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# CANADIAN CONTRACT RECORD

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"TENDERS" AND "FOR SALE" ADVERTISEMENTS PAGE 22

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## 1907 A RECORD BREAKER.

The aggregate of construction work for the year just closed has been in more senses than one a record breaker for the majority of Canadian cities, in some cases surpassing all previous totals. Nevertheless, the year had two full months in which the volume of building was confined to the smallest possible compass. Unquestionably there would have been a considerably greater amount of work done in those months but for the financial depression. The weather was extremely satisfactory for building, there being neither snow, rain, nor extreme cold weather. Had the growing custom of prosecuting structural operations into early winter been adhered to during the past couple of months there is reason to believe that the expenditure would have far surpassed the most optimistic prognostications of contractors made early in the spring.

What is true of the larger cities scarcely holds good in the case of the smaller towns. In the case of these there has been pronounced conservatism all season, nevertheless, they have, in the majority of cases, been building steadily and persistently, replacing old structures with modern buildings. In the line of public undertakings, such as waterworks, sewers, electric gas lighting plants, paving and road construction the smaller towns have been doing very good work. They have been making their communities better and more desirable places of residence, and at the same time have been enhancing their standing and value from a business standpoint.

## THE BUILDING PROSPECT.

It is not too early perhaps to make a study of the conditions likely to affect building during the coming season and to gain therefrom some idea of the probable magnitude of structural operations during the year 1908. It may be said at the outset that the outlook so far as architects are concerned seems decidedly favorable. Of course there has been a financial stringency. That is now ancient history. No one needs to be told that speculators in stocks on margin have suffered during the past three months through a sudden loss of confidence; but this result, although it has affected the community in general through the increase in the rates of interest, has not been accompanied by any material disturbance of mercantile or industrial conditions, and does not seem likely to have such a result. It is impossible to permanently affect detrimentally the country's commercial expansion. When the present uneasiness has ceased there will, undoubtedly, be a notable increase in building operations throughout the country. It is a recognized fact that stock market prosperity usually has an unfavorable effect on building. Naturally when railroad stocks are paying 7 or 8 per cent. the modest returns from a real estate investment cease to be attractive, but when distrust is aroused in speculative investments, real estate with its solidity, assured, if moderate, income and practical certainty of appreciation in value, exercises a greater attraction. At the present time savings banks and trust companies, attracted by the high rates of interest on railway notes and bonds, and wishing to keep their investments in a form in which the money will be quickly available in case of sudden demand, are not inclined to lend money on mortgages, even at high interest, and this has, for a year or two, done much to check building with borrowed money. With a return to normal conditions—and this is certainly before us — aided probably by disgust for Wall street methods and by the unusual amount of money which is being accumulated and will soon seek re-investment, there is every reason to believe that real estate mortgages at moderate rates will soon regain favor, and hundreds of well-considered projects for hotels, theatres, concert halls, apartment houses and mercantile buildings, which have been held in abeyance on account of the difficulty in financing them, will be carried out.

## LABORERS HAVE PROSPEROUS YEAR.

The condition of its workers is always a fair indication of a country's prosperity, and the latest report of the Deputy Minister of Labor shows that the productive workers have enjoyed an exceptionally favorable year. During the calendar year 1906 there were wage increases affecting 17,446 workmen, the aggregate increase being $12,741 per week. The decrease in working hours effected during the year aggregated 7,958 hours per week.

"It seems an unfortunate paradox," says the "Toronto Globe," in a recent editorial on this subject, "that the hours of labor can be shortened only when there is a scarcity of workmen and a seeming economic need for longer instead of shorter hours. The only time when a demand for shorter hours can successfully be resisted or longer hours can be imposed is when there is a surplus of workmen, and long hours are economically unnecessary. It is when times are good and there is plenty for everyone to do that workmen can increase their wages and shorten their hours of labor. And as a rule the extent to which they are successful in increasing their wages determines the duration of the good times they and the whole community enjoy. Good times are brought to an end by the accumulation of great stocks of goods for which customers cannot be found."

During 1906 there were 26,014 employes involved in trade disputes, as compared with 16,329 during 1905. The aggregate loss in time was 490,400, as compared with 284,140 in the previous year. Of the 138 strikes and lockouts during 1906 there were 61 in the Province of Ontario. The employers won the final decision in 50 of the total number of cases; 41 were decided in favor of the employes and 23 were compromised.

## RESTORE CONFIDENCE THROUGH ADVERTISING.

The best manner in which the manufacturer and jobber can show his confidence in the financial and commercial situation of this country is to begin an advertising campaign the very first week in January. Nothing can be more stimulating than advertising. You may not have the goods to sell, you may wish to curtail credit, but advertise all the same. Keep your goods before the trade. A break in the chain is disastrous. If a merchant slackens on his advertising his present customers or his prospective patrons will come to the conclusion that his business is weak, while so long as he hammers away enthusiastically at a publicity campaign he gives the impression that business is booming with him, and fixes himself in the eyes of the trade as a man of push, enterprise and progress.

Make the good times yourself. Restore confidence by being confident. The best method is by bright, cheerful advertising. Don't go around with a long face, with "blue" stories of "up against it," "down and out," etc., or people will be afraid to do business with you. If every jobber and manufacturer were to begin an advertising campaign in January and announce that the depression had passed, we venture to predict that in a short time an atmosphere of cheerfulness and confidence would be restored to the most gloomy in the land. No man is more constantly unhappy, or succeeds in making others so, than the pessimist. He is out of harmony with things. He loses the true dignity of life.

If every business would go to work with a will to convince its customers that there is no real cause for suspension of business, confidence would be restored almost immediately.

## THE COMMERCIAL OUTLOOK.

At the recent meeting of the Canadian Pacific Railway shareholders, called to authorize a new issue of $28,320,000 of capital stock, Sir Thos. Shaughnessy declared his confidence and that of his fellow-directors in the future of the country. They agree that Canada will continue to progress and that any temporary setback consequent upon general world conditions will prove comparatively unimportant. Sir Thomas said that the road should continue adding to its facilities, so that it might be ready to handle the largely increased traffic that was certain to be thrown upon it. Evidently the managers of the Canadian Pacific have no fears for the future. The New York "Financial Chronicle" believes that business should soon be restored to something like a normal basis, but that before distrust can be wholly removed "there must be less antagonism toward corporate bodies." The London "Statist" thinks that the period of depression in the United States will be long or short, according to the action of Congress. A writer in "The Review of Reviews" calls attention to crops, railway earnings, exports and the gold supply as bases for confidence in an early restoration of prosperous conditions. The depression, he says, may continue well on toward the end of this year, but "our present financial and business depression will probably end almost as suddenly as it began." Within two months, this writer observes, money may be plentiful and cheap, and stocks and bonds may be rising. The New York "Post" recalls that the panic of 1893 was attended by a great number of railway bankruptcies, but there is no indication to-day of a repetition of such catastrophies. On the whole the situation, both here and across the line, seems fairly sound, and the feeling is that once the money flurry is over the tide of prosperity should begin to rise again.

## THIS YEAR'S IMMIGRATION.

That immigration to Canada will closely approach the 300,000 mark for 1907 was the statement made recently by Mr. W. D. Scott, head of the Immigration Department at Ottawa. Mr. Scott declined to discuss the local situation further than to say that, with the present heavy immigration to Canada, it is inevitable that there should be a certain amount of congestion in the cities in winter time. This, he said, was because the farmers cannot employ the immigrant farm laborer all the year round. He thought that much credit should be given to the Canadian method of distributing new arrivals, and thought it compared very favorably with the methods used in the United States.

## GRIN.

If you're up against a bruiser and you're getting knocked about—
Grin.
If you're feeling pretty groggy, and your licked beyond a doubt—
Grin.
Don't let him see you're funking, let him know with every clout,
Though your face is battered to a pulp, your your blooming heart is stout;
Just stand upon your pins until the beggar knocks you out—
And grin.

This life's a bally battle, and the same advice holds true,
Of grin.
If you're up against it badly, then it's only one on you,
So grin.
If the future's black as thunder, don't let people see you're blue;
Just cultivate a cast-iron smile of joy the whole day through;
If they call you "Little Sunshine," wish that *they'd* no troubles too—
You may—grin.

Rise up in the morning with the will that, smooth or rough,—
You'll grin.
Sink to sleep at midnight, and although you're feeling tough,
Yet grin.
There's nothing gained by whining, and you're not that kind of stuff;
You're a fighter from away back, and you *won't* take a rebuff;
Your trouble is that you don't know when you have had enough—
Don't give in.
If Fate should down you, just get up and take another cuff;
You may bank on it that there is no philosophy like bluff—
And grin.

—From "Songs of A Sourdough," by Robert W. Service.

After all, the country's real Santa Claus is the farmer, and even now the pack on his back is so heavy he continues to call for help to move it.

# Power From Tide Water

The project of a large plant to be erected at South Thomaston, on the Maine coast, to compress air by the inflow and outflow of water in a large tidal basin, has already attraced considerable attention. Further information has been communicated to "The Engineer" (Chicago) by William O. Webber, who gives details of the lock and gates, a plan and sections of the construction at the same point, and a profile of the locatio nat South Thomaston. Says Mr. Webber:—

"At this point the maximum tide is 10.6, mean tide 9.4, and minimum tide 7.9 feet, giving, respectively, 5,000, 4,000 and 3,000 horse-power.

"In the dam, where the main channel is navigable, will be a lock for vessels, 40 feet wide, 200 feet long, and 28 feet deep. On either side of this lock will be one or more sets of shafts, each making a unit, or compressor, of 1,000 or more horse-power. These shafts will be sunk into the rock to a depth of 203.5 feet below mean low water, the downflow shaft being 15.75 feet in diameter, and the upflow shaft 35.65 feet in diameter. The inflow gates will be five in number and 10 feet wide, the outflow gate six in number and 10 feet 8 inches wide.

"The water on entering the inflow gates will swing them open, pass down the downflow shaft at a velocity of 16 feet per second, drawing in air through about 1,500 half-inch inlet tubes. Arriving at the bottom of the shaft, the combined air and water will flow in both directions, horizontally, the air separating from the water untill all of the air is accumulated in the separating chambers. The water will then flow up the up-take shaft at a velocity of three feet per second, and out through the outflow gates.

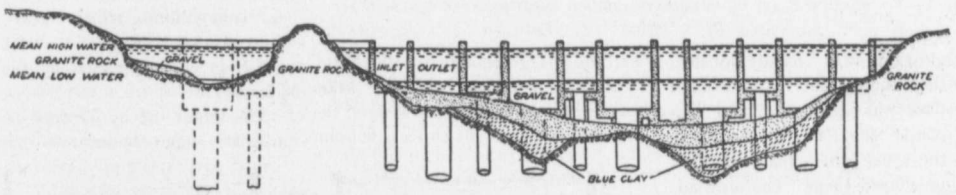
"The air entrapped in the air chamber is then under a head of water 195.5 feet high, varying with the height of the tides. This compressed air is then led up the upflow shaft in a 14 inch pipe. At the top of the gates these 14 inch pipes are united into a 30 inch pipe, which conveys the air ashore."

The air thus compressed, we are told, will contain only about one-sixth the moisture that is in the atmosphere from which the air is drawn. This dryness makes it particularly adaptable for transmission to considerable distance, in pipes, without undue friction. The author states that the whole 5,000 horse-power could be transmitted 1 mile, in a 30 inch pipe, with a loss of only 1.5 pounds pressure, or 10 miles, in a 48 inch pipe, with a loss of only 2.5 pounds pressure. We read further:—

"This air can be used cold, without danger of freezing in expanding, in steam engines or rock drills. A test was made on an 80 horse-power Corliss engine, in which the entering air was 5.3 degrees F., and the exhaust minus 40 degrees, and continued for ten hours without the slightest sign of frost in the exhaust passages and pipes of the engines. A marked economy, however, is obtained by pre-heating this air immediately before using it in motors, as raising the air to 370 degrees will practically double the volume of the air, and, instead of requiring 3 to 4 pounds of coal per horse-power per hour, as air receives heat about six times as easily as water, these results can be obtained at an expenditure of from 1-2 to 5-8 pound of coal per horse-power per hour.

"As there are no working parts in the compressor, there is no depreciation, or operating expenses, to be taken into account, excepting watchmen to prevent depredations on the plant, keep ice and floating timbers from permanently obstructing the inlet racks, and operate the boat lock. Therefore the cost per horse-power is practically represented by the interest on the original investment and the wages of these watchmen. The cost of original construction will amount to about $100 per horse-power.

"There are numerous places, all practically situated between the 40th and 50th parallels of latitude, in both the northern and southern hemispheres, where the tides are of sufficient magnitude to make this plan commercially feasible, the necessary requirements being a tidal basin, of considerable size, connected with the ocean by a comparatively narow outlet. Each acre of such basin, under a 9 foot tide, is capable of producing 5 horse-power. It is not commercially feasible to develop such a plant with a basin containing much less than 200 acres, or requiring a length of dam exceeding 3 feet per acre of pondage."




PROFILE VIEW OF TIDAL POWER PLANT.

## OBITUARY

There died in Chicago recently one of the best-known brick manufacturers on the American continent, in the person of Frank Alsip, brother of Wm. Alsip, president of the Alsip Brick, Tile and Lumber Company of Winnipeg. Deceased was also famous as an inventor of numerous improved brick-making devices. He was born in Pittsburgh, Pa., in 1827, and was one of the Argonauts who crossed the plains in '49 to the California gold fields. He returned to Wisconsin in 1857 and, after the great Chicago fire, established several strong companies with a total capacity of one hundred million brick per annum. Two sons and two daughters survive.

## VOLTAR, AN ANTI-CORROSIVE COMPOUND.

Voltar, the well-known anti-corrosive compound, manufactured by the Electric Cable Company, 17 Battery place, New York City, has been specified by the bridge department for the painting of the Brooklyn Bridge.

# A Reinforced Concrete Addition to a Brick Building

About eight years ago the Rocky Mountain Telephone Company erected a three storey building, 31 by 93 feet, on State street, Salt Lake City, for their central exchange and offices. It was found after a few years that the increasing business required more space, and the building was enlarged by increasing the width to 51 feet.

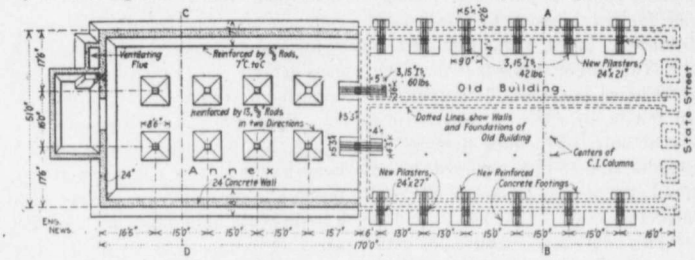



FIG. 1.—FOUNDATION PLANS OF COMBINATION BRICK AND CONCRETE BUILDING AT SALT LAKE CITY.

This addition was hardly finished when they found that the additional floor space was insufficient, and in a short while they might need four times the space which their enlarged building offered them. The only additional lot they could obtain was in the rear, only 51 by 77 feet in area. It was obvious that, with so small additional space, several storeys would have to be placed on top of the old building to fill all the requirement of floor space, especially the requirement of one large room, technically known as the operating room, in which all local and long-distance lines centre. The old building (Fig. 1) was built of 17 inch and 21 inch brick walls with concrete footings 3 feet 6 inches wide, and the old style long span Golding expanded metal and channel arch floor construction was supported by the brick walls and a line of 6 inch cast iron columns. The foundation of these walls and columns could only carry a small additional load, and would have been utterly unable to carry the weight of the three additional storeys (of which two only were to be built at this time).

The accompanying figures show the structural solution of the problem. New reinforced concrete pilasters were built on the north side inside the building (on account of the neighbor objecting to an outside pilaster), and on the south side of the building. New reinforced concrete foundations were built on both sides of the walls, and the pilasters rested on three 15 inch steel beams, which were supported by both footings and placed in position one at a time by cutting a hole in the wall only large enough for one beam. When the brickwork over one beam was tightened up by iron wedges, the adjacent hole was cut and a new beam inserted and so on, although the walls were interrupted by many windows, and these not all in a vertical line, this difficult work was done without causing the slightest crack in the building. The Golding arch construction being of such very doubtful value in tying the walls together, it was decided to tie each pair of opposite pilasters together by 1 1-2 inch tie rods at the first and fourth floors. In order to diminish the free unsupported lengths of the south side pilasters they were tied to the brick walls about every 5 feet by 1 inch bolts, and at the third floor level tied together by an ornamental tie beam lengthwise of the building. These pilasters support the fifth floor, the sixth floor and future roof storey and the walls from fifth floor up. It was found that the 12 inch wall load from the fourth to the fifth floor could be carried by the old wall, and the interior cast iron columns were strengthened by pouring grout into the hollow space and letting 1-2 inch rods drop into the grout, giving a reinforced concrete column inside the cast iron columns, which enables them to carry that portion of the fifth floor which is not supported by the wall pilasters.

The annex, 51 by 77 feet, is a reinforced concrete skeleton building with 12 inch brick curtain walls. The basement walls are of 24 inch plain concrete with reinforced concrete footings about 7 feet wide. The wall columns are 24 by 20 inches, rein-

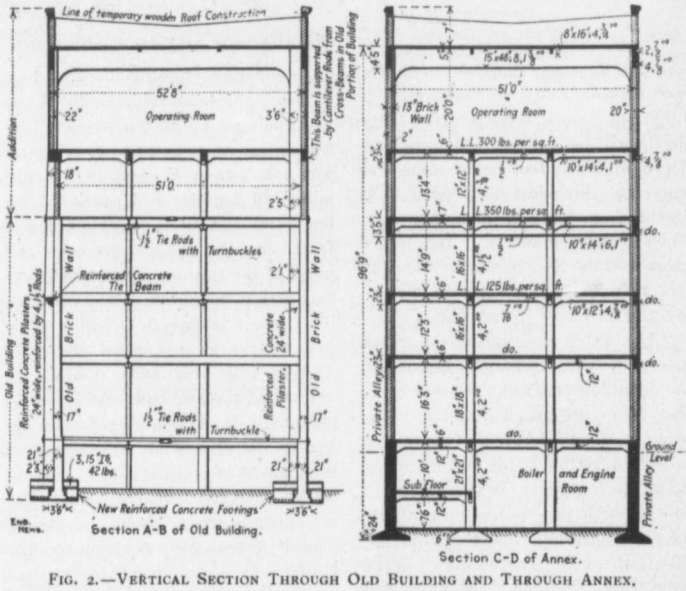



FIG. 2.—VERTICAL SECTION THROUGH OLD BUILDING AND THROUGH ANNEX.

forced by four 1 1-2 inch rods from first to fifth floor. The interior columns vary from 20 by 20 inches in the basement to 12 by 12 inches in the fourth storey, and the reinforcement varies from four 2 inch rods to four 3-4 inch rods tied together every 12 inches by 1-4 inch ties and connected at each floor by gas pipes 3 feet long, filled with grout. The columns adjacent to the old building had to have cantilever footings similar to the wall plates in the old building. The columns divide the building in nearly square panels, which are divided up by the girders from 15 to 16 feet apart in both directions. Half the number of all rods in girders were bent up and extended into the adjacent girders for from 18 to 24 inches. Stirrups were of 1-4 round steel and from 4 to 12 inches apart.

The third storey ceiling was suspended from the fourth floor and had to be strong enough to carry a weight of 50 pounds per square foot in order to support the many cables placed between the ceiling and fourth floor to reach the automatic connecting machines placed on the fourth floor.

The operating room in the fifth storey is about 50 by 170 feet and necessitated spans in the sixth floor 50 feet long, in the annex and over the old portion. As another storey is to be added to the building these girders have to carry also the future sixth storey and roof. They were figured as an arch without hinges and therefore the steel rods in the outside pilasters were bent up into the lower part of the beam. The girders are 15 inches wide and 48 inches deep and reinforced by from eight to ten 1 3-8 inch rods, 56 feet long, bent into the columns to follow the line of stress. The lintel at the sixth floor was made 4 feet 5 inches deep in order to tie the frames well together, as earthquakes are not of so very rare occurrence in Utah. A temporary wooden roof covered by a composition roof was built over the sixth floor, which also contains a blue print house for the company's use, built of metal lath and plaster walls and roof.

The floors have a 2 1-2 inch cinder concrete finish in which the gas and electric pipes were imbedded and the linoleum was directly pasted on the smoothed cinder concrete.

A ventilating flue at the outside of the building was built 3 feet 6 inches by 7 feet 8 inches inside dimension, and 125 feet high, with 6 inch concrete walls reinforced by 7-16 inch rods 12 inches c. to c. in both directions.

At each floor in the rear of the building were reinforced concrete fire-escape platform cantilevers from each floor for 6 feet 6 inches. The stairs were also of reinforced concrete. The inclined slabs, including the necessary column and girder construction, were built together. The floors and the steps proper were built afterwards in special moulds and of marble chips and cement, which were rubbed to produce a slight polish and to imitate granite. They were afterwards placed in position like stone steps.

The concrete pilasters in the exchange room represented the most difficult task of the whole job. The exchange board, about 70 feet long and 6 feet high, was parallel to the north wall of the old building and only 27 inches away from it, while the new concrete pilasters were 25 inches deep. Any accident to the board, caused by heavy shocks or by surplus water coming on the floor or through cracks, would have disabled thousands of wires and caused tremendous losses. As it was impossible to brace the column forms in the exchange board, expansion bolts were fastened to the walls on both sides of the form, from 18 to 24 inches apart in vertical direction, and the forms wired to the bolts by means of No. 8 wire. The cracks were closed by battens and oakum, and the concrete was mixed rather stiff, and only two feet of the column was concreted at a time. As the concreting of the north side pilasters could not be carried on by bringing the concrete into the various offices or exchange rooms, thereby spoiling floor and furniture, it had to be poured from the fifth floor through 8 inch collapsible sheet iron tubes, often for a height of 50 feet. This of course caused a tremendous noise in the exchange room, which could be heard through the phones all over the city, and for this reason was carried on about midnight.

Much of the outside work was laid in freezing weather and in times of snowfall. The snow was shoveled out of the girder forms, boiling water poured into the forms to heat the wood and especially the steel rods. The concrete was mixed with boiling water, which took the frost out of the sand and the crushed gravel; a number of salamanders were kept going day and night, and the forms were sprinkled from the underside to prevent baking of the concrete in the state of setting. The tops of the floors were protected by boards and burlaps.—The Engineering News.

## THE USE OF CONRETE IN FREEZING WEATHER.

Concrete may be mixed and placed during freezing weather with perfect safety, provided certain conditions obtain or certain precautions are taken.

In mass work, where only relatively light loads will come upon the concrete until such time as it has had an opportunity to thaw out and reharden, and where the superficial appearance is of no importance, no precautions need be taken to prevent freezing.

In cases where freezing must be prevented until at least the initial set has taken place, three different methods may be used separately or in combination, viz.:

(a) The concrete aggregate may be heated, or hot water or steam may be used in the mixing. This hastens the set.

(b) Sodium chloride, calcium chloride or other chemicals may be added, so as to lower the freezing point of the water.

(c) The work may be enclosed and the interior of the enclosure maintained above a freezing temperature until the concrete set naturally.

The heating of the aggregate is always advisable so as to preclude the possibility of frozen lumps of sand or larger aggregate getting into the completed work. In one case the writer removed from a reinforced concrete column during the depositing of the concrete a lump of frozen sand which would have occupied fully fifteen per cent. of the effective column area. Even when boiling hot

water is employed, the mixing process does not usually occupy enough time to thaw out frozen lumps, even of small size. The sand and other aggregate should always be heated.

The writer always advocates heating the water also. A small expenditure will cover the cost of the apparatus necessary for this purpose, and the fuel bill is relatively small. If steam is employed for this purpose it will be found exceedingly valuable to lead a pipe or hose to the point of deposit and heat and clean the forms, and the reinforcement, if used. The writer has often taken the temperature of the concrete at the moment of depositing, and periodically for hours afterwards, and has observed temperatures of 70 to 80 degrees F. in the concrete being deposited and temperatures of over 40 degrees F. six hours afterward, when the workmen commenced to travel over the fresh concrete, simply laying planks for runways.

It is usually impracticable to place concrete at temperatures below 20 degrees F., because of the effect of the cold upon the workmen. The writer has, however, successfully placed many yards at temperatures down even to zero, where the men were protected and where the mixing and placing operations were so arranged as to be of exceedingly short duration for each batch.

The erection of a canvas or other more substantial enclosure completely around the work involved, is always effective but somewhat costly. Heat may be obtained from salamanders, temporary steam coils, etc., and the writer has thus often succeeded in thawing out frozen floor slabs covered on top only with hay and canvas. Canvas alone in such locations is not sufficient protection, the dead air imprisoned in hay or shavings being necessary as an insulator.

For mass concrete work the use of chemicals added to the water may be advisable where the temperatures do not fall much below the freezing point. The writer has used no chemical except common salt, which has shown good results in several experiments, and no detrimental results in actual work.

The safest and most economical method of handling concrete for each separate operation must be determined for itself. In freezing weather it may be advisable to manufacture the different parts of the structure in a temporary factory and afterward erect them "in the dry," as is steel. On the other hand the "wet" method may be necessary, and then some scheme should be devised for handling the concrete direct from the mixer to the place of deposit without intermediate dumping. Derricks, cars, etc., will readily accomplish this.

# The Surface of the Earth

In commencing this article I do so with a desire to draw the attention of those interested in the practical business of building construction in the matter of its statical value, especially as to foundations, as these constitute the fundamental basis of all successful structures.

As a corollary it might be stated that the constituent materials of the crust of the earth, or its geology, are only known in a mediocre or general way by architects and builders, and, strange to say, this very important matter is rarely or never introduced into the curriculum of architectural or engineering schools, most of the courses being devoted to things terrestrial and not subterranean, notwithstanding the fact that as every structure must stand on mother earth it behooves the constructor to have a knowledge of the materials on which the intended bridge or building is to rest and remain stable and permanent.

In order, therefore, that one may determine the materials composing the site, it is imperative that the engineer, architect or builder should ascertain what is in the upper crust of the earth, to the depth of the excavation, as planned, to obtain the footings and full depth of cellar or foundation walls; and should these be, or be intended to be carried down to a great depth, as in the case of a very high or heavy building or bridge, then this can only be found by borings or drillings made vertically through the several strata, until the desired material is definitely located. For example, we will assume that it is specified that the footings must rest on good, permanent, solid rock, free from fissures, clefts, water courses or other damaging or deleterious features, and that the level of these footings is so deep as to necessitate caisson work; then the borings, if made close together at spaced intervals of, say, from two feet to four feet in squares, will convey to the engineer the natures of the compositions forming the stratas at the desired level, and experience must dictate the proper course of treatment required to properly support the superstructure. In rock it is now usual to employ concrete to level up the inequalities of the surface in the area of the footings after it has been proven and positively assured that the rock in its mass is solid and dependable, no matter at what depth this is obtained, and with the assistance of reinforcement by the insertion of grillage, rods or any other means of strengthening to make the concrete more cohesive and reliable. But it does not always happen that rock is obtainable, and on account of the vagaries of nature that the site may so vary in its sectional profile as to make the bed of the rock dip or drop at so sharp an angle as to leave along its side a stratum composed of hard or soft clay, mud, sand, quicksand, or even soft or rotted rock itself, and it is the presence of these unsafe factors which places a mental strain on him who is in charge, and taxes his ingenuity in order to provide sufficient bearing, and it is here we will take up the consideration of the ingredients as they may occur.

Quicksand is a sand composed of particles so round and so fine as to possess no coherency whatsoever, and is so utterly incapable of solidity as to be classed as a liquid, so that it flows through the fingers and, like water, yields under pressure, being so elastic and so full of voids, and therefore absolutely unfit for the resisting places of footings or the sustaining of weights. It is then imperative that it be removed either by suction pumps or excavating, or be penetrated through to a depth where a more

solid material is situated. Fortunately, it is generally found that quicksand is placed on the upper layer of a bed or strata of good, hard sand, and the excavator having obtained this will have no difficulty in testing and treating his base, but he should endeavor, as far as he possibly can, to locate the area of the sand bed to guard against any possibility of its slipping. A sectional profile map of the land, should such a thing be within his reach, will help to guide him in this query, especially in the cities where other buildings have been previously in existence, and have been pulled down to make room for the new structure; but in open land he can easily learn from the oldest inhabitant, any of the neighbors, or perhaps from his own personal observation of the topography of the land as to the natures of the bottom.

The foregoing remarks apply to liquid or soft mud, loose clay, mixtures of sand and gravel, shale or any ground which conveys an idea of uncertainty or unfitness, and it is here that we recognize the true and important value of a practical knowledge of the geological constituents of the earth's crust and the infinite variations with which the constructor must cope. If mother earth had only laid down some fixed rule for her compositions, if we were assured that there would always be the same ingredients all over one site, all would be well, and the task would be simple; but, unfortunately, she is erratic in her formation, and it has been the experience of the writer to have to provide against rock clay, sand and mud all within an area of 200 square feet. The most serious problem the foundation constructor has to solve is the matter of filled-in ground, or dumping ground, which is, as a rule, generally swamp, along the banks of rivers, valleys or flat land adjacent to the sea; though there are in the cities plots and lots whose original filling in to bring the cellars up to the depth from the curb line required by law. This, then, is a matter needing consideration, and can only be regulated by the size and weight of the building to be erected on the site, in addition to the nature of the ingredients the fill is composed of. This, then, can only be settled by a close study of the existing conditions and what weights the filled-in ground will be obliged to sustain. For example, it would be manifestly unwise to erect a five or six storey apartment house or flat on a filled-in bottom, the thickness of the filling being from three to four feet, dumped on top of a clay crust, resting on a substratum of mud or marsh land, for the reason that the constituent materials are incapable of resisting the downward pressure, and the result would be that the building would settle dangerously or perhaps collapse; so in this consideration there is nothing for it but to drive piles to solidify the mud and make the same a coherent mass by using concrete.

Nothing is more deceptive than "filled-in" or "made" ground, for the reason that the fill may sometimes consist of very good material, excacated from another site not far away, and having laid on the filled-in lot for some years, assumed an appearance so natural as to deceive even the most experienced observer; and it may perhaps happen that the intended building is not so heavy as to demand the excavation of the fill down to natural bottom, and that its sustaining power approximating 100 pounds to the square foot will be enough for the purpose; but the load to be supported should be determined by the plans and specifications, as set forth by the architect. A good, hard clay dump which has rested on a rock or natural clay crust may be relied upon, provided it has had a long time to solidify, as the weather serves to force together its particles, but ashes and other incongruous and miscellaneous materials are never trustworthy, even for the smallest class of buildings, not alone for the possibility of their changing their formation, but also on account of their unhealthfulness.

In the Supreme Court of the State of New York, recently, the question was asked a witness as to "what he considered safe ground to build on." The question being hypothetical, it was obviously imposible for the witness to give an exact answer, so he answered that "he didn't know, as it would all depend upon the class of building which was to be erected and the nature of the underlying ground." The result was that counsel was compelled to state specifically, in detail, the class of building which had been or was to be placed on the site, and then assume a clay bottom as the earth's crust. From this it will be inferred that the greatest judgment is requisite on the part of the builder in setting the foundation footings, and there is not now, and never has been, any golden rule laid down by which any human being could foretell what is beneath the topographical appearance of the earth's surface, and it is only by boring or excavating that its formation can be determined, and even then it may deceive. To illustrate this, a case may be mentioned where, in excavating for a twelve storey building on Broadway, New York, the bottom was found after excavating to a depth below the curb level of twenty feet, the soil was found to be ostensibly good, sharp, compact sand, evidently sufficient, when treated with concrete and grillage, to fully support the superstructure. This work was completed; the steel frame set, and together with the brickwork carried up to the third tier of beams; when the walls commenced to crack the beams and girders settled out of level, and the whole job became unsightly. The architect ordered it down, and it was removed and another excavation of the bottom made. On the level of twenty-five feet below the curb the old brick cesspools built by the English and Dutch settlers were uncovered and removed, proving that the present level of Broadway was much above the original topographical contour of the island at that point, and that the site was being built on the third time. Much difference of opinion prevailed among the experts on this operation, but the result was the same; when the bottom subsided the whole mass of the building followed the footings to their levels.

In consideration of the foregoing it would be well if more attention was paid to this feature of building by those engaged in its practice, not leaving the treatment of the soil or rock to those who do not know, but by practical observation and a study of the geological properties of the crust of the earth to provide that every structure may maintain its equilibrium and statical permanency. — Architects' and Builders' Magazine.

# Contracts Department

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

## CONTRACTS OPEN.

**Brandon, Man.**

The city council have selected a site at Princess avenue and Thirteenth street for the proposed court house and have put through a by-law to borrow $125,000 from the Imperial Bank in this connection.

At a meeting of the board of works held last week the matter of paving Main street was further discussed and it was decided to order the construction of the work as soon as possible.

Plans are to be prepared for underground public lavatories corner of Portage and Main, and corner of Higgins and Main.

**Brantford, Ont.**

The Hamilton Radial Electric Railway Company have applied for permission from the Government to build and operate a line from this city to a point on the Detroit river at or near Windsor.

It is understood that a new theatre will be erected to replace the opera house recently destroyed by fire and that a business block will be put up on the sigte of the disaster.

**Calgary, Alta.**

The Independent Meat and Packing Company have selected property east of the Calgary Brewing and Malting Company's building for the location of their new plant.

**Chilliwack, B.C.**

Drainage schemes are to be carried out in this town at a cost of $17,000.

**Durham, Ont.**

The by-law to issue $4,000 5 per cent. 20-year debentures to build a bridge across the Saugeen river has been carried.

**Economy, N.S.**

It is understood that the Nova Scotia Lumber Company are about to commence operations on the Miller property.

**Edmonton, Alta.**

Permits have been taken out by the city for a $12,000 incinerator and for the Kirkness school, to cost $13,000. Other permits include: James Mathews, store, Christabelle street, $1,600, and A. C. York, addition to dwelling, Sixth avenue, $2,400.

**Estevan, Sask.**

William Evenden is contemplating the erection of a large business block on Fourth street.

**Fort William, Ont.**

The ratepayers have ratified the by-law to guarantee the bonds of the Fort William Car Company and to grant a sum of $50,000 for the acquisition of a site.

**Fredricton, N.B**

C. H. LaBillois, Chief Commissioner, Department of Public Works, invites tenders as follows · up to January 27th for building the Waterboro low water wharf, specifications of which may be seen at residence of T. A. Farris, Waterboro, N. B.; up to Feb., 24th for the construcion of two metal superstructure spans over the Black river, Wellington, N.B., and for two metal superstructure spans over the Madawaska river, St. Jacques, N.B. Specifications of the four last named works may be seen at the office of the Department in this city.

**Goderich, Ont.**

W. L. Horton, manager of the Goderich Elevator and Transit Company, states that he has plans for an addition to the elevator in this town. The directors favor the extension, but are not likely to put construction in hand during the present stringency.

**Halifax, N.S.**

It is the general opinion that another railway is badly needed in the Eastern portion of the province and a joint conference of the city, town and county councils have arranged to meet in Sydney with a view to the furtherance of the project. Government assistance will be sought.

**High River, Alta.**

A cement industry is about to be established here on the farm of J. D. O'Neal.

**Kincardine, Ont.**

The surveys for the West Shore Electric Railway will be commenced shortly from this town. Construction is expected to start in May.

**Kingston, Ont.**

The street improvement by-law to raise $12,000 has been passed.

**Lachine, Que.**

The Catholic church here will be rebuilt and enlarged to seat 4,000 people; estimated cost $80,000.

**Lethbridge, Alta.**

A new three story block is to be built on Round street early in the spring by G. A. Seaman.

In an address to the local liberal association, delivered last week, Hon. W. H. Cushing announced that work on the new jail and court house would be started shortly. The Minister stated that the jail building was but the first item in a plan for placing jails in every judicial district of the province.

**London, Ont.**

It is understood that the Hobbs Hardware Company will erect a new warehouse and plant.

**Louisberg, N.S.**

The Cape Breton Railway Company will shortly enter upon the construction of an extension of their line from St. Peters to this place, a distance of thirty-one miles.

**MacLeod, Alta.**

Tenders are invited by the Supply Officer, R. N. W. Mounted Police, Regina, up to January 24th for cast iron water pipes and other material required in the installation of a water works system at the barracks in this town.

**Matsqui, B.C.**

Following the report of engineers F. C. Gamble, of Victoria, and R. Keefer, of Ottawa, an auxiliary dyke will be constructed on the Fraser river at this point by the Government at a cost of some $10,000.

**Moncton, N.B.**

At the coming session of the legislature application will be made by this city for permission to construct and operate a street railway in Moncton and Shediac; also for authority to issue bonds to $35,000 to the amount of for the proposed bonus to the Higgins shoe factory.

**Montreal, Que.**

General Manager Morse has given definite assurance that the Grand Trunk Pacific will construct a branch line into this city at no very distant date.

**North Bay, Ont.**

Hon. Frank Cochrane, Minister of

Mines, accompanied by a delegation from the North Bay board of trade, visited the smelter plant of the Montreal Reduction and Smelting Company at Trout Mills last week and witnessed a demonstration of the plant. The smelter question was discussed, with a view to securing Government assistance in the extension of this industry.

**New Westminster, B.C.**

At a special meeting of the city council held last week it was decided to locate the new reservoir at the upper end of Queen's Park on 4th avenue.

**Norton, N.B.**

A large feed mill is to be erected here by Elias Harmer & Sons.

**Okotoks, Alta.**

Building operations are about to be commenced by the Okotoks Milling Company in the erection of their new flour mill. The company will install an electric plant for lighting and power purposes.

**Ottawa, Ont.**

A refinery building is to be added to the mint at a cost of $15,000.

Representatives of the power, navigation, lumber and municipal interests of the Ottawa Valley again waited upon the Government last week for the purpose of urging the construction of a system of dams for the conservation of the upper waters of the Ottawa river, so as to increase the facilities of manufacturing during the low water season and to add a general impetus to trade. The deputation asked for an appropriation of $160,000 but the whole project involves an ultimate expenditure of about $500,000. Amongst the delegates were J. R. Booth, W. H. Rowley, W. Y. Soper and Peter Whelen. The Premier promised a thorough investigation of the scheme.

**Owen Sound, Ont.**

The shipping interests in this locality are badly in need of a dry dock and W. P. Telford, M.P., is energetically working in this behalf.

**Port Arthur, Ont.**

Mayor Ashdown, of Winnipeg, a member of the shipping commission, paid a visit to the city last week in connection with the enlarged plan for the proposed improvement of the harbor. This plan involves the removal of the present breakwater and the construction of a new work one thousand feet farther out in the bay. After his inspection Mayor Ashdown said that although the commission had already sent in their report he though tthat he could send in another report advising that the harbor work be laid out on the lines discussed.

Application is being made by the Mount McKay and Kakabeka Falls Railway Company for permission to build north or south of the Kaministiquia river.

William Scott, of the Pigeon River Lumber Company has applied to the city for fifty thousand horse power to use in the operation of large pulp mills, which it is the intention of erecting here in the near future.

**Prince Albert, Sask.**

The ratepayers have sanctioned a by-law to raise $50,000 for the extension of the waterworks and electric light systems and for the purchase of additional fire fighting apparatus.

**Prince Rupert, B.C.**

It is expected that tenders will shortly be called for by the Canadian Fish and Cold Storage Company, Limited, for the erection of buildings of the proposed cold storage plant.

**Regina, Sask.**

The Provincial Government have decided to proceed at a very early date with preliminary work for the new Departmental buildings, so that tenders for the actual construction can be called for.

**Revelstoke, B.C.**

C. H. Topp, City Engineer, announces that during the coming season the town purposes installing a 400 horse-power gas engine and a suitable gas producer plant; also a 150 kw. dynamo to supply electric energy for power.

**St. Thomas, Ont.**

The ratepayers have approved a by-law for an expenditure of $18,000 on the construction of a subway under the M.C.R. tracks at Ross street.

**Swift Current, Sask.**

Galt & Smith, consulting engineers, Toronto, have recently been making up a report for a waterworks system for this town, to cost about $50,000.

**Sydney, N.S.**

The Cape Breton Prospecting Company will install a new steam plant.

**Toronto, Ont.**

Tenders are invited by E. Coatsworth, Chairman, Board of Control, up to January 28th for a 15,000,000 and 6,000,000 imperial gallon triple expansion vertical engine for the main and high level pumping stations.

Tenders are invited by E. Coatsworth, Chairman, Board of Control, up to January 21st for the construction of sewers at Essex street, from Shaw street to 670 feet east and at Dupont street, from 700 feet west of Christie to Shaw street. Specifications at office of City Engineer.

The overcrowding of the city night schools is a matter that is to be called to the attention of the Board of Education at their next meeting by trustee C. A. Brown, who will move that the Riverdale school be enlarged at a cost of $50,000. An addition to the Jarvis street Collegiate will also be discussed and probably also the building of a new school at Avenue road and St. Clair avenue.

It is announced that the Bell Telephone Company are contemplating extensive improvements to their Ontario lines and that the bulk of the money recently received by the company in connection with the deal with the Manitoba Government is to be expended in and around Toronto, as the centre of the Province.

It will be noticed that the largest permit of the past week was that taken out by the Roman Catholic order for a new $50,000 church, corner Dundas and St. Clarens avenue. Following is a list of recent permits: Smith Brothers, 2 storey galvanized iron storage shed, corner Duke and Parliament streets, $2,000; Rev. Jas. Walsh, 2 storey brick Roman Catholic church, corner Dundas street and St. Claren's avenue, $50,000; Joseph Frost, 4 attached 2 storey brick veneered front and rough-cast dwellings, corner Carlaw and Eastern avenues, $5,000; R. Jessiman, 2 storey brick dwelling, corner Markham and Wolseley streets, $2,500; King Brothers, 2 storey rough-cast dwelling, Lake front, $1,500; Alfred Hutchins, piar 2 storey, semi-detached brick dwellings, corner Spadina avenue and Russell street, $7,000; W. J. Gage & Company, water tank, Spadina avenue, $1,200; John Kay Son & Company, sprinkler tank, King street west, $1,200; Harris Abattoir, water tank, Strachan avenue, $3,000; G. M. Bryan, alterations to dwelling, Carlton street, $1,500; Ontario Government, 1 storey grlvanized iron experimental plant, Clifford street, $2,500; John O'Neil, 2 storey frame dwelling, Centre Island, $1,700; P. Sheedy, 2 storey frame dwelling, Centre Island, $1,700; T. P. Haffey, 2 storey frame dwelling, Centre Island, $1,700.

**Thessalon, Ont.**

A deputation waited upon the Minister of Railways last week for the purpose of soliciting government assistance for the Thessalon & Northern Railway from this town to the main line of the Canadian Pacific Railway.

**Vancouver, B.C.**

J. P. Graves, President of the Granby Mining Company, states that the capacity of their smelter is to be in-

for distributing purposes will be required.

C. E. Cartwright, Chief Engineer, Esquimalt and Nanaimo Railway Company, wants tenders up to January 20th for the grading of the first section of ten miles from Wellington to head of Nanoose Bay, according to specifications which may been at engineer's office.

Recent building permits include :—A. L. Tutyell, frame house, Fifth avenue, $2,400; Boyd Burns & Co., brick warehouse, Alexander St., $11,200; Thos. T. Gadd, frame house, Comox street, $4,000; E. Matsin, frame house, Lansdowne avenue, $1,200; Johnston & Co., frame apartment house, Seymour street, $14,000; L. Scott, brick store, Pender street, $12,000; T. A. Allan, frame apartment, Richard street, $4,000; Henderson & Fraser, frame house, Raymour street, $3,000; G. W. Allison, frame house, Albert street, $1,500; C. N. James, frame house, Twelfth avenue, $1,500; J. J. Gray, frame house, Keefer street, $1,500; T. W. Chandler, frame house, Robson street, $2,300, E. W. Bloomfield, frame tenement; Hastings street, $11,000.

The British Canadian Wood, Pulp and Paper Company, Limited, recently formed with a capital of $1,000,000, are contemplating the erection of a mill in the vicinity of this city.

**Victoria, B.C.**

Tenders are invited by W. H. Northcott, City Purchasing Agent, up to February 10th for supply of 750 drums of creosote, to be delivered by May 1st. Specifications and further particulars at agent's office.

A by-law for improving the water supply has passed the city council. The measure involes an expenditure of $619,000.

The Victoria creamery have secured a site in the city for the erection of a new plant.

Recent building permits include : C. B. Ennis, one and a half storey frame dwelling, Simcoe street, $1,200; J. O. Turnbull, residence, Pandora street, $2,500.

**Victoria Harbor, Ont.**

Jas. Tudhope, M.P.P., of Orilllia, waited on Hon. Dr. Pugsley and Hon. Geo. P. Graham a few days ago to ask the Government to undertake at the earliest opportunity extensive dredging works at this place and at Tiffin Harbor. It is understood that the railway companies intend to make these ports their chief terminal points.

**Winnipeg, Man.**

C. A. Young, Chairman of the Trans-Continental Railway Commission, announces that work will be commenced on the shops at St. Boniface for the trans-continental line just as soon as weather will permit and that the contracts will probably be let within the next three months. Temporary shops adjacent to the main line of the company in the west end of Fort Rouge will be constructed.

Arthur Wickson, architect, has been instructed by the Western Congregational church to prepare plans for a new edifice to be erected corner of Preston and Home streets at a cost of $40,000

**Edmonton, Alta.**

Improvements will be effected to the waterworks in the spring at a cost of approximately $40,000. It is probable that tenders will be called for in the course of a few months on sewer work to cost about $200,000 and septic tank to cost about $100,000.

**Weyburn, Sask.**

Considerable drainage work is to be started in the spring and the new council will shortly arrange the preliminaries. Five or six miles of pipe creased this season by one thousand tons per day.

## CONTRACTS AWARDED.

Foley Brothers and Larsen, of Winnipeg, Man., have received the contract for the construction of 126 miles of the Grand Trunk Pacific system, extending from a point six miles east of this city to Wolf Creek, 120 miles west of Alberta capital. It is understood that the cost is between $40,000 and $50,000 per mile, or a total of between five and six million dollars.

**Hamilton, Ont.**

The Climax Road Machine Company have just received a contract for the supply of a stone crushing outfit and road grader for Prince Edward County, Ont.

**Keremeos, B.C.**

The Vancouver, Victorian & Eastern Railroad have awarded a five mile grading contract for the line west of this place to Fred Lane, of Grand Forks, B.C.

**Revelstoke, B. C.**

The successful tenderer for the building of the new city jail was O. W. Abrahamson at $3,500.

**Toronto, Ont.**

The James Morrison Brass Manufacturing Company, Toronto, have been awarded the contract for rewiring the Parliament Buildings in this city ; estimated cost $10,000.

**Victoria, B.C.**

E. H. Heap & Company, of Vancouver, have secured from the provincial government the timber contract in the construction of the bridge over the Thomson river.

**Winnipeg, Man.**

The Board of Control have awarded a contract for the installation of electric light at the fire service waterworks building to J. M. Taylor at $1,175.

Kelly & Sons, of Kenora, Ont., have been awarded the contract for the Redwood bridge piers and the Dominion Steel Company have been entrusted with the superstructure on the same work.

## FIRES.

Buildings of J. R. Chisholm, J. Haywood, Saskatchewan and Battle River Development Company, A. T. Panton, L. Young, E.A. Fox, Earle and Keith, W. Kennelly, Puet & Johnson and Customs Office, at North Battleford, Sask., loss $50,006.

Premises of Fur Dressing and Cleaning Company, Montreal, Que.; building loss $10,000.

Warehouse of Canadian Northern Railway, Humboldt, Sask.; loss $5,000.

Residence of Peter Ferris, Longueuil, Que.; loss $3,000.

Building of Maxwells, Limited, Halifax, N.S.; loss $20,000.

Buildings of Grafton & Company, Wood, Kelly and others, property of John Stratford estate, Brantford, Ont.; loss $50,000.

Planing mill and carpenter shop of William Schaife, Port Credit, Ont.; loss $2,500.

Furnishing store of White & Manahan, Winnipeg, Man. ; total loss $35,000.

Buildings of E. W. Jacobs and Company, Montreal, Que.: loss $15,000.

Furniture warehouse of M. Rawlinson, Toronto, Ont., building loss $10,000.

Opera house and other property at Brantford, Ont.; loss $15,000.

Hamill hotel, two-storey frame structure, Hedley, B.C. totally destroyed; loss not ascertained.

Warehouse of R. J. Armstrong and Company, Saskatoon, Sask.; considerable building loss.

Westmoreland avenue Methodist church, Toronto, Ont.; loss $8,000.

## BUSINESS NOTES.

Kent and Turcotte have been appointed curators in the affairs of contractor P. L. W. Dupre of Montreal.

The plumbing firm of Adams and Main, Winnipeg, Man., have dissolved.

J. R. Murphy, sash and door manu-

facturer, Vancouver, B.C., has been succeeded by the Fairview Manufacturing Company.

J. and N. Provost, contractors, Asbestos, Que., have dissolved.

The creditors of J. B. McManus & Company, contractors, of Moncton, N. B., have accepted an offer of thirty cents on the dollar.

Incorporation will be sought at the next session of Parliament for a company to build a railway from Nicola Lake, B.C., to Vancouver. The proposed route follows the Nicola, Coldwater, Coquihalla and Fraser river valleys to the railway bridge across the Fraser at New Westminster.

It is understood that the city of Edmonton has been offered 95 for nearly one million of its debentures by the Bank of Montreal and it is expected that an announcement will be made in the near future, that the offer has been accepted. Nearly all the municipalities having bonds for sale have recently received numerous offers from Eastern and British capitalists, which shows that there is a considerable improvement in the bond market, along with a large amount of confidence in the future of our Western towns.

Municipalities with debentures on hand should not be too anxious to dispose of them if there is no pressing emergency. Municipal debentures in the States which were almost unsaleable two months ago are now being picked up rapidly by brokers, who are confident that investment funds in large amounts will be available in a short time. The congested state of the debenture and bond market is not nearly as keen as it was, and all signs point to a further relaxation. Considerable money is being held out of commercial enterprises because of the gloomy outlook. This will accumulate and ultimately seek an outlet in substantial securities, such as municipal debentures. With a maturing fund of this kind, good municipal securities are bound to command attention and competition.

The National Portland Cement Company, Limited, have just declared a dividend of five per cent for the year ending December 31st., 1907.

Application for charter has been made by the Lake Sand & Gravel Company, Toronto, of which concern the following are provisional directors: H. W. Maw, G. S. Hodgson and W. J. MacKay.

## NEW COMPANIES.

Master Soap Specialty Company, Limited, Toronto, Ont., incorporated, capital $150,000. Incorporators, George Livingstone, S. Windsor, W. J. Marks and F. T. Strangways, all of Tottenham, Ont.

Cole's Automatic Brick Manufacturing Company, Limited, Montreal, Que., incorporated, capital $100,000. Incorporators, John Scott, Edward Cole, A. R. Oughtred, all of Montreal, and others.

## BUILDING NEWS.

Another tribute to the prosperity of the west is to be found in the record of new flour mills that were erected during the past year. The activity which prevailed in this direction during 1907 is probably unequalled in the history of western Canada. No less than 13,700 barrels daily capacity have been added this year in Canada west of the great lakes, this representing 17 new mills and three enlargements, distributed as follows: Northwestern Ontario, 10,500 barrels; Manitoba, 100; Saskatchewan, 825; Alberta, 1,750; British Columbia, 325; total 13,600. Four of these mills are of unusually large size and are equipped with everything that is modern and convenient in the nature of machinery. Even the smallest of them are modern and capable of turning out the very best article for export purposes.

The Universal Lumber Co., Limited, have been incorporated at Spokane, Wash., to carry on lumbering operations in British Columbia. The concern owns 10,000 acres of timber lands between Rossland and Greenwood, in British Columbia, and while offices will be maintained in Spokane, it is not the intention to ship any of the forest products out of Canada. The incorporators of the company are H. W. Greenburg, C. W. Sanson, S. S. Bassett and A. Herman, of Seattle.

$2,758,540 is the building record of the city of Hamilton, Ont., for 1907.

Toronto's building permits for 1907 totalled $14,225,800. Despite the depression of the last few months these returns show an increase over 1906 of more than a million dollars

Building operations in the town of Westmount, Que., for the year of 1907 show the substantial increase of $100,000 over the figures for previous years. The actual total is $893,600. As compared with the past five years this shows a considerable increase, the figures being; 1903, $282,700; 1904, $350,300; 1905, $800,850; 1906, $763,600; 1907, $893,600, representing a total spent on building operations in the suburb during the five years of $3,091,050.

Kamloops, B.C., installed during 1907 an up-to date sewerage system at a cost of $45,000. The debentures authorized and issued by the city for the carrying out of this work were taken up by one of the local banks at 99; previous debentures issued by the city in the early part of the year for other public works, were taken up by the local banks, one lot bringing 101, and another 100½. The waterworks plant and the electric lighting system, owned and operated by the city, and installed a few years ago at a cost of $110,000, were further improved during the year to the extent of $15,000, in order to cope with the rapid growth of the city, which has more than doubled its population in the last ten years.

The past year has been remarkable in the history of Vancouver for the great number of homes erected. The previous year had been more of a "business block" era and consequently the average value of the buildings was higher than the year just closed. Notwithstanding this fact, however, the total value of building permits issued during 1907 surpassed that of 1906 by $1,324,334. The number of permits issued amounted to 1773, thevalue amounting to $5,632,744, as against 1,006 permits issued during 1906 amounting in value to $4,308,410. When it is remembered that the year 1906, showed an increase of $1,655,410, over 1905, it will be seen that the year 1907 was one that the "Sunset Doorway" may well be proud of.

The labor situation having become a great deal more satisfactory than it was a few months ago, matters are looking up considerably along the line of the Grand Trunk Pacific and the Trans-continental railways, and the contractors and sub-contractors do not apprehend any great difficulty in securing labor during the present year. The statement was recently made to the effect that whereas men were restless and decidedly independent a couple of months ago, they are now working quite steadily and where there is one vacancy there are always two men ready to take the place. It is also stated that no less than ten thousand men will be required next season on the several Trans-continental contracts in the Province of New Brunswick and Quebec. A great deal of interest centres on the contract to be given out in the very near future from Prince Rupert, B.C., eastward by the G.T.P., which from a contractor's point of view is the finest piece of work on the entire line from St. Lawrence to the Pacific Ocean. There will naturally be a large amount of rock cutting, tunnel work and above all side hill work, and experts declare that a good deal of this section will cost $100,000 per mile, and perhaps some miles will even exceed this estimate, which is said to be a conservative one.

# TENDERS AND FOR SALE DEPARTMENT

## DEBENTURES FOR SALE

### CITY OF PETERBOROUGH

Sealed separate tenders endorsed "Tenders for Debentures" will be received by the undersigned up to MONDAY, THE 20TH DAY OF JANUARY, 1908, at 4 p.m., for the purchase of the following Collegiate Institute Debentures.—

$21,000, 4½% due December 31st, 1937. Interest payable 30th June and 31st December in each year.

$40,000.00, 5% payable in 30 equal Annual Instalments.

Both of the above are confirmed by Special Act of the Ontario Legislature.

No tender necessarily accepted.

F. ADAMS,
City Treasurer.

Peterborough, 30th December, 1907

TENDERS FOR

## FIRE ALARM BOXES

Tenders addressed to the undersigned will be received by registered post only up to noon on

**TUESDAY, JANUARY 21st, 1908**

or furnishing the above named articles.

Specifications and forms of tender, together with the conditions governing tenders, as prescribed by by-law, may be obtained upon application at the office of the Fire Department, Richmond Street Fire Hall, Toronto.

The lowest or any tender not necessarily accepted.

E. COATSWORTH (Mayor).
Chairman Board of Control.

City Hall, Toronto, Dec. 16th, 1907.

## SEALED TENDERS

Will be received by Wm. Lane, Clerk Huron County, Goderich, P.O. Ont., where plans may be seen, until TUESDAY, THE 28th DAY OF JANUARY, 1908, at 2 P M. for the erection of the superstructure of a Steel Bridge to be erected over the north branch of the Maitland river on Josephine street in the Town of Wingham, Huron County The bridge is to be one span 140 feet floor, 16 ft. wide, sidewalk 6 feet wide, Lattice or gas pipe rail on bridge concrete floor, 1 part cement to 3 parts gravel. To be completed on or before the 15th day of September, 1908.

Tenders must be accompanied by marked cheque equal to 10 per cent of contract price and payable to Treasurer of Huron County.

The deposits of unsuccessful tenderers will be returned.

No tender necessarily accepted.

Also a 103 ft. span Pratt truss pin or rivetted concrete floor 14 ft. wide.

D. PATTERSON,
County Commissioner,
Huron County.

## TENDERS

### Office Commissioner, Public Works and Mines

**Department Technical Education.**
**Halifax, Nova Scotia.**

Sealed tenders, marked "Tenders for Technical College" will be received at office of undersigned up to noon on MONDAY, FEBRUARY 17, 1908, for the erection of the

**Nova Scotia Technical College,**

in the city of Halifax.

Plans and Specifications can be seen at the office of Herbert E. Gates, Architect, Roy Building, Halifax, N.S. Each Tender must be accompanied by a Certified Cheque for 10% of the total amount of the Tender, as security for the performance of any contract entered into with the Department.

The Commissioner is not bound to accept any Tender.

C. P. CHISHOLM,
Commissioner Public Works & Mines.

## United Counties of Prescott and Russell.

## Tenders for Iron Highway Bridge

Sealed tenders addressed to the undersigned will be received up to 12 o'clock NOON of TUESDAY, the 21ST DAY OF JANUARY NEXT, A D 1908 for the construction of an iron highway bridge over the Big Castor River, 120 to 125 feet span. State price for each and also for removing the old 80 foot span, now in use, to the site of the new bridge over the Little Castor about one mile distant, and place the same on the new abutments ready for public use.

Tenders are also asked for the masonry work required for the Big Castor bridge. concrete or stone. Information may be obtained from the undersigned by letter or in person, who will visit the locality with those tendering if required.

The lowest or any tender not necessarily accepted.

By order of Council.

E. ABBOT JOHNSON,
County Clerk,
Prescott and Russell,
L'Orignal,
Ont.

L'Orignal, December 16th, 1907.



## Operation of Winnipeg Water Softening Plant.

The water softening plant at Winnipeg, Manitoba, recommended by Dr. Rudolph Hering in 1897, was built by the Pittsburg Testing Laboratory and put in operation in July, 1901, being the first large municipal water softening plant in America. It was described in "The Engineering Record" of June 14, 1902. The process followed consists of adding lime to the water, followed by the precipitation of the sludge in tanks, filtration through cloth filter presses, and subsequent carbonation of the effluent with the products of combustion of burning coke. The operation of the plant was recently investigated by Messrs. James H. Fuertes, R. S. Lea, J. E. Schwitzer and George C. Whipple, the board of consulting engineers who have been examining methods of securing a new supply for the city, and from their report the following statements regarding the operation of the plant have been taken.

The softening process is limited to the removal of the carbonates of lime and magnesia, and no attempt is made to remove the sulphates. The analyses which have been made indicate that the efficiency of the plant has been reasonably satisfactory in accomplishing the work for which it was designed, though it has not by any means completely softened the water. The efficiency of the plant in removing the total hardness is about 56 per cent. and the temporary hardness 75 per cent., while the permanent hardness and chlorine remain unchanged. The magnesium is reduced by about 46 per cent.

The well water contains but little iron, all of which is removed during the softening process, and between 20 and 30 parts per million of free carbonic acid, but no information was available to show the amount of carbonic acid left in the water after treatment. Without the use of the coke burning apparatus the water would be free from carbonic acid and would have a slight alkalinity due to the presence of normal carbonates. With the coke burning process in use,

regulated to supply just the right amount of carbonic acid, these normal carbonates would be changed to soluble bicarbonates with no excess of carbonic acid; but if not properly operated there may be supplied to the water an excess of carbonic acid fully as large as that present in the well water before treatment.

The figures in the accompanying table show the average quantities of chemicals used in the softening process.

AVERAGE QUANTITIES OF CHEMICALS USED FOR SOFTENING.

| Year | 1903 | 1904 | 1905 | 1906 | 1907 |
|---|---|---|---|---|---|
| Warer softened dai y, million imperial ga lon | 1.54 | 1 79 | 2 19 | 2.36 | 2.33 |
| Lime, pounds used per day | 5,219 | 5,686 | 7,223 | 7,797 | 8,067 |
| Coke, pounds used per day | 875 | 894 | 755 | 620 | 555 |
| Acid, pounds used per day | 45 | 61 | 67 | 65 | 61 |
| Lime, pounds per million imperial gallons | 3,390 | 3,180 | 3,300 | 3,300 | 3,465 |
| Coke, pounds per million imperial gallons | 569 | 498 | 345 | 263 | 237 |
| Acid, pounds per million imperial gallons | 29.2 | 34.1 | 30.6 | 27.5 | 26.2 |

*For five months only.

These figures show that during the last five years there have been required for softening an average of 3,327 pounds of lime per million imperial gallons, 382 pounds of coke for changing the normal carbonates to bicarbonates, and 29.3 pounds of acid for cleaning the cloths used in the filter presses. The cost of these chemicals has been as follows:—

| | |
|---|---|
| Lime, 3,327 lb. at 0.63 cent | $20.95 |
| Coke, 382 lb. at 0.15 cent | 1.91 |
| Acid, 29.3 lb. at 1.5 cent | 0.44 |
| Total | $23.30 |

According to the report, the softening plant does not now appear to be in first-class physical condition, although it is operated in a fairly satisfactory manner and gives as good results as could reasonably be expected. The plant reduces the hardness of the water from 480 to 210.

## CEMENT FROM VOLCANOES.

The saving Japanese, who are forced to play a close game with life because of the narrowness of their islands and the tremendous yearly increase in the population, have learned to take cunning advantage of every by-product of nature.

They rake the sea beaches for seaweed to use as fertilizer and grub the mountains for twiggs to burn into charcoal. Now they are turning the many and troublesome volcanoes to good purpose by manufacturing the volcanic ash into cement. To them belongs the credit of discovering that the scoria that sweeps down from volcano vents and sears the neighboring countryside may at least be tolerated,

if it has to come, as an economic asset.

G. H. Seidmore, American Consul at Nagasaki, has reported to the Department of Commerce and Labor at Washington that a Japanese company organized to work volcanic ash into cement had already paid a dividend of 9 per cent. for the first half year on a capital of 200,000 yen and that it had more orders in sight than it could fill. The Mitsu Bishi and Kawasaki dockyards, the two great privately owned dockyards of the empire, the Government naval yards at Sasebo and the Wakamatsu Iron Foundry Company were all being supplied with the new ash cement.

The Government had recently granted a contract for 60,000 bags of the stuff to be used in the new harbor works at Keelung. Quantities have already been exported to North China, Formosa and Corea.

The ash, which is obtained from two of the great craters in the so-called Japanese Alps, running throught the main Island of Hondo, near the west coast, is ground and screened at the new company's factory, and because of the nature of the composition it needs nothing but water to become very good cement. One asset the new company can count upon—the supply of the crude material is inexhaustible, and the more that is carted away the more land will be uncovered for the struggling farmer.

The discovery of the new cement strikes one more American product from the ilst of the exports which had been necessaries for Japan. The Portland cement manufactured in Oregon and Washington was the only cement in use in Japan before the keen Japs turned the scoria into a paying proposition.

## GAS GENERATED BY ELECTRIC LEAKS.

Investigating a leakage of current from the negative cable of an electric tramway in Liverpool, Dr. Bassett has found that the top of the wooden trough carrying the cable had been burned through and material had leaked in that had formed a hard alkaline crust on the wire. Hydrogen was given off on contact with water, suggesting the presence of free sodium and potassium. A fluid alloy of these two metals was discovered in interior crevices, and analysis showed that the crust was two-thirds sodium and potassium hydroxides, the remainder being mostly earthy matter, with some soluble silica and about one per cent. each of free potassium and free sodium. It was concluded that electrolysis formed the free alkali metals, which water converted into hydroxides, with the evolution of hydrogen. If confined and mixed with air, the hydrogen might have produced a violent explosion, and this suggests a new explanation of explosions near electric mains that have been usually attributed to coal gas.

## PORTLAND CEMENT IN CANADA.

Beginning in 1891, the production of Portland cement in Canada has increased from 2,033 barrels at $5,082 to 1,598,815 barrels in 1906, valued at $2,381,014, while in the same period the number of cement works increased from one to twelve. The raw material, marl and clay, are abundant and the demand for cement has been, and still is, very active. In consequence of this demand the increase in production has been accompanied by an advance in price, the average cost per barrel at the factory having risen from $1.42 in 1905 to $1.48 in 1906. It seems in every way likely that the production and sale of cement will show a corresponding increase in 1907.

Nearly all of the Portland cement manufacturers hitherto established in Ontario have made use of marl as one of the ingredients, but there is a tendency towards substitution of solid limestone, where this can be obtained of suitable composition, as it is believed the cost of production can in this way be lessened. The limestone beds at Point Ann, on the Bay of Quinte, are utilized by the Belleville Portland Cement Company, but all the other plants use marl.

The production of Portland cement since 1891 has been as follows:

| Year. | Bbls. | Value. |
|---|---|---|
| 1891 | 2,033 | $5,082 |
| 1892 | 20,247 | 47,417 |
| 1893 | 31,924 | 63,848 |
| 1894 | 30,580 | 61,060 |
| 1895 | 58,699 | 114,332 |
| 1896 | 77,760 | 138,230 |
| 1897 | 96,825 | 170,302 |
| 1898 | 153,348 | 302,096 |
| 1899 | 222,550 | 444,228 |
| 1900 | 306,726 | 598,021 |
| 1901 | 350,660 | 563,255 |
| 1902 | 522,890 | 916,221 |
| 1903 | 695,260 | 1,182,799 |
| 1904 | 880,871 | 1,239,971 |
| 1905 | 1,254,360 | 1,783,451 |
| 1906 | 1,598,815 | 2,381,014 |

Capital and money may be timid, but if the banks don't soon begin to go along in the old way the people will have something to say that will jar sensitive nerves. The future is up to the banks.

### CONCRETE BUILDING UNDER COVER.

Concrete building construction under cover is being carried on at the present time on a new transformer house at Longue Pointe, Montreal. The building, which is entirely of reinforced concrete, measures 46 by 46 feet in plan and is 32 feet high. A tent with rounded ends 50 by 80 feet over all and 25 feet high at the eaves was erected over the site of the building and heated with salamanders and steam coils. The outside temperature up to the middle of December had reached as low as +3 degrees F. at night, and during some days did not go above 10 degrees. Work was carried on continuously inside the tent. W. S. Barstow & Company, New York, are the engineers, and the Canadian White Company, Montreal, are the contractors.

## DANISH REGULATIONS FOR SAND-LIME BRICK.

According to an official announcement of the Copenhagan building authorities, under date of June 26, 1907, sand-lime brick and cement brick may be used for building purposes under the following conditions:

The resistance of the brick to pressure must be at least 140 kilos per square centimeter (1991 pounds per square inch). The proof of the brick being up to this standard can at any time be called for by the building officials at the expense of the makers.

For outside walls no brick must be used, the resistance of which to the influence of frost has not been demonstrated.

The brick in question may only be used for ordinary fire-places, but not to take the place of clinkers, hard-burnt brick or fire brick.

Each brick must bear a registered factory mark.

## CAUSES OF FIRE.

Returns by the London Fire Brigade show that the careless practice of dropping matches and other lights is the most prolific source of conflagrations, more than 21 per cent. of the 3,843 fires which occurred in the County of London last year having been due to this cause. Not less than 257 fires arose from unprotected lights, 148 from oil lamps, 67 from improperly set up stoves, 98 from hot ashes, and 235 from sparks from grates. Gas leaks and the reckless search for them with lights resulted in 134 fires. Defective wiring for electric circuits led to 100 fires, some of them quite disastrous, but it is believed that the new regulations and safeguards urged upon architects by electrical engineers will make quite safe such wires as may be placed in future.

## CALENDARS FOR 1908.

Mussens, Limited, Montreal, dealers in railway, mining and contractors' supplies, and F. H. Hopkins & Company, Montreal, contractors' supply firm, have forwarded us useful calendars for 1908 containing illustrations of some of their principal lines.