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The Canadian Engineer

ESTABLISHED 1893

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TORONTO, CANADA, OCTOBER 23rd, 1908.

CONTENTS OF THIS ISSUE.

STRIKES AND A SOLUTION.

The opinion has been often expressed that trades unions are better managed in the Old Country than in America. And the reason given for this is the large proportion of middle-aged or elderly men connected with their management. The younger and bolder men, probably prevail in the councils of the unions in the United States and Canada. Demands are made by them upon employers which workers of greater age and more experience know to be unfair, or at least impossible to be conceded. Business conditions will not admit of them. But the enthusiastic young worker or the truculent walking delegate cares little for business conditions, if they interfere with his demands.

Within the week, a piece of news comes from Yorkshire which ought to give pause to striking workmen and their leaders. A ship-builder and ship-owner of experience and wealth, Sir Christopher Furness, makes the declaration, at a conference between capital and labor held at West Hartlepool, that the relations between ship-building mechanics and ship-yard owners have become intolerable to the latter. He, therefore, asks that the following proposals be considered:—

First, that strikes must cease, or the works would be closed.

Second, if the trades unions thought they could carry on the business themselves, the firm was willing to sell out at a price to be fixed by assessors.

Third, if the unions would not, the firm was willing to admit its workers as partners on a profit-sharing basis; and,

Fourth, that a council be formed to settle all disputes, or refer them to accredited arbitrators.

If the trades unions really believe, as their actions indicate they believe, that their employers are always and everywhere making money and have no difficulties to surmount, here, in these proposals, one would think, is a chance for the men. Assuredly it looks as if this Englishman offered them the long end of the stick. For he says: "Come, now, lads; I'll sell out to you. Or, if you won't buy, I'll make you my partners, on a profit-sharing basis. And if you agree to neither, and will not consent to have all disputes settled by a council and stop this everlasting striking, the works will close." It would be as difficult to deny the fairness of these offers as to wonder at a capitalist, who rather than have his capital imperilled longer by unreasonable strikes, determines to close his works and put a stop to the men's earnings. But it is very doubtful if the obstinacy of the men will yield. Here is an instance of their unreason:—

Years ago, in the early nineties, if memory serves, masters and men in the iron trade of Great Britain came to loggerheads over a matter of wages. The furnaces were shut down, and for many months remained so. So great a commercial stagnation ensued and so widespread was the distress arising from lack of work that the foremost men in the kingdom came together to consult daily for weeks upon the situation. Bankers, members of Parliament, Cabinet Ministers, were closeted with iron-masters and trades union delegates, the object being to arrive at a solution of the vast industrial difficulty.

The solution was reached at last. A committee was formed, composed of prominent men in manufactures

and commerce and intelligent men from the ranks of the iron workers, which committee should meet quarterly to settle the men's wages upon a sliding scale, a fixed relation being established between the price of iron or steel and the daily wage of the worker. Thus: beginning with, say, 1st May, if the price of the billet was so much per hundredweight, the wage for the quarter should be so many shillings per day. If steel advanced in price, the wage should advance pari passu. If steel declined in the world's market, the men's wages must come down.

For a time, all was well. That is to say, the steel market steadily tended upwards, and the men's wages followed its rise. A period of activity in steel production ensued, and for many quarters in succession there was an unbroken series of advances in price of steel and a corresponding increase in wages of the prosperous "workingman," who admitted that the conference committee was a heaven-sent institution.

But, observe—the **very first time** that this quarterly arbitration board had to report that the price of steel showed a decline and that men's wages must come down, the men refused to abide by the agreement of their representatives—ceased work rather than agree to it! This breach of faith interrupted a current of prosperous activity in the British iron and steel trade and laid the foundation for a lack of confidence between iron-master and iron-worker which has affected—may one not say embittered—their relations ever since.

Therefore, having this painful instance in mind, one can hardly expect the workers to agree to Sir Christopher's fourth proposal, which is the formation of a council to settle all disputes. As to the two which offer the men a choice of buying out a shipyard or becoming partners in it, they seem as unlikely as the other, in the present temper of the men. It would seem, then, unhappily, that the alternative of closing the works is the only one, if the workers will not listen to the voice of reason.

PRESENT PRICES AND DEMAND.

Under this head the "Canadian Cement and Concrete Review" in the October number, discussing the situation, said:—

In looking over the present building situation in Canada one cannot but be convinced that low prices and light demand go hand in hand. While it would seem that low prices of building materials should stimulate trade, such is not the case. Supply and demand regulate current prices. Light prices usually stand for a small margin of business as well as a small profit. Comparing present prices of building materials with those of a year ago they may in general be nominally the same; however, materials may and have been purchased much below the schedule of 1907. Tenders for both large and small work have been in many cases considerably below those furnished a year ago. Builders could hardly hope for better conditions for building. The present condition of the labor market makes it possible for any builder to obtain the most efficient labor at moderate wages. . . . Low cost of materials, a much beter class of workmanship and greater efficiency of labor with the associated saving of time, all point to the present as a time to build. With less work available, competition is more keen and better service will be rendered. With the smaller outlay and many to choose from, the builder of to-day should realize well on his investment. At the present time of money tightness, however, many problems have to be solved by him in his efforts to decide this question. The interests of the various elements of trade are securely linked together, and we could hardly expect to see activity in the building trade coincidently with a depression in other lines. A loosening up of the money market and a general revival of business activity would doubtless do more to stimulate the building trade than can ever be accomplished through low cost of materials, abundance of labor and the other conditions of cost associated with a financial depression that might tempt the speculative builder.

THE CANADIAN SOCIETY ANNUAL MEETING.

The Toronto branch of the Canadian Society of Civil Engineers have invited the parent society to hold the next annual meeting, which will be held during January, 1909, in Toronto. At the last annual meeting held in Montreal there was a strong feeling that this year it should be held in some outside city. Ottawa, Quebec, Toronto, and Winnipeg men mentioned as centres that would welcome Canadian engineers and centres in which a meeting of the society would awaken interest in the organization.

By some arrangement the choice of meeting place has narrowed down to Montreal or Toronto, and in the final decision the members near and dwelling in Montreal will likely be found desiring a Toronto meeting.

The Toronto Branch is strong in numbers, organization and on entertainment. A society endeavoring to unite engineers in a country so vast, so cosmopolitan, and suffering so from growing pains, as Canada, must come to the individual member as much as possible. It would be a great help to the Canadian Society to meet in 1909 in Toronto.

But while on the subject more might be said. It would be a mistake for the annual meeting to oscillate between Montreal and Toronto. There are other cities where successful meetings might be held.

Other cities than Toronto have branch societies. In other cities a little campaigning would arouse enthusiasm enough to assist in organizing branches in those cities and nothing better than an annual meeting held there, could be used to open the campaign.

INACCESSIBLE ECONOMIZERS.

When the rapid increase in a factory's requirements for steam far exceed those anticipated at the time the boiler plant was laid out the installation of economizers is often the best remedy. In such instances an economizer must usually be placed with secondary regard to ease of access and cleaning. But what excuse can a consulting engineer offer for placing an economizer between the boiler-house wall and the by-pass flue in such a way that repairs or cleaning is practically impossible, particularly in a new plant where the value of land is of very little importance.

In a specific case where this was done the choking of the draft through the dirty economizers made it absolutely necessary that the by-pass damper should be partly opened even with a light load. The designer of the plant explained that a higher volatile coal was being burned than that for which the plant was designed, and that as a consequence the economizer could not handle all the gases because of the resulting increase in volume. But an analysis of the coal by the Coal Department of the Arthur D. Little Laboratory, Boston, showed that the coal being burned actually contained 2 per cent. less volatile than the coal originally designated. Under this condition the economizer was increasing the efficiency by less than 3 per cent.

BECOMING A CHESTNUT.

Once more it is officially announced to-day that "work will soon begin" on the hydro-electric transmission line. One feels like saying, as Hamlet did to the player, "Come, leave thy damnable faces and begin."—Hamilton Herald.

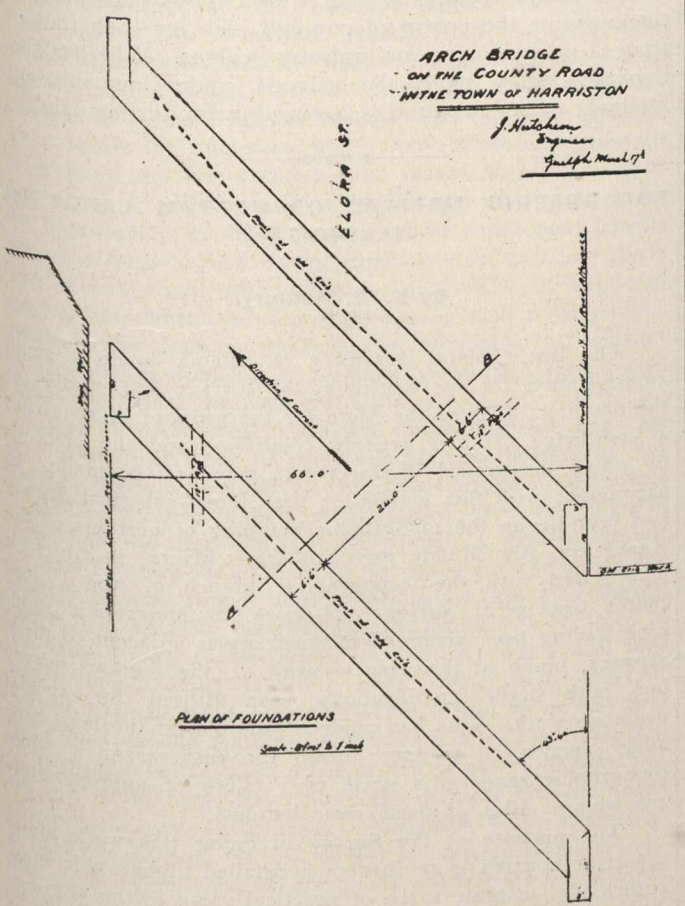
—An important deal has just been put through whereby Nobels, the famous English powder manufacturers, have purchased the Acadia Powder Company's plant at Waverley, near Halifax.

CONCRETE IN MUNICIPAL BRIDGE WORK.*

By James Hutcheon, O.L.S., Guelph.

Twenty years ago the use of Portland cement concrete was very limited in this Province. The manufacture of Portland cement in Canada was at that time still in the experimental stage. The cement then being used was imported from Europe, and, being high in price, its use was confined chiefly to difficult foundation work, and to a limited extent in sidewalks and street pavements.

The use of cement concrete for sidewalk construction came rapidly into favor, because of its substantial appearance and durable qualities, compared with the materials then in use.



Plan of Foundations of Concrete Arch Bridge, Harriston, Ont.

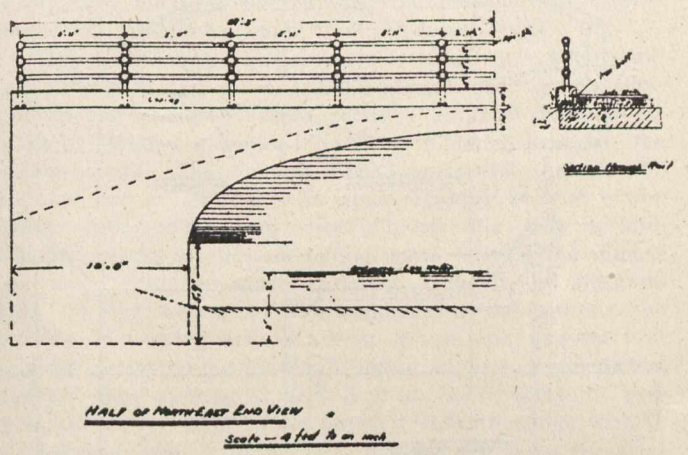
Though its value for that purpose was at once recognized, yet even ten years ago there were very few municipal councils who would consent to its use in bridge abutments, though some would permit it to be used in the foundations. To-day concrete has almost entirely displaced both stone and wood in the construction of abutments, short-span bridges, and culverts.

It is in almost universal use for foundations and in the basement walls of large buildings, and even in the cellar walls of low-cost buildings it occasionally takes the place of rubble masonry, while in the form of concrete blocks or of moulded artificial stone it has a recognized place among the ordinary building materials. But the widest field for expansion in the uses of concrete lies in its combination with steel in the form of reinforced concrete.

Rapid though the increase in the uses of concrete have been, the literature on the subject has kept pace with the growth, till every phase of this subject appears to be covered.

So much prominence is, however, given to the newer methods of construction with reinforced concrete that we are apt to forget that plain concrete still has its uses, and, perhaps, think that if our designs do not provide for reinforcement they are not quite up to date.

The experimental knowledge of the action between steel and concrete is now so complete, and the experience with its use in construction so extended that its safety and durability are beyond question, when used

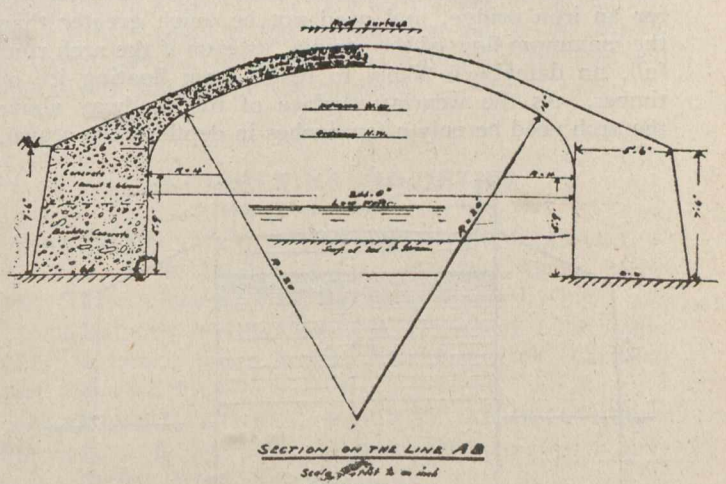


Side Elevation, Concrete Arch Bridge at Harriston, Ont.

with reasonable skill and intelligence. The want of this skill must for a time retard its use in municipal work, as the necessity for careful supervision of concrete work is not yet fully realized by the average council.

The work, as a rule, is let to the lowest bidder, and often goes to an inexperienced contractor to be carried out, under the inspection of a commissioner or a member of the council without previous experience or knowledge of the work.

Limited in this way, the engineer, however much he may admire other styles of construction, will confine his designs in concrete to types within the capacity of those who are to carry out those designs. The plain concrete arch is without exception the best form of construction for culverts or short-span bridges under such conditions, and spans up to 30 or 40 feet in length can

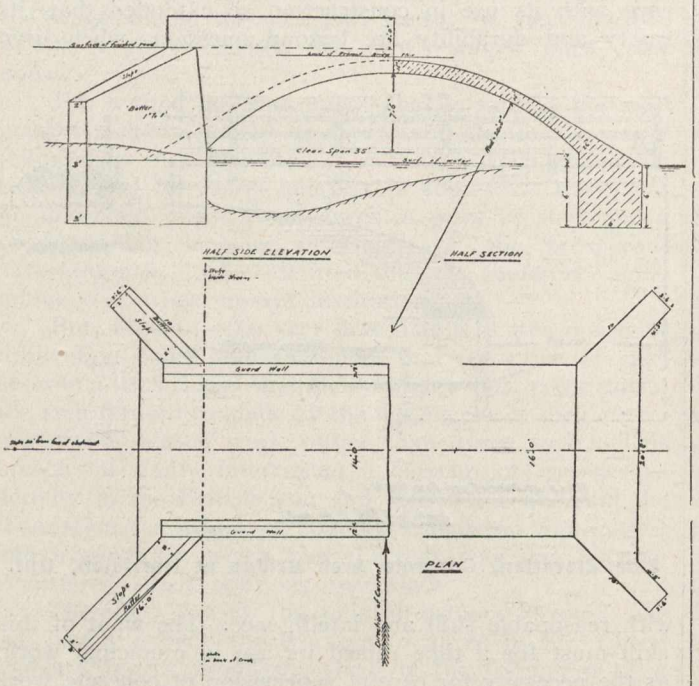


Section of Concrete Arch Bridge, Harriston, Ont.

be built by local building contractors at prices which compete with steel bridges, when we take the cost of the abutments for the steel bridge into account, while the appearance and durability of the arch gives it a decided preference. The span length should be limited to something like the length named, as an increase in span much above the length mentioned necessitates more expensive false work and more difficult construction, with the increased danger of settlement during construction, so that where a greater length of bridge is required the

*From the 1908 Proceedings of the Association of Ontario Land Surveyors.

length should be made up by increasing the number of spans rather than by increasing their length. In situations presenting no unusual difficulties in obtaining safe foundations, it will often be found that two short spans of, say, 20 feet each, can be built for less money than a single span of 40 feet, and at the same time give a bridge of more pleasing appearance. In fixing the proportions

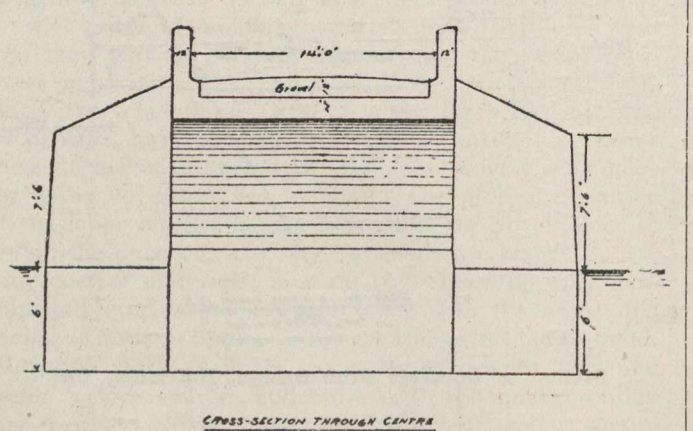


Plan, Half Side Elevation and Half Section of Concrete Bridge, at Arthur, Ont.

of the arch we cannot do better than remember the old rule that the rise should not be less than one-sixth of the span, but in many cases the formation of the ground will admit of a greater rise than this, especially if the spring of the arch be kept near the low water surface.

If the arch is low and flat, its appearance will usually be improved by making it of the three-centre form, using short curves with a radius of four feet or thereabouts at the abutments.

In an arch bridge the opening or waterway may usually be considerably smaller than would be necessary for an iron bridge, and need not be much greater than the maximum flow of the stream, as even if the arch runs full, no damage is likely to result from floating ice or timber. As the wearing surface of the roadway above the arch need be only a few inches in depth at the crown,



Section through Centre, Concrete Bridge at Arthur, Ont.

there are very few places where this form of bridge cannot be used without much change in the grade of the road.

In the construction of the piers and abutments, the cost may be kept down without impairing the quality of the work by using boulder concrete. Below ground a 1 to 6 gravel concrete may have as much as fifty per cent. of the volume of the work made up of boulders. When so used the concrete should be mixed wet, so that the stones will bed themselves in it. Towards the spring of the arch the percentage of boulders should be reduced. In the arch ring a concrete of one part cement to five parts gravel has given good satisfaction.

If the gravel available for the work is fine or sandy, part of it should be replaced with broken stone. In a flat arch, a concrete of 1 cement, 2 sand and 4 broken stone is to be preferred. In the guard walls, a gravel concrete of 1 to 8 is sufficient. The thickness of the arch ring in short-span bridges is a question about which we have little available information. The writer a few years ago built a 20-foot arch, with a low rise and a thickness at the crown of 10 inches. A month after completion it carried a 15-ton roller. In several 35-foot spans the thickness has been made fifteen inches at the crown. It would, therefore, appear that within these span limits a thickness at the crown of one-half inch for each foot of span is safe practice for highway bridges. Whether this thickness may safely be reduced under our present methods of construction is a question for further trial.

TOPOGRAPHIC MAPPING OF BOTTOM LANDS IN ILLINOIS.*

By E. W. McCrary.†

The last General Assembly of Illinois made a small appropriation for the beginning of surveys and studies of the overflow lands of the State for the purpose of acquiring a knowledge of their existing conditions and the methods by which the needed improvements may best be made. In accordance with this legislation the State Geological Survey last year began the topographic mapping of portions of the Kaskaskia, Big Muddy and Embarass Rivers, in which it co-operated with the topographic branch of the United States Geological Survey. Co-operative topographic mapping having been arranged in quadrangles adjacent to these streams, much of the control work of the regular survey has, with slight modifications, been utilized for special drainage work. This has made it possible, at the least possible expense, to produce during the past season a 5-foot topographic map on a scale of 1:24,000 of approximately 200 square miles of these river bottoms.

The purpose of the Survey in doing this work along the river courses is to furnish a detailed topographic map, sufficiently accurate to be of practical value to the engineer in the planning of any proposed drainage improvements and the estimating of costs for same. While the question of the scale has been somewhat perplexing, it is believed that the 1:24,000 scale will prove adequate for the uses for which it is intended, since it is sufficiently large to contain all detail that would be taken into account in the planning of these improvements. It has the additional advantage of permitting large sections of country to be mapped on a single sheet of paper, thereby presenting in a collected form the conditions in different sections of the bottoms. Also because of its much reduced cost, which must be considered with a limited appropriation, it has a very strong claim to consideration.

Of the 160 square miles of mapped country, a portion of the Kaskaskia River bottoms, 130 square miles are under from 1 foot to 8 feet of water several times each year. The overflow season usually begins in January, and at times lasts as late as the middle of August, which makes the season, in which the land is dry enough for cultivation, entirely too short for successful farming. It seems to be generally necessary to plant several times each spring, and even with the last planting they cannot hope for a yield to

* From Year Book of Illinois State Geological Survey for 1907.

† Assistant Engineer, Illinois State Geological Survey, Urbana, Ill.

the full capacity of the land. It has been stated that a successful crop, one that has escaped damage by the flood, does not occur oftener than once in seven years. In fact, so completely is this river in possession of its bottom lands that very little effort is made to utilize it in any way, and at the present time it might well be considered mere waste land.

Before the uplands were reclaimed by tiled drains, a rainy season of even a week's duration produced but a slight increase in the flow of the channels of these streams. This was due to the fact that the rain collected in enormous areas of marsh and lowlands and reached these river courses by a very slow and tedious process. The experience of the past summer while making topographic surveys along the Kaskaskia River, shows that a rain of twenty-four hours will now raise the stream from 4 to 10 feet. An explanation of this is readily found in the fact that with the present system of tile drainage and the excellent outlets thereto, water from such a rain is carried quickly from the fields and poured immediately into the upper courses of these steams, and the multiplication of these feeders has forced upon the streams a burden entirely beyond their present capacity. As a result the numerous floods have rendered thousands of acres of the best farming land of the State practically worthless. It will be easily seen that the responsibility for the improvement of the channels of these rivers rests equally upon the farm holders on the upper courses of these rivers with those located nearer their outlet. The principle of general assessment, so thoroughly recognized in legislation providing for drainage districts, can be applied with justice to these larger problems of reclamation which cover all land within individual drainage basins.

The methods used in making these drainage maps are very similar to those of the topographic branch of the United States Geological Survey, the principal difference being that because of the contour interval used, the enlarged scale, and the object of the work itself, a greater amount of detailed work is necessary. As bases for the maps the primary traverse transit lines of the United States Geological Survey are used for position and the primary level lines of the same survey for elevation, in addition to the steel tape measurements along township lines. With these lines for control, a plane table buggy traverse is run along the first ridge road outside the bottom on each side of the river, and as often as possible cross roads, which tie the work together, are run in the same way. Since the distance between roads crossing the river is so great, it has been found necessary, at intervals of from 1½ to 2 miles, to traverse from the outside roads to the river, where points are left for the purpose of being tied on by the stadia traverse of the river. While the wheel method of measurement may be considered crude and inaccurate, a practical test will prove that for scales even longer than the one used in this work, and controlled equally well, it will fully meet all requirements. The accumulative error is slight, and when larger errors are made, they are readily located after the traverse has been tied to itself or to another line.

Over the same roads, and others when necessary, spirit levels are run and numerous elevations painted at summits, bridges, road corners, and other convenient points, while at intervals scarcely exceeding a quarter mile, substantial bench marks are left. The level work is so planned that elevations determined by stadia need not be carried for distances greater than 1½ miles. Experience during the past summer indicates that levels may be successfully carried with this instrument for distances of 3 or 4 miles. The instrument is similar to the ordinary stadia except that it is provided with an attachment which simplifies the reading of elevations at an angle. It has been in use on the United States Geological Survey the last few years, the idea for the improvement having originated with members of that survey.

The frame work of traverse and level lines, together with the stadia traverse of the river and other streams, is adjusted to the land lines and the other available control, after which it is ready for the topographer. This topographic sketching is by far the most difficult work connected with the making of a map, because of the necessity of carrying innumerable stadia lines through the dense jungles of the bottoms. Starting from convenient bench marks, these lines zigzag through the bottoms, the sight being through the openings of greatest length in the general directions of the traverse. The importance of these lines being closely run is clearly shown by a glance at the finished map, for the great number of lakes, sloughs, marshes and isolated hills are features that cannot be reliably mapped except by actual survey. Being hidden, as they are, by dense woods they must be hunted, and the meandering traverse line is the method by which they are found.

On the drainage maps, such features have been carefully traversed and their elevation determined, and in addition to the numerous cross sections at short intervals, a mass of isolated elevations have been left throughout the bottom lands. These stadia lines, as carried through the bottoms, are usually run with great difficulty because of the heavy undergrowth, and especially is this true in midsummer, when, in addition to the dense foliage, the intense heat and mosquitoes make work both difficult and disagreeable. In fact, because of this condition in the bottoms, the problem of keeping help is a very serious one, and the best solution seems to be in the bringing of help from such a distance that quitting at will is made more difficult. Few men will submit long to the physical sufferings met with in the bottoms, even at wages from two to three times the price they can receive elsewhere, if they are where they may reach home within a few hours.

Along with the stadia traverse and levels the relief of the river bottoms and the country adjoining the bottom lands has been carefully sketched. This map of the relief with 5-foot contours should greatly facilitate the study of the river problem. Mere location of the stream course and elevations, be they ever so numerous, does not bring to the eye of the engineer the actual figuration of the surface. It is thought that it will be necessary to inspect most minutely the local physiographic conditions before a successful plan of improvement can be determined. It has been planned, therefore, to present to the engineer who studies this great problem the most complete possible data for his use. It is not claimed that this form of map is the most inexpensive one, even under the favorable conditions under which it was accomplished last season, but it is believed that in the end it will justify itself on the ground of economy in the saving of time and of additional work for the engineer. It also seems that in a study of the carrying capacity of the channel, the effect of possible dike construction and of the control of lateral streams, the topographic features of the map will appeal very strongly to the engineer.

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, J. E. Hutcheson, Ottawa; 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. Union meeting with the Canadian Society Civil Engineers.

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.

American Society of Mechanical Engineers.

The November meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies Building, 29 West 39th Street on Tuesday evening, November 10th. Mr. Franklin Phillips, president of the Hewes & Phillips Iron Works, Newark, N.J., will make an address on "The High-powered Rifle and its Ammunition: Instruments of Precision," illustrated by lantern slides.

Mr. Phillips is an expert marksman, and in 1903 won the position as first alternate on the International Rifle Team to England. He was for many years chairman of the Committee on Rifle and Pistol Practice in the National Guard of New Jersey, and is now ordnance officer of the Second Infantry of that State.

Tests of rifles and ammunition at Sea Girt, N.J., by men connected with the New Jersey National Guard have led to marked improvement in arms and ammunition and to an entire change in the powder used by the Government, thereby greatly increasing the accuracy of the shot. The improvement has been extended to large guns, and instead of 2 per cent. hits, which were made at Santiago, 80 per cent. is now the average in some ships.

Mr. Phillips has actively participated in this work, and, as he is primarily a mechanical engineer as well as a marksman, he will explain to his audience the practical bearing of his investigations upon the construction of arms and the elements entering into ammunition.

Undergraduates' Society, McGill.

A meeting of the Undergraduates' Society Applied Science was held in the Chemistry Theatre on Wednesday, October 14th. The meeting was small in numbers, but those present were amply repaid, for it was one of the most interesting and profitable lectures given before the Society.

Dr. Klotz, of the Department of the Interior, was the speaker of the evening, his subject being "The Datum Plane." He divided it into two parts, the intellectual and the physical. He defined the former as the basis from which we set out, having completed our university course. He dwelt on the importance of absolute accuracy in mathematics, and stated that a misplaced decimal meant nothing in college life except marks, but in actual life it meant failure.

The physical datum plane is the surface of water, at rest or in equilibrium.

Dr. Klotz then outlined the work of the Boundaries Commission and the difficulties experienced in establishing monuments along the forty-ninth.

Dr. Adams, Prof. McLeod and Dr. Barnes were present and spoke briefly in appreciation of the excellent address delivered by Dr. Klotz.

After the addresses business was returned to, and Dr. Adams was unanimously elected honorary president for the ensuing year.

WELDING CONCRETE REINFORCING RODS.

A fair example of the efficiency of the Thermit weld was demonstrated in the construction of the test syphons for New York City's new water supply at Peekskill, N.Y.

These syphons are 11 feet inside diameter and are constructed of concrete, reinforced with steel rings formed of twisted rods bent in the form of a circle with the ends welded together.

Two forms of reinforcement were used, as shown in the drawings.

In figure 1, two rows of 1-in. x 1-in. rings were inserted at longitudinal centres of 4 in.

The contract covering the joining together of the ends of these rods called for a joint efficiency of 75 per cent., but as the material was high carbon steel with a tensile strength of 70,000 pounds, it was found impossible to obtain such a high efficiency by any method until the Thermit process was called upon. This process was finally adopted after a number of test welds had been made and subjected to tensile tests which in most cases proved an efficiency equal to the rod itself.

The method of procedure used in the field was rather crude, owing to the short space of time allowed for preparation, but it proved sufficient to keep well in advance of the construction work. The method employed was as follows:

The rods, after being cut to the proper length, were bent

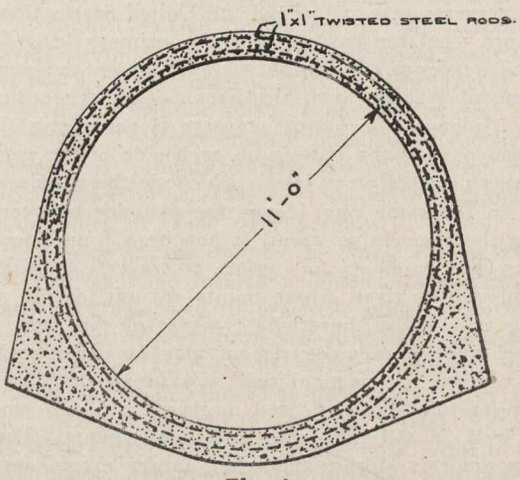


Fig. 1.

around a wooden form, allowing ½-in. between butt ends. The ends were then brought to a bright red heat in a forge and a set of flour and sand moulds, baked in two parts ready for use, clamped around them. In the meantime an automatic crucible containing the proper quantity of Thermit was placed in position, and as soon as the moulds had been made ready the Thermit in the crucible was ignited and the Thermit steel poured about the ends of the rods. It will be noted that this procedure differs considerably from the method in use for butt-welding rods, where the slag is poured into the mould first and serves to bring the ends of the rods to welding heat, at which time they are drawn together by clamps to effect a weld. On the Aqueduct, however, a butt-weld would not have fulfilled the conditions of test, owing to the fact that it would have been impossible to leave a reinforcement of Thermit steel around the weld. By the method adopted it was possible to leave a considerable reinforcement, which added very greatly to the strength of the joint and contributed in a marked degree to the success with which the process was used on the work.

MECHANICAL STRAINS IN POLE LINE.*

F. A. Bowman.

A pole line with the wire attached to it is a complete mechanical structure, and in its design must be treated as a whole, and the different strains and their resultants as carefully calculated and provided against as they would be in any other piece of engineering. The fact that the failure of any part of a line is very seldom accompanied by loss of life is probably a great reason why this matter has not received more widespread attention than it has. First-class engineers have studied the question and the larger companies are insisting on the very best work on account of the saving in maintenance charges, and the improvement in the service they are giving, but the smaller ones still look only for cheapness in first cost.

The strains to which the poles of a line are subjected are:

First.—The comparatively simple compressive strains due to the dead weight of the wires and their supports, augumented at times by a very serious weight of ice and snow. In this case the pole acts as a simple pillar and as a rule it will be found that when the other strains have been provided for there is ample strength to meet this one.

Second.—The transverse strains produced by the tension of the wires whether acting in the direction of the pole line or producing resultant forces acting at various angles. These strains and their resultants are materially increased, or their directions altered by the pressure of the wind, a load of snow and ice, variations of temperature and the action of frost and water. On straight lines the forces acting in the direction of the line must be carried along until some form of anchorage is reached. Others found acting at an angle with the directions of the line must be provided for at their points of applications. There are three forces which in this climate produce serious strains. They are wind, frost and water. Wind pressure may rise to be a serious factor in itself as it may reach 30 pounds per square foot, which when applied to a pole 40 feet high measuring 7 inches in diameter at the top and 14 at the ground level is equivalent to a horizontal strain of 500 pounds applied to the head. But a more serious matter is the vibration set up not only by the varying pressure of the wind on the pole and crossarms but by the rythmic swing which it produces in the wires. When as in the case of lead covered telephone cables, or large stranded power wires the weights are 2 and 3 pounds per running foot, the racking strain on the poles is very great. It is well known what a destructive force a regularly timed swing becomes in the case of a suspension bridge, so great that marching troops are always made to break step before crossing one, so as to reduce this action to a minimum. A pole line closely resembles a suspension bridge in many of the problems of its design. This vibration not merely produces a strain in the poles but it has a tendency to loosen their hold in the ground. Many of our heavy winds come in autumn or spring when the poles are not held firm by frost, and when the ground is soaked and softened by water. It sometimes happens that a heavy fall of wet snow, or a sleet storm will come at this time. Abbott in his work on "Electrical Transmission of Energy" cites a case of sleet amounting to 6 inches in diameter on a No. 11 wire. This means a weight of about 1500 pounds per pole for each 10 pin arm. This increases the compression strains only, as long as the wires are still, but if a wind springs up and this mass is set swinging the resulting strain is very great. A striking instance of this was a severe storm of wet snow followed by frost and high wind that occurred a few years ago through the New England States. One telegraph company had a stretch of 50 miles of poles go down in the State of Maine. These poles were not broken but were in swamp land and were actually torn out of the ground.

The action of frost is well known, but in some kinds of land it is much greater than others. It goes on gradually year after year and it is very often not realized how much actual lifting it does to a pole. The writer reset poles this year which had been lifted two and a half feet in seven years. Water plays a much more serious part in shifting and loosening poles than is generally recognized. It does this not merely by softening the ground, thus reducing the resisting power of the pole to oppose the strains of line and wind, but also by its hydraulic lifting power. If the surrounding earth is saturated and a pole has become sufficiently loosened to allow a free passage to the water to reach its base and accumulate there the upward pressure on it will be very considerable. Take the case of pole 18 inches in diameter at the butt and set 6 feet deep. Its area will be 254 square inches and the hydraulic pressure tending to lift it will amount to 762 pounds. Again in the case of a pole 10 inches in diameter at the butt and set 5 feet in the ground the lifting pressure will be 200 pounds. Probably the conditions are rarely such as to develop the full theoretical pressure but nevertheless it is a force that has to be reckoned with. It is also possible that the pole may just reach to a water bearing layer that leads from much higher ground, which may result at certain times to its being subjected to a much higher head than its own depth of setting and consequently to serious lifting pressure. This may readily occur to a pole at the foot of a slope and that the wires rising to higher poles on each size of it are putting an upward strain on it. This upward strain may not be very great, but when acting in conjunction with the water and vibration it may result in the pole being raised. This shows the importance of grading a line by putting taller poles in the hollows so as to avoid this upward strain as much as possible.

The formulæ for the strains produced by the wires are given in so many text books that it is not necessary to do more than quote them here. Those for the strains due to wires directly suspended from the poles are admirably given in a little work on "Wires in Electrical Construction," published by John A. Roebling, Sons & Company, and are as follows:

$S \times W$ = the horizontal strain at the middle of the span.

$$S = \frac{y^2}{2x} + \frac{x}{6}$$

where y = one half the span in feet

x = the deflection, dip, or sag in feet.

w = the weight of the wire per foot.

The strain at the insulators is slightly greater but is much more difficult to calculate and the difference is so small for all ordinary spans and dips that it can be neglected. A few illustrations will show the strains ordinarily met with. No. 12 S. W. G. copper wire with spans of 130 feet is a very common condition. Some of the largest companies call for a dip of 7 inches in this span if the wire is strong at a temperature of 60 F. By the above formula this gives a horizontal strain of 123 pounds. A No. 9 B. W. G. iron wire with the same span and dip gives a strain of 235 pounds. In the case of telephone lead covered cables suspended from stranded steel messenger wires the strains become very great. Thus a cable of 52 pair of No. 19 B. & S. with its supporting strand weights 3 pounds per foot. If the span is 110 feet and the dip 1½ feet, the horizontal strain amount to 3,025 pounds. If this is applied to a pole 25 feet above the ground, and we assume the pole to be held rigidly in the ground the stresses called forth approach very closely to the ultimate strength of the pole ordinarily used, and leave no factor of safety. When the messenger wire is pulled up to its proper tension before the cable is hung and then clamped to each pole, the strain is the same in each span. The difference in the span being compensated by the difference in the dips. The strain is then balanced on all poles except those at the end of the run. It is doubtful if this state of equilibrium remains long after the cable is hung. The greater weight of the cable in the longer spans tends to stretch the messenger wire, and it is impossible to clamp it sufficiently tight to prevent its slipping without injuring it. The variations in strains on the poles so introduced is probably not a very serious matter.

* Read before the Nova Scotia Society of Engineers.

The side strain produced by a trolley wire suspended between two poles on a span wire is given by the following formulæ very kindly furnished by the Stone & Webster Co., of Boston.

$$\text{For single trolley horizontal strain} = \frac{L}{2X}\left\{\frac{LW}{4} + \frac{T \times W'}{2} + \frac{Z}{2}\right\}$$

$$\text{For double trolley horizontal strain} = \frac{L-A}{2X}\left\{\frac{AW}{2}(L-A) + \frac{W}{4} + \frac{TW'}{2} + \frac{Z}{2}\right\}$$

Where W = weight per foot of span wire
W' = weight per foot of trolley wire
Z = combined weight of ears and hangers
T = length of trolley wire between supports
L = length of span between supports
L' = length of span wire
X = dip of span of wire at point of attachment of trolley.
A = distance between trolley wires for double trolley.

For a pair of 2/0 trolley wires this gives a strain of 400 or 500 pounds.

The only really satisfactory way to meet these strains is by guying to anchors buried in the ground below the frost. Experience shows that in our climate at least any other method of taking care of these strains will yield sooner or later. Guy stubs if not themselves guyed, will yield after a time. It is thoroughly recognized that the strains in bridges of either the suspension or cantilever type must be carried back to solid anchorages in the ground, and the same principle must be adhered to in pole line construction. Of course in a busy thoroughfare direct guying is often impossible, but in almost every case the construction can be extended to a point where the guy will really not interfere with traffic. It is well recognized that a pole line is not a thing of beauty but in all places except the largest cities it is to-day a necessary evil. This being so, aside from any question of maintenance or service the best looking line will be the one that has the wire cables neatly strung, reasonably tight, and kept so. In other words what will impress the eye as a piece of engineering properly designed and constructed. To attain this result the above mentioned principle of carrying all strains ultimately to an anchorage in the ground must be carried out. The proper way to set such an anchor is with a log or iron plate buried well below the frost and a rod extending from it to the surface of the ground to which a guy wire from the pole can be attached. A serious mistake is often made in putting down such anchors. This is that the hole or trench is dug at the same angle as the final direction of the pull. The result is that the anchor pulls merely against newly tamped earth and, therefore, yields to a considerable extent. The hole or trench should be put down perpendicular and a little farther from the pole than the intended position of the anchor. It should be then undercut towards the pole, and a narrow trench cut towards the pole. The object of this is that the anchor shall have a solid and undisturbed body of earth to pull against. Braces are not good as the action of the frost on them tends to heave up the pole. In country pole lines in this country the curves if properly guyed generally occur often enough to make comparatively fixed points in the line and so break up the destructive action of a rythmic swing of the line. But where straight lines of half a mile or so occur one or more poles should be guyed solidly to the ground but with head guys in the direction of the line and side guys across it and if the situation is an exposed one a few poles each side of the guyed pole should be head stayed from the top of one to the butt of the next. This is equivalent to the wind bracing and other methods of stiffening bridge structures. One other point must be taken up. When a line has been built to withstand the strains before mentioned, a new trouble has been introduced. This is the variation in the length of the wire due to variations in temperature. The co-efficient for the contraction of copper for each degree Fahrenheit is generally given in works or physics as .0000095. Recent experiments by wire manufacturers, show that for the copper wires in use, this is rather high and that .0000046 is a good average. This means a contraction of expansions of about ¼ inch in every mile for each degree, or between 60 F. and -10 F. a contraction of 1 foot 8 inches in the mile. In an unguyed line this contraction is provided for by the movement of the poles on curves, etc., but as soon as the line is guyed solidly this produces what is often a strain exceeding the strength of the wire and making what are known to linemen as "frost breaks." To meet this, tables are prepared giving the dip that is to be allowed in a given span, according to the temperature of the air at the time the wire is strung.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

5395—Sept. 14—Dismissing complaint of the Northern Elevator Co. complaining against rates charged by the C.P.R. for hauling feed oats from the elevator at Winnipeg to company's tracks.

5396—Oct. 7—Authorizing the Brantford and Hamilton Electric Railway to temporarily operate its crossing with the G.T.R., Brantford and Tillsonburg Branch, in the city of Brantford, Ont.

5397—June 23—Ordering the County of Carleton to be joined in the application of the city of Ottawa, and directing the C.A.R. Co., the St. L. and Ottawa Ry. Co., and the Montreal and Ottawa Railway to carry the Richmond Road, Ottawa, under the railways by means of a viaduct, and to make such change in the location of the portions of their respective railways as may facilitate the construction of such work.

5398—Oct. 6—Approving agreement of the city of St. Thomas, corporation of Township of Yarmouth, and the M.C. R.R., ordering that Ross Street be diverted by being widened and carried under the railway and works of the M.C.R.R. by means of a subway; also that First Avenue be diverted and widened and a new subway constructed immediately to the west of the present subway.

5399—Oct. 6—Granting leave to the corporation of the town of Campbellford, County of Northumberland, Ont., to erect, place and maintain its electric light wires across the track of the G.T.R. at Simpson Street and Saskatoon Avenue, town of Campbellford, County Northumberland, Ont.

5400—Oct. 6—Permitting the United Gas Co., Limited, St. Catharines, Ont., to lay gas pipes or mains under the tracks of the G.T.R. at certain points in the Counties of Welland and Haldimand, Ont.

5401—Oct. 13—Authorizing Macdonald College to lay and maintain a water pipe under the tracks of the C.P.R. Co. at Ste. Anne de Bellevue, Que.

5402—Oct. 15—Directing that every accident report or information furnished to the Board, pursuant to the provisions of Sec. 292 of the Railway Act, be privileged, and only made public or given upon Order of the Board.

5403—Oct. 14—Authorizing the C.P.R. to use and operate the bridge at Rush Lake, Sask., on the Swift Current section of its line of railway.

5404—Oct. 14—Authorizing the C.P.R. to use and operate the following bridges on its Calgary section: At mileage 109.9; mileage 179.1; Irrigation Canal, near Langdon, and Irrigation Canal, near Strathmore, Alta.

5405—Oct. 14—Approving by-law of the Windsor, Essex and Lake Shore Railway Co., authorizing F. E. Low, its general manager, to prepare and issue tariffs of tolls to be charged for traffic carried by the company between Windsor and Leamington, Ont.

5406—Oct. 14—Authorizing the C.P.R. to open for carriage of traffic those portions of its line from Stoughton, on its Arcola-Regina section, to Weyburn, on its Portal section, Saskatchewan, provided that the speed be limited to fifteen miles per hour.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

Standard Specifications for Portland Cement as published January 27th, 1903.

DEFINITION.—

(2) SPECIFIC GRAVITY.—The specific gravity of the cement shall be at least 3.09, and shall not exceed 3.25 for fresh cement; the term "fresh" being understood to apply to such cements as are not more than two months old.

(1) FINENESS.—The cement shall be ground so fine that the residue on a sieve of 10,000 meshes to the square inch shall not exceed 10 per cent of the whole by weight, and the whole of the cement shall pass a sieve of 2,500 meshes to the square inch.

TIME OF SETTING.—

(b) TENSILE STRENGTH.—Neat Cement.—Briquettes made of neat cement, mixed with about 20 per cent. of water, by weight, after remaining one day in air, in a moist atmosphere, shall be immersed in water, and shall be capable of sustaining a tensile stress of 250 pounds per square inch after submersion for two days; 400 pounds per square inch after submersion for six days; 500 pounds per square inch after submersion for twenty-seven days. The tensile test shall be considered as the average of the strength of five briquettes, and any cement showing a decrease in tensile strength on or before the twenty-eighth day shall be rejected. Sand and Cement.—The sand for standard tests shall be clean quartz, crushed so that the whole shall pass through a sieve of 400 meshes to the square inch, but shall be retained on a sieve of 900 meshes per square inch. The sand and cement shall be thoroughly mixed dry, and then about 10 per cent. of their weight of water shall be added, when the briquettes are to be formed in suitable moulds. After remaining in a damp chamber for twenty-four hours the briquettes shall be immersed in water, and briquettes made in the proportion of one of cement to three of sand, by weight, shall bear a tensile stress of 125 pounds per square inch after submersion for six days, and 200 pounds per square inch after submersion for twenty-eight days. Sand and cement briquettes shall not show a decrease in tensile strength at the end of twenty-eight days, or subsequently.

(a) CONSTANCY OF VOLUME.—Mortar pats of neat cement, thoroughly worked, shall be trowelled upon, carefully cleaned, 5 in. by 2½ in. ground glass plates. The pats shall be about ½ in. thick in the centre and worked off to the sharp edges at the four sides. They shall be covered with a damp cloth and allowed to remain in the air until set, after which they shall be placed in vapour in a tank, in which the water is heated to a temperature of 130° Fah. After remaining in the vapour six hours, including the time of setting in air, they shall be immersed in the hot water and allowed to remain there for eighteen hours. After removal from the water the samples shall not be curled up, shall not have fine hair cracks, nor large expansion cracks, nor shall they be distorted. If separated from the glass, the samples shall break with a sharp, crisp ring.

SULPHURIC ACID.—

AMERICAN SOCIETY FOR TESTING MATERIALS.

Standard Specifications for Portland Cement as Revised June, 1908.

18. DEFINITION.—This term is applied to the finely pulverized product resulting from the calcination to incipient fusion of an intimate mixture of properly proportioned argillaceous and calcareous materials, and to which no addition greater than 3 per cent. has been made subsequent to calcination.

19. SPECIFIC GRAVITY.—The specific gravity of the cement, ignited at a low red heat, shall not be less than 3.10, and shall not show a loss on ignition of more than 4 per cent.

20. FINENESS.—It shall leave by weight a residue of not more than 8 per cent. on the No. 100, and not more than 25 per cent. on the No. 200 sieve.

21. TIME OF SETTING.—It shall not develop initial set in less than thirty minutes, and must develop hard set in not less than one hour, nor more than ten hours.

22. TENSILE STRENGTH.—The minimum requirements for tensile strength for briquettes one inch square in section shall be within the following limits, and shall show no retrogression in strength with the periods specified:—

Neat Cement:—

Age.	Minimum Strength.
24 hours in moist air	150–200 lbs.
7 days (1 day in air, 6 days in water)	450–550 lbs.
28 days (1 day in air, 27 days in water)	550–650 lbs.

One Part Cement, Three Parts Sand:—

Age.	Minimum Strength.
7 days (1 day in moist air, 6 days in water)	150–200 lbs.
28 days (1 day in moist air, 27 days in water)	200–300 lbs.

If the minimum strength is not specified the mean of the above values shall be taken as the minimum strength required.

23. CONSTANCY OF VOLUME.—Pats of net cement, about three inches in diameter, one-half inch thick at the centre and tapering to a thin edge, shall be kept in moist air for a period of twenty-four hours.

(a) A pat is then kept in air at normal temperature and observed at intervals for at least twenty-eight days.

(b) Another pat is kept in water maintained as near 70° F. as practicable, and observed at intervals for at least twenty-eight days.

(c) A third pat is exposed in any convenient way in an atmosphere of steam, above boiling water, in a loosely closed vessel for five hours.

24. These pats, to satisfactorily pass the requirements, shall remain firm and hard and show no signs of distortion, checking, cracking or disintegration.

25. SULPHURIC ACID.—The cement shall not contain more than 1.75 per cent. of anhydrous sulphuric acid (SO_3), nor more than 4 per cent. of magnesia (MgO).

THE CANADIAN SOCIETY OF CIVIL ENGINEERS

With a membership of over two thousand, a safe financial statement, and the prestige that comes with being the only Canadian society including engineers of every branch among its members, the Canadian Society of Civil Engineers has not yet secured that place in the hearts of the members of the engineering profession in Canada that a national professional organization should.

Where lies the fault? At the last annual meeting the

question was discussed at length and with considerable vigor. Has the question been dropped and consideration deferred until the next annual meeting?

Many are asking, "What do we get in return for our membership?" That is a question of some individual importance, but it is just as necessary to enquire, "What is each member giving to the Society?" Some are giving of their experience in prepared papers. In the matter of papers the Society is doing all that may be reasonably expected of it. But it must not rest there, for, after all, this is but a small part of their work.

Some few are giving their time to executive work, the classification of new members, the routine business of the Society. Their good work must not be overlooked nor their services valued too lightly.

The great majority of the membership, however, are doing little or nothing to advance the Society. A vast army of men in the wilderness waiting for a leader—men ready and willing to do their part, but uncertain as to what to do and of the reception their efforts will receive.

We do not propose to deal in this article with the greater questions before the Society, but will indicate one question which has been very much neglected and in which many members are interested.

On another page we have placed side by side copies of the standard specifications for Portland cement as issued by the Canadian Society and the American Society for Testing Materials. The comparison does not reflect any great credit on the Canadian Society.

There is no reason why our specifications should be incomplete and it is in neglecting these little things that our Society has failed to secure a hold on the young engineer in Canada.

Would it be possible to secure a report from the Committee on Cement Tests oftener than once in every five years?

ELECTRIC LINE CONDUITS—CITY LIGHTING—HARBOR IMPROVEMENTS.

(From Our Own Correspondent.)

Montreal, Oct. 21st, 1908.

For many years past overhead wires have been severely condemned by the business interests of Montreal, and many efforts have been made by the government of the city to abolish them and compel all companies to put them in underground conduits. The question of the ownership of these conduits has been prolific of much discussion, ownership by the city being generally deemed most advisable. Eventually, a committee of experts was appointed by the city council to report upon the matter. Mr. Ross, of Messrs. Ross & Holgate, engineers, made his report last week, showing that the Montreal Street Railway claimed that they were under no obligation to place their wires in a municipal conduit, the Montreal Light, Heat and Power Company decline to reply, but claiming that they had the right to go underground in a conduit laid parallel to the proposed civic one at any time. On the whole, Mr Ross said, much opposition was met, and it was evident that the city would have to secure power from the Legislature to compel the different companies to act in unison with it.

The Lighting Committee of the city has recommended the following offer to be made the Montreal Light, Heat and Power Co. for public lighting for the next ten years: Arc lamps, each, per year, $60; incandescent, 64 c.p., $30, and 32 c.p., $15 each. For lighting municipal buildings, etc., by meter, for incandescent and arc lighting, 9 cents per kilowatt hour for the current used. The company asked about 25 per cent. more.

The Dominion Car and Foundry Co. resumed operations this week with a normal force after having been practically shut down for months past. The C.P.R. has just placed an order for about 500 composite cars, and the car company expects that the activity will be sustained, and that they will be able to keep a large number of mechanics employed right along.

The erection of an electric plant, centrally situated along the harbor front, is the latest scheme upon which Mr. F. W. Cowie, the chief engineer of the Montreal Harbor Commissioners, is working. The idea is to supply from this plant all the current required for every purpose in connection with the Harbor Commissioners' property. The power will be obtained from a new source of supply, the location of which is not announced, although it is understood to be in the vicinity of the city. The construction of a drydock also will be proceeded with before a great length of time, although nothing very definite has yet been decided upon in this connection, save that it will be sufficiently capacious to accommodate any vessel reaching port. Another work now being planned for is the construction of a concrete wall along the piers to protect the piles from the action of the current and water.

In connection with the sub-contract let by P. McGovern to the J. W. Harris Co., the latter firm has requested the Water Committee to retain the sum of $7,300 from what is due the former. It is alleged that this amount represents the cost of the excavation work performed by the Harris Company for McGovern, who has the contract for the construction of the new conduit for the city.

RESULTS OF THE USE OF WHITE PORTLAND CEMENT.*

For a long time chemists and others connected with the Portland cement industry have been endeavoring to produce a Portland cement which should possess all the characteristics of the common product, and yet when mixed with the proper aggregates would give a concrete almost pure white. As the Portland cement industry grew by leaps and bounds, and the product became more universally known by the masses the demand was more insistent for a Portland which would permit of more artistic and ornate work than the material admitted of than was being manufactured. The great difficulty, however in producing such a cement was to find crude material of the proper chemical combinations free of the oxide of iron. Synthetic work has proved that the necessary compounds to make Portland cement are lime, silica and alumina. Iron is not necessary absolutely, although it aids as a flux the combination of the above constituents. Portland cement materials are found in about every State in the Union, but deposits containing no iron or but a trace of iron are extremely rare.

In giving this paper it will be necessary for me to talk about the results obtained through the use of the cement manufactured by the Art Portland Cement Co., of this State, because until very recently the product of this company was the only white Portland cement manufactured commercially.

The first cement was turned out in November, 1906, out of our factory, and we found out soon after we began to manufacture our product commercially that notwithstanding the fact that there was a great demand for a white cement, the user of the product was going to satisfy himself by exhaustive tests on the material that the cement was really a Portland and was not a makeshift so that while a great many orders were on the books from all over the United States and from many points in Canada, the cement was not selling like the ordinary Portland in 10,000 barrel lots, but with a few exceptions in sample lots of from one to ten barrels. In this way the cement was very widely distributed, and was very thoroughly tested in almost every imaginable way from the scientific Government and municipal method to the crude method of the small concrete block maker.

Now, as regards the results of the use of the white Portland cement. Fully 80 per cent. of the users of this

* By M. M. Smith, in annual report of Indiana Engineering Society.

product are the makers of concrete blocks. Probably in no other branch of the concrete industry has there been such an insistent demand for more ornate effects than in the concrete block business. The ordinary concrete block made out of the ordinary Portland cement and the ordinary sand does not make a very beautiful appearance, and there is no one that will deny this. The business of making these blocks has appealed to men in every community because of the demand for a cheap building material. When properly made the blocks have merit, because they make a good, warm building in winter and a cool building in summer, and the cost of the blocks is in reach of the mass of the people. The conservative architect is slowly taking up the concrete block, and the white cement has appealed particularly to the larger companies manufacturing concrete blocks that have had in their employ architects. The white cement is mostly used on facing the blocks, the ordinary Portland concrete being used for the base. It is necessary, of course, to watch the manufacture of the cement very closely because of the necessity to make the product conform from a quality standpoint with the ordinary high-grade Portland. While the cement has gone into the facing of thousands of concrete blocks made by hundreds of different users, it has been found that without exception the bond between the white Portland concrete face and the ordinary concrete base has been perfect. We know this to be a fact, because the user of a new product, if he does not get the results that he feels he ought to get, does not, as a rule, when reporting it handle the subject in the politest language. One of the largest users of the white cement manufacturing concrete blocks is located in Lincoln, Neb. This company is managed by an engineer, and during the last year has used about 1,000 barrels of the cement, almost all of which went into the facing of concrete blocks. This company believes in not how cheaply they can make the blocks, but how good they can make them, and as a result they have done much in overcoming the prejudice against concrete blocks in their neighborhood. The National Association of Cement Users, of which Mr. Humphrey is the president, will no doubt at its convention at Buffalo next week take necessary steps towards regulating the manufacturing of concrete building blocks, and will recommend to the different municipalities standard methods for controlling their manufacture. The concrete block has a place as a material of construction, and the proper steps are being taken to overcome the prejudice now existing. The white Portland cement is assisting very materially to overcome this prejudice, because of the fact that a block faced with this material is pleasing to the eye.

Another use for the white cement has been in exterior plaster work. In many of the cities of the country cement plaster houses are being built, and very artistic and beautiful effects are being obtained. Here, again, the architect and the builder have been seeking for a more artistic effect than that possible by using ordinary Portland, and here again the white cement has found a place. One of the large users of the white cement uses the ordinary Portland cement concrete for first and second coat on the metal lath and the white cement concrete for the surface coat. This customer has placed the cement in no less than fifty different houses during the last year, giving the building not only the white effect, but also any desired color by treating the white cement with mineral colors. This form of building is receiving a great impetus through the more general knowledge of the people in Portland cement and its wonderful adaptability as a building material. Here again the white cement is doing its little mite towards improving from an artistic standpoint this form of building.

Another use for the cement has been for non-staining purposes. The cement analyzes less than one-half of 1 per cent. of the oxide of iron, and as a result can be used with perfect safety in laying up marble, Bedford stone, pressed brick, etc. The imported Puzzolan cements have been and are being used for this purpose, but they are not altogether satisfactory, as their tensile strengths are low, and they also stain more or less. The Government is slowly being convinced of the quality of the white cement, and as a result the cement is beginning to be used in Government work mostly for non-staining purposes. The cement is also being used in a number of court house jobs in different parts of the country, and is universally giving results.

Another use for the cement is in porch work, for making ornamental pillars, caps, etc., and also for the porch floors, treads, etc.

So far as I know the cement has not been used in reinforced concrete construction for the body of the work. The price of the cement is about twice that of the ordinary Portland, and for this reason it is not used in work where strength is required rather than beauty. The cement is being used, however, for a veneer in connection with the reinforced concrete, and this is a use which will grow as the product becomes better known.

It may be of interest to give a few tests of the cement extending over a year, in order to show how it compares with the ordinary Portland. These tests are an average of the daily tests of the cement made during the first fifteen days in January, 1907:—

Fineness, 100-mesh	98.1
Fineness, 200-mesh	85.4

Setting time: Initial set, 2 hours and 15 minutes; final set, 6 hours. Boiling test O.K. Specific gravity, 3.14.

Tensile strength.

Neat cement.	Pounds.
24 hours	350
7 days	765
28 days	806
3 months	820
6 months	892
1 year	915

One part cement, three parts Garden City 20.0 sand:—

7 days	324
28 days	367
3 months	420
6 months	490
1 year	510

These tests show that the cement is fully up to the requirements of any specifications, and compare favorably with the results obtained in testing the very best of the ordinary Portlands. The sand tests are somewhat high, but the reason for this is because of the extreme fineness to which the cement is ground.

BUILDING PERMITS ISSUED DURING THE FIRST SEVEN MONTHS OF 1908 IN WINNIPEG ARE AS FOLLOWS:

Month.	Permits.	Buildings.	Cost.
January	31	32	$ 16,550
February	21	21	10,050
March	64	73	113,900
April	191	221	640,550
May	211	231	649,800
June	196	229	782,050
July	169	215	1,385,850
Total	883	1,022	$3,578,750

During the corresponding months of 1907, 2,542 permits for 2,408 buildings value at $5,261,550 were issued.

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.

BLUE ROCKS.—Tender for Blue Rocks Breakwater, N.S., will be received at this office until 4.30 p.m. on Friday, November 6, 1908, for the construction of a breakwater at Blue Rocks, Lunenburg County, Province of Nova Scotia, according to a plan and specification to be seen at the offices of C. E. W. Dodwell, Esq., Resident Engineer, Halifax, N.S., E. G. Millidge, Esq., Resident Engineer, Antigonish, N.S., on application to the Postmaster at Blue Rocks, N.S., and at the Department of Public Works, Ottawa. Nap. Tessier, secretary, Department of Public Works.

New Brunswick.

ALMA.—Tenders for Point Wolfe Bridge will be received at the Department of Public Works, Fredericton, until Monday, 2nd day of November, 1908, at noon, for rebuilding Point Wolfe Bridge, parish of Alma, Albert county, N.B., according to plans and specifications to be seen at the Public Works Department, Fredericton, N.B., and at the office of Walter B. Dickson, Esq., M.P.P., Hillsborough, Albert county, N.B., and at the office of Geo. D. Prescott, Esq., M.P.P., Albert County, N.B. John Morrissy, Chief Commissioner, Department of Public Works, Fredericton, N.B.

ELGIN.—Tenders for River View Bridge will be received at the Department of Public Works, Fredericton, until Monday, 2nd day of November, 1908, at noon, for rebuilding River View Bridge over Pollet River, parish of Elgin, Albert county, N.B., according to plans and specifications to be seen at the Public Works Department, Fredericton, N.B.; at Goddard Bros.' store, Elgin, and at the store of Mr. I. C. Prescott, Albert, Albert county, N.B. John Morrissy, Chief Commissioner, Department of Public Works, Fredericton, N.B.

MONCTON.—Tenders for the branch line, Harmony to Elmira, will be received up to and including Saturday, October 31st, 1908, for the construction of a line of railway from Harmony Station, on the P.E.I. Railway, to Elmira, a distance of about ten miles. Plans and specifications may be seen at the following places: The station master's office, Souris, P.E.I.; the resident engineer's office, Charlottetown, P.E.I., and at the chief engineer's office, Moncton, N.B., where forms of tender may be obtained. D. Pottinger, general manager.

ST. JACQUES.—Tenders for Silver Stream Mouth Bridge will be received at the Department of Public Works, Fredericton, until Monday, 2nd day of November, 1908, at noon, for rebuilding Silver Stream Mouth Bridge, parish of St. Jacques, Madawaska county, N.B., according to plans and specifications to be seen at the Public Works Department, Fredericton, N.B.; at Maxime Cormier's, Esq., Edmundston; at Charles Cyr's, Esq., St. Leonard's, and at Jesse W. Baker's, Esq., Baker Brook, Madawaska, N.B. John Morrissy, Chief Commissioner, Department of Public Works, Fredericton, N.B.

Quebec.

CAP ST. IGNACE.—Tender for Cap St. Ignace Wharf will be received at this office until 4.30 p.m., on Friday, November 13, 1908, for the construction of a Wharf at Cap St. Ignace, Montmagny County, Province of Quebec, according to a plan and specification to be seen at the offices of A. Decary, Esq., Resident Engineer, Post Office, Quebec; Chs. Desjardins, Esq., Clerk of Works, Post Office, Montreal; on application to the Postmaster at Cap St. Ignace, P.Q., and at the Department of Public Works, Ottawa. Nap. Tessier, secretary, Department of Public Works.

POINTE à BROUSSEAU.—Tender for Pointe à Brousseau Wharf will be received at this office until Monday, November 16, 1908, for the construction of a Wharf at Pointe à Brousseau, Gaspe County, Que., according to a plan and specification to be seen at the office of Ph. Beland, Clerk of Works, Post Office Building, Quebec, on application to the Postmaster at Little Valley, P.Q., and at the Department of Public Works, Ottawa. Nap. Tessier, secretary, Department of Public Works.

RIVIERE BLANCHE.—Tender for Riviere Blanche, Pier Head Extension, will be received at this office until 4.30 p.m., on Monday, November 16, 1908, for the construction of an extension to Head Block of Pier at Riviere Blanche, Rimouski County, Province of Quebec, according to a plan and specification to be seen at the offices of Mr Chs. Desjardins, Clerk of Works, Post Office, Montreal; Mr. A. R. Decary, Resident Engineer, Post Office, Quebec; on application to Mr. Hermel Parent, Postmaster, Tessierville, Que., and at the Department of Public Works, Ottawa. Nap. Tessier, secretary, Department of Public Works.

Ontario.

LEAMINGTON.—Tender for Public Building, Leamington, Ont., will be received at this office until 4.30 p.m. on Tuesday, November 3, 1908, for the construction of a public building at Leamington, Ont. Plans and specification can be seen and forms of tender obtained at this department, and at the Post Office, Leamington. Nap. Tessier, secretary, Department of Public Works.

LINDSAY.—Tender for Trent Canal will be received at this office until 16 o'clock on Tuesday, 17th November, 1908, for the works connected with the construction of the Lindsay Section of the Canal. Plans and specifications and the form of the contract to be entered into can be seen on and after the 19th October, 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, Peterborough, Ont., at which places forms of tender may be obtained. L. K. Jones, secretary, Department of Railways and Canals. (Advertised in the Canadian Engineer.)

PARKHILL.—Tender for Public Building, Parkhill, Ont., will be received at this office until 4.30 p.m. on Tuesday, November 3, 1908, for the construction of a public building at Parkhill, Ont. Plans and specification can be seen and forms of tender obtained at this department and on application to the Postmaster at Parkhill, Ont. Nap. Tessier, secretary, Department of Public Works.

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.)

SAULT STE. MARIE.—Tender for Main Gates will be received until 16 o'clock on Tuesday, the 27th October, 1908, for the works connected with the construction of the upper Main Gates for the Sault Ste. Marie Canal. Plans, specification, and the form of the contract to be entered into, can be seen on and after the 19th of October, 1908, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Sault Ste. Marie, Ont., at which places forms of tender may be obtained. L. K. Jones, secretary, Department of Railways and Canals.

Manitoba.

MORDEN.—Tenders will be received by the trustees of Maple Leaf School District No. 83, for the steam heating and ventilating of the six-roomed stone school in the town of Morden. Tenders will be received up to the first day of November, 1908. H. McK. McConnell, Chairman of the Board.

British Columbia.

COAL HARBOR.—Tenders for Dredging Coal Harbor will be received until Friday, 30th October, 1908, at 4.30 p.m. for dredging required at Coal Harbor, Vancouver, Province of British Columbia. Specifications and form of tender can be obtained on application to G. A. Keefer, Esq., Resident Engineer, New Westminster, and the Department of Public Works, Ottawa. Tenders must include the towing of the plant to and from the works. Only dredges can be employed which are registered in Canada at the time of the filing of tenders. Nap. Tessier, secretary, Department of Public Works.

VERNON.—The City of Vernon calls for tenders for the following:—For delivering f.o.b. cars at Vernon, B.C., the following quantities, more or less, of best quality vitrified salt-glazed sewer pipe and specials: 1,800 lineal feet, 15 inches diameter, 2½ feet long; 5,200 lineal feet, 12 inches diameter, 2½ feet long; 4,000 lineal feet, 10 inches diameter, 2½ feet long; 15,000 lineal feet, 8 inches diameter, 2½ feet long; 4,000 lineal feet, 6 inches diameter, 2 feet long; 50 Y junctions, 6 inches off 12 inches; 100 Y junctions, 6 inches off 10 inches; 300 Y junctions, 6 inches off 8 inches; 150 ⅛ 6-inch bends. All materials to be 1-12 diameter in thickness and subject in every respect to the approval and entire satisfaction of Mr. John Galt, consulting chief engineer. The 15-inch and 12-inch piping, including junctions, must be delivered immediately, the balance later on as required. Sealed tenders marked "Sewer Pipe," to be in the hands of the undersigned not later than 8 p.m. of Monday, October 26. Frank M'Gowen, City Clerk.

CONTRACTS AWARDED.

Ontario

BRADFORD.—The York County Commissioners and County Engineer Frank Barber met here and awarded the contract for filling at the Holland River Bridge to Mr. Thos. Art, of Holland Landing. The contract price was: Earth fill, 60 cents per cubic yard; gravel filling, $1 per cubic yard.

Manitoba.

BRANDON.—The City Council has accepted the tender of the Dominion Bridge Company of Montreal, for a steel bridge to be erected at First Street. The price is $27,288. The concrete foundations and pillars are almost completed and the C.P.R. have started the work on their part of the bridge over the railway tracks.

KILLARNEY.—The contract for building and erecting a telephone line for the municipality was awarded to George Foley & Company at from $64 to $80 per mile. Thornburn & McConkey tendered at from $65 to $87 per mile.

Alberta.

CALGARY.—The contracts have been let for a large factory building 100 feet by 130 feet for the Western Printing and Lithographing Company, Limited. The building will be situated on First Street West, and the cost when completed will be in the neighborhood of $20,000

Foreign.

YOUNGSTOWN, OHIO.—The G. M. McKelvey Company have placed an order with the Nernst Lamp Company for the new Westinghouse Nernst Lamps for the entire lighting of their new four-storey store building, to be occupied this month. The installation will consist of thirty-six three glower lams for the first floor, sixty-nine two glower lamps for the second and third floors and seventy-five 132 watt lamps for the basement and fourth floor.

RAILWAYS—STEAM AND ELECTRIC.

Ontario

KINGSTON.—Since a year ago last May, the Kingston and Pembroke Railway has expended the sum of $110,000 in improving the road. During this summer, special attention has been given to the fixing up of the bridges and culverts along the road. Owing to the dry season ,the water in the rivers has been very low, and make it possible to go about the work much easier. Special attention was also paid to the roadbed and the rolling stock, and considering the fact that all this expenditure mentioned is apart from the usual expenditure, the company has indeed made a most creditable showing.

Alberta.

RED DEER.—At the last session of the Dominion Government a subsidy of about $200,000 was granted the Alberta Central Railway Company to build a line from Red Deer west to Rocky Mountain House, a distance of about seventy miles. Active steps will be taken at once to get the survey made. The line will pass through and open up a rich agricultural and timber district, and will be of considerable benefit to farmers who have settled in the Medicine River Valley. The C.P.R., realizing the need of a line, have an expert locator going over the proposed line, possibly with the intention of taking over the charter of the Alberta Central Company.

LIGHT, HEAT, AND POWER.

Ontario.

COBOURG.—The Town Council has passed a by-law authorizing the clerk to sign a renewal contract with the Cobourg Utilities Corporation for the supply of water and light to the town. The contract for the supply of water is the same as the former one, but the light contract is greatly modified. By the new terms the town gets an all-night service, instead of up to twelve o'clock, and a reduction of $10 in each arc light, making a total of $280 on the arc lights. On the incandescent street lights there is a reduction of 25 per cent., or a total of $80 on the sixteen lights. To private citizens there is a reduction of 33⅓ per cent. The town has the right to buy out the company at any time, and after five years, if it is considered that the cost of light is excessive, on account of any progress that may be made in electrical development, then the town can call in the Government arbitrators to adjust the cost.

PORT ARTHUR.—Port Arthur has made a supply contract with the Kaministiquia Power Company to take 400 horse-power for ten years at $25 per horse-power. The company will build up a sub-station here, with a capacity of 3,000 horse-power, and will us no discrimination between the city and Fort William.

SEWERAGE AND WATERWORKS.

Ontario.

FORT FRANCES.—Work on the water-power has again started. J. J. Wood & Company of New York, have the contract of the completion of the dam and erection of the power house. The contractors have men here taking stock of the equipment, and engineers are on the ground with a view of partaking in active work next week. The work will now be rushed to completion.

TELEPHONY.

Nova Scotia.

LUNENBURG. — The telephone line extending from Barss Corner through Maplewood and Parkdale is nearing completion.

Ontario.

SEELEY'S BAY.—The Leeds Rural Telephone Company are extending their lines into Pittsburg.

WATERFORD.—The Waterford Council has passed a by-law granting a franchise to the Norfolk Telephone Co.

British Columbia.

CRANBROOK.—A telephone company has been formed in Cranbrook to be known as the Kootenay Telephone Lines, Limited, which will be capitalized for $200,000. They have purchased the Cranbrook Telephone Company's system and will operate within the boundaries of British Columbia. They have a by-law before the city of Fernie which received its first reading October 8th, for the purpose of installing a new telephone system in that city and through the Pass. It is the intention later on to connect with Alberta. This by-law for the installing of a new telephone system in the city to replace that destroyed by fire has received its second reading, and will on the 26th go before the people for a vote.

PERSONAL.

MR. R. H. INGRAM, formerly of the G.T.R. has been appointed General Manager of the Cananea, Yaqui River and Pacific Railway Company.

MR. JOHN COULTER, of Brantford has been appointed General Manager of the Ontario Portland Cement Company, in the place of the late Mr. W. G. Elliott.

MR. R. LANGDON FRENCH, formerly of the C.P.R. engineering staff, Muskoka, Ont., and more recently of the Chicago, Milwaukee and St. Paul Railway, is in Toronto on a visit.

MR. N. B. PRICHARD has opened an office as a Chemical and Mining Engineer at 40 Quebec Street, Sherbrooke, Que., giving special attention to sulphuric acid, smelting and power plants.

MARKET CONDITIONS.

Montreal, October 21st, 1908.

One of the foremost authorities of the United States, says that he does not think that the railways are going to venture far in their purchases or the manufacturers risk their capital very heavily while the tariff question remains unsettled. If it were not for that, a much more rapid recovery would have taken place. This seems to represent fairly the opinion of those best informed on the pig-iron situation of the United States. Demand has been exceptionally dull in both Northern and Southern irons, during the past week, although enquiry for delivery during the fore part of 1909 shows a slight increase. It is not thought, however, that a buying movement will be inaugurated before the elections. Melters are fairly well covered until the end of the year, and there is sufficient stock to take care of any that are not fully covered. Some strong opinions have lately been expressed to the end that the election of Mr. Bryan, as president, would be injurious to the trade and interests of the country.

Last reports from England and Scotland show a quieter tone to the pig-iron market. Scotch makers are holding firmly to established prices and appear to be able to dispose of their output without difficulty. On the other hand, stocks of Cleveland warrants are showing a gradual increase and prices for these are slightly easier. The news that both English and Scotch pig-iron makers are blowing in their furnaces is confirmed and seems to indicate that the future will show a satisfactory business and that improved conditions will take care of the output. Both fuel and ore show a tendency to advance, and this would sooner or later be followed by proportionate advances in the price of pig-iron. There is considerable movement in pig-iron, in the Montreal market, as is usual at this time of the year. New orders are few and far between, however, and mostly go to Canadian makers. The market is steady and dull.

The market holds very steady, as follows:—

Antimony.—The market is easier, at 9 to 9½c.

Bar Iron and Steel.—Prices are steady all round, and trade is decidedly dull. Bar iron, $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $2.00; sleigh shoe steel, $1.90 for 1 x ⅜-base; tire steel, $1.95 for 1 x ⅜-base; toe calk steel, $2.40; machine steel, iron finish, $2.10.

Boiler Tubes.—The market is steady, quotations being as follows:—2-inch tubes, 8½c.; 2½-inch, 10c.; 3-inch, 11½c.; 3½-inch, 14¾c.; 4-inch, 19c.

Building Paper.—Tar paper, 7, 10, or 16 ounce, $1.50 per 100 pounds; felt paper, $2.25 per 100 pounds; tar sheathing, No. 1, 50c. per roll of 400 square feet; No. 2, 35c.; dry sheathing, No. 1, 40c. per roll of 400 square feet; No. 2, 26c. (See also Roofing.)

Cement—Canadian and American.—Canadian cement, $1.65 to $1.75 per barrel, in cotton bags, and $1.90 and $2.05 in wood, weights in both cases 350 pounds. There are four bags of 87½ pounds each, net, to a barrel, and 10 cents must be added to the above prices for each bag. Bags in good condition are purchased at 10 cents each. Where paper bags are wanted instead of cotton, the charge is 2½ cents for each, or 10 cents per barrel weight. American cement, standard brands, f.o.b., mills, $1.85 per 350 pounds; bags extra, 10c. each, and returnable in good condition at 7½c. each.

Cement—English and European.—English cement is steady at $1.70 to $1.90 per barrel in jute sacks of 82½ pounds each, sacks extra, and $2 to $2.20 in wood, per 350 pounds, gross. Belgian cement is quoted at $1.60 to $1.75 per barrel in bags, bags extra, and $1.75 to $1.85 per barrel, in wood.

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

Copper.—The market is steady at 14¼ to 15c. per pound. Demand continues limited.

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

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

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

Iron.—Canadian pig iron is offered at $18 for best, down to $17 for lower grades, while imported iron in car lots, on cars, on dock, Montreal, is as follows, for larger lots lower prices would be taken: No. 1 Summerlee, $20.25 to $20.75 per ton; No. 2 selected Summerlee, $19.75 to $20.25; Cleveland, $18.50; and No. 3 Clarence, $18; Carron, special, $20.25 to $20.75; Carron, soft, $19.25 to $19.75.

Laths.—See Lumber, etc.

Lead.—Trail lead is weak, but prices lower, at $3.50 to $3.60 per 100 pounds, ex-store.

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

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

Pipe—Cast Iron—The market is strengthening and dealers look for higher prices shortly. Meantime former quotations hold: $33 for 8-inch pipe and larger; $34 for 6-inch pipe; $34 for 5-inch, and $34 for 4-inch at the foundry. Pipe, specials, $3.10 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

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

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 60c. per roll; three-ply, 80c. per roll of 100 square feet. (See also Building Paper.)

Rope.—Prices are steady, at 9½c. per lb. for sisal, and 12½c. for Manila.

Shingles.—See lumber, etc.

Spikes.—Railway spikes are in dull demand and prices are lower at $2.40 per 100 pounds, base of 5½ x 9-16. Ship spikes are also dull and steady at $3 per 100 pounds, base of ⅝ x 10-inch and ⅝ x 12-inch.

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

Steel Plates.—The market is steady. Quotations are: $2.15 for 3-16, $2.25 for ⅛, and $2.15 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.05; and 16-gauge, $2.10.

Tar and Pitch.—Coal tar, $4 per barrel of 40 gallons, weighing about 500 pounds; roofing pitch, No. 1, $1 per 100 pounds; pine tar, $4 per barrel of 40 gallons; pine pitch, $4 per barrel of 180 to 200 pounds.

Telegraph Poles.—See lumber, etc.

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Toronto, October 22nd, 1908.

In hardware and metals, there is firmness, with a feeling pervading the hardware trade that prices must soon go higher. Dealers are busy, both sides, for in both metals and hardware the demand shows increase. The metal markets in London yesterday were all strong. In the United States it appears that the uncertainty of the election alone keeps back the demand for many structural materials.

Nothing new in bricks, stone, or cement; none of them is active, bricks being perhaps the least quiet. Nor can we report any marked feature of the lumber market. Roofing or covering materials, such as roofing felt, building paper, pitch and tar show distinct activity, which arises in part from new dwellings going up and in part from repairs and additions undertaken in anticipation of winter.

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 more enquiry.

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

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