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CANADIAN CONTRACT RECORD

A Weekly Journal of Engineering, Public Works, Tenders, Advance Information and Municipal Progress

"TENDERS" AND "FOR SALE" ADVERTISEMENTS PAGE 3

TENDERS AND FOR SALE DEPARTMENT

Debentures for Sale

VILLAGE OF ELMIRA

Sealed tenders will be received by the undersigned up to 7 o'clock P.M. on the 16TH DAY OF DECEMBER, 1907, for the purchase of $7,500.00 4½ per cent. Debentures, payable in twelve years, re loan to "Elmira Interior Woodwork Company, Limited," and $25,000 00 4½ per cent. Debentures, payable in thirty years, re Waterworks.

Particulars from the undersigned.

No tender necessarily accepted.

JOHN H. RUPPEL, Clerk.

Corporation of the City of Revelstoke

Notice to Contractors

The Municipal Council of the City of Revelstoke is prepared to receive tenders for constructing a Sewage System for the city according to plans and specifications which may be seen at the City Hall, Revelstoke, B.C., on and after the 28th inst

Tenders must be sealed, endorsed on the outside, "Tender for Sewage," and reach the undersigned not later than NOON of FRIDAY, DECEMBER 27, 1907

Tenders must be accompanied by an accepted cheque, payable to the Revelstoke City Treasurer, equal to five per cent. (5%) of the amount of the tender, which cheque will be forfeited if the party tendering declines to enter into a contract when called upon to do so, or fails to complete the work contracted for.

The lowest or any tender not necessarily accepted.

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H. FLOYD, City Clerk.

Revelstoke, B C., Nov. 25, 1907.

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Ontario-Rice Lake Division

SECTION No. 2.

Notice to Contractors

Sealed tenders addressed to the undersigned and endorsed "Tender for Trent Canal," will be received until 16 o'clock on SATURDAY, FEBRUARY 1ST, 1908, for the works connected with the construction of Section No. 2, Ontario-Rice Lake Division of the Canal.

Plans and specifications of the work can be seen on and after the 4th December, 1907, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro, at which places forms of tender may be obtained

The lowest or any tender not necessarily accepted

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
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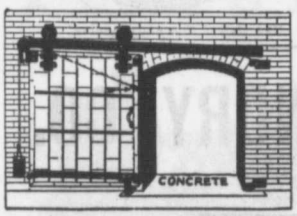

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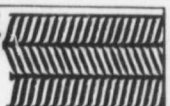

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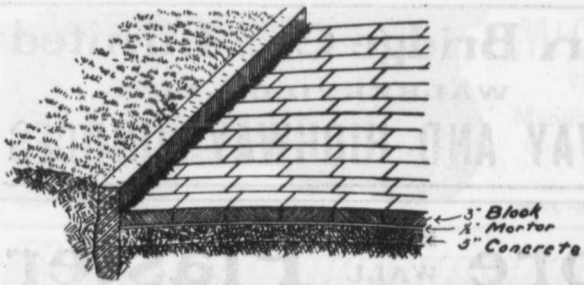

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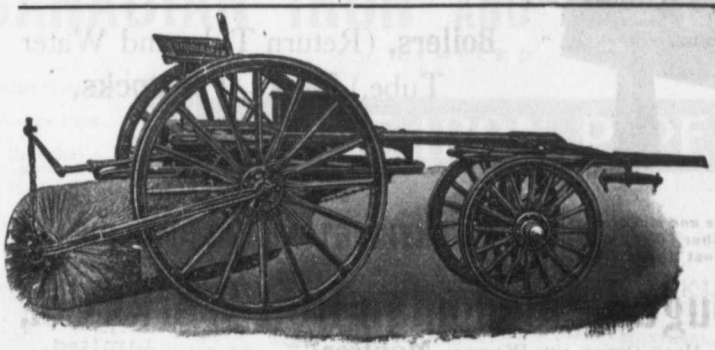

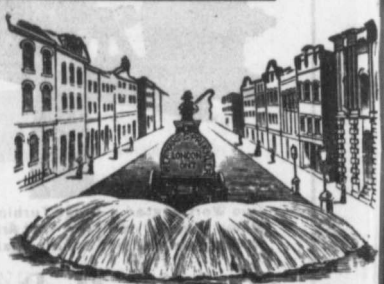

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STRUCTURAL ENGINEERS
TORONTO OFFICE
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TELEPHONE MAIN 6260

Toronto, November 11th, 1907.

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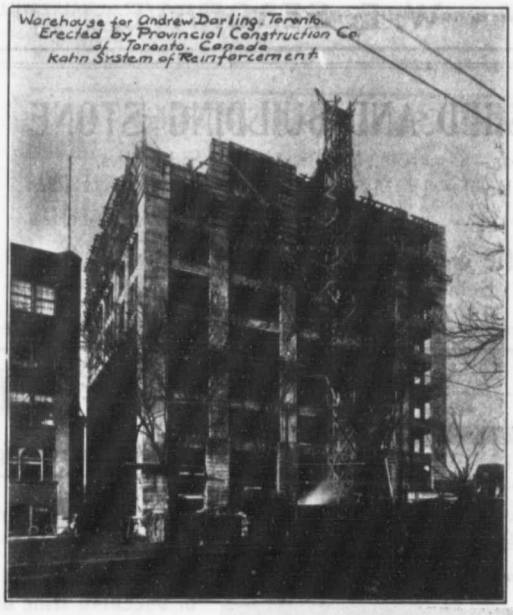
Montreal, Que.

W. H. C. Mussen,

Dear Sir:-

We are sending in this mail photograph of the warehouse which we are erecting for the Andrew Darling Co. of this city. As you will see, our work is nearing completion, and we wish to say that the plant which you furnished us for this work has proved to be very satisfactory in its operation. We started pouring concrete early in July, and have frequently made a daily run of 100 to 110 yards with the No. 1 Smith Mixer used, which we think is a very good record for this size machine, as it was located in a position which subjected it to most trying conditions.

Yours very truly,
THE PROVINCIAL CONSTRUCTION CO. Limited,
Per Thomas J. Lannin
President.



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therefore, in comparing the Smith with other machines, the claims for which are based on what their makers would like them to do, rather than what the machines are actually capable of doing.

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POWER FROM EARTH'S HEAT.

The earth as a steam boiler is a scheme for to-morrow. In the Simplon tunnel intense heat was encountered in the heart of the Alps, heat which needed modern methods of cooling to prevent the workmen from being incapacitated. At the bottom of all deep mines the earth is considerably warmer than at the surface. A theoretical increase of temperature of one degree has been based on results obtained in a variety of localities. But this must be taken as only approximate, for great variation exists in different parts of the globe. There is no doubt that the heat of the earth gradually increases with the depth. On this, says the "Chicago Tribune," is based a theory for a new source of power. It is proposed to bore two holes directly into the earth's surface 12,000 feet deep and fifty feet apart. At this depth there should be a temperature of about 240 degrees, far above the boiling point of water. Heavy charges of dynamite would be dropped to the bottom of each hole and exploded simultaneously with the view of forming a connection underground between the two walls. Cold water is to be poured down one hole, and the steam issuing in consequence from the other is to be applied to industrial machinery. The scheme is said to be within the present standards of cost and enterprise. It is believed that in the Pittsburg district the plan might be carried out for about $50,000, and that after this initial expenditure there would be a practically unlimited supply of high pressure steam for the mere cost of the water from which it was produced.

THE INDUSTRIAL DEPRESSION.

There is now being discussed in the leading mercantile centres of the United States and Canada the possibility of an industrial as well as financial crisis. New York, the original storm centre, seems to be regaining its financial equilibrium, although all over the United States, the banks have partially suspended cash payments. In some sections, according to the American press, almost complete suspension prevails, and business is being done through the medium of printed cashiers' cheques, which circulate as freely as money. These conditions are, however, regarded as only temporary, and the question now being asked most anxiously is whether the financial crisis is to be followed by the more serious calamity of an industrial slump. It is now generally admitted by even the most optimistic that business must suffer some depression, but opinions vary widely as to the probable extent and duration of the trouble. Despatches from widely separated sections tell of the temporary shutting down of plants, the reduction of working hours and the laying off of men, the causes given varying in different cases.

In the United States a number of Texas lumber mills have adopted a four days a week schedule; the largest ship and car building works in Washington, D.C., have reduced their pay roll from about $23,000 a week to $5,000, and in Massachusetts a number of large industrial plants are either shutting down or running with reduced help. A Chicago despatch states that nearly 1,000 machinists in Chicago are idle, and that railroads west of that city have laid off an aggregate of 25,000 men employed in construction work, maintenance of way and in the mechanical department. Special reports to "Dunn's Review" from sixty or more of the leading cities of the country indicate a wide curtailment of production in many industries, although in most instances this is said to be due to fear of overproduction rather than to diminished orders. Trans-Atlantic steamship companies report an unprecedented exodus of aliens from the country, and they interpret the phenomenon as a sign of industrial depression.

In Canada similar conditions prevail. In Toronto, building activity is almost at a standstill, despite the favorable weather that has prevailed during the past few weeks. Labor bureaus state that they are unable to place more than ten per cent. of their applicants. Lumber jacks are coming into the city and applying personally at the offices of well-known operators as to opportunities for bush work. This is an almost unprecedented occurrence. In Montreal many of the large factories have been put on half time during the last two weeks, the woollen goods workers being especially affected. Last week it is said that two hundred men were laid off in the large industrial establishment of the Thomas Davidson Manufacturing Company. The building season is about over in Montreal, and hundreds of men are out of employment. Last week about two hundred metal workers were suspended at the Grand Trunk shops at Point St. Charles. During last month the staff of men employed in the C. P. R. shops has been gradually reduced and the manufacturing of box cars completely discontinued. Western Canada, while in certain lines there is cause for apprehension, is, from all accounts, better off than the east. The mines are working a greater number of men, and with the rise in the price of copper and the expected rise in the price of lead and silver, more properties are yet opening. The lumber industry is perhaps in the most unsettled condition, very little labor indeed being required for operations in the woods on account of the greatly curtailed log cut.

Unwonted caution is apparent in every branch of commerce and in every part of the country.

THE COMMERCIAL SITUATION

THE FINANCIAL OUTLOOK.

Much difference of opinion prevails as to what the immediate future will bring forth in the financial world. President Chas. S. Mellen, of the New Haven Railroad, is thus quoted in a Hartford despatch to the "New York Commercial": "This is not a rich man's panic. It is a widespread distress, rapidly extending itself to the farthest sections of the country, and it will levy its tax in such a way that no man, woman or child shall fail to bear his portion of the burden." On the other hand, "a man who ranks as perhaps the highest authority in the United States on trade conditions," is quoted by the "New York Evening Post" to the effect that the business situation will probably show improvement in a month, and that the panic will leave no serious industrial disturbance in its wake.

President Gompers, of the American Federation of Labor, is evidently of the same opinion, since he proclaims as the watchword of his organization at theis time: "No reduction in wages." The "New York Times" ranges itself with the optimists, emphasizing as the most remarkable feature of the present disturbance the fact that the general business of the country has shown such decided firmness and soundness."

WHERE THE CROP MONEY WENT.

It may puzzle a good many to understand why there should be lack of money in a country that has had such good crops as we have had for several years past. The cause is the overstraining of credit. We have been enjoying such phenomenal prosperity that everybody, almost, has been dabbling in speculation of one kind or another in the general haste to make fortunes in a couple of years. The farmer has been buying the section of land next to him, before some one else would take it up. He of course had to borrow the money to do this, or he put all his income into it and lived on credit from the local merchant. He expected to be able to sell at a few days' notice, if necessary, and the man who bought a house expected to rent it for a big amount or sell it at a big profit. To-day as things are they cannot sell, and the question of the hour is how to meet the payments due. This is one of the secrets of the money stringency in the West. The people have been too ambitious. They have been rushing headlong into everything and anything in the speculative spirit of the past few years. Now the tide has turned—a halt is called, and the people are seeing what the result of rashness is.

The country after this situation blows over will be on a better business footing than ever before. It is a new country, and the newcomers as well as those who have been there for years will know in future more about the caution that is required and the pace they should keep.

CRIPPLING THE WHEAT MOVEMENT.

In "The Commercial" of November 23 appeared a communication from a business man in a Manitoba town, showing the result of the money stringency. He claims that it has caused a slump in grain prices at country points, and a serious loss to the farmers. He says that the retail merchants cannot collect from the farmers under existing conditions, and the merchant cannot pay the wholesalers. It has been admitted all along that the curtailing of speculation is one of the best things that ever happened the country, but the serious thing is to prevent the marketing of the grain at this time of the year. The higher grades of wheat will continue high in price, but if the movement of the lower grades is delayed it may mean the loss of considerable money to the farmers and merchants.

The correspondent in question closes his letter with an appeal to the jobbers and retailers to use their influence to get the returns for the crops into the country. The retail merchants have Christmas goods that they want to dispose of, and it is very necessary that everything possible should be done to enable the farmer to sell his grain, and put the money into circulation among the business men.

THE CALL MONEY.

It is not a fact that the money our banks have in New York could be withdrawn at a few hours' notice. The sixty million dollars or more that our financial institutions have there were loaned on securities which to-day could not be marketed without serious loss, if at all. Think what it would mean throwing sixty millions worth of stocks on the market, and especially under present conditions. To do so would ruin the chances of selling. One million of any stock put upon the New York market to-day would cause another panic.

The greater part of Canadian money in Wall street is there because the banks want higher interest, and in the meantime Canada suffers. Whatever the inducement for higher interest may be, Canada has first claims upon the operations of the country's chartered banks. What would we think of such a proposition as our Canadian street cars being sent to St. Paul or Chicago because there they could collect more fares? The street railway companies are chartered to operate here for the convenience of the public. On the same principle the banking institutions are chartered to accommodate the Canadian people.

Over a million bushels of grain were shipped out from Fort William elevators last week, which is the largest amount yet shipped in any week this fall. Elevators are running daily, Sundays included. Boats continue to come in slowly.

FROST RESISTANCE OF BRICKS

The nearer brick making becomes an exact science the more satisfaction will be given to manufacturers and builders. The elimination of guesswork and unknown factors in the manufacture should be the aim of every reputable firm. Builders of modern high grade city structures are changing their methods rapidly, and we find the work drifting into the hands of large building contractors who guarantee the quality of all materials used in their structures. They employ experts in the different departments to inspect the work and materials, and as a result anything which fails to come up to the required standard is rejected. It is becoming more difficult every year to dispose of poor bricks, while those which have a high standard of quality rarely fail to find a profitable market.

In the use of building materials most reputable architects agree that bricks are the most serviceable of all artificial products. They represent the right unit for giving variety and stability to walls, and they are durable and fireproof. In the present fireproof building movement bricks stand pre-eminently to the front as the most useful for general work. Since the San Francisco fire the supply of bricks on the Pacific coast has been far below the demand. A good many inferior bricks were used in the old San Francisco buildings, and they must have been partly instrumental in permitting the fire to extend beyond the control of the fire department. A good brick wall, fireproofed on the inside with hard burnt terra cotta porous blocks, and on the outside with structural terra cotta blocks, is probably the best fireproof thing that can be erected. In tests made in the laboratories in New York and Chicago such a wall withstood temperatures up to 3,000 degrees without crumbling or being seriously impaired. Such walls up to the fourth and fifth storey represent the best which modern science has accomplished.

Higher buildings require the reinforcement of steel frame. When the steel frames are erected, however, they are intended to carry the loads of the different floors, and are not supposed to withstand fire. They demand perfect protection from high temperatures by an outside and inside wall of bricks or terra cotta. Up to the eighth and tenth storeys of such buildings good fireproof bricks are considered the most suitable by architects, but in the twenty and thirty-storey structures structural terra cotta blocks are being largely employed owing to their relative weight. They are so light in weight that they decrease the load on the steel frames, and thus secure a rigid wall of great height with the minimum amount of metal framework.

The demand for burnt bricks is therefore an important factor in the present building movement. More burnt bricks which will withstand a high temperature are used to-day than ever before in the history of the trade. These bricks roughly divide themselves into two distinct classes. One is ordinary burnt bricks for the protection of steel work, but without any ornamental qualities. They are used inside of the walls, and are put up to receive a face of stone, terra cotta, marble or other ornamental material. Their chief quality is their high fire resistance. It does not matter whether they are carefully moulded and pressed or even if their ends are a little rough and chipped. But like fire bricks they must be able to withstand a high temperature without disintegrating. The other class of bricks are fireproof, and at the same time ornamental. They are face bricks used in fireproof walls. They must contain a high fire resisting quality and prove sufficiently ornamental to make their exposure in the walls attractive.

These points in brick making are fully appreciated by many manufacturers, and the qualities have become fixed factors. The manufacture has been reduced to an exact science, and as a result builders of the better class employ them unreservedly. Nothing has influenced the fireproof building movement more effectually than the makers of first class fireproof bricks.

But there are other qualities which demand immediate attention. The effect of frost on bricks is of paramount importance. Heat and cold affect iron and steel to such an extent that contraction and expansion involve many nice little calculations in putting up a skyscraper. To a large extent the brick walls which protect the steel must serve another purpose. They must protect the metal from dampness and rapid changes in temperature. It is true that many kinds of waterproofing material, either paint or paper, are used to protect the iron and steel from atmospheric dangers, but builders rely more generally upon the bricks to secure the result desired.

There has been a great deal of experiment carried on among builders in the last year for the purpose of finding out the relative value of good bricks in protecting steel frames from heat and cold. The outcome of these experiments may add more scientific data to the building problems. It will result in the call for a more accurate classification of bricks for special purposes. Manufacturers of bricks will furthermore be helped in their work by consulting such data.

Now as a fact bricks differ so greatly that it is impossible to lay down any rule in regard to their action under certain atmospheric conditions, and yet it is a simple proposition to manufacture bricks of a certain standard grade which will under all conditions yield the same general results. It is this standardization, as it might be called, which buildings are seeking.

Before exact scientific data in the making of bricks enabled manufacturers to produce uniform standards bricks were pretty much the same, and a good many erroneous ideas concerning them were prevalent. Brick making was in a primitive stage then, and the products of the trade were pretty crude. Their resisting power to heavy weights or loads was not great, and their disintegration under certain conditions was a foregone conclusion. Thus the action of frost on bricks was important and one of the agencies which tended to injure the

(Continued on page 23.)

CEMENT AND CONCRETE

[NOTE --Contributions suitable for publication in this Department are invited from subscribers and readers]

IMPERMEABLE CONCRETE

One of the most desired characteristics of concrete at the present time in connection with its physical resistance to the results of loading is impermeability to water. Although the ultimate compressive resistance of the strongest concrete is far below that of the best natural building stones, it is high enough to meet the exacting requirements of masonry in most engineering structures, and its lack of tensile resistance is effectively cured by steel reinforcement. In spite of the fact that its real merits, intrinsically of a high order, have at times been greatly exaggerated and grossly overworked by ignorant and ill-judged advocates, concrete is rapidly becoming one of the most valuable of all our structural materials for engineering purposes, if, indeed, it has not already reached that position. It is employed in many cases where its main function is that of carrying loads, but at the same time where the quality of real impermeability would add greatly to its value. This is not only true in an extended range of engineering structures, such as dams and aqueducts, but also in its application to buildings both en masse and in blocks. If concrete could be given a truly impermeable character its value would be greatly enhanced and its field of usefulness would be even more rapidly extended than at present.

The great obstacle heretofore experienced in making concrete waterproof has been its highly porous character. With the dry mixtures used in times past, the porosity of concrete was excessive and not the least of the many advantages accruing to the use of wet mixtures is the greater solidity or density conferred upon the mass. A wet mixture not only causes all portions of the mass to run together in greater solidity but it enables the finer materials of the aggregate to flow freely and thoroughly into the spaces between the coarser particles, thus producing a much more nearly continuous and dense interior mass. This means obviously a greatly enhanced capacity to resist seepage through it. In fact, if the cement were ground sufficiently fine to enable it and the finest parts of the sand to enter freely into all the interior spaces of the aggregates, a waterproof material under high intensities of pressure would result; but the wettest mixtures which it is possible to use neither eliminate all the air bubbles nor fill all the interior spaces. However, much care may be taken in securing a thorough and intimate admixture of the component parts, all porosity is not eliminated and some seepage results under pressures of forty to sixty pounds per square inch or even less.

If suitably mixed concrete could be put under a high pressure before the initial set takes place, so as to squeeze out all air and surplus water, should there be any, in much the same way as molten steel is compressed, in order to produce grades of that metal of special value, it is altogether probable that the resulting density would be sufficient to secure essential impermeability under very high heads. This obviously is impossible, but some recent investigations appear to indicate that there may be other simple means of attaining the much-desired quality of impermeability. In a discussion by Mr. Richard H. Gaines of the paper presented to the American Society of Civil Engineers in April of the current year by Messrs. W. B. Fuller and S. E. Thompson, there are set forth some results of tests made to determine the effect of the addition of certain substances on ordinary concrete mixtures. In the search for materials which may enhance the waterproof character of concrete it is clear that none must be used which will prejudice the resistance or durability of the mixture. Mr. Gaines, who is the chemist of the New York Board of Water Supply, shows that the addition of small percentages of alum solution and fine clay to Portland cement mortar and concrete enhances greatly the impermeability of the mixture and that both compressive and tensile resistances were increased. Although the number of the tests was relatively small and the life of the test specimens was not long enough to settle conclusively such a question as that under consideration, the results obtained show that the line of investigation followed is worthy of being carried further in order to determine just what value may be attached to the mixtures of such materials as were employed with the usual proportions of cement, sand and gravel or broken stone in the manufacture of mortar and concrete.

It has been indicated by tests that, contrary to the former opinions of engineers, the presence of small percentages of fine clay of a suitable character and properly mixed does not necessarily injure the strength of concrete, and it has also been shown that the same mixture may aid in attaining more nearly waterproof qualities. Up to the present time, however, investigations of this kind have not been carried far enough to give quantitative results of sufficient range for practical purposes. It has generally been considered that the effect of fine clay in reducing the porosity of concrete was wholly mechanical,

but the modern view of physical chemistry, so to speak, may disclose such a purpose. With the modern wet concrete mixtures, the presence of the clay is asserted by Mr. Gaines to induce a colloidal action which is apparently aided by such a solution as that of alum, so that the result is a modification of the interior mass, tending to eliminate ordinary porosity.

There is nothing new in the employment of an alum solution as well as various soap solutions to afford concrete a certain degree of impermeability to water, but the purpose hitherto has been to produce an impermeable surface rather than an impermeable mass, which the results of Mr. Gaines' experimental work appear to indicate is attainable. The great advantage of securing an impermeable or waterproof mass of concrete over superficial effects is so clear as to need no comment. This observation is especially pertinent to all reinforced concrete work, in which it is of the first importance to protect the steel reinforcement from corrosion. It is to be hoped that in its investigations connected with the construction of the Catskill aqueduct, the Board of Water Supply will extend its investigations thoroughly into the field indicated by the results already obtained by Mr. Gaines. At the present time it is difficult to imagine any greater benefit to be conferred upon all classes of concrete work than to find some simple and effective method of making it waterproof under reasonably high pressures. Such an investigation should also include tests with hydrated lime and the various proprietary waterproofing compounds, now extensively used, some of which seem to be giving good results when added to the usual concrete mixtures.—Cement Era.

Many complaints are made of damp coming through exterior walls of concrete houses. In English practice they paint the exterior faces of walls and in the application of the last coat they powder the same with dry sand. Colors from white to yellow through to dark reds and browns are the most lasting.

REINFORCED CONCRETE CONSTRUCTION.

That reinforced concrete has, during the year just closing, increased its hold on the engineering and structural world in general, is undisputed, while the extent to which reinforced concrete is used, as well as the remarkable results obtained, makes the subject one of vital importance. A brief resume of the work done in Canada during the closing year should therefore be of interest to the readers of THE CONTRACT RECORD.

Reinforced concrete was practically unknown in Canada up to three years ago. It is true there were some structures then in existence in which reinforced concrete floors and roof slabs had been used, but these floors and roof slabs were supported by steel columns and beams. In other words, the structures were really steel buildings, the steel being protected against fire by concrete, but this could hardly be termed reinforced concrete construction. Three years ago this type of construction was practically first introduced into Canada, and the erection of a few buildings was begun in Toronto, Montreal, Ottawa and other large Canadian cities. The following year a better showing was made, and in addition to the larger cities the smaller centres began to use this material for general building purposes. The year just closing sees a very large percentage of the buildings in every section of Canada carried out in reinforced concrete.

In Canada, as well as in other countries, numerous systems of reinforcement are used. The Trussed Concrete Steel Company of the United States, who handle the "Kahn" System, found the Canadian field developing so rapidly that they decided early this year to organize an independent Canadian company and, accordingly, built a plant for the manufacture of the Kahn reinforcing steel in Walkerville, Ont. During the past year the Kahn system of reinforcement has been used to advantage in footings, columns, floors, roofs and other parts of buildings, as well as in bridges, arches, culverts, abutments, retaining walls, septic tanks, reservoirs and tunnels in Canadian work. Office buildings, hotels, government buildings, warehouses, manufacturing buildings of reinforced concrete can to-day be found in every part of Canada. Toronto alone to-day boasts of twenty buildings in which the Kahn system of reinforced concrete has been used. Among these is the Andrew Darling Building, now being completed, which is the largest monolithic reinforced concrete building on British soil. The new Toronto public library, now in course of construction, is being built on this same system, while in Hamilton there are ten buildings built on the Kahn principle. Two of these, the Eagle Spinning Mills, were built in 1906, and are now being enlarged to nearly double their size.

In this particular instance a remarkable record is being made by the contractors, the Provincial Construction Company, Toronto. The contract was awarded in the first week of October, and the buildings at this date, eight weeks later, are practically completed; they consist of one building about about 84 by 104 feet, two storeys and basement, also one building 30 by 80 feet. The contractors began excavating the day the contract was awarded. That they have been able to carry out this work with such rapidity, at the time of the year when ordinary building materials were very hard to obtain, helps to prove the assertion made by concrete advocates, that reinforced concrete building construction, when in the hands of a proper organization, can be handled with greater rapidity than any other type of construction known.

TO PAINT GALVANIZED IRON.

To get paint to adhere to galvanized iron seems to be a difficult problem and various experiments have been made in order to find a way of getting around the difficulty. The United States Government has adopted a mode of procedure which seems to give satisfactory results. Specifications call for the use of vinegar in washing the surface before painting. This roughens or corrodes the surface and gives the paint much better adhesion.

CANADIAN PLUMBER HEATING AND LIGHTING ENGINEER

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers.]

A Method of Sewage Treatment for Isolated Houses

We reprint from the "Engineering Review" the substance of a paper by John Mitchell, describing a method of sewage treatment for isolated dwellings adopted by him with satisfactory results in New Zealand:

It is well known to householders and members of local bodies that in all cases where there is no proper sewerage and water system the ordinary night soil service or the operation ordinarily performed by individual householders is usually inconvenient, unsatisfactory, and to a degree expensive, besides being more or less a danger to public health.

The more recent adaptations of the septic tank have caused a considerable measure of improvement and given some degree of relief where the principles have been rightly understood and true methods have been properly applied. The cost of installing the ordinary septic tank has, however, greatly restricted its sphere of use, and greatly retarded the progress of reform in that direction.

I have found by experiment that it is possible to provide a special form of closet pan, so contrived that it will, in itself, not only be free from many of the usual drawbacks, as a receptacle; but that it may also be combined, in use, with an inexpensive bacterial macerating pit and means for effluent disposal that is simple, inexpensive and efficient.

The closet pan is designed to suspend the organic solids in water and to dilute the urine, so that there shall be no bad odors arising therefrom. Usually a water closet pan is contrived with the intention of as quickly as possible getting rid of the organic solids by resorting to an effective water flush. In the country and in the cases above recited that is rarely practicable or convenient.

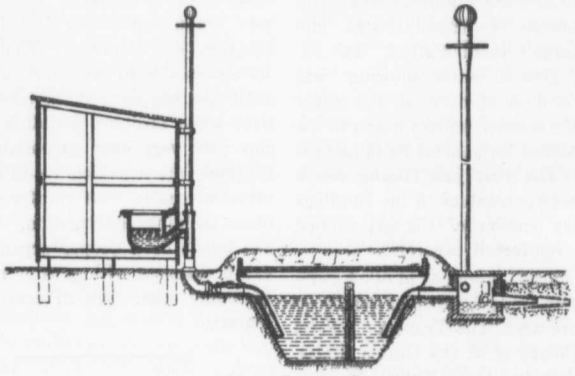

FIG. 1.—SEPTIC PIT AND SUBSOIL.

The pan, Fig. 1, is intended to hold and to receive daily about four gallons of water, say an ordinary domestic bucketful. That will generally be found sufficient to satisfactorily suspend the amount of organic matter deposited in the pan for the day. To flush it out twice a day would be still better. The pan is provided with an arm in the back and a vertical discharge pipe so arranged as to make an effective trap or water seal, and at the same time to connect easily at its lower end with the drain leading direct to the bacterial macerating pit. The upper end of the discharge pipe is made to receive the flange of an upcast metal ventilating pipe, where so desired. The metal pipe may be made to unship so as to give access there as an inspection pipe, or a special inspection opening may be formed in the vertical discharge pipe immediately below the flange, if preferred. The vent pipe would be carried up as high as convenient and be surmounted with a wire guard to exclude birds, leaves, and the like.

To avoid the expense attaching to the construction of a concrete or brick septic tank and its gear, I have contrived the already mentioned bacterial macerating pit, which is a trench formed in the earth itself, ordinarily about 8 by 4 by 4 feet. The side walls and end walls of the pit are made to batter so as to prevent their collapse, and to facilitate the making of their surfaces more or less impervious by a coating of tar, cement, sand, and cowdung, or any other inexpensive dubbing, in contradistinction to brick or concrete walling. In certain cases the earth itself will be found sufficiently retentive, or soon become so when

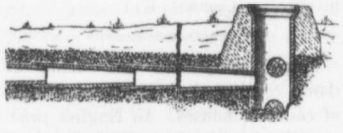

FIG. 2.—SPECIAL FORM OF SEWAGE DISTRIBUTORS,

brought into use, as the pores of the earth will sooner or later "sludge up," and thereby prevent the escape of the liquid. The location of the pit must be governed by circumstances, but it would be desirable to keep it not less than 6 feet away from the outbuilding.

To protect the margins of the pit and to carry its cover, I provide a 9 by 2 inch wooden curbing. On a supporting fillet is laid a protective cover, made of 9 x 2 inch tarred planks, having the joints covered with 3 by 1 inch battens nailed to one plank only, to facilitate removal. On that, and between the curbing, is laid a 6 inch layer of fine garden soil.

A cleaning eye is provided at the side of the inlet pipe to permit of the removal of any obstruction that may get into the pipe there. A junction is also provided at that point conveniently to take the drain from the kitchen sink, baths, wash bins, etc., where such is required for the treatment of house sewage.

To carry the macerated organic matter to the living earth near the surface and to distribute it there, a system of shallow trenches, say 12 to 15 inches deep and 12 inches wide, is used. In these is laid a layer of gravel about 3 inches thick, or scoria, shells, or other hard pebble-like substances. On that are placed field tiles and at the sides and over the top thereof similar material is laid, and finally over that is placed the garden soil (humus) and top sods.

Where the land is of stiff clay, or very retentive, it must be dug up in the neighborhood of the pipes and for some distance away and mixed with sand and humus, so as to let it become "alive" and active. To more effectively distribute the effluent and in certain special land configurations I prefer to use pipes specally contrived for that purpose by Dr. J. P. Frengley, M.D., or those of my awn special design as shown by Fig. 4.

Where the land configuration demands deviations of the field tiles in several different directions, I provide a small collecting well, and from that I take outlets at a uniform level in any convenient number of directions that may be desired. Obviously, too, any of those outlets from the collecting wells can be easily plugged and the distributing system controlled and made intermittent accordingly, if use, or special conditions, demand such.

Under certain circumstances I have found it necessary to ventilate and thereby aerate the pipe system, so as to carry away any excess of gases formed as a part of the process and at the same time introduce a free supply of fresh air for the invigoration of the aerobes. That is attained by bringing the ends of the field tile ducts into communication with the surface by delivering them into the side of a 6 or 9 inch glazed socket pipe, placed on end with a hole formed therein to receive the field tile, and perforated to allow the sewerage to spread out therefrom. The top of the 9 inch pipe stands above the surface, and the opening is protected with a cast iron grating. Round about that pipe I usually place a bed of gravel or scoria and the like, say 3 by 3 by 1 1-2 feet, to serve as a catch pit for any unusually large discharge of liquid from the bacterial macerating pit and at a time when the humus is already moist, as it would be in the rainy season. It is believed that the introduction of a limited quantity of rain water, from say the roof of a small outbuilding into the collecting well, and thence through distributing pipes, is advantageous. The ventilating pipe is connected with the first collecting well and is nearest to the macerating pit, and is to be carried to some convenient building, fence, or special supporting standards. Thence it is carried up into the air as high as possible, say 20 to 30 feet, and is surmounted with a special aspirating head.

Under all ordinary circumstances I believe it will be found that one foot lineal of 4 inch field tile, placed as hereinbefore described, will satisfactorily dispose of 1 gallon of liquid from the macerating pit daily.

The manner of using those appliances has been made so obvious by the extended explanation of the appliances, methods and principles already given, that further reference is hardly needed. Briefly, then, the pan, when to be used, is first charged with clean water, and is to be flushed daily with the morning bedroom slop water, and by an after-bucket, or buckets, of clean water. A corresponding volume of water, excrement, urine and paper is displaced from the pan and carried to the bacterial macerating pit; there a bacterial scum soon forms and prevents the escape of gases to any perceptible or hurtful extent. The organic matters are reduced to a macerated condition and are suspended in the liquid contained in the pit, and are in due course displaced (when the pan is flushed) and carried to and distributed in the living earth by means of the field tile and gravel trenches. They are there absorbed, changed, converted, purified and utilized by Dame Nature's own methods.

When the slow accumulation of solids in the macerating pit makes cleaning necessary the sludge may be shoveled out and dug into the soil, after which the pit should be filled with clean water. If the tile distributors clog they may be taken up and the surrounding material aerated or else replaced with fresh material; or new tile lines may be laid.

Where snow and ice prevail it would be necessary to take the usual precaution against such and to make the trenches deeper accordingly.—Engineering News.

TO CLEAN RUSTED STEEL.

Rusted steel can be cleaned by brushing with a paste compound of 1-2 ounce of cyanide potassium, 1 1-2 ounces castile soap, 1 ounce whiting, and water sufficient to form a paste. The steel should be washed with a solution of 1-2 ounce cyanide potassium in 2 ounces water. To preserve steel from rust dissolve a part caoutchoue and 6 parts turpentine with a gentle heat, then add 8 parts boiled oil, and mix by bringing them to the heat of boiling water. Apply to the steel with a brush the same as varnish. It can be removed again with cloth soaked in turpentine.

Another method of cleaning rusty pieces of steel is given as follows: Put the pieces in a solution of chlorate of tin, not too strong, or it will attack the metal, and let them stay there about 24 hours or less. Take the pieces from the bath, wash them in water, then in ammonia, and then dry them quickly.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

CONTRACTS OPEN.

Alberni, B.C.

The Redcliffe Lumber Company, the Alberni Mills Company and the B.C. Cedar Company have applied for water-frontage at this place with a view to the erection of large mills.

Atwood, Ont.

George Lochhead, clerk, Elma township, wants tenders up to December 10th for the construction of a drain in the township of Elma. Specification at Mr. Lochhead's office, this place.

Barrington Passage, N.S.

The Union Bank of Halifax have approved plans for the erection of a branch bank at this place.

Brandon, Man.

Alderman Clarke, chairman of the sewers committee, has resigned owing to the defeat of his proposition to erect a scavenger depot.

Calgary, Alta.

The council are considering a by-law to raise $35,000 for building purposes in connection with the exhibition board.

Chilliwack, B. C.

The Chilliwack Co-operative Association are taking tenders for alterations to their store.

Clinton, Ont.

Announcement is made that a new edifice will be commenced next spring to replace the present St. Joseph's Church. $10,000 has already been subscribed for the project.

Cobalt Ont.

A proposal is being formed for the erection of a $25,000 Y.M.C.A. Institute here.

Chesley, Ont.

The inhabitants of this town have petitioned the member for North Bruce to bring the matter of a new post office building before the Government.

Deschenes, Que.

A deputation recently interviewed the Hull Electric Railway Company, which is controlled by the C.P.R., concerning the proposal to dam the river at this place. The estimated cost is $150,000 and the project is beginning to take definite shape.

Edmonton, Alta.

Plans of the buildings for the new power plant are being prepared under the supervision of city engineer Keely.

Fort William, Ont.

The bond issue of the Fort William Car Company, Limited, has been disposed of and work on the proposed $500,000 plant will shortly be put in hand.

Active steps are being taken by the Fire, Water and Light committee to improve the fire appliances of the city. The suggested improvements include a new fire hall in ward 1 and extensions to the central hall.

A by-law to raise $16,000 by debentures for the erection of a high school has been sanctioned by the ratepayers.

Halifax, N.S.

In connection with the increased shipping facilities that are being arranged, it is understood that the Government will construct a new pier on the Cunard property.

Owing to the unsafe condition of night work at pier No. 8 the 'longshoremen recently refused to work and a petition has consequently been forwarded to the Minister of Railways asking the Department to build a new overhead bridge.

Hartney, Man.

T.B. Woodhull, secretary-treasurer, will receive tenders up to December 18th for a pile bridge across the Souris river. Specifications at secretary-treasurer's office.

Kamloops, B.C.

Architects Honeyman and Curtis, of Vancouver, have completed plans for the new $70,000 provincial law offices and tenders are called for up to December 31st. Tenders must be addressed to F. C. Gamble, Public Works Engineer, Victoria, B.C.

Kamsack, Sask.

It has been decided to purchase a chemical engine for fire protection in this town.

Kinkora, Ont.

Plans have been prepared by James S. Russel, architect, Stratford, for the erection of a new Roman Catholic school here and building operations will be commenced in the spring. The cost will be about $2,000.

Ladysmith, B.C.

The Tye Copper Company, Limited, are making extensive improvements to their smelting works here by means of additional machinery and the building of a new wharf at Oyster Bay.

Tenders are invited by Fred Gelinas, Secretary, Department Public Works, Ottawa, up to December 11th for the construction of a public building at Ladysmith. Specifications may be seen on application to the local postmaster and at the Department.

Another movement is on foot for the acquisition of a hospital in this town.

Lethbridge, Alta.

Two measures recently defeated by the ratepayers have now been passed by a large majority. The electors voted $30,000 to bore for natural gas and approved the purchase of a gas well at $13,000.

London, Ont.

Dr. Niven, chairman of the local Board of Health, announces that an anonymous individual will contribute a further sum of $10,000 to the proposed tuberculosis fund in the event of the Blair offer being accepted.

At the anniversary services of the Colborne street Methodist Church held last week, plans were discussed for the enlargement of the church and a special offering taken which realized $700. The project will now be hurried forward.

J. Lewis Thomas has just returned from England, where he submitted several samples of Dorchester clay to the examination of prominent tiling manufacturers whose reports were most satisfactory. It is probable that a meeting will shortly be convened with a view to the formation of a company.

Montreal, Que.

A new fire station will likely be built on Pine avenue and estimates are now being prepared.

A rumor is current to the effect that a deal is being negotiated for the acquisition of property on St. James, West Notre Dame and St. Peter street, owned by S. Carsley & Company and others, for a large down town hotel proposition.

The road committee are asking the finance committee for $3,000,000 to carry out improvements to streets and sewers next year.

New Westminster, B.C.

Tenders have just been taken for the erection of a large frame school house at Annieville, Delta electoral district.

Niagara Falls, Ont.

Votes of the ratepayers will be taken on January 6th upon a by-law to raise $23,000 by debentures for school building.

Orillia, Ont.

Additions are being made to their factory in this town by the Dominion Wrought Iron Wheel Works.

Ottawa, Ont.

A by-law of the Nepean township council to raise $10,000 for bridge construction will be submitted to the ratepayers at the January elections.

The Anti-Tuberculosis Society have definitely decided not to locate at Rideauville and are now considering other sites.

The property committee have recommended a by-law to raise $8,000 for the building of a covered way on York Street.

City Engineer Ker will shortly recommend the construction of extensive improvements to the waterworks, including the widening of the aqueduct, the supply of a new intake pipe and the construction of a reservoir at Bayswater.

Pembroke, Ont.

A by-law will likely be submitted to the ratepayers at an early date to raise $25,000, the amount of the engineer's estimate, for building a steel bridge at Mary street.

Pincher Creek, Alta.

On December 10th the ratepayers will vote on a measure to give a $25,000 guarantee to the Alberta Oil, Coal and Wheat Railway Company.

Port Arthur, Ont.

An additional dock will probably be built by the C.P.R. next season in front of their new station.

Port Stanley, Ont.

The Government are about to construct a 200-foot crib here for the protection of the beach.

Rainy River, Ont.

The Sutherland Innis Company of Chatham, Ont., are negotiating for a free factory site at this place.

Saskatoon, Sask.

A recommendation has been passed by the Underwriters' Association urging the city council to erect suitable buildings for the fire appliances. The suggested improvements call for a new fire hall and stabling.

Souris, Man.

The local Board of Trade will petition the Government for a suitable post office building here.

Stratford, Ont.

The Canadian Rand Company have submitted to the water commission a proposition to install an air compressor plant for raising the flow in the artesian wells.

The G.T.R. are carrying out plans for enlarging their various repair shops. In this town they are erecting a large machine shop in which will be installed a 120-ton electric travelling crane and other machinery.

St. Boniface, Man.

On December 17th the ratepayers will vote on a by-law to raise $260,394 to wipe off the town debt and for the completion of various public works.

Sydney, C.B.

A new steam plant will be installed at their mines by the Cape Breton Prospecting company.

Torbrook, N.S.

An electric plant is to be installed by the Londonderry Iron Mining company for the operation of their mines at this place; estimated cost $40,000.

Toronto, Ont.

The York County Council have passed a resolution urging the Ontario legislature to erect one or more consumptive hospitals. At the same meeting the council adopted the county commissioners report recommending the repair of a number of bridges throughout the county.

Tenders will shortly be awarded by the Provincial Public Works Department for the construction of winter roads in Northern Ontario.

The Trusts and Guarantee Company have acquired the premises now occupied as a drug store by the Hooper Company, Limited, and will remove on the expiration of their lease next year. Extensive improvements will be made to the property.

The Children's Aid Society have asked the Board of Control to share the cost of a $13,000 addition to the Children's Shelter on Simcoe street.

The Minister Myles Shoe Company have taken out a permit for a $30,000 brick factory on Simcoe and Pearl streets. Work on the foundations has already commenced and the building is to be ready for occupation by next spring.

Notice is given of the civic intention to construct extensive sewerage and side walk improvements. The estimated cost is in the neighbourhood of $90,000.

Denison and Stephenson, architects, Star Building, King Street, have just taken tenders for a $10,000 addition to the F. T. James' warehouse, Church and Colborne Streets.

Construction has commenced on the new $30,000 Bank of Hamilton branch corner of College street and Ossington avenue. The building is to be completed by June next. Denison and Stephenson, architects.

A permit has been applied for at the city architect's office for extensive alterations to the Walker house.

By this time next year the C.P.R. expect to have the line between this city and Montreal double tracked.

The Orangemen have decided to build a new up-to-date hall corner of Euclid avenue and College street.

H. F. McNaughton, Secretary, Department of Public Works, wants tenders up to December 9th for the erection of a frame dwelling on south side of Clifford street for purposes of sewage and water investigation. Specifications at the Department.

The Canadian Birbeck Savings and Investment Company have taken out a permit for a four-storey office building on Adelaide east to cost $120,000.

At St. Paul's Anglican Church, Bloor Street, many improvements are in view. An enlarged Sunday school will be built also a new parish house, the expenditure for which will approximate $40,000.

City Engineer Rust has recommended new pavements for Barton, Trafalgar and Jones avenues, and Lisle, Murray, Wallace, Leslie, Lane and Colborne streets, at an estimated cost of over $80,000.

Recent building permits include:—L. J. Bland, 1½-storey brick dwelling, Palmerston avenue, $1,800; R. Robson, 2½-storey brick veneered and rough cast dwelling, Margueretta street, $1,500; Chemical Laboratories Limited, addition to chemical works, Horne street, $2,500; D. J. Sellers, alterations to dwelling, Carlton street, $1,500; R. Dale, 3 attached 2-storey brick dwellings, Grace street, $7,000; T. M. Mallord, 2-storey brick dwelling, Havelock street, $4,000; Trust and Guarantee Society, 2 and 3-storey vaults, King street, $2,000; M. Sims, alterations to store and dwelling, Church street $4,000; Edgar P. Lens, 1-storey brick store and stable, Broadview avenue, $3,000; George Harrow, 2 pairs 2-storey detached brick dwellings, Withrow avenue, $9,000; David Henderson, 2½-storey brick dwelling, Clinton street, $2,500; Canadian Birbeck Investment and Savings Com-

pany, office building, Adelaide street east, $120,000; H. Douatt, 2-storey galvanized iron factory, Carlaw avenue, $1,200; T. R. Whiteside, 2-storey brick dwelling, Oriole road, $6,000; David Lavine, 2½-storey brick dwelling, Beverley street, $5,500; Edward Gearing, pair 2-storey semi-detached brick dwellings, Maitland street, $3,000; T. Williamson, pair 2-storey brick veneered and rough cast dwellings, Emerson avenue, $2,400; W. Daan, 3-storey wood storage workshop, Queen street, $2,000.

Vancouver, B.C.

A permit has just been obtained by Parr and Fee, architects, for a new $100,000 block on Pender street. The same firm have nearly completed plans for the new 6-storey building of the Bowser and Wilson company to be erected at a cost of $100,000 and also for the 5-storey Boyd Burns block on Alexander street to cost $60,000.

The exhibition association have asked the finance committee for a grant of $50,000 for building and other purposes.

The B.C. Electric Railway will develop power on the Jordan River to provide light and power for Vancouver Island.

Welland, Ont.

Plans are being completed by Langley and Howland, architects, Toronto, for the new county hospital and tenders will be called for as soon as they are ready.

The Ontario Power Company are about to erect a new transformer station on Hellems avenue.

Windsor, Ont.

Plans are being prepared by City Engineer Hanes for additional sewers in this city.

Winnipeg, Man.

Permits have been taken out by the C.N.R. for the erection at Fort Rouge of a power house to cost $25,000 and a foundry to cost $30,000.

A by-law to raise $7,000 for building a school house at Kildonan will be submitted to the ratepayers on December 17th.

A site has been obtained on Notre Dame Street by the newly formed Imperial Theatre Company for the erection of a fine new theatre which will be erected at a cost of something like $100,000. Amongst those who signed the petition for the charter were Thomas B. Campbell, proprietor of the Mariaggi Hotel, and John Hooper, architect, of the firm of Hooper and Walker, this city. It is hoped to have the building completed by next September.

The railway commission at Ottawa have passed an order for a new bridge over the C.P.R. at Brown and Brant streets, the structure to be paid for by the city.

The power consulting engineers, Louis Herdt and William Kennedy, of Montreal, and City Engineer Ruttan, have been instructed to report to the Board of Control any changes that should be made in the power plant specifications preparatory to taking new tenders.

Woodstock, Ont.

The Provincial Government are considering the matter of erecting two consumptive sanitariums for eastern and western Ontario respectively, and it is hoped that one will be establisned in this locality.

C. H. Denton, Chairman of the Finance Committee, invites tenders up to December 5th for $50,000, five per cent 30-year Oxford County debentures.

CONTRACTS AWARDED.

Battleford, Sask.

C. R. Robinson, who is now building the registry office, has obtained the contract for the new court house at about $40,000.

Fernie, B.C.

The successful tenderer for the new rink to be built here was C. J. Digby at $18,700.

Digby and Waide have secured the contract for the addition to the Crow's Nest Hotel.

Langham, Sask.

Contractor Reid, of this town, successfully tendered for building the new town hall at $2,995.

Sarnia, Ont

William Ellis, of this town, has secured a large contract from the Board of Works for asphalt block paving at $40,000.

Shell River, Man.

The successful tenderers for the construction of a bridge across the Shell River were the Algoma Steel Bridge Company at $2,500.

Toronto, Ont.

Sproat and Rolph, architects, have awarded the following contracts in connection with the proposed alterations to the Lever Bros' Sunlight Soap factory on Eastern avenue which will be carried out at a cost of $60,000: masonry, T. Cannon and Son; carpentry, A. Weller and Company; steel work, Hamilton Bridge Company; roofing and metal work, A. B. Ormsby and Company; painting and glazing, J. McCausland and Son; plumbing, W. J. McGuire,

FIRES

Property of Canadian Neckwear Company, Toronto, Ont, loss, including stock, $20,000.

Factory of Canadian Wadding Company, Montreal, Que., loss $20,000.

Buildings of Campbell & Campbell, Brandon, Man., loss, including stock, $20,000.

Buildings of Lewis Wigle, Leamington, Ont., loss $10,000.

Property at Sintaluta, Sask., owned by A. McKinney, H. Wilbur and Bell Bros., loss not stated.

Baptist church, Fort William, Ont., owned by Y. M. C. A., loss $1,000.

NEW COMPANIES.

Larder Gold Fields, Limited, Toronto, Ont., incorporated, capital $1,500,000. Incorporators, James Hawes, E. G. Gibson, J. D. Pringle and R. L. Gibson, all of Toronto.

Dominion Sand & Stone Company, Limited, Montreal, Que., incorporated, capital $20,000. Incorporators, Thomas Craig, W. B. Powell, James Burnett, J. W. Craig and Joseph Durand, all of Montreal.

Magog Wollen Mills, Limited, Sherbrooke, Que., incorporated, capital $49,000. Incorporators, A. P. Lomas, James Lowe, J. P. Wells and C. D. White, all of Sherbrooke.

Dominion Pharmacal Company, Limited, Toronto, Ont., incorporated, capital $500,000. Incorporators, T. M. Higgins, William Douglas and others, of Toronto.

P. L. Robertson Manufacturing Company, Limited, Hamilton, Ont., incorporated, capital $250,000. Incorporators, P. L. Robertson, W. G. Reid, A. E. Guidal and H. E. Evel, all of Hamilton, Ont.

Stratford Manufacturing Company, Limited, Stratford, Ont., incorporated, capital $40,000. Incorporators, A. P. Boyer, and G. M. Richardson, of Goshen, Ind.; W.E. Swartz, of Stratford, Ont., and others.

Fortier & Thivierge Company, Limited, Clarence Creek, Ont., incorporated as general merchants, with authority to develop electric power and to erect and operate grinding plants, capital $40,000. Incorporators, Alfred Noel, Jr., W. Thivierge and T. Perrin, of Clarence Creek, and others.

A. Colson Company, Limited, Montreal, Que., incorporated as stockbrokers and dealers in bonds. Incorporators, Henry Weinfield, N. Rosenberger and A. Lavardure, all of Montreal.

Auto Strop Razor Company, Limited, Montreal, Que. Incorporators Wm. Innis, H. J. Gaisman and others.

BUSINESS NOTES.

A new firm of decorators, Beullac Limited, have registered at Montreal.

The Utica Shale Brick and Pipe Company, of St. Lambert, Que., have registered.

A new architectural firm has been formed at Regina, Sask., architect Hutchinson having taken Mr. E. MacGlashen into partnership. Mr. MacGlashen is an architect and builder of considerable experience. He was formally at Boston, Mass., and Watertown, S.D.

The Wilcox Manufacturing Company, London, Ont., manufacturers of builders' hardware, have gone into liquidation and the London and Western Trust Company have been appointed liquidators. It is understood that the liabilities of the concern exceed the subscribed capital by about $50,000. The company was formed three or four years ago with a capital of $250,000.

Philippe Allard, contractor, of Montreal, Que., is reported to have assigned.

Lemire & Frere, builders and contractors, of Montreal, have registered; also Mount Royal Engineering and Electric Contractors, same city.

The town of Berlin recently awarded to Wood, Gundy & Co., Toronto, $63,200 debentures. The bonds bear interest at the rate of 5 per cent and are repayable in 30 annual instalments.

Duquette & Bissonette, plumbers, Montreal, have dissolved.

BUILDING NEWS.

Trustee Simpson, of the Property Committee of the Board of Education, Toronto, has opened up an important discussion by a motion that the Board insert an eight-hour clause in all their contracts.

"Under our present system it is possible for certain employers to force a nine-hour day upon workmen in the building trades, when an eight-hour day is the recognized working time," said Mr. Simpson. "There are about two thousand carpenters in the city to-day who cannot work for some contractors because they are pledged to work only eight hours, at the regular rate of wages. The unfair employers do not pay overtime rates for the ninth hour. I want to have all contractors placed on the same footing when tendering for civic work, as the contractor who works his men long hours has an advantage over other contractors in tendering for our work.

At Vancouver, B.C., there has just come into force a new building by-law, one of the sections of which provides that no dwellings shall be located on thoroughfares less than thirty feet in width. The limit as to height of buildings is placed at 100 feet save when special fire fighting appliances are part of the structure, in which case the Building Inspector is to use his judgment. All buildings over 70 feet in height except grain elevators and churches; all apartment houses over 55 feet in height and all institutional buildings over 50 feet in height, must be fireproof. Regarding churches the demand is made that when the edifice is planned to accommodate 1,200 people the portion including the main auditorium shall be fireproof.

Very meagre details have come to hand concerning the terrible accident on the G.T.P. construction, twenty-six miles north of Dryden, Ont. It appears that while the foreman and his powder men were conducting operations, a tremendous explosion suddenly occurred, killing the foreman and six of the workmen and injuring four others. The division engineer and several officials had visited the scene of the disaster a few minutes previously. The victims were all Austrians.

The estimate for a distributing plant at St. Thomas, Ont., as submitted to the city council by Engineer Richards, of the Hydro-Electric Power Commission, is $42,493.

A syndicate is being formed at Prince Albert, Sask. for the development of clay beds in that locality. A Chicago brick machinery firm sent back a splendid sample of pressed red brick in return for a quantity of clay. Those interested in the matter are very optimistic and think that as soon as the plant gets under way Prince Albert will be able to supply all the pressed brick used in the west.

Great progress has been made by O'Brien and Mullarkey, the contractors for the new line of the Quebec, Montreal and Southern Railway between Pierreville, Que., and St. Philomene, Que. By the end of the season it is anticipated that three parts of the steel will be laid. In connection with the Nicolet, Becancourt and Gentilly bridges, which form part of the contract, it is interesting to note that while 3,750,000 pounds of steel will be used in the superstructure, 3,000,000 pounds are already on the ground.

A contractor named Boss, of Winnipeg, was recently killed in a premature dynamite explosion at Cross Lake, Man. Mr. Boss had the contract for putting in telegraph poles on the C.P.R. main line east of Winnipeg.

Three lives were lost last week in a newly finished well near Aylesbury, Sask. The dead are R. H. Craig, W. J. Forfar and Lewis Riswold, the last named of which lost his life in a plucky attempt to rescue the other two men, who were overcome by foul gas whilst at work in the shaft.

A rumor is current to the effect that English and American capitalists have organized to build a line between Fort Churchill on the Hudson Bay and Port Simpson on the Pacific Coast.

Toronto building permits for the current year up to the end of last month totaled $13,618,775. The figure for November was $638,150, as compared with $1,087,692 for the same month of 1906.

The engineer of Perth County, Ont., Mr. George L. Griffith, of Stratford, Ont., has had survey parties employed for some months in surveying the drainage area of the old Stewart drain and the Boyle drain, including the north and south branches of the Maitland River in the townships of Elma, Perth county, and Grey, Huron county. The Stewart drain, about eighteen miles in length, carries off the flood waters from the townships of Wallace, Maryborough, the town of Listowel and the northern part of the townships of Mornington and Elma. It will include cleaning out about seven miles of the north branch of the Maitland River and will cost in round figures about $30,000. It is proposed to go on with the whole of the work as soon as possible, and a deputation will interview the Provincial Government to get assistance under what is known as the "Municipal Drainage Aid Act." This act enables the Government to provide one-third of the cost for cleaning out, deepening and improving rivers for the purpose of better draining farm lands. This drain scheme forms one of the largest plans ever devised in the province of Ontario for drainage purposes, taking in as it does about one-half of the county of Perth and part of the county of Huron. The drains will be ten feet wide at the bottom and forty feet wide at the top.

There is plenty of room for the industrial expansion of Montreal. The south shore of the river, which will some day be to Montreal what Brooklyn is to New York, is at present practically all agricultural land, while Montreal is itself but a small spot on the Island of Montreal, which is thirty-two miles long and ten wide at the broadest part. Montreal has only just begun to expand beyond the long-established limits of the city boundary. The nine miles run by trolley line to Lachine was a year or two ago a trip through farming land for almost the entire distance. Now factories and houses are springing up along the whole route of the car lines, and it will be but a short time before all the gaps between are filled up.

DRAINAGE FOR CELLARS

The importance, from the standpoints of hygiene, durability, appearances and utility of a "dry house" is so universally admitted, that a few words on the subject, which although originating with the builder, is usually regarded as within the province of the plumber, will not be regarded as out of place. The mere fact that, as a rule people are healthier in buildings erected on a dry soil and that subsoil dampness is regarded as conducive directly to various troublesome ailments and diseases, and may also encourage the development of low forms of life, which in themselves engender disease conditions, should make the drainage of ground water from under our dwellings, no matter where located, a most important consideration.

If possible, subsoil water should be confined to a depth below that at which it might cause dampness in the lower part of the house, by the provision, when the site of the building is being prepared, of suitable artificial channels, laid at the requisite depth and sloping towards some point at which the water therein collected may be discharged. These channels, which convey only comparatively clean water, are known as drains and the contamination of their contents, by leakage from the sewer or house drains, should be carefully guarded against.

The best practice, in their construction, consists of the excavation, near the foundation walls of the bulding, of trenches filled with loose or broken stone. Two or three feet below the cellar floor the drains (common drain tile) should be placed, care being taken, by wrapping the joints with tarred paper, or strips of some cheap fabric, to prevent the earth finding its way in when they are finally covered. Where there is a spring or other source of water in the vicinity of the foundation the drains must be increased in capacity.

A suitable outlet for the drainage is the next necessity, and where there is open ground in the vicinity this does not entail any serious difficulty. The water being in itself inoffensive, may be conducted into any convenient ditch, pond, etc., at a level sufficiently low to ensure the necessary pitch. If there is no such means available, a masonry cesspool can be located on ground sufficiently lower than the building to make drainage back impossible, and the drainage run into that, or, as a last resource, the drain water can be carried into the sewer. Where a surface water sewer is available, this is least objectionable, but if the common sewer has to be used, the drain water should be conducted first into a mason's trap, the basin of which is to be filled with coarse sand or fine gravel and which is equipped with a running trap, into which, if possible, a rain leader should also discharge. The reasons for these precautions are, that the joints of the drain tile cannot be made perfectly tight and every effort must be made to prevent any saturation of the cellar floor with sewer air or liquid.

A dry cellar floor, impervious to water, such as a concrete base, topped with asphaltum, makes possible, and finished well up the sides with good Portland cement, is equally important in insuring a damp-proof house.

Openings in the cellar floor affording connection with the sewer, for the purpose of removing water that may, by bad management, find its way in, are always objectionable and should at least be made secure by a trap having a deep seal and flap or ball valve protection. Care must also be taken in the construction of the walls below the level of the ground, if this trouble is to be prevented.

A "damp course" should be incorporated in all walls, on the principle that an ounce of prevention is always preferable to a pound of cure and work can be done while the walls are building that would be practicably impossible afterwards.

The best damp course is perforated bricks, by means of which circulation of air is promoted through the walls and the best preventive of dampness provided. Asphaltum may be advantageously combined with the tiles, although layers of slate or damp-proof tiles in asphalt are also good. If at all possible and there is any suspicion of dampness in the surrounding strata, an open space or dry area, all around the walls is the best assurance against moisture in the house, provision being made for proper drainage, should water enter from the top during bad weather. If this should prove impracticable, a double wall for the basement, with an air space between the inner and outer walls, should be resorted to and the extra expense will be more than repaid by the dry, sweet air in the basement and freedom from damp creeping up the walls.

In case of concrete or concrete block building, protection against ground damp is absolutely necessary, as it affects the disintegration of the material and the weakening of the building. Where the concrete is re-inforced there is also the corrosion of the steel or iron re-inforcement to be guarded against.

In laying house drains, to ensure their self-cleaning or scouring and proper carrying capacity, they should have a "fall" or grade of at least a foot in every hundred feet. If the fall is less than this, a special flushing apparatus should be installed to keep them clear. To ensure their remaining tight and prevent depressions, see that they are laid on a well tamped bottom, having suitable hollows to receive the hubs, on boards laid on well rammed earth, or on concrete.

CONCRETE FOR OIL TANK

Experiments have been made to determine the availability of concrete for oil storage tanks and it was found that the material was entirely suited for the purpose. Accordingly a number of them have been built at El Paso, Texas, by one of the railroad companies of that section which is engaged in extensively handling oil from the fields of that State. Up to this time it was generally agreed that the presence of oil had some serious effect on the concrete, but if this is true it was not shown by the experiments.

FROST RESISTANCE OF BRICKS.

(Continued from page 13.)

character of this building material. Bricks were not then supposed to withstand frost well at all under adverse conditions. Thus if they were soaked with water, and then exposed to a freezing temperature, they would crack or burst open owing to the rapid expansion. This fact discredited bricks for foundation work or for walls where there was a constant exposure to dampness. Those early bricks were very porous, and they absorbed an immense amount of water, and this in changing to ice did cause ruptures which might endanger the stability of walls.

Yet on an examination of many of the old houses of early days in which bricks were used for foundation of walls we find that they withstood the action of freezing very satisfactorily. On the other hand, foundations built nearby cracked and tumbled down within a few years. The difference was in the making of the bricks. Some of the early brick makers discovered the value of reducing the porosity of their bricks for foundation work so that they would absorb less water. The porosity of the bricks must to a large extent even to-day determine their usefulness for foundation work and for street paving. Indeed, in the use of bricks for paving and for sewer work the porosity of the materials is a factor which determines to a large extent their value.

The frost resistance of bricks, and their loss of stability after being subjected to freezing, are points which are of vital importance to a wide list of trades and industries. It is a well-known fact that some bricks which are not subjected to any particular compression can be very porous without materially losing their value. When placed firmly in a wall or pavement, the action of freezing does not materially weaken them unless a heavy compression is applied to them at the moment of great expansion. Thus pavement bricks of great porosity may not be injured, but if a heavy truck passed over them when frozen they would crack and break in pieces. A sidewalk thus laid with bricks of great water absorption qualities might endure indefinitely, but a street pavement where heavy traffic is accommodated would break and disintegrate rapidly.

Similarly bricks for a two or three storey structure might last even though subjected to great freezing, but if they were employed in a ten or twelve storey structure there would be danger of a collapse through the weakening of the foundations. In making bricks for any particular line of work, therefore, it is essential that their relative density and porosity should be considered as well as other qualities. Builders are studying this problem more and more, and they demand for certain work bricks which will suffer the least from freezing.

Paving bricks are or should be made for the most part of very dense material, so that the percentage of water absorption is comparatively small. The best paving bricks contain as low as 2.41 to 3.31 per cent. of water absorption, and the best buff face bricks even as low as 1.32 per cent. From these dense bricks we can go up to common backing-up bricks with a percentage of absorption equal to 20 to 25 per cent. Common wall bricks contain from 7.70 to 13.70 per cent. of water absorption, while many machine made bricks prove very good for general use with water absorption possibilities of 12 to 19 per cent. Good sewer bricks have a porosity sufficient to permit of an absorption of water equal to 8.40 per cent.

Good face bricks range from 3.50 to 12 per cent., and hard burnt brick about 5 per cent. Arch bricks have a porosity of a high degree without affecting their value. As a rule the greater amount of water that the bricks absorb the greater will the danger be in freezing. The expansion is naturally greater in bricks which contain an unusual amount of water. But it is not a conclusive fact that the porosity of the bricks necessarily determines their usefulness. There are variations in the different bricks tested which indicate that the loss of stability through freezing is merely one factor in the situation. Much depends upon the strength and compression of the bricks. A paving brick with a high compression and a moderate porosity will often lose in stability much more than another with a moderate compression and greater porosity. A nearly vitrified brick will show probably the least loss of stability from freezing, although variation in vitrified bricks is sufficient to prevent any general rule. A hard faced brick with a porosity sufficient to allow a water absorption of 4.19 per cent., and a compression of 1.197 pounds, showed after severe freezing a loss in stability of only 5.1 per cent., while a paving brick with a compression of 764 pounds and a percentage of absorption of 2.41 showed a loss of stability of over 45 per cent. The reason for this loss must have been in the composition of the brick and the method of making.

Some go so far as to claim that there is no relationship whatever between the porosity of bricks and their frost resistance, and to discover the cause of the latter we must look into the ingredients of the bricks and their methods of mixing and baking. The loss in compressibility in bricks after freezing is one of the peculiar results which seem to carry out this conclusion. The loss of stability in some bricks is insignificant, and in others quite startling. In a few tests the compressibility after freezing has actually increased, and instead of a loss of stability there has been an improvement. This is particularly noticeable in very porous bricks. A series of tests showed that a backing-up brick with 16.31 percentage of absorption, and a compressibility of 249 pounds was stronger and better after freezing nearly 25 per cent. Its compression after freezing was 310 pounds. This test, however, was unusual, and simply indicates the wide range of variation possible. A face and paving brick with 7.82 percentage of absorption and compression of 444 pounds instead of showing a loss of stability after freezing gained 9.9 per cent. Gains in stability of 1 to 3 per cent. in backing-up bricks, face brick and common brick after freezing are quite common, but few if any instances are on record showing a gain in stability from freezing with

any of the dense bricks with a very low porosity and small water absorption.

In making tests with such bricks by freezing not one but a dozen and sometimes twenty and thirty freezings and thawings were necessary to establish any reliable data. The effect of one freezing is not very great. The bricks show a slight readjustment of parts and a tendency to open in slight crevices, but these are so minute that they are scarcely noticeable to the naked eye. Even the second and third freezing merely tend to emphasize these small lines in places. But the first lines are generally the natural fractures which subsequent freezings and thawings increase and cause eventually to break.

Many attempts have been made to overcome this tendency to weakening of bricks under freezing, and bricks with a large percentage of pure clay and silica have resisted thirty freezings and thawings without any material loss. The question of securing bricks which will have a high porosity and a very great resisting power to frost is one that can only be answered by scientific tests and experiments. The need for such bricks is imperative, and science should be able to solve the problem to the satisfaction of all. With the increased use of bricks for paving, sewers and foundation work it is essential that uniformly standard bricks of great frost resistance should be made so that contractors can depend upon them for all classes of work.

A TIMBER TEST.

The soundness of lumber may be ascertained by placing the ear close to one end of the log, while another person delivers a succession of smart blows with a hammer or mallet upon the opposite end, when a continuance of the vibration will indicate to an experienced ear even the degree of soundness. If only a dull thud meets the ear, the listener may be certain that unsoundness exists.

SAN FRANCISCO HAS 600 IDLE BRICKLAYERS.

"There are at present about 1,000 bricklayers enrolled on our books," writes a San Francisco correspondent in the "Indianapolis Bricklayer and Mason," "and of this number fully 600 are idle, and there seems to be little hope of a change for the better until after the municipal election is over, as capital is tied up pending the issue of same. Should this election result in favor of the man who holds the confidence of the investors of capital, both locally and in the eastern cities, there will doubtless be an immediate resumption of those activities in the building line which received such a sudden and pronounced set-back following the graft exposures and prosecution here a few months ago.

"The number of strikes in the city has somewhat decreased, although there are yet some pending settlement, among which is that of the carmens' union; for, while union men generally ride in the cars by consent of the committee having that strike in charge, yet the car-men are still out.

"Concrete construction has not perceptibly abated, and this, as you know, has considerably reduced the work in our market.

"On the whole, I am inclined to take an optimistic view of the matter, and rather look for good times here during the rainy season."

TWO SKYSCRAPER ELEVATORS OPERATING.

It is a well-known fact, says "Carpentry and Building," that the towering skyscrapers which cluster the business sections of the leading cities of the country have been made possible by the developments in elevator construction, which have made readily accessible the upper storeys of buildings rising to a height of 20, 30 and even 40 storeys. One of the latest developments in connection with the elevator service of a building, and which is designed to economize space is suggested by a recent invention of a Chicago architect. The key to the invention is the operation of two elevators in one shaft. The point is made that with the practical devices to be used as equipments for the cars, the running of two elevators in one shaft will be just as safe as the running of one elevator car is at present in the tal office buildings of the country. It is asserted that this scheme will revolutionize the elevator service in the tall buildings, causing a saving of space, while doubling the officiency of the average elevator plant. In explaining his invention in a recent interview, Mr. Hunt vouchsafed the following particulars:

"We will take, for example, a building of 20 storeys. The express elevator is at the first floor, loading; it in the basement, not loaded. As soon as the express or upper elevator is loaded, it leaves and makes its first stop at the tenth storey. Meanwhile, as soon as the express elevator has left the first floor, the elevator from the basement comes up to the first floor and is loaded, and it leaves the first floor at the same time the express elevator leaves the tenth. Now, they both travel up 10 floors and serve locally. Then they both travel down 10 floors, serving locally. The positions then are: Express elevator at tenth floor, local at first. While the express elevator is descending from the tenth floor to the first the local elevator unloads at the first floor and drops into the basement, then the express elevator unloads at the first and the same process is repeated.

"The upper elevator is never de-

layed. The lower elevator is only delayed while the upper elevator is loading or unloading, which, in a two minute schedule, would be about 14 seconds.

"Not only are these elevators protected by the ordinary means, in case of accident, by safety clamps, but they have mechanism, simple and effective, which, when these elevators get within a predetermined distance of each other, slows down the elevators, and at a closer point absolutely stops them; also in case of either non-operating of machinery or breaking of cables, have positive clamps which make it impossible for them to come closer together than a predetermined distance. Any type of elevator can be used."

SOME FIRE TESTS ON IRON COLUMNS.

The authorities of the city of Hamburg, Germany, recently had some interesting and valuable experiments made to show the effect of fire on cast iron columns. The tests are thus described in a recent issue of the Deutsche Banzeitung:

The columns were 8 feet long, 10 inches in diameter, and of one-thirteenth of an inch metal. They were loaded centrally and eccentrically and some were cased with a fireproof covering. A hydraulic press was placed below the column with its crosshead above it, and then a hinged oven containing twelve large gas burners was clamped above the column.

The oven was furnished with apparatus for measuring heat, with peep holes and with a measuring jet. On an average a load of three tons per square inch, with a heat of 1,400 degrees Fahrenheit, produced deformation in 35 minutes in a centrally loaded column without casing. This showed itself by bulging all around in the middle of the heated part, especially where the metal happened to be thinner. Fracture occurred finally in the middle of the thickest point of the bulge. If the load was less, this occurred at a higher temperature. Jets of water had no effect until deformation heat was reached. The casings had the effect of increasing the time before deformation began from half an hour to four or five hours.

FACILITATING NAVIGATION.

An important piece of work now being carried out to facilitate navigation on the great lakes is the improvement of the St. Mary's river by the construction of the West Neebish channel at what are known as the West Neebish rapids, 17 miles below Sault Ste. Marie, Michigan. These rapids, as their name implies, were situated in the river channel on the west side of Neebish Island, and in their natural state extended a distance of half a mile over an exceedingly shallow watercourse, with a maximum depth of about 3 feet, and a width of a quarter of a mile. The rock dyke of Niagara limestone forming this barrier between Neebish Island and the mainland, is about 2 1-4 miles in width, from deep water to deep water. This dyke, which constitutes the bed of the rapids, is one of the two low points in the ridge, whose higher parts form Sugar and Neebish Islands. The other low point is the Middle Neebish channel on the north side of Neebish Island, and between it and the southern extremity of Sugar Island.

The work on the new West Neebish channel was commenced in May, 1904, and is expected to be completed by December, 1907. It includes two different methods of construction: (1) Excavation under water: (2) excavation in the dry, the original channel having been closed by coffer dams and then pumped out. The contract requires the excavation of a clear channel width of 300 feet for a distance of 13,300 feet. Of this distance, 8,560 feet is called rock excavation, in which there are 1,700,000 cubic yards to be removed; and the balance is 287,000 cubic yards of earth. There is considerable stripping of earth and boulders (river drift) in the rock section, and a good deal of rock projecting above the 22 foot plane in the earth section. In the dry section this stripping has run from scraping to 15 feet in some places, and the earth is estimated at 12 per cent. of the rock excavation. The depth of the rock varies from nothing at either end to 27 feet near the middle.

Prices of Building Material

PRESSED BRICK, Per M.

TORONTO PRESSED BRICK AND TERRA COTTA WORK

	F.O.B. Milton, Ont.
Red No. 1	$13 80
" 2	12 50
" 3	10 00
Buff No. 1	17 00
" 2	13 00
Brown	25 00
Roman Red	30 00
" Buff	35 00
" Brown	40 00
Hard Building	8 00
" Sewer	8 80
" Backing	7 00

Moulded an 1 Ornamental from $2.00 to $5.00 per 100.
Terra Cotta string Courses and Friese, from 50c. to $2.00 per ft. run.
Roofing Tiles, $20.00 per 1,000.

DON VALLEY BRICK WORKS.

Nos. 1, and 2, Red Pressed Bricks	Please write to head office, 34 Toronto St. Toronto, for catalogue and prices.
Nos. 1 and 2 Buff Pressed Brick	
No. 1 Brown Pressed Brick	
Pompeiian Red, Buff and Brown Pressed Bricks	
Ornamental Bricks of all kinds for Mantel purposes	
Enameled Bricks of all Colors	
Porous Terra Cotta Fireproofing of all Descriptions	
Vitrified Street-Paving Bricks	
Semi-Vitrified Foundation Bricks	
Common Stock Red and Grey Bricks	
Sewer Bricks	
Stone or Macadamised Roadways	

BEAMSVILLE BRICK AND TERRA COTTA CO.

	F.O.B. Beamsville.
Red Peerless Facing	$16 00
" No. 1	14 00
" No. 2	12 00
" No. 3	10 00
Brown Peerless Facing	20 00
" No. 1	18 00
Buff Peerless	20 00
" No. 1	18 00
" No. 2	15 00
Moulded and Ornamental Brick from $3 to $10 per C	
Roman Red (Size 12 x 4 x 1½ in.)	30 00
" Buff " "	30 00
" Brown " "	35 00
Vitrified Paving Brick No. 1	18 00
" " " No. 2	15 00
Sewer	8 00
Roofing Tile	22 00

Sackett Plaster Board, 32" x 36" in size, sold at about 2c. per square foot

LUMBER

CAR OR CARGO LOTS, F.O.B. TORONTO.

	Per M. Ft.	
1 inch No. 1 Pine cuts and better	$49.00 to	$51.00
1½ to 2 inch No. 1 cuts and better	54.00	58.00
2 inch No. 2, Pine cuts and better	48.00	50.00
1½ to 2 inch No. 3 cuts and better	42.00	46.00
1 inch Pine Dressing and better shorts	28.00	30.00
1 x 4, 6 and 8 Common	27.00	28.00
1 x 10 and 12 Common	30.00	36.00
1 inch mill run sidings	28.00	29.00
1 x 10 and 12 mill culls	22.00	23.00
1 inch dead cull sidings	15.00	16.00
1½ inch Flooring	32.00	34.00
Hemlock, 1 x 4 to 8 inch	19.00	20.00
2 x 4 to 8 inch, 12 to 16 feet	22.00	23.00
2 x 4 to 10 inch, 18 feet	23.00	25.00
1½ inch No. 1 4 ft. Pine Lath	4.75	5.00
1½ inch No. 2 4 ft. Lath	4.25	4.50
1½ inch No. 1 4 ft. Hemlock Lath		4.00
XXXX Pine Shingles	3.50	3.75
XX Cedar Shingles	2.50	2.75
B.C. Shingles:		
XXX 6 butts to 2 inch		3.85
XXXX 6 to 23-16 inch		4.07
XXXXX 5 to 2 inch		4.50

HARDWOODS—PER M. FEET CAR LOTS.

Ash, white, 1sts and 2nds, 1 to 2 inch	$36.00 to	$38.00
Ash, black, 1sts and 2nds, 1 to 1½ inch	33.00	35.00
Birch, M. R. 1 inch	21.00	22.00
" 1½ inch to 2	23.00	24.00
Basswood, Common and better, 1 to 1¼ inch	25.00	26.00
Basswood, 1¼ to 2 inch	26.00	28.00
Elm, soft, mill run, 1 to 1½ in.	23.00	24.00
Elm, rock, mill run, 1 to 1½ in.	26.00	28.00
Maple, common and better, 1 to 1½ inch	22.00	23.00
Oak red plain, 1sts and 2nds, 2 to 4 inch	46.00	50.00
Oak, white, 1sts and 2nds, 1 to 1½ inch	44.00	46.00
Oak, quartered, 1sts and 2nds	70.00	80.00