miles. Gross receipts were $14,595,960, and the total net revenue receipts $4,528,355, prior charges absorb $3,625,885, and deficiency on Canada Atlantic, $344,455. After meeting the deficiency on the Detroit, Grand Haven & Milwaukee of $232,865, a total of $936,240 is left for dividends.

A REINFORCED CONCRETE METEOROLOGICAL OBSERVATORY.

There has just been completed on the top of Blue Hill, a few miles from Boston, a reinforced concrete observatory which presents some interesting features aside from its stability. One of the essential elements required in its design was absolute resistance to the entrance of water



Reinforced Concrete Water Tower.

under the conditions of heavy beating rains at very high velocities.

As designed by George T. Tilden, architect, of Boston, the observatory is of circular section, 17 feet 6 inches inside diameter, 20 feet 6 inches on the outside, and 33 feet high. The walls are of double thickness of 4 inches each, separated by a 10-inch air space, which provides an absolute means of preventing the passage of water. The contract was awarded to the Aberthaw Construction Co., of Boston, already well experienced in this class of work.

Reinforced concrete was selected on account of its many advantages, important among these being its unyielding stability, freedom from vibration in high winds, and its watertight qualities, so necessary in a location where wind velocities range up to 80 and even 100 miles per hour. Expectations have been so fully realized that the action of the self-recording instruments has been entirely free from the unknown errors which were caused by the rocking of the old observatory, and there have been no signs whatever of leakage.

The observatory is built on a ledge, the walls being bonded thereto; the floor is slightly raised to provide an air space beneath. A separate 4-inch granolithic finish was put on top of the first floor to provide a smooth tread, as well as to prevent any possible access of moisture. The general concrete mixture was 1:2:4.

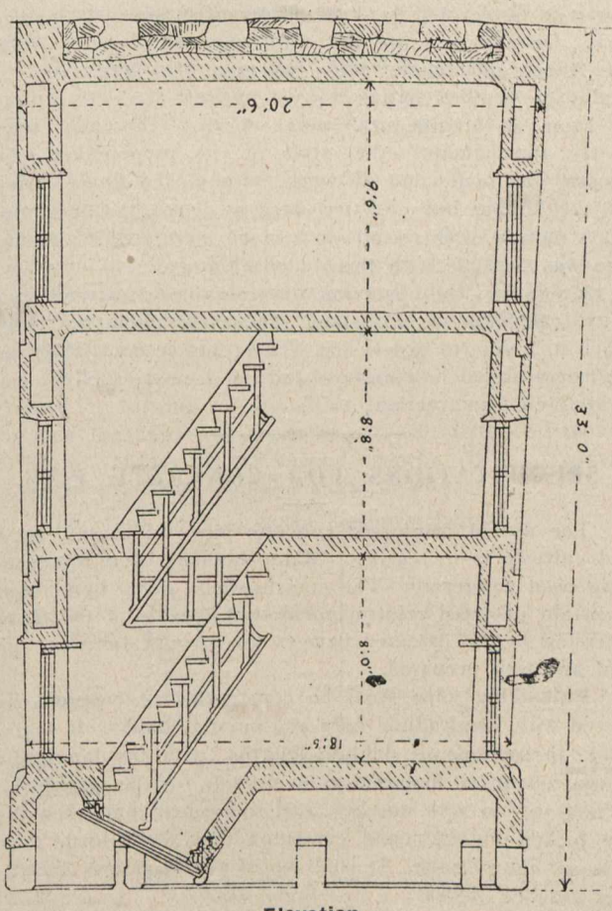
Steel reinforcement consists of ¼-inch square twisted bars, spaced nine inches on centres, running in directions at right angles to each other, embedded in the concrete near the surface, and extending into the wall.

The second and third floors and the roof are 6 inches thick, reinforced with ½-inch, square, twisted rods at right angles to each other and projecting into the wall. Those for the second floor vary in spacing from 12 inches on centres at the circumference to 5 inches apart at the centre. Steel reinforcement for the third floor and roof is practically identical with that of the second floor, but with an added number of bars at each side and at the middle end of the stair openings and roof scuttle. The reinforcing bars are placed close to the bottom of the floors, while those for preventing cracks close to the wall are placed near the top, being bent up at the wall and hooked over the nearest inside horizontal wall bar. All floors, including the roof, are granolithic finish; the latter is pitched towards the two water ways which connect with the drain pipes.

The inner and outer 4-inch walls are reinforced to the height of the second floor by ¼ and ⅜-inch twisted bars. Above this ¼-inch bars are used entirely except where the ⅜-inch bars are placed for strengthening the flag-pole socket. Concrete webs at 3-foot intervals connect the inner and outer walls, reinforced and connected to them by Z-bent ¼-inch bars.

The stairs are of wood, with wrought iron railings. The scuttle is provided with a window for observation in wet weather. The windows are in all cases double-sashed and tight fitting. For taking outdoor temperature in winter and for other purposes a wooden set shelter is fastened to the sill of the second storey window facing the north.

Heating is provided for by a fireplace and grate on the first and second floors. One flue for both is built into the

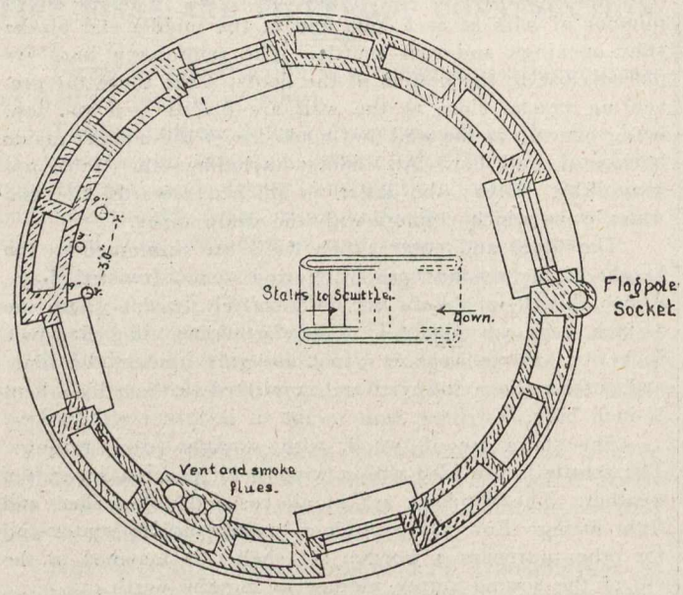


Elevation.

wall on the south-east side. Close to this are two other flues, to be used for ventilating purposes. All flues terminate flush with the top of the parapet. Louvre dampers are used for regulating the opening of the ventilating flues.

Upon completion of the observatory many self-recording instruments taken from the old tower were immediately

installed so as to make no serious break in the continuous yearly records, and such instruments as could be set up in the adjoining library building were made use of during the process of reconstruction. On the first floor in addition to three standard mercury barometers, are self-recording daily, weekly and monthly barometers, as well as a self-recording wind velocity meter and a self-recording wind direction meter. The two latter are connected to the anemometer and weather vane by metal rods passing through iron pipes extending through the floors and roof. The rooms on the second floor are to be equipped with steel cases for the keeping of observation records, while the third



Section through Third Floor.

floor is to be devoted to cloud observations and astronomical work. On the roof are the continuous sunshine recorder, wind vane, anemometer and flag-pole, the latter for the display of weather signals.

From an architectural point of view the new tower closely approximates the style of its predecessor. The smooth, clean-cut concrete work, with picked finish, brings out the simple but effective design—decidedly appropriate in a structure of this kind—in a much more striking manner than was possible with the old observatory.

Altogether, the observing tower is one of extreme durability, calculated to withstand the severe climatic changes which it is sure to experience. The concrete contractors and engineers are to be congratulated on a most excellent piece of concrete construction.

SPECIFICATIONS FOR CONCRETE PIPE.

The use of reinforced concrete pipe for drains, sewers and culverts is increasing. Many methods of reinforcement have been suggested. The specifications given here require a certain patented reinforcement, but outside of the clauses referring to the patented devices the specifications are general and well prepared.

Pipe.—The pipe shall be constructed of concrete reinforced with longitudinal bars and circular bands. It shall be made in sections of definite lengths, with the longitudinal reinforcement so disposed as to provide for the inter-locking of one section with another, and so formed that when these are locked together and cemented they shall form a continuous line of pipe. It shall be of the thickness shown in the attached tables.

Concrete.—The concrete used in the construction of the pipe shall consist of either of the following mixtures: A—1 part of Portland cement, 2½ parts of clean, sharp sand, 5 parts of crushed stone or clean, coarse gravel, not more than one inch in diameter. B—1 part of Portland cement, 5 parts of sandy gravel as taken from the pit.

The amount of cement in the mixture may be increased if the engineer shall so order in writing, in which case payment shall be made for the actual cost of the cement added. Crusher run stone or crushed slag below one inch in diameter may be used with the written consent of the engineer.

Mixing.—The concrete shall be mixed in batches large enough to make at least one complete section of pipe. When mixed by hand, it shall be done on a tight mixing board, made for that purpose. The sand shall first be spread in a thin layer on the board, and the cement spread over this and the whole turned until of a uniform color. The stone, which shall have been previously wet, shall then be added, together with the required amount of water and the whole turned until all of the particles are coated with cement and the mixture is of uniform consistency. All mixing machines shall meet the approval of the engineer. If a continuous mixer is used it shall mix the materials to a uniform color before the water is added, and shall mix the wet mixture until all the particles are thoroughly coated with cement and it is uniformly wet. It shall also feed the ingredients in their proper proportions at all times. At least once every twenty minutes the mixer shall be stopped and the platform upon which the concrete is being fed shall be entirely cleared, so that no concrete shall remain thereon long enough to attain its initial set.

Placing.—The concrete shall be placed in the forms and thoroughly tamped in layers not exceeding three inches in thickness as quickly as possible after being mixed. In no case shall concrete be used which has begun to set. The finished pipe shall be kept moist for a period of at least six days.

Forms.—The forms shall consist of cast-iron bottom rings and steel plates rolled to a true circle for the size for which they are intended. They shall be rigidly held in position so that they cannot be distorted while the concrete is being placed in them.

Cement.—All cement used shall be of some well known and reputable brand of Portland cement. It shall be properly stored in a dry, well-ventilated place, and properly protected from the weather. There shall not be more than one day's supply of cement out on the work at any time. Cement that has become lumpy in the packages shall not be used. All cement shall fulfil the requirements of the specifications contained in the Professional Papers of the Corps of Engineers U.S.A., No. 28.

Reinforcement.—The reinforcement shall be of steel in the shape of flat bars and bands. Test specimens shall develop a tensile strength of from 66,000 to 70,000 pounds per square inch, an elastic limit of 50 per cent. of this and an elongation of 22 per cent. The reinforcements shall be of the sizes and shall be placed in the pipe as shown on the attached sheet of details. It shall be held rigidly so that it shall be uniform in all sections. The longitudinal bars shall have hooked ends at either extremity for the interlocking of adjacent sections. The circular bands shall have loops punched in them at equal distances apart, through which the longitudinal bars shall pass.

Laying.—The sections shall be laid with the spigot ends towards the outlet and one of the longitudinal rods at the top of the pipe. After the section is laid, a joint shield made for that purpose shall be slipped around the pipe with about half its width projecting beyond the end of the pipe. The next section shall then be fitted to the one already laid, care being taken to have the projecting hooks of the longitudinal rods close to the corresponding hooks of the section already in place. A tie-band shall then be slipped through these hooks, locking the sections together. The joint shield shall be drawn up snugly around the pipe and the joint flushed with water. A thin mortar shall be poured in the joint and the shield left in place until the mortar has set. Care shall be taken to completely fill the joints with the mortar. All joints shall be water-tight.

Building activity in Winnipeg was greater in September as the figures for the month show. There were 202 permits issued covering 236 buildings to cost $477,400.

PRELIMINARY LOCATION IN THE BUSH.*

By Robert Laird, Haileybury, Ont.

An assistant locating in the extreme north, though hard-working, honest, ingenious, painstaking and unusually "bush-wise," was surely gaining the reputation of being a slow-coach with the head office, because he did not know and did not think out a very simple wrinkle connected with his work.

His ingenuity was sadly misused, and all because he had not conceived the idea that it was, and is, possible to run in a curve on the ground without establishing a single transit-point upon the curve itself; he had a firm conviction that his transitman must of necessity set the transit on the curve—preferably at the P. C., or if not there, then at the P. T.—in the case of a compound curve; he regarded the P. C. C. as a point from which he could no more escape than we all can escape the confidences of our friends.

When his P. C., P. T. or P. C. C. fell within the margins of a lake, in the midst of a stream, or on a nearly vertical rocky wall, as was the case more often than otherwise, he described this as "—— —— hard luck," and proceeded to bridge the stream with heavy timbers, to drive long plugs for the transit legs in marshes and lake margins, or to erect platforms at rocky faces; establish thereon with care his P. C., set the transit over it, and proceed to another point on the curve—which, being out of sight because of the trees, might or might not prove suitable for a transit-point, and this was not disclosed until a line had been cut out thereto and chained; if not suitable, the building operation was repeated or the line abandoned and a second try made for another and more desirable point.

All this is easily avoidable by a much more elastic method than that of laying down a curve by its chords; i.e., by short or semi-tangents to the curve. This method—as far as I am aware—has not been amplified by any field-book writer; perhaps it has been considered too obvious and simple to merit description; but that case in point—the bridge-building person of my experience—seems to warrant a short statement regarding it.

Had he been asked to run in a curve of ten degrees deflection, he would not have hesitated to disregard the P. C. as a transit-point, but would have measured along the tangent, produced the sub-tangential distance corresponding to the degree of curvature desired, there set his transit, turned the ten degrees, laid down the remaining sub-tangent—which is also the leaving tangent from the curve—made proper correction for chainage, and gone gaily on; but fifty degrees of curvature was to him quite a different matter.

If the first ten degrees of a curve can be so laid down, so can the following ten, or any other number of degrees.

The leaving tangent of the first part is then the entering tangent of the second part, and for every distance along this tangent there is a corresponding angle of deflection just as truly as there was for any entering sub-tangential length; and this is true for the third or any following part.

Now, to suggest the elasticity of this method. There is no good reason for selecting a certain length of tangent or a certain number of degrees of deflection; the proper considerations which determine these are as follows:—

1. Any distance along the tangent to the curve, beyond the P. C., whose abcissa distance from that curve is not too great for the convenient and fairly accurate offsetting of stakes, and such that the leveller may easily observe the elevations of the corresponding points on curve, notwithstanding the obstruction to view by trees, vegetation, etc.

2. That the point be so chosen that a good foresight from it may be had.

3. That it be suitable for a transit point.

Suppose, then, we desire to lay out a 3° curve through an angle of 50° to the left of a given tangent, the P.C. of which is L. 320 + 57; this hub is set, if possible, and the tangent is produced to any distance at the discretion of the picketman; this distance for a 3° curve should not exceed 350 feet.

The chainmen are furnished with a table of offsets, at five-foot intervals, of tangential length; they offset, if required, to the left L. 321, the offset for 45 feet; L. 322, that for 145 feet, etc. (Should they mislay this table, they are permitted to use the approximate formula $x = \frac{7}{8} n^2 D$.)

In the meantime the transit is moved forward and set up at the end of the line. Suppose the chainage of this hub is found to be 323 + 62.1, being a tangential length of 323 + 62.1 — 320 + 57 = 305.1 feet; the angle corresponding is 18°.09′ and length of arc 605 feet.

This angle is turned to the left, and the picketman instructed to cut not less than 350 feet and not more than 650.

The chainage of the point on curve, ahead of the transit, where this tangent touches is: Chainage of P. C. plus the arc 320 + 57 + 6 + 05 = 326 + 62; the chainage of the transit-point back of that curve point, and reckoning from it, is the chainage of that curve point minus the tangential length 326 + 62 — 3 + 05.1 = 323 + 56.9. (The correction for chainage is made at the transit point for simplicity.)

With this chainage the men go ahead; offsetting station L. 324, offset for 260 feet; L. 325, that for 160 feet; L. 327, that for 40 feet, etc., as before.

The chainage at the end of this line is found to be 329 + 72.8, then tangential length is 329 + 72.8 — 326 + 62 = 310.8 feet.

Corresponding angle is 18°.29′, and arc is 616.1 feet.

This angle is turned and the chainage correction made as before.

The new point on curve is 326 + 62 + 6 + 16.1 = 332 + 78.1.

Now, total angle turned is 18°.09′ + 18°.29′ = 36°.38′, leaving 50° — 36°.38′ = 13°.22′ still to be run; the corresponding tangential length is 223.8 feet and arc is 445.6 feet.

The instruction to the picketman, at the second transit point, was, cut the line 310 feet to the curve point and 223.8 feet beyond it or to chainage 332 + 78.1 + 2 + 23.8 = 335 + 01.9.

This hub is then set correctly and the completing angle there turned. It will be noted that this hub must fall on the sub-tangent to the curve, or on the tangent passing through the P. C. C. when the curve is compounded.

Chainage is again corrected and the P. T. hub set 223.8 feet ahead of the transit point, thus completing the curve at station 322 + 78.1 + 4 + 45.6 = 337 + 23.7.

In the case of a compound curve the process is continued by turning off from this leaving tangent of the first branch the angle corresponding to the distance beyond the P. C. C., proper for the second branch. (If a 1° curve, and tangent 322 feet; then the angle 6°.26′.)

The form of field notes is shown below:—

P. T.	L.	3 ÷ 67		
		3		
		2		
T. P.		1 > 0 ÷ 45.7 = ÷ 45.0	6° 26′	643.3
	(322.0)	340		
		9		
		8		
P. C. C.	L.	7 ÷ 23.7	1 Curve Left 6° 26′	L.C. = 643.3′
		7		
		6		
T. P.		5 ÷ 01.9 = 4 ÷ 99.9	13° 22′	445.6′
	(223.8)	3 > 4		
P.	L.	2 ÷ 78.1		
		2		
		1		
		330		
T. P.		9 ÷ 72.8 = ÷ 67.3	18° 29′	616.1′
		9		
	(310.8)	8 ( )		
		7 (0.4)		
C. P.	L.	6 ÷ 62		
		6 (0.9)		
		5 (offset)		
		4 (17.7)		
T. P.		3 ÷ 62.1 = ÷ 56.9		
		3 (15.2)	18° 09′	605.0′
	(3.03.1)	2 (5.5)		
		1 (0.5)	50° 00	1666.7
P. C.	L.	320 ÷ 57	3 Curve Left 50°	L.C. = 1666.7

*Read before the Ontario Land Surveyors' Convention.

Note.—The sum of the short tangents has no relation to the sum of the sub-tangents to the curve.

You will have noticed that the stakes were offset to the curve, if required; that has not been the custom; on the contrary stakes are set in the lines as cut, but with the initial letter before the station numbers omitted, and with the words "offset Left — ft." written on the back of the stakes, except on those stakes set where the tangents touch; these are fully marked, thus, L. 326 + 62.

The reasons for this: Offsets at an exact right angle are often not practicable because of the trees. (For this reason also a close calculation of abcissa is not made, that for the nearest five-foot being deemed sufficient.) The rodman and leveller readily find the stakes in this position, and use them—which is, perhaps, doubtful in the case of stakes hidden in underbrush; the topographer also has definite points and elevations to work from. The rear chainman has an undisturbed point at which to hold the chain; these stakes are left standing and are verified by the topographer; the chainmen know that this will be done. Foremen of clearing gangs, when properly instructed, have no difficulty in laying out the right-of-way correctly.

The chief instrumental advantages of this method, in rough ground covered by trees or broken by water, cliffs, etc., are the avoidability of short sights and the latitude possible in the choice of ground for the transit points. Curvature being introduced, largely to avoid obstructions, and the curve running around the hills, the tangents are often in better ground, being outside the curve, whereas the long chords being inside often cut across very bad ground, indeed.

It might be noted, too, that for equal lengths of abcissa to a curve, there is always one less transit point by this method than by that of a chord method.

Other advantages are: The picketman and axemen do not wait for the chainage, but cut ahead to any point at the discretion of the picketman. The chainmen have plenty of time to properly do their work, and do not delay others, as the chainage of the hub at the end of the line is not required until the transit is brought forward and set up, except in one case, ie., the final hub.

One transit point alone, no matter how long the curve (except it be compounded, when two are set) demands exact placing, and, that being an unusual operation, is more likely to be properly performed. A chainman who will insist on and will secure the exact setting of a point when it is a duty repeatedly performed is a jewel rare. Errors of considerable magnitude are liable to occur, especially when one of the party is an habitual talker, the fascination of a joke completely dulls the fine edge of observation; a hub may be driven plumb, or when driven be several inches out of place, and the point taken on it anyhow, so that the point of the joke be not missed.

The procedure, to emphasize the idea in all minds, that this is an important duty and one that must be done properly, has been as follows: When a hub is to be set to chainage, the chainmen first lay off the correct plus; the picketman drives the hub, the chainmen lay off the plus again, marking a line at right angles to the transit line across the hub; the picketman takes point therein; if for any reason the hub does not contain both, the operation is repeated until it does. The essential feature of this is, that the chainmen, who are held responsible, shall repeat the measurement as often as necessary, and shall remain in position to repeat it until after the signal has been given for the transit to come ahead.

The transitman, when in position to look back along the line, sets his vernier at 180°, sights back, and revolves the upper limb, but does not plunge the telescope; his vernier is now at 0°, and the angle is set off by direct reading. This was found necessary, as the cross-hair diaphragms of the instruments supplied were much too thin, and in the extreme changes of temperature (often 40° in a morning and as much in the afternoon) considerable hourly variations in the line of collimation were found.

The chainmen have been required to blaze a large tree on that side facing the hub, and to mark thereon all information, as at P C.: "P. C. 3° C. Left 50°," or as at transit point: "T. P. A. Left 18°.09′. 323 + 62.1 = 323 + 56.9."

The picketman's instructions included the following:—

Hubs shall not be set, where avoidable, in soft ground or in ground that is worked by the roots of a wind-swayed tree, nor point taken on a stone nor on bare rock. (It is possible that tangential transit points, being, as they are, distant from centre line, may remain through construction days and furnish permanent reference marks.)

Hubs shall not be set, when approaching a steep rise, close up to the foot of it, but far enough back therefrom so that the transit may be able to see to the top of it, nor so far beyond the crown of the rise that more than two feet, at the foot of the picket, is hidden from the transit thereby.

A general order to all: No one shall stand in the line, neither between the picket and the transit, nor behind either, that their signals may not be obscured.

This method may be combined with the chord method by setting a hub at any C. P. and then proceeding in the usual way, and may be used at any time in avoiding obstructions, etc.

In the event of an inaccessible P. C., the tangent is produced to a convenient point, the proper angle turned there and a point on curve set; thence the remainder of the curve is run in.

Should an obstacle cover the P. C. and prevent the production of the tangent, a hub is set in the tangent, an angle turned, and the proper tangential distance set out therefrom; through the latter point a line is run parallel to the tangent, whose length is equal to that tangential length already laid out, plus the distance from hub on tangent to P. C. This is now a point on curve, and a line through it parallel to the sight line off the tangent is also tangent to the curve, so that the remainder of the curve may be laid out therefrom as desired. An obstacle within the curve may be avoided by following a tangent from any suitable point on the curve until that obstacle is passed, thence setting a point on the curve and continuing as usual.

The field book published by Edward Butts contains a table of tangents and arcs for each minute of deflection for curves of whole degrees from this by inspection or by simple multiplication one obtains the angle and arc corresponding to the stated tangent.

PLANS FOR CONSERVATION OF SWEDISH FORESTS.

The Swedish Central Statistical Bureau has sent in to the Government a very extensive report about the state of the Swedish forests. From this it appears that the lumber cutting has been exceeding the growing capacity of the forests, and that the stock of raw material is steadily sinking. The yearly gross capacity of the forests is calculated at 34,530,000 cubic metres. All of this, however, cannot be utilized, partly on account of too expensive transport and partly for other reasons. Enormous quantities of the wood rot away in the woods, in some distant districts even from 20 to 40 per cent., reducing the effective production thereby to 29,336,000 cubic metres.

According to investigation, it is calculated that the yearly consumption amounts to at least 3,300,000 cubic metres, partly for home use and partly for export. Quite a considerable overproduction thus takes place, and this is the case especially with the forests of the farmers, as the cutting there goes on without system and without thought of the future. The Bureau, therefore, points out the necessity of special laws for the maintenance of the forests, and urges the Government to buy up as much of the forests as possible.

The quantity of timber cut in the forests of Japan during the year ending March 31, 1907, was valued at $17,004,288 currency. As might be expected, the public treasury has considerable interest in the receipt of dues on all timber that is cut.

DISCUSSION ON THE EFFECT OF TREATED TIES ON ELECTRICAL APPLIANCES USED IN BLOCK OR GENERAL SIGNAL SERIVCE.*

By S. M. Rowe, Consulting Engineer.

The question of the effect of zinc-treated ties on the electrical appliances used in the block or general signal service of railroads has just been called to the writer's attention, and in such manner as to indicate that in some cases this has been found serious, and, believing it to be important that the facts be known, he has deemed it best to correspond with the signal officers on the various lines, addressing an inquiry to each. The reason that it applied more particularly to the treatment of railroad ties seemed to justify the writer in doing this. The inquiry has met with quite free and cheerful responses, and the data obtained are, therefore, placed before the members of the Association for general information and to encourage further study of the matter.

The writer takes this means of thanking those who have contributed information for their ready response.

Chicago and Northwestern Railway.—We have put in a large number of ties which have been through the zinc-chloride treatment, and our experience indicates that if a track section were completely renewed with ties having this treatment, it would be impossible to operate a section over 1,200 feet in length. If, however, the ordinary renewals are made each year, that is, 12 to 15 per cent. of the total number of ties in a section, there is very little trouble. These ties act as condensers, but even this does not interfere with the circuits.

The worst trouble with ties having this treatment is in hot or dry weather, whereas in cool, wet weather the effect of the treatment is practically nil. After the ties have been in the track about one year, the effect of ties on circuits seems to disappear, so that if the ties in a track are renewed in the ordinary manner they may be in a few years entirely renewed without bad results to the signals.

Illinois Central Railroad.—Regarding the use of red oak treated ties in territory equipped with automatic block signals, in 1904 and 1905 we completed a piece of second track construction, in which all the ties were red oak treated with the zinc-chloride process, and we found on installing the automatic block service that the track circuits were entirely too long for this class of ties, and we were obliged to reduce them about 50 per cent. in length. It was our observation, however, that the conditions that required this reduced length of circuit had been eliminated as the ties became more seasoned, and it is not our impression that we would meet with any difficulty in maintaining the longer track sections, even in track that was entirely laid with zinc-chloride treated ties, where the track had been laid long enough so that the ties were being renewed at the rate of three or four hundred per mile per year.

We developed by investigation that we would experience no more trouble with a track of this kind than with a track laid with white oak ties, where freshly laid zinc-chloride ties do not exceed 25 per cent. of the total.

In regard to the effect of creosoted ties on block signals, our experience is so limited as to be of little value. Our signal people claim that they observed last year on some track laid with rock ballast, and in which some creosoted ties had been placed, that there was some disturbance of signal circuits and some reduction in the length of the circuit had to be made. However, the piece of track in question was in rather bad shape for ties, a very large number being put in, and the condition was not a normal one.

It seems possible, however, that we may find some difficulty in maintaining track laid exclusively with creosoted ties, but this we can tell very little about at this time.

Delaware, Lackawanna and Western.—In reference to difficulties in our work in the signal system from treated ties, creosoted or otherwise—at the present time we have very few creosoted ties in service. These are at points where our track circuits are very short, and we have, therefore, experienced no difficulty in working our signals properly. We have had some difficulty in working long track circuits, say, one mile in length, where green, untreated ties have been laid, but trouble of this kind has been of short duration. We have, however, had no end of trouble on account of refrigerator cars dropping salt brine on the ties, which in turn formed a good conductor, conveying current from one rail to another instead of going back to relay, causing the relay to remain open, holding the signal in the danger position.

Atchison, Topeka and Santa Fe.—About the only reliable case we had was one with a long track section where a large number of zinc-treated ties had been introduced at one time. We could not get current enough to the far end of the section to work the relay. It was easy enough to straighten this out by cutting the section, but we wanted to find out a little more about the matter, therefore made some tests to ascertain whether we could not work the same section with some rearrangement of the batteries. In making this test we discovered that there was a developed current in the section somewhere, and in testing for it found that this current was developed by the application of our own battery. The current disappeared finally after a certain discharge and could only be developed by one polarity. The last test made was to use the lost polarity for the development of the current, and after taking a reading reversing the current quickly to see what the effect would be, we found that an application of reversed current would immediately neutralize the current which we had already developed.

We were not able to continue the tests, because the circuit was in service and had to be kept working, but our deductions were that we had constructed a crude kind of storage battery by the use of treated ties in connection with our tie-plates, spikes and rails. In order to do away with this trouble, as far as possible, we have arranged to cut our western sections down to half a mile, and believe this will take care of all conditions unless a whole half-mile section happens to be renewed at one time.

Great Northern Railway.—We have been through one severe experience with track circuit trouble, where a new line was laid on ties which had been treated to the zinc-chloride process.

When we first set up our batteries on this work it was found that the current from same was almost wholly lost at a distance of from 1,000 to 1,500 feet. This was due to the zinc in the ties serving as a conductor, which for a time caused a decided tendency toward short-circuiting and grounding of the current passing through the rails.

In the course of seven or eight days from the time batteries were connected to the rails, it was noticed that an improvement had set in, and gradually from that time on the treated ties gave less and less trouble until practically all ill effects from their use disappeared. If a similar case presented itself now, we would arrange to connect the track batteries with the rails, not less than thirty days prior to the signal system going into service, thus allowing the batteries to insulate the spikes from the ties, which is the effect produced by the small electric current passing from the rails to the ties through the spikes.

It is our judgment that the zinc-treated ties used for ordinary yearly tie renewals will not cause any track circuit trouble. The length of the track circuit sections, of course, has a bearing on the subject. It is good practice to limit the length of track sections to 3,000 feet, even though non-treated ties are used.

We do not know that the creosoted tie has caused any trouble in this direction.

Contractors in various parts of the United States are figuring on bids for the construction of the new $20,000,000 passenger station which the North-Western road is going to erect on West Madison Street, Chicago.

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*American Maintenance of Way Association.

ENGINEER'S CLUB, TORONTO

A Few Suggestions

THE ENGINEERS' CLUB—WHAT DOES IT STAND FOR?

It was with many misgivings that three weeks ago we sent a circular letter requesting suggestions as to what might be done to increase the usefulness of the Engineers' Club, Toronto. We were fearful lest the officers would resent such interference, and we had some doubt as to whether enough members would respond to make the replies interesting. Happily, our fears were groundless; the officers of the Club approved of the campaign, the members responded promptly, and we are sorry that we cannot publish all replies.

As an association of expert designers and constructors, the Engineers' Club is a unique organization, including among its membership men in every branch of engineering and men of every grade in those separate branches into which engineering naturally divides itself. There is the clerk, the inspector, the draftsman, the designer, the erector and the consulting engineer.

But the membership is not confined to engineers alone, for it includes men engaged in almost every occupation with which engineering is associated—the salesman, the contractor, the architect, and even the promoter. An organization so cosmopolitan in membership is in a position to deal with the duties of an engineer to his client, the client's obligation to the engineer, the mutual relation between chief and assistant, the relation of designer and builder in a spirit that will increase the devotion of the profession to the cause of engineering, and impress upon engineers the necessity of professional spirit and the inspiration that comes from high ethical ideals.

No organization can come to power quickly, and if the Engineers' Club is to become established and remain a strong professional organization, if they would get away from the gild, the glamour, the veneer of a self-admiration society, they must be prepared to consider engineering ethics, the relation of the engineer as man to man, the relation of the engineer to the profession and the position in which the profession should stand to the engineer.

Facts and figures may be necessary, but outlook and inspiration are more necessary, and will only come with a thorough understanding and an appreciation of "the other man's point of view."

What is Worth Reading is Worth Preserving.

Sir,—The Executive should require of every person reading a paper before the club that he leave a copy of his paper with the librarian. If the addresses are not published in the form of proceedings these papers could be bound for future reference.

Yours, Literary.

For You, Mr. President.

Sir,—Some interest would be added to the meeting if the chairman in introducing the speaker would tell something of the speaker's history and in the discussion that follows never allow a member or visitor to take part until his name has been given.

Yours, Inquisitive.

Work for the Profession, not the Individual.

Sir,—As I understand the matter, you request engineers to state in one hundred words what they consider will improve the Engineers' Club. Would say, if engineers in their different lines would disclose their inmost thoughts as to what has contributed to their success in their own particular line, disclose what they know absolutely to be the snags likely to be encountered and how to meet them all and do their best to put a new beginner opposite the same hub of progress as he has succeeded in attaining himself, Canadian engineering would secure a high place in the world's standard. To do this an engineer must be prepared to disclose any secret discoveries of a short or extended practice that may be of use to his brother engineers, and not to care so much if he is successful in his individual practice, so long as Canadian engineering practice is successful and in the lead in the world's progress.

Yours, John S. Fielding.

Toronto, Sept. 28th, 1908.

Publish Your Proceedings.

Sir,—So far as I can see, the main defect at present is that a paper read is practically lost to all who do not attend the meeting at which it is read, and I believe it would be in the interests of the Club to select the best papers for publication. Whether these should be published previous to their reading at the meeting or in pamphlet form at the end of the year would have to be considered by the Club.

Yours very truly,

Robert W. Angus.

A Permanent Secretary and ??

Sir,—I am sure the popularity of the Engineers' Club would be increased if they appointed a man who would always be on hand to receive messages and deliver them.

The quarters at present are about as cheerful as a morgue, a cold winter is sure to come, and friends of engineers would like something hot to drink. Could arrangements be made whereby a glass of hot water and a pinch of soda could be served to guests?

Yours sincerely,

Temperance.

Make it a Sewing Circle?

Sir,—If the Club would prohibit smoking in the lecture-room during the time of meeting I am sure more members would attend. There are many who do not smoke who find it impossible to sit through a two hours' "smoker."

Yours, Smoker.

Oct. 1st, 1908.

Turn Out.

Sir,—If the members of the Engineers' Club had as much ambition as our esteemed editorial friend, and would give up one night a week to attend the meetings and use their brains (and we have as brainy men as any club of its kind in the world) to discuss the papers that are read before the Club, and advise and help the Executive, the daily papers would then take notice, and then members would not only derive individual benefit, but the Club in general also.

The discussion of municipal and Government affairs in our line are always handicapped by slim attendance. If the members would only realize that the more popular and better known this Club becomes the better chance the members would have to obtain lucrative positions, and those in business for themselves would obtain considerable free advertisement, and thereby increase their business.

Yours very faithfully,

W. Van R. Reynolds, M.E.

Increase the Membership.

Sir,—In answer to your valued favor of September 21st, please find statement herewith as to suggestions for increasing the popularity, usefulness and professional standing of the Engineers' Club of Toronto:—

1. Popularity.—Mail each member application forms for membership, with letter asking them to make an effort to get additional members.

2. Usefulness.—Publish with least expense possible the minutes of each meeting, so that members not able to attend may derive full benefit from their membership.

Respectfully yours,

R. N. Grace.

141 Farnham Ave., Toronto.

A Better Reference Library.

Sir,—Although the present quarters of the Engineers' Club may not be capacious enough to permit any material increase in shelf room, an effort should be made immediately to enlarge the existing reference library. In addition to the engineering journals, which are at present bound and preserved for reference, many more, some of them now on the Club's subscription list, should receive like treatment, since nowhere in the city, if not at the Engineers' Club, are technical publications running back farther than the current volume readily accessible to the practising engineer. If this step were taken forthwith, by the time the new quarters are available the nucleus of a reference library quite in keeping with them would have been formed.

Yours, C. R. Young.

Greater Care in Selection of Papers.

Sir,—Judging from the attendance at the different meetings of the Club during the past year, it was quite evident that the kind of papers before the Club at these different meetings was the drawing card. For instance, at a meeting where a paper or discussion, such as "Rail Sections," was before the meeting the lecture-room would be crowded and the discussion entered into by most of those present. On the other hand, a paper of interest to only a small section of the Club practically kills the meeting for that evening.

The papers, then, to be selected by the committee should be such as will appeal to not only the majority of the Club members, but also to the general public so far as possible. The discussion of engineering matters pertaining to this city or Province will bring the Club before the local and Provincial press, and, I believe, increase its professional standing.

Faithfully yours,
Andrew F. Macallum.

Engineering Law.

Sir,—Replying to your letter of the 21st ult. regarding the Engineers' Club of Toronto, I may say it has occurred to me that, as many engineers have neither time or opportunity to acquaint themselves with the laws governing contracts, it would be both interesting and instructive to have a few addresses or papers given before the Club on this important subject. Could not some legal gentleman of reputation be procured to do this? In view of the litigation which has been going on at various places in Ontario with reference to the contracts between the municipalities and the Hydro-Electric Commission, I would suggest that the addresses or papers take up specially the powers and restrictions which municipalities have in the letting of contracts.

Trusting this suggestion may be of service, I am,
Yours very truly,
O. W. Smith.

Print the Papers.

Sir,—One of the principal objects of an engineers' society is to present to the members papers on subjects of engineering interest. The interest is much greater when the paper arouses discussion, particularly when a number of the members are in a position to discuss the subject fully.

Would it not be well, then, to have advance copies distributed to the members, say, two weeks before the paper is presented? It would put the members who are interested in a position to discuss the subject fully, and thus would add largely to their interest, and also to that of those who were wholly listeners.

Very truly yours,
J. Morrow Oxley.

Several Very Practical Suggestions.

1. Prohibit smoking in the lecture hall before 10.30 p.m. The minority have rights that should be respected.

2. Discourage self-advertising by following more closely the rules of similar professional organizations respecting this matter.

3. Reserve the first meeting of each month for business, and the last meeting of the month for Toronto branch of Canadian Society of Civil Engineers.

4. Provide proper racks for periodicals and unlock the bookcases.

5. New members elected who have not paid their dues should be requested to resign, otherwise their names to be posted at Club.

6. Publish a Club directory to contain list of members, past officers, etc., and constitutions.

Yours truly, Willis Chipman.

Professional Loyalty.

Sir,—A professional society to be successful must be aggressive. It must show in no uncertain way its unanimous disapproval of any direct or indirect reflection upon the ability of Canadian engineers. The loyalty which exists amongst the members of the other professional societies should be an object lesson for engineers.

In order to invite a thorough, frank and prepared discussion founded on experience, instead of a few vague and rambling remarks, the papers should be printed and a copy sent to each of the members at least two weeks ahead of its schedule time. These papers, with the discussion and a definite conclusion, where practicable, should be recorded and printed.

If these suggestions were considered, the Toronto Engineers' Society would make its presence felt, and also raise the profession to the dignity which it rightly deserves. It would also encourage the younger members to take an active part in the proceedings.

Yours truly, W. R. Worthington.

Luncheons.

Sir,—It has occurred to me that perhaps a modification of the methods adopted by the Canadian Club, if introduced into the management of the Engineers' Club, might prove helpful. Let us bring to Toronto during the coming winter, say, four outstanding engineers from the United States or elsewhere to address us on the big engineering problems of the day. A luncheon at McConkey's to cost 35 cents per member might precede the address. The Club would be advertised and its members individually helped. The visitors' expenses could be paid out of the treasury. These luncheons might supplant the annual dinner if thought advisable.

P. Gillespie.

A SELECT COMMITTEE

Sir—I would suggest that a select committee be appointed to consider the replies sent to the Canadian Engineer, and that they be instructed to prepare a series of resolutions, based upon these suggestions, and report to the Society at a November meeting.

Yours, S. B.

ENGINEERING SOCIETIES.

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

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

CANADIAN STREET RAILWAY ASSOCIATION.—President, E. A. Evans, Quebec; Secretary, Acton Burrows, 157 Bay Street, Toronto.

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

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, J. Galbraith; Secretary, Prof. C. H. McLeod. Meetings will be held at Society Rooms each Thursday until May 1st, 1908.

QUEBEC BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, E. A. Hoare; Secretary, P. E. Parent, P.O. Box 115, Quebec. Meetings held twice a month at Room 40, City Hall.

TORONTO BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—96 King Street West, Toronto. Chairman, C. H. Mitchell; Secretary, T. C. Irving, Jr., Traders Bank Building. Regular monthly meeting, October 29th.

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

ENGINEERS' CLUB OF TORONTO.—96 King Street West. President, J. G. Sing; Secretary, R. B. Wolsey. Meeting every Thursday evening during the fall and winter months. October 15th, club smoker and social evening.

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

CANADIAN MINING INSTITUTE.—413 Dorchester Street West, Montreal. President, W. G. Miller, Toronto; Secretary, H. Mortimer-Lamb, Montreal.

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

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

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS (TORONTO BRANCH).—W. G. Chace, Secretary, Confederation Life Building, Toronto.

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

SOCIETY NOTES.

The Institution of Municipal Engineers.

At a meeting of the Executive Committee of the institution held at the Bedford Hotel, Southampton Row, London, W.C., on Thursday, September 17th, fifty-five applications for membership were considered. Of these, thirty-two were accepted and twenty-three held back for further consideration. The membership roll now stands at 320.

Draft by-laws were submitted by the committee appointed at the last meeting for their preparation, and were approved, subject to confirmation at the general meeting of members to be held on Friday, October 9th.

It was decided that, recognizing the great possibilities of an Institution of Municipal Engineers in the widest sense of the term, men holding important appointments under local authorities as electrical, gas, mechanical and water engineers should be eligible for election to membership of the institution.

Particulars of the aims and objects of the institution, together with forms of application for membership, may be obtained of Mr. B. Wyand, secretary, 10 Eagle Place, Piccadilly, London, W.

Architectural Institute of Canada.

The members of the new Architectural Institute of Canada, organized last year, in the first annual meeting, held in Ottawa, September 28th to October 1st, decided to make that place the headquarters of the association. The by-laws and constitution of the association, which now numbers members from all parts of the Dominion, were adopted as drafted by the Executive. It was agreed that no member shall either be a party to a building contract except as owner, guarantee an estimate or contract by personal bond, attempt to supplant another architect after definite steps have been taken towards his employment, or advertise himself beyond giving his name, address, profession or office hours.

It is also regarded as contrary to the ethics for any member to criticize in the press the professional conduct or work of another architect except under his own name or under the authority of a professional journal; neither shall be furnished designs in competition for private or public work unless an adviser satisfactory to the competitors is employed to draw up the conditions and assist in the award.

The schedule of charges adopted regulates the usual and minimum charges to be maintained by members of the Institute for professional services, such services consisting in the making of necessary preliminary studies, working drawings, specifications, large scale and full size details, and in the general direction and supervision of the work. It fixes the minimum charge for all building over $10,000 at 5 per cent. upon the cost of the work and for less than that amount at 6 per cent. For alterations and additions to existing buildings and for furniture, monument, decorative and cabinet works the commission shall not be less than 10 per cent. Furniture or other articles purchased under the direction of the architect shall entitle him to extra compensation.

Consultation fees for professional advice are to be paid in proportion to the importance of the work involved, while the charge per day which an architect may make will depend upon his professional standing, in no case, however, being less than $16 per day of eight hours. Time occupied in travelling will be charged at the rate of $2 per hour, if in office hours, and $1 per hour if otherwise. All necessary travelling expenses are to be paid by the owner.

Alterations to contracts, drawings and specifications and professional and legal services incidental to negotiations for site, disputed party walls, right of line, measurement of work, or failure of contractors are not covered by the above amounts, and are to be charged for according to the time and trouble involved, when such services are necessary.

When heating, ventilating, mechanical, electrical and sanitary problems in a building are of such a nature as to require the assistance of a specialist, the cost for such services is to be borne by the owner, as is also the cost of chemical and mechanical tests when required.

The usual scale of charges for assessing competitions is specified at one-fifth of one per cent. upon the estimated cost of the proposed building, plus travelling expenses.

President, A. F. Dunlop, Montreal; vice-presidents, Messrs. Maurice Perrault (Montreal), F. S. Baker (of Toronto), and S. Hooper (Winnipeg); secretary, Alcide Chausse (Montreal); treasurer, J. W. H. Watts (Montreal). Council—W. H. Archer (Vancouver), C. B. Chappell (Charlottetown), D. Ewart (Ottawa), G. E. Fairweather (St. John, N.B.), H. E. Gates (Halifax), H. B. Gordon (Toronto), R. P. Lemay (Quebec), S. Frank Peters (Winnipeg), C. A. Monette (Montreal), F. C. Clemesha (Regina), J. E. Wise (Edmonton), E. L. Horwood (Ottawa), E. Burke (Toronto), R. W. Hynes (Toronto).

It was decided that a medal should be granted each year to each Canadian architect who carries out an important work.

anadian Mining Institute.

The members of the Canadian Mining Institute, accompanied by a number of prominent mining men of Great Britain and Europe, returned to Montreal, October 2nd, from a tour of the Dominion. The visiting mining engineers were much impressed with the mining industry of Canada.

The mineral production of Canada for 1907 was valued at $86,183,477 as compared with $70,057,308 in 1906 and $28,485,023 ten years ago. The gold and lead production decreased considerably, the former by $3,220,436, equal to 18 per cent., and includes every district, with the exception of Nova Scotia.

Engineers' Club.

The opening meeting of the Engineers' Club was held on October 1st at the club rooms, King Street West. President Sing presided, and a large number of members were present.

The main item of the evening's proceedings was a paper read by Mr. W. G. Bligh, M. Inst. C.E., formerly in the Public Works Department of India, on the design of river weirs founded on sand. The lecture was accompanied by numerous lantern slides representing drawings illustrative of the subject.

A short resumé of this paper may be of interest to our readers, as it deals with a subject quite new to most members of the profession interested in irrigation works. Firstly, it was shown that the conditions governing the flow of water through the sand substratum of a dam or weir are identical with those well known to exist in the case of pipes, viz., that the velocity of the current is a constant throughout, its value being dependent on the fineness of the particles of sand through which it is compelled to percolate, as well as the length of the base of the superimposed structure. The hydrostatic upward pressure on the base of the weir wall and its protective horizontal apron are similar to the case of a pipe line measured by the ordinates drawn from the level of the tail water to the hydraulic grade line, which latter is the hypothenuse of a right angle triangle whose base is the length of the floor and whose perpendicular the head or difference of levels between the head and tail water.

The problem, therefore, resolves itself into the following, that the stability of a weir on a sand foundation from a statical point of view can be definitely assured by providing a length of base of the structure sufficient to effect the neutralization of the velocity of the percolating stream to a negligible quantity. The required thickness at any point is also definitely determinable from the area of hydrostatic pressure.

As the pressure head diminishes with the length given to the base, the latter must clearly be a multiple or coefficient of the head, or symbolically $l = cH$, in which expression l is the effective base length of the impervious superstructure, i.e., including all vertical depressions and sinuosities. The design, therefore, hinges entirely on the values adopted for the coefficient c. These values are obtained from existing examples of successful and unsuccessful weirs, the failures proving as usual the most valuable object lessons, and the values adopted vary from 18 for Nile quicksand, to 9 for boulders and sand, 15 and 12 being respectively the coefficients for ordinary light and coarse river sands. Thus, with a given height of weir of 12 feet the length of the base would be (from the formula $l = cH$) for a fine sand of Class I. $12 \times 15 = 180$ feet.

The value of the projection of the horizontal floor to the rear of the drop wall, where the conditions differ from those existing with the fore apron in its freedom from hydrostatic pressure, as well as from the erosive effect of falling water, was then treated at some length, as well as the value of vertical curtains of steel or concrete steel sheet piling. The method of design of parts of an overfall weir under given conditions of head and sand coefficient were then illustrated on the graphical system now first introduced by the author. Several such examples illustrating this method of design were given in the paper.

Next, examples of critical analysis of the section of the Narora overfall weir were given, illustrating the hydraulic grade lines and effective base lengths of this section under three conditions: Firstly, as originally constructed; secondly, as it was when failure took place, and thirdly, as repaired by extension of its rear apron. At this stage it was shown that the principles already enumerated applied equally well to weirs which had no impervious apron, but were built of masses of loose rock, pitched to a slope; in fact, the Indian anicut or loose-rock weir, of which one example exists in America, viz., the Laguna weir on the Colorado River.

The efficiency of the vertical party walls in the fore apron in compelling percolation through the sand base was touched on, and two examples were illustrated, one, the section of the celebrated Okhla weir, which has no vertical curtains whatever, and the other the Dehri weir, over the Son River, which is 2½ miles long, and carries a discharge of 730,000 second feet. The improvement which could have been effected in this section by removing the two rows in five miles of curtain blocks, substituting one row of concrete sheet piles at the rear of the work, was brought to notice, as well as the immense saving such an alteration in the design of the section would effect, while assuring equal or greater stability.

After this a large number of graphically analysed sections of Indian weirs of several distinct types were exhibited on the sheet and commented on. Alternative sections were also given illustrative of suggested change in type or design, among the most notable being the section of the Damietta and Rosetta subsidiary weirs, recently constructed over the Nile in Egypt. A short description was given of the novel method of subaqueous construction first adopted in this great work, which, when better known, will revolutionize older systems. Objectionable points in the design were brought to notice and remedy suggested in an alternative section.

The last section was that of the Sidnai needle weir on the Ravi River, a valuable object lesson in the successful application of clay, surfaced with shallow brick blocks, lime grouted, as a material for the fore as well as the rear apron of a weir, a system which the lecturer considered could be applied in many cases with great advantage as regards cost.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

5246—Sept. 23—Authorizing A. A. Granger, Montreal, P.Q., to lay a 9-inch water pipe under the track of the C.P.R. at L'Epiphanie, P.Q.

5247—Sept. 23—Authorizing the muncipal Township of Maidstone to erect, place, and maintain its wires across the tracks of the M.C.R.R. at one mile east of Essex Station, Ont.

5248—Sept. 28—Authorizing the city of Hamilton to lay a 6-inch water pipe under the tracks of the G.T.R. where Liberty Street crosses same, between Hunter and Yonge Streets, Hamilton.

5249 to 5251—Sept. 22—Authorizing the municipal Township of Maidstone to erect, place, and maintain its wires across the tracks of the MC.R.R. at 300 feet west of Woodslee Station, one mile west of Woodslee Station, two miles west of Woodslee Station, Ont.

5352—Sept. 25—Authorizing the Burford Electric Light Co. to erect, place, and maintain its wires across the tracks of the G.T.R. at Maple Avenue, Burford, Ont.

Delayed Order, No. 5310, dated Sept. 17th, authorizing the Consumers' Gas Co., of Toronto, to lay a 20-inch gas main under the tracks of the C.N.R. where the same crosses Eastern Avenue, Toronto, Ont.

5352—Sept. 25—Authorizing the Burford Electric Light, Heat and Power Co. to place its electric wires across the track of the G.T.R. at Maple Avenue, Burford, Ont.

5353—Sept. 14—Authorizing the C.N.R. Co. to fence its right-of-way between Canora and Tiny, in the Province of Saskatchewan, and that the work be completed before the 1st December, 1908.

5354—Sept. 29—Authorizing the C.P.R. Co. to construct an additional track across public highway at Rolling Dam, New Brunswick, on its St. Andrew's Branch.

5355—Sept. 29—Authorizing the Noisy River Telephone Co. to place its wires across the track of the G.T.R. at Collingwood Street, village of Creemore, Ont.

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.

Nova Scotia.

YARMOUTH.—Tenders will be received up to October 27, 1908, for the construction of a three storey building on Cliff Street, Yarmouth, N.S., for the Yarmouth Young Men's Christian Association. Specifications may be seen at the Y.M.C.A. Rooms, or at H. G. Tedford's, Collins Street.

New Brunswick.

ST. JOHN'S.—Tenders for St. John's harbor improvements will be received at this office until 16 o'clock on Monday, the 12th October, 1908. Plans, specifications and the form of the contract to be entered into can be seen at the office of the Superintending Engineer of the Quebec Canals, No. 2 Place d'Armes, Montreal, on and after Thursday, the 1st October, 1908. J. W. Pugsley, Acting Secretary, Department of Railways and Canals.

Ontario.

MISSION RIVER.—Tender for dredging will be received until 15th October, 1908, at 4.30 p.m., for dredging terminal basin at mouth of Mission River, Ontario, and also for dredging an additional three feet over the areas already dredged to a depth of 22 feet in the Kaministiquia and Mission Rivers as specified. Nap. Tessier, Secretary, Department of Public Works, Ottawa.

OTTAWA.—Tenders for Trent Canal will be received until 16 o'clock on Tuesday, the 20th October, 1908, for the works connected with the construction of Section No. 7, Ontario-Rice Lake Division of the canal. Plans, specifications and the form of the contract to be entered into can be seen on and after the 26th September, 1908, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro', Ont., at which places forms of tender may be obtained. L. K. Jones, Secretary, Department of Railways and Canals.

PORT BURWELL.—Tenders for Port Burwell breakwater extension and dredging will be received at this office until 4.30 p.m. on Tuesday, November 3, 1908, for the construction of an extension to the breakwater and dredging at Port Burwell, Elgin county, Ontario, according to a plan and specification to be seen at the offices of J. G. Sing, Esq., engineer-in-charge, Confederation Life Building, Toronto; H. J. Lamb, Esq., engineer-in-charge, London, Ont., on application to the postmaster of Port Burwell, Ont., and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works.

RONDEAU.—Tenders for Rondeau breakwater and dredging will be received at this office until 4.30 p.m. on Friday, October 30, 1908, for the construction of a breakwater and dredging at Rondeau, Kent county, Ontario, according to a plan and specification to be seen at the offices of J. G. Sing, Esq., resident engineer, Confederation Life Building, Toronto; H. J. Lamb, Esq., resident engineer, London, Ont., on application to the postmaster at Rondeau, Ont., and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works. (Advertised in the Canadian Engineer.)

TORONTO.—Tenders for the trades mentioned below in connection with the above work will be received by registered post only, addressed to the undersigned, up to noon on Monday, 12th October, 1908: 1. Slating and galvanized iron work. 2. Painting and glazing. Plans and specifications may be seen and forms of tender and all information obtained at the office of the city architect, Toronto. Joseph Oliver (Mayor), Chairman Board of Control

Manitoba.

BRANDON.—Sealed tenders are asked for the erection of certain buildings, in whole or in part, in the city of Brandon, for Brandon Gas and Power Co., Limited. Drawings and specifications can be seen at 723 Louise Avenue. Geo. H. Harper, chief engineer. 723 Louise Avenue.

CONTRACTS AWARDED.

Ontario.

DUNDAS.—The Northern Electric and Manufacturing Co., Limited, Montreal, have been warded the contract for the fire alarm system for this town.

HESPELER.—The contract for pipe and special castings was given to the Gartshore-Thomson Co., Hamilton; hydrants, valves and valve-boxes to the Canadian Foundry Co., Toronto, and for fire pump, the Canadian Foundry Co., Toronto.

HESPELER.—The town council has let the contracts for the fire protection pipe line. The excavating and back-filling will be done by the Concrete Engineering and Construction Co., of Toronto, and the pipe and castings by the Gartshore-Thompson Co., of Hamilton. The hydrants, valves and pump will be purchased later.

NEWMARKET.—Mr. Isaac Rose, of Newmarket, has closed a contract with the Metropolitan Railway Co. to build stations at Jackson's Point and Sutton.

THOROLD.—Mr. Joseph Hunt secured the contract for sodding the sedimentation basin at 7 cents per square yard.

Manitoba.

WINNIPEG.—The tender of the Western Coal Co. to supply 200 to 400 tons of coal for the high-pressure plant at $5.99 per ton has been accepted.

Saskatchewan.

SASKATOON.—A contract for the construction of a public building at Saskatoon, to cost $13,300, has been let to Dion & Simoneau, of Cookshire, Que.

LIGHT, HEAT, AND POWER.

Ontario.

ST. CATHARINES.—The Lincoln Electric Light and Power Co. secured the contract from the city for light at the following prices for a period of seven years, commencing September 1, 1908, for the sum of $50 per arc lamp per year. The city will also agree to use 100 arc lamps by December 31, 1909. The St. Catharines Gas Co. put in a tender as follows: 325 gas lamps for $26 per lamp, 9 gas arcs for $55 per lamp. The small lamps to burn on an all-night schedule, the 9 gas arcs to burn full until midnight; one mantle after midnight. The schedule to be operated as stipulated in our present contract. The Light Committee in reporting submitted a comparative statement as follows:—

325 gas lamps at $26	$8,450 00
9 gas arc lamps at $55	495 00
Total	$8,945 00

Lincoln Electric Light and Power Co.'s propoosition, under which the present gas lamps, together with at least 81 electric arc lamps would be used:—

125 gas lamps at $28	$3,500 00
11 gas lamps at $27.50	302 50
81 electric arc lamps at $50	4,050 00
Total	$7,852 50

Showing a saving by the latter proposition of $1,092.50.

TORONTO.—The Court of Appeal is hearing the appeal of the Hamilton Cataract Light and Power Co. from the decision in favor of the Royal Electric Co. of Montreal. This latter company sued to recover $60,000 for generators supplied, and recovered judgment. The defence set up was that the machinery was defective. The question set up before the court was whether the defence had made that argument untenable by continuing to use the machines after declaring they were faulty.

Manitoba.

WINNIPEG.—At a recent meeting of the city council Cecil B. Smith chief power engineer, sent in a letter suggesting that $22,000 be provided for expenditures necessary on the power scheme before winter sets in. The work to be covered by the $22,000 is given as follows: Earth excavation, $10,000; camp for general work, $1,000; water tank and pipes for city's locomotive, $2,000; permanent house for engineers, $2,000; engine shed, $500; 24 miles of telephone lines, $6,500.

Alberta.

LETHBRIDGE.—Smith, Kerry & Chace, of Toronto, have been instructed by the town council to design and construct a steam-electric generating station, which will involve the use of certain elements in the old station, which has recently been purchased by the city from the Lethbridge Electric Co. The new station will be equipped with approximately 1,000 kw machinery, including steam water-pumping unit, coal-handling apparatus, etc.

Saskatchewan.

YELLOW GRASS.—The Yellow Grass Elctric Light and Power Co. has been formed under a municipal franchise for the purpose of erecting an electric lighting and power plant for Yellow Grass.

British Columbia.

NELSON.—The corporation is having plans and specifications prepared for the construction of extensions to its hydro-electric plant on the Kootenay River, involving machinery for a second unit having a capacity of 1,000 kw.; also transmission circuit and equipment for sub-station. Smith, Kerry & Chace, Toronto, have charge of the work.

RAILWAYS—STEAM AND ELECTRIC.

Quebec.

MONTREAL.—According to a Vancouver despatch the Canadian Pacific Railway is to acquire the White Pass and Yukon Railway, which runs from Skaguay to White Horse, and also the line of steamers running in connection with the railway from White Horse to Dawson City.

QUEBEC.—The Canadian Northern Quebec Railway will open on December 1st their new line from Garneau Junction to this city. Mackenzie & Mann will then have 650 miles of road in operation in this Province. In addition, they have 75 miles projected in other parts of the Province, principally around Lake St. John, in Chicoutimi and Roberval districts. A ten-mile branch is also being built in Montcalm county, between St. Jacques and Rawdon.

Manitoba.

ARDAL.—About thirty men are busily at work grading the road of the C.P.R. extension from Teulon, at this end of the line, while at the other end over one hundred and twenty graders are distributed over about six miles of the road, nearly twelve miles south from here. The work is progressing favorably though slowly, and it is hoped that the grading will be finished this fall.

EMERSON.—Surveyors are here to stake out the direct line east of Red River for the Great Northern Railway from Emerson to Winnipeg. A lot of good country will be tapped between the C.P.R. and the river. The surveyors are not wasting any time in laying out the new route, and it will not take them long to reach Winnipeg.

EMERSON.—The surveyors for the Continental Midland Railway have reached here and commenced the survey toward Winnipeg. The road will run on the east side of the Red River, paralleling the Canadian Pacific into the city. Only sixty-five miles now remain to complete the distance between Galveston and Winnipeg. Construction will commence from St. Louis in the early spring, and it is expected that the road will be in operation in 1911.

Alberta.

EDMONTON.—William Burns, a C.N.R. surveyor and engineer, and E. M. Hill, assistant engineer, have returned to the city from the country west of Edmonton. They have been engaged for the past eight months in survey work for the Canadian Northern in the Brazeau River district. The grade from the C.N.R. coal property on the Brazeau to the G.T.P. line is such that the coal may be taken down to the G.T.P. without the expenditure of an ounce of steam.

Saskatchewan.

PRINCE ALBERT.—Work on the rail and traffic bridge is progressing splendidly, and quite a large amount of the steel for the superstructure has arrived. The falsework is in place, and the work of putting up the steel will be started at once. The bridge gang are expected from Hamilton, Ont. The hoisting crane has arrived and was placed in position.

British Columbia.

VICTORIA.—The work in the improvement of the roadbed of the Victoria and Sidney Railway is progressing. In about a month it will have been completed, and the local management is of the opinion that the system of the Island line will be as good as the best to be found on the mainland. The repairs to the wharf at Sidney have been finished for some weeks. The dock now is absolutely solid. The toredo-eaten piles have been replaced by new ones.

Foreign.

DULUTH.—The Duluth, Rainy Lake and Winnipeg road will begin construction work on its lines from Virginia to this city shortly.

TELEPHONY.

Ontario.

AYLMER.—The South Malahide and Bayham Telephone Co. have just issued a new directory. They have 600 phone holders connected with Central. Seventy-one of these have private wires. The system covers a radius of twenty miles, and after the installation costs $3 per year.

Saskatchewan.

REGINA.—Unless the weather proves unfavorable it is expected that the system of Government telephones between Regina and Antler will be installed and in working order this fall. The location of the poles and stringing of wires commenced on the 24th of September last, and already something over twelve miles of line have been completed. Antler, the eastern terminal of the system, is located on the Arcola branch of the Canadian Pacific Railway, and is separated from Regina by a distance of 200 miles. Thirty-six poles are employed to each mile of the territory covered. The system will be equipped with a pair of copper wires, of which material the quantity used will amount to 524 pounds per mile.

SEWERAGE AND WATERWORKS.

Ontario.

NEW LISKEARD.—The council will submit a by-law to the ratepayers on October 17th, providing for the issue of $15,000 5 per cent. 30-year debentures for the completion and extension of the waterworks system of that town.

ORILLIA.—Two money by-laws were voted on to-day. One of $10,000 for waterworks extension carried by 111 majority. The other, $30,000 for the completion of the power plant, carried by 126 majority.

RECENT FIRES.

Ontario.

TEESWATER.—The C.P.R. roundhouse and the W. R. Thompson Co.'s sawmill, the one at the southern extremity, and the other near the north end of the town, were burned

to the ground on Saturday night. A freight engine that had come in a few hours before was destroyed, and a snow-plough standing on the track was scorched. This is the third roundhouse to be burned on this site. It was a substantial building, erected two years ago to replace one destroyed by lightning. There is no accounting for the fire.

Quebec.

MONTREAL.—The loss will be nearly $10,000 as the result of the destruction of the C.P.R. roundhouse at Outremont. Three locomotives were damaged.

MISCELLANEOUS

Ontario.

MORRISBURG.—H. A. Pruner, of the Morrisburg Concrete Co., who tendered on the walks here last spring, has constructed during the season $20,000 worth of concrete walks in the towns of Finch, Perth and Athens.

PRESCOTT.—The Geo. Hall Co.'s new coal trestle at Prescott is all ready for operation, and will probably be used on October the 7th, when a boat will be in port. The trestle in nearly 3,500 feet in length, and is of the endless type. Eighteen small trolley cars will be used to distribute the coal. The trestle is 50 per cent. longer than the one at the company's plant in Ogdensburg, and is said to be the biggest between Duluth and Montreal.

SARNIA.—The Standard Chain Co., of Canada, Limited, Sarnia, Ont., have commenced to rebuild their factory, which was destroyed by a tornado last June. They expect to be in a position to manufacture a full line of chain within thirty days. They have a considerable quantity of chain on hand, and are in a position to ship promptly such sizes as they have on hand at Sarnia at present.

Manitoba.

PORTAGE LA PRAIRIE.—Smith, Kerry & Chace, of Toronto, have made a report to the town council on a method of creating an artificial lake by diverting the waters of the Assiniboine River.

WINNIPEG.—The directors of the American Steel and Wire Co., of Illinois, a subsidiary company of the United States Steel Corporation, arrived here this morning to complete the purchase of the Munroe Steel Works and to erect a big plant here.

WINNIPEG.—H. N. Ruttan, city engineer, placed before the Board of Control his first official statement in regard to the efficiency of the high pressure plant. The statement came as a reply to the letter from the Insurance Committee of the Board of Trade asking when the city would formally accept the plant, the underwriters having declared that there would be no reduction in insurance rates until the plant has been taken over by the city. The engineer says that the pumps and engines are satisfactory, but that the test of the gas producer plant showed that it had not sufficient capacity to operate the whole plant. The engineer describes the underwriters' action in waiting for an official acceptance of the plant as a "mere pretext."

PERSONAL.

MR. G. H. PERLEY, of the C.P.R. engineering staff, Embro, Ont., has removed to Andover, N.B.

MR. W. G. CHACE, B.A. Sc., of Smith, Kerry & Chace, Toronto, has removed to Winnipeg, Man., and taken charge of the Winnipeg municipal power plant construction.

MR. R. R. JAMIESON, general superintendent of the Central Division of C.P.R., has resigned and has accepted a position with a private enterprise at Calgary, Alta.

MARKET CONDITIONS.

Toronto, October 8th, 1908.

Keeping pace with the improving fall demand for various kinds of merchandise there are more requests for pig-iron, in both city and country. Structural steel is not in equal demand for the reason that factories or other large buildings are not numerous among the structures launched today. But plenty of small or moderate dwellings are under construction. The general movement in metals keeps up, and any increase in price would make them more active still. Bricks are moving moderately. In cement the anomaly is presented of retail dealers being busy with small orders, while prices are lower at wholesale, and manufacturers say no round lots are moving. White pine is quiet at steady prices; hemlock active, hardwoods in slack demand.

Things are shaping better in the United States. Reports to end September from 35 car-service bureaus say that the last fortnight has witnessed a decrease of 49,045 in the list of unused railway cars, the number of which is now 173,587, whereas in midsummer it was over 300,000. The aggregate number in use by the 35 associations, 2,441,720 cars in August was below the 2,998,237 cars reported for August, 1907. Much of this demand for cars comes from the lumber states of the North-West, although the cut of white pine is reduced there. In the South there is a marked decrease in the cut of yellow pine, and not much activity in it. Demand for pig-iron is better in the States, but that for structural steel is very slowly improved, if at all.

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

Antimony.—Price unchanged at 8¾c., with moderate demand here, but prices are advancing outside.

Bar Iron.—$1.95 base, from stock to the wholesale dealer.

Boiler Plates.—¼-inch and heavier, $2.40. No special activity. Boiler heads 25c. per 100 pounds advance on plate.

Boiler Tubes.—Demand limited. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per foot; 2-inch, $8.50; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $12.10; 3½-inch, $15.30; 4-inch, $19.45 per 100 feet.

Building Paper.—Plain, 30c. per roll; tarred, 40c. per roll. Weather still too fine to make demand brisk.

Bricks.—Common structural, $9 per thousand, wholesale, and the demand moderately active. Red and buff pressed are worth, delivered, $18; at works, $17.

Cement.—The market is lower; cement can be had in 1,000 barrel lots at $1.80 per barrel, including the bags, which is equal to $1.40 without bags. Overproduction is evident, and demand is not brisk in a wholesale way. The smaller dealers, however, are busy selling small quantities.

Coal Tar.—In improved request; $3.50 per barrel the ruling price.

Copper Ingot.—Still active; prices unchanged at 14¼c.

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

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

Roofing Felt.—There is much more demand and a better feeling. Price $1.80 per 100 pounds.

Fire Bricks.—English and Scotch, $32.50 to $35; American, $28.50 to $35 per 1,000. Demand continues fair.

Fuses—Electric Blasting.—Double strength, per 100, 4 feet, $4.50; 6 feet, $5; 8 feet, $5.50; 10 feet, $6. Single strength, 4 feet, $3.50; 6 feet, $4; 8 feet, $4.50; 10 feet, $5. Bennett's double tape fuse, $6 per 1,000 feet.

Galvanized Sheets—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.05; 12-14-gauge, $3.15; 16, 18, 20, $3.35; 22-24, $3.50; 26, $3.75; 28, $4.20; 29 or 10¾, $4.50 per 100 pounds. Fleur de Lis—28-gauge, $4.30; 26-gauge, $4.05; 22-24-gauge, $3.50. Queen's Head—28-gauge, $4.50; 26 gauge, $4.25; 22-24-gauge, $3.70.

Iron Chain.—¼-inch, $5.75; 5-16-inch, $5.15; ¾-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.

Iron Pipe.—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch $3.56; 1-inch, $5.11; 1¼-inch, $6.97; 1½-inch, $8.37; 2-inch, $11.16; 2¼-inch, $17.82; 3-inch, $23.40; 3½-inch, $29.45; 4-inch, $33.48; 4½-inch, $38, 5-inch, $43.50; 6-inch, $56. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.71; 1-inch, $6.76; 1¼-inch, $9.22; 1½-inch, $11.07; 2-inch, $14.76. Rather more movement following the natural fall demand.

Lead.—Active, but slightly irregular. We still quote $3.90.

Lime.—In adequate supply and moderate movement. Price for large lots at kilns outside city 21c. per 100 lbs. f.o.b. cars; Toronto retail price 35c. per 100 lbs. f.o.b. car

Lumber.—Dressing pine we quote $32 to $35 per thousand for usual lengths (12, 14, and 16 ft.), and stock sizes of boards, and $38 to $40 for special lengths, common stock boards, as to grade, $24 to $28; Cull stocks, $20; sidings, $17.50; Southern pine, moderately firm; Norway pine rather easy. Hemlock moves steadily in small quantities. British Columbia shingles still $3.20; lath, No. 1, $4; No. 2, $3.50; spruce flooring, $25. Prices generally firmer; movement not remarkable, but round lots of hemlock are moving. The Toronto demand is for dwelling construction, factory construction being quiet.

Nails.—Wire, $2.55 base; cut, $2.70; spikes, $3. There is a fair supply and no especial activity.

Pitch.—An active trade at 70c. per 100 pounds. The stock is low, and holders are firm.

Pig Iron.—Rather more enquiry, and prices practically unchanged. Clarence quotes at $19.50 for No. 3; Cleveland, $19.50 to $20; in Canadian pig, Hamilton quotes $19.50 to $20.00.

Rope.—Sisal, 9½c. per lb.; pure Manila, 12½c., Base.

Sewer Pipe.—In good demand; price 70 per cent. off list at factory for car-load lots; 60 per cent. off list retail.

Steel Beams and Channels.—Quiet. We quote:—$2.50 to $2.75, according to size and quantity; if cut, $2.75 to $3; angles, 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.—80-lb., $35 to $38 per ton. The following are prices per gross ton: Montreal, 12-lb. $45, 16-lb. $44 25 and 20-lb. $43.

Sheet Steel.—Market steady, with fairly good demand; 10-gauge, $2.50; 12-gauge, $2.55; American Bessemer, 14-gauge, $2.35; 17, 18, and 20-gauge, $2.45; 22 and 24-gauge, $2.50; 26-gauge, $2 65; 28-gauge, $2.85.

Tool Steel.—Jowett's special pink label, 10½c. Cyclops, 18c.

Tank Plate.—3-16-inch, $2.50.

Tin.—The United States market is strong and a little higher. Prices looking upward here, price still 30 to 33c., irregular here at 30 to 32½c.

Zinc Spelter.—Business very good at unchanged prices, say, $4.90 to $5.

* * * *

Montreal, October 7th, 1908.

The pig-iron markets of the United States are almost featureless. There continues to be some fair sales in basic grades, but foundry grades are unchanged. It is now generally expected that there cannot be any very great revival until towards spring, at any rate.

In England, producers are evidently looking for a recovery before long. During the week, four more furnaces in the Cleveland district have resumed operations, after being out of blast for several months. Stocks in store remain practically the same as previously, the increase being not more than 1,000 tons per week. There is a better demand for hematite pig for steel making purposes. The situation in Germany is expected to be cleared up within the next week or ten days, and if the agreements are renewed a decidedly steadying effect upon the English market will be the result.

In the local market, prices of pig continue steady. Supplies are arriving constantly, although in more limited volume than usual, at this time of year, this being the period in which supplies for the winter are brought in. The SS. "Inishowen Head," which went ashore a short distance above Quebec recently, carries some 3,100 tons of pig-iron, the greater part of