Vol. 18. Toronto—DECEMBER 11, 1907—Montreal NO. 41

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.

H. A. BROWN, Mayor. H. FLOYD, City Clerk.

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

FOR SALE

One 15 inch Austin Jaw Crusher, mounted with 28 ft. of elevator and screen, all complete in good working order An early reply will oblige. THAMES QUARRY Co., St. Marys, Ont.

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WM. MAHLON DAVIS,
Town Engineer, Berlin, Ont.

City of Sherbrooke

Province of Quebec

Tenders for Pipe

Sealed tenders addressed to the undersigned, and marked "Tenders for cast iron water pipe and fittings," will be received up to TUESDAY, DECEMBER 31ST, 1907, for about 516 feet 24 inch cast iron water pipe, 13,100 feet of 18 inch and 7,000 feet 16 inch, also fittings for above sizes.

The lowest or any tender not necessarily accepted.

Particulars may be obtained from

THOMAS TREMBLAY,
Supt. Waterworks.

DEPARTMENT OF RAILWAYS AND CANALS, CANADA

TRENT CANAL

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,

Ottawa, 28th November, 1907.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

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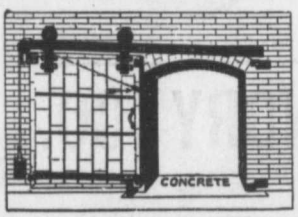

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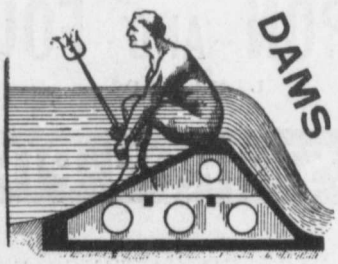

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THE PROVINCIAL CONSTRUCTION CO. LIMITED
STRUCTURAL ENGINEERS
TORONTO OFFICE
59 JORDAN STREET
PHONE MAIN 6385

Toronto, November 11th, 1907.

Mussens, Limited,
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. Lamming,
President.

Do Not Be Misled,

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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ECONOMICAL BUILDING.

"Efficiency with economy" is the motto of the age, and architects and builders no less than commercial men have to adopt it. They are entrusted with the spending of large sums of money for their clients, and they must see to it that this money is spent to the best advantage. At the very first interview with the client, the question of cost usually crops up, and is often very much to the front, and from that time to the issue of the final certificate, financial questions are never wholly absent. They largely control the general conception of the design as embodied in the preliminary sketches; they necessitate restraint when preparing the working drawings; they call for the most intimate knowledge of materials when writing the specification, and the greatest care to keep within proper limits when preparing the details. During the progress of the works, also, many opportunities of effecting little economies present themselves, and should always be seized. True economy in building cannot be effected by the use of rule-of-thumb methods; every detail of construction and each material must be designed and selected for its particular purpose, and with due consideration for the size and class of building for which it is required. What is good for the mansion may be superfluous for the cottage, and all superfluity, whether of strength or quality, entails the outlay of money for which no value is received.

In foundations, the proportion of the ingredients of the concrete should no more be fixed than the nature of the ingredients themselves; but the one should be partly determined by the other, as well as by the strength required. The class of mortar to be used will depend upon the kind of walling, the situation, whether exposed or otherwise, and other circumstances, and the proportions in which it is mixed will not necessarily be 1 to 3, but will vary according to the strength required, and the kind of lime or cement chosen. In the case of sound Portland cement and good angular sand, 1 to 5 makes a thoroughly strong mortar for all ordinary purposes. In plastering, it is by no means necessary to use three-coat work in every room, regardless of the class of building; and so on through all the trades, except, perhaps, the painter. In this trade, common colors may be chosen, but it is always false economy to use inferior paint. Possibly the most difficult of all materials to specify is the timber. If the very best is wanted for the highest class of work, there is comparatively little trouble in making the requirements clear; but the greatest difficulty is experienced in getting them complied with. In the case of the carpenters it is wasteful to specify the best materials for all classes of work.

It must be obvious that the speculative builder could not sell his houses at the price he does if he built them to the average architect's specification, and although it is not desirable that architects should be concerned in the erection of flimsy structures, as far as possible all buildings should be erected from the designs and under the superintendence of architects, and if this is to be done it is necessary to recognize that the property must be built at a price to show a reasonable return on the outlay. This class of work opens a perfectly legitimate field for the architect, provided he attains his end by simplicity of treatment, sound construction, and the use of such materials as are capable of fulfilling their purpose for a reasonable length of time. In designing small houses for individual clients the architect will not be compelled to exercise such strict economy as in speculative work; but, even in this case, he is not justified in increasing the expenditure without some good reason, for whether he build for speculation or not, he must build well, his economies must all be effected on well-considered lines. His aim is true economy, such as he is bound to study as much in the church or mansion as in the cottage.

CANADIAN TRADE RETURNS.

The figures of Canada's trade for the month of October show that the financial stringency has not operated, as yet at any rate, to prevent the continuance of the rapid growth in the volume of imports, although the increase for the month is considerably less than the average increase of the preceding months of this year. The total imports for the month, exclusive of coin and bullion, amounted to $31,484,400, an increase of $2,363,832 as compared with October, 1906. For the first seven months of the present fiscal year the total imports, exclusive of coin and bullion, have been $222,635,138, an increase of $34,053,458, as compared with the corresponding period of last year. The duty collected during the month was $5,119,136, an increase of $430,892.

EXPORTS FALLING OFF.

Exports for the month show a considerable falling off, principally in animals and their product, which declined about two million dollars, as compared with the same month last year. Total exports for the month, exclusive of coin and bullion, $26,623,078, a decrease of $2,095,362. For the seven months the decrease was $1,117,561, the total amount of exports for the period being $158,299,950.

COIN AND BULLION.

During October Canada imported coin and bullion to the value of $444,313, and exported $414,353. In October, 1906, the imports of coin and bullion were $2,609,263 and the exports $1,802,864. During the past seven months the imports of coin and bullion have been $3,760,597, and the exports $5,810,068. The total trade for the seven months was $381,623,314.

THE COMMERCIAL SITUATION

ONTARIO'S CROP RETURNS.

Ontario's oat crop this year was nearly 25,000,000 bushels less than it was in 1906. The figures quoted are the result of compilations made by the Provincial Agricultural Department from returns of 2,000 correspondents and are embodied in the fall crop report for the Province. The report, with one exception, that of potatoes, shows decreases in every class of crop. Speaking of fall wheat the report says that the yield is a little below 1906, but up to the average of new fall wheat. It says: "The acreage of new fall wheat will be somewhat increased in the Lake Erie and Georgian Bay counties, but will be about the usual extent in the other parts of the Province. Seeding was done a little later than usual, owing to the late harvest, but while operations ranged from the end of August to the third or fourth week of September, most of the crop was got in during the second week of September. It has an excellent start, but while green and healthy looking there is hardly as much top as was desirable to ensure its taking the risk of an open winter. About forty varieties are reported as being grown, Dawson's golden chaff still being by far the favorite."

Of the labor situation the report says that for the greater part of the province there was a scarcity of labor, especially of the right quality. There was much outspokenness as to the unfitness of many old countrymen offering for farm labor.

The following is a statement of areas and yields of crops for 1907 and 1906 respectively:—

Fall Wheat—15,545,491 bushels, against 18,841,771.

Spring Wheat—2,473,651 bushels, against 3,267,000.

Oats—83,524,301 bushels, against 108,341,455.

Barley—21,718,332 bushels, against 25,253,011.

Rye—1,081,706 bushels, against 1,397,582.

Buckwheat — 2,546,468 bushels, against 1,792,903.

Beans—790,269 bushels, against 950,312.

Peas—7,365,036, against 7,388,987.

Potatoes—20,907,803 bus., against 15,020,290.

Turnips—48,205,605 bus., against 57,060,151.

Corn for husking (bushels in the ear)—22,007,931 bushels, against 23,988,682.

Corn for forage (green)—2,029,547 tons, against 2,149,413.

Hay and Clover—3,891,863 tons, against 4,684,625.

STATEMENT OF THE BANKS.

According to the official bank statement, the circulation of bank notes for October last, as compared with the same month last year, shows an increase of only half a million dollars, whereas the paid-up capital, which constitutes the limit of circulation, is $9,284,198 greater. But the statement also shows that during October the banks put $4,834,983 more in circulation, to that extent relieving the financial stringency during the month. During the twelve months, ended October 31st, 1906, however, the banks' increased their circulation by about six millions.

Again, in the matter of current loans in Canada, the amount outstanding on October 31, 1907, was $579,860,498, an increase of $1,653,221 during the month, and an increase of $48,841,029 during the twelve months.

Call and short loans in Canada show a decrease of $455,206 during the month, and a shrinkage of ten millions during the year. Canadian banks have $15,211,864 less at loan on call in the United States than on September 31, while the decrease under this head for the twelve months was $12,590,200. There has also been a decrease during the year of some ten millions in current loans abroad.

The average amount of Dominion notes held by the banks during October was $47,722,328, about the same as during September, but $7,261,428 more than the holdings in October, 1906. The reserve of the banks is returned at $69,862,098, an increase of $3,318,304 during the year. In the twelve months ended October 31, 1906, the banks added nine millions to their reserve.

Deposits by the public, payable on demand in Canada, that is, for current business, amounted to $170,498,311 at the end of October, an increase of $1,428,814 during the month and of nearly eleven millions during the twelve months. Savings deposits are returned at $416,787,636, showing a decrease of $4,340,071 in the month. The inference is not unfair, however, that much of this has been withdrawn for investment in low priced securities. The increase in savings, as compared with October, 1906, is $25,878,117. During October the Bank of Montreal loaned $4,811,258 to the Government.

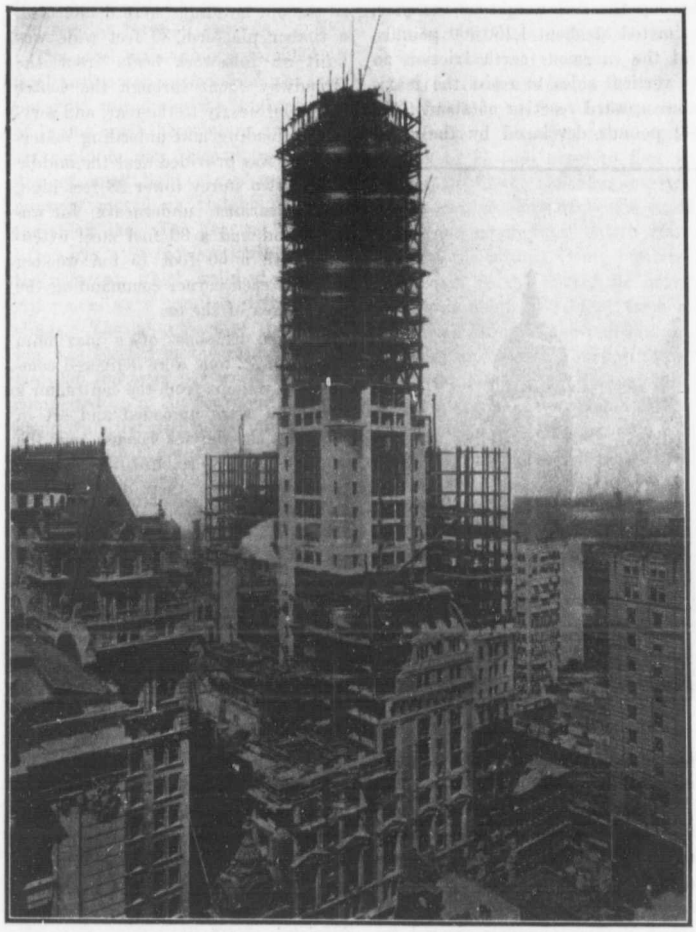
GOVERNMENT EXPENDITURE FOR PUBLIC WORKS.

The report of the Minister of Public Works for the fiscal period ended March 31 last gives details of a total expenditure during the nine months aggregating $7,155,396, of which $2,784,713 was for public buildings; $1,964,529 for dredging, and $1,532,255 for harbors and rivers. The revenue of the Department was $279,484, every item of revenue showing a considerable increase over the preceding year. In connection with the plans for the proposed new Departmental Buildings, Deputy Minister Gobell notes that the plans submitted in the architects' competition last summer are now the property of the Government, but it has not yet been decided whether any of them will be followed in their entirety, or whether the designs will only serve as a model in the preparation of the final working plans. In respect to the dredging contracts, Mr. Gobell states that contracts were only made without public tenders for work at places where on the public call no tenders were received.

Structural Features of the Singer Building, New York.

(From The "Engineering Record")

The building, at the corner of Liberty street and Broadway, New York, covers an area of about 24,000 square feet, with a main structure having a uniform height of fourteen storeys, surmounted by a large tower 612 feet in extreme height above the curb. It includes the old steel frame Singer and Bourne Buildings, originally ten and fourteen storeys high respectively, and their additions and extensions which have been combined into a single continuous structure with fronts of about 133 feet on Broadway and 238 feet on Liberty street. The old Bourne Building and the old Singer Building have grillage foundations on sand, the Bourne Building addition has reinforced concrete spread footings, and the addition to the Singer Building and its great tower have concrete pier foundations carried down by the pneumatic caisson process to rock at a maximum depth of about 92 feet below the Broadway curb.



View of Singer Building Tower During Erection.

The building is of fireproof steel cage construction of the ordinary type, except that special provision is made to resist wind pressure in the tower. It is designed for office purposes and has a two storey curved mansard roof and flat deck corresponding with that of the old Singer Building. The tower, sixty-three feet square at the base, has vertical walls faced with brick and limestone. It is located near the centre of the Singer extension, with the front wall parallel to Broadway and about 30 feet back from the curb line, so that the main building has the effect of a wide base about 200 feet high for the tower shaft. The tower contains thirty-three principal storeys above the main roof, making forty-seven storeys in all, and terminates in a segmental dome springing from the thirty-eighth storey and finished with a flat deck at the forty-second floor, carrying a lantern about 16 feet square and 63 1-2 feet high, with a steel flagpole rising nearly 36 feet above it. The highest office floor is the fortieth, at an elevation of 524 feet above the curb, and the lantern balcony, 562 feet above the curb, is the highest point accessible to the public, while the summit of the small dome is 612 feet and the top of the flagpole is 668 feet above the curb.

On the architect's plans two storeys, known as the ground storey and messanine storey, are not numbered, therefore what is called, on the architect's plans, the first storey is in reality the second storey. The messanine storey, between the thirteenth and fourteenth storeys, was not numbered, so that in the present numeration the storey originally designated as the fourteenth becomes the sixteenth, and all storeys above it are correspondingly changed from the former designation, numerals commencing at ground level.

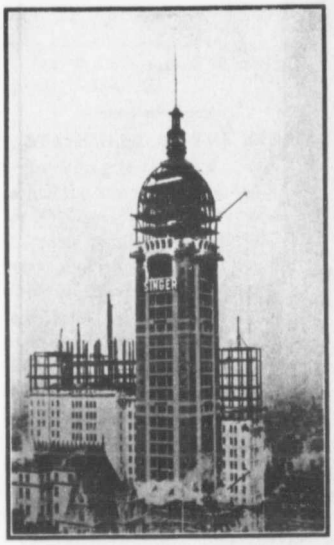
The structural features correspond with recent practice for steel cage office buildings and are most interesting in the provisions for wind bracing required for the 30 pound horizontal pressure assumed on the entire vertical surface of the building. There are 58 lines of steel columns with closed rectangular cross sections, which support the beams and girders of the various tiers on horizontal connection angles field riveted to their top and bottom flanges. In the fourth

storey one of the corner columns is carried on a triple web cantilever plate girder 30 inches deep and 18 feet long, which receives a load of about 500,000 pounds and is anchored by bearings on the under side of brackets riveted to one of the interior columns. The columns have cast steel bases distributing their loads over I-beam grillages covering the tops of the concrete piers. Tower columns have maximum combined loads of as much as 1,637 tons and have correspondingly massive lower storey sections.

The heavy wind pressure is resisted by a system of 25 vertical panels of X-bracing between adjacent pairs of columns. Four panels terminate at the sixteenth storey, sixteen panels in the corners of the tower are carried up to the thirty-fourth storey, and the remaining five panels, between the interior columns of the tower, are carried up to the thirty-eighth storey. In nearly all cases the wind bracing consists of full length intersecting diagonals in each panel. All of the horizontal members are made of pairs of channels back to back, and the same construction is used for the diagonal members except in the highest storeys, where the strains are lighter and single channels or angles are used instead. Some of the wind braced panels are replaced in the lower storeys with knee braces instead of full length diagonals. In the tower, the X-braces are arranged in alternate long and short vertical panels to clear the door and window openings.

In all cases the wind braces are field riveted to wide projecting connection plates shop riveted to the columns. In many cases these occur on three faces of the same columns, making them extremely bulky and difficult to store or handle. The tower has 36 columns continuous through the fourteen storey building to a point 320 feet above its roof at the foot of the dome, 510 feet above the curb.

The four centre columns are continuous to the forty-fifth storey about 580 feet above the curb, where they support the light framework of the upper dome about 30 feet higher. They have a total length of 579 1-2 feet each and a cross section of 160 square inches at the bottom, while the others are only 499 feet high, but have about the same cross section. Eight of them are anchored with four 4 1-2 inch vertical screw rods engaging pin connected riveted links extending through the peir 40 or 50 feet to its base, where they are secured to anchors cast into the concrete so as to develop the full weight of the pier, estimated at about 1,150,000 pounds, and the enormous earth friction on its vertical sides to resist the maximum upward reaction of about 925,000 pounds developed by the over-



COMPLETED TOWER FRAMEWORK.

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The four storey dome, 63 feet in diameter at the base and 50 feet high, has four hip rafters at the corner columns. Each of them is double and each part is made of a pair of curved 15 inch channels riveted together back to back. They are seated on diagonal beams in the thirty-eighth floor, and rise nearly vertical to the thirty-ninth floor, above which they curve inward to the forty-second floor, having gusset plate connections riveted between their webs for each floor beam. They are made in two sections, field spliced in the thirty-ninth storey and connected at the fortieth and forty-second to cantilever floor beams projecting beyond the four centre columns of the tower. In each face of the tower there are four intermediate curved jack rafters similar to the hip rafters between them.

The contract for the sub-structure was awarded September 18, 1906, and required that it should be completed ready to receive the steel superstructure in 110 calendar days. As soon as the old buildings were demolished, a timber platform 30 feet wide was built on falsework bents from the Broadway front through the centre of the lot nearly to the rear, and served for loading and unloading materials. It was provided near the middle with a two storey tower 28 feet high, with clearance underneath for wagons, and had a 30 foot steel extension with a 60 foot 15 ton wooden boom at each corner commanding the entire area of the lot.

Wooden caissons of a maximum weight of 12 tons were delivered complete by wagons from the contractor's yard and were unloaded and set in place by the derrick booms, and the concrete piers were built like tall vertical shafts on their decks, before sinking was commenced, thus saving cofferdams and providing a great weight for forcing them into the excavation made later by men working under pneumatic pressure in the usual way. In this way the thirty caissons were sunk a little below the surface of the hard pan and the excavation continued below them to rock Staten Island, and shipped on lighters to pier No. 11 in the East River, where it was delivered on trucks to the Broadway front of the building and immediately unloaded by means of a derrick seated at first at street level and afterwards moved up with the steel work every second tier. The derrick was of special construction, designed by the contractors, and had a 75 foot mast and a 65 foot boom of 40 tons capacity. Both mast and boom were round sticks of timber with cast steel and forged steel fittings, and the mast was provided with connections for sixteen 1 1-4 inch steel guy ropes, only eight of which were used for this work. It weighed 10 tons and was equipped with 3-4 inch wire rope tackles for the hoist-

ing and topping lifts, which were rove with from nine to three parts, diminishing as the work advanced, and the weight of the members decreased. The derrick was hoisted from storey to storey in the usual manner, first unshipping the boom and using it as a gin pole on the second floor to hoist the mast with. The entire operation required only about three hours and was accomplished by the regular force of erectors.

The steel was either assembled in final position as unloaded or was temporarily stored on the highest tier of beams until the columns and girders could be set. Occasionally bundles of small light pieces were temporarily stored on the bridge over the sidewalke. The heaviest member lifted was a 54 foot section of one of the columns, which weighed 28 tons. All pieces were handled with chain slings. The main part of the building was erected at the rate of about two 250 ton tiers per week, and was completed up to the fourteenth storey about June 1st with a maximum force of 200 men. The work was then practically suspended for nearly six weeks, and when resumed the tower was erected at the rate of four tiers in seven days, the heaviest tier weighing about 140 tons.

The erection of the tower was commenced at the seventeenth floor about the middle of July, and was completed September 15th, about 2,000 tons of steel having been raised from 200 to 600 feet during that interval. This part of the work was considerably delayed by the narrow width of the panels, which made it almost impossible to store more than one of the bulky column sections in each space, and by the awkward location of the colum splices which, in order to clear the wide connection plate for the wind bracing, were placed almost midway between the floors and required the construction of scaffolds for field riveting.

After the completion of the main building up to and including the seventeenth floor, which serves as a roof deck, some of the wall columns in the Broadway front were continued from the fourteenth floor, where they terminated, and the curved mansard roof rafters commenced, to the seventeenth floor at the level of the main flat roof by temporary steel columns braced in position. These carried steel girders and heavy wooden beams and planks forming a deck at the seventeenth floor level, which extended over the curved mansard roof and provided a substantial landing platform for the steel members used in the tower.

The 40 ton boom derrick was seated at this point and hoisted all steel members from trucks on Broadway, deposited them on the platform or delivered them directly to a similar derrick of 25 tons capacity that was carried up in the usual manner with the successive tiers of beams in the tower and erected the entire framework of the latter. Being located in the centre of the tower, the derrick mast was about 60 feet from the Broadway front of the building, and its boom was not long enough to command the trucks in the street below, hence material was hoisted at two operations as already described.

The 40 ton derrick hoisted from the street to the seventeenth floor, a little over 200 feet, in about 1 1-2 minutes, and was operated by a Lidgerwood engine permanently located on the first floor. The 25 ton derrick was operated by another Lidgerwood engine seated on the seventeenth floor and provided with steam from the boiler of ther compressors. It had a maximum record of unloading and hoisting 400 tons of steel in 6 hours. The hoisting tackle for this derrick was rove with a spliced 3-4 inch steel wire rope 2,500 feet long and the lower block was provided with a 1,500 pound cast iron counterweight to assist it in overhauling. In its highest position on the fortieth floor, it hoisted materials from the landing platform on the seventeenth floor about 350 feet in 3 minutes. It was moved up with every second tier of beams in the usual manner and was only out of service about 1 1-2 or 2 hours for each operation. Each hoisting engine was provided with two gongs, operated by electric buttons at their derricks, signals from which controlled all of the hoisting.

The sixteen columns in the tower were erected like those in the main building up to the base of the dome, above which the four centre columns were first erected, together with their beams and girders, by the derrick seated on the thirty-eighth floor. The lower halves of all the curved dome rafters were then set in position and connected to the floor beams and girders, bracing them with sufficient stability to maintain them until after the derrick was raised to the fortieth floor and erected the next section of the four centre columns. The upper parts of the double hip rafters were then erected and their upper ends connected to the column framework of the tower, after which the intermediate jack rafters were erected, the first ones having their upper ends guyed until final connections could be made completing the framework of the dome. The derrick was not moved above the fortieth floor, and in that position it erected all of the steel up to the forty-fourth floor, which is the second in the lantern and is about 47 feet above the fortieth floor. The three last floors and the small dome for the concrete filling. The work was carried on continuously by two 150 men shifts in charge of Mr. Alexander Allaire, superintendent for the Foundation Company, contractors.

(To be Concluded in next week's issue)

A CORNER PLASTERING IDEA.

Some architects are now including in their plastering specifications instructions that the plaster must be cut down the corners with a trowel when it is put on. The purpose is to prevent cracks from shrinkage. It is argued that when plaster is cut through at the corners with a trowel it will leave it free to shrink in drying and thus prevent in a great measure the ugly cracks that sometimes disfigure the walls. The instructions apply not only to room corners, but especially to corners around flues and chimneys. They want what cracks there are to be in these corners, ready made and straight, so that they will not show so plainly. And besides, it is easier to fill them, or when paper is used on the walls it will cover them without their showing.

Size of Pipes for Direct Radiation

By Arthur McGonagle in "Engineering Review."

The accompanying diagram is intended to be used for determining the commercial size of pipe necessary to supply direct radiation at various distances, and various assumed losses in pressure.

The figures on the left-hand margin of the diagram represent square feet of direct radiation. Those on the right, the commercial diameters of line, marked "Trial Diameters," on standard weight pipe. The vertical the upper margin of the diagram, are intended for use in cases where extreme refinement is called for.

The long diagonals represent the various losses, in pounds per square inch, and the short diagonals on the lower part of the diagram the various distances, in feet.

The amount of direct radiation to be supplied, and the distance of such radiation from the source of supply being known, the desired loss of pressure is assumed, and the size of pipe necessary, determined as follows: Find the intersection of the horizontal line representing square feet of direct radiation with the long diagonal, representing the assumed loss. Follow this intersection vertically downward until the short diagonal, representing the distance, is met; from that point move horizontally to the right, and in the right-hand margin find the nearest commercial size of pipe necessary.

Example:

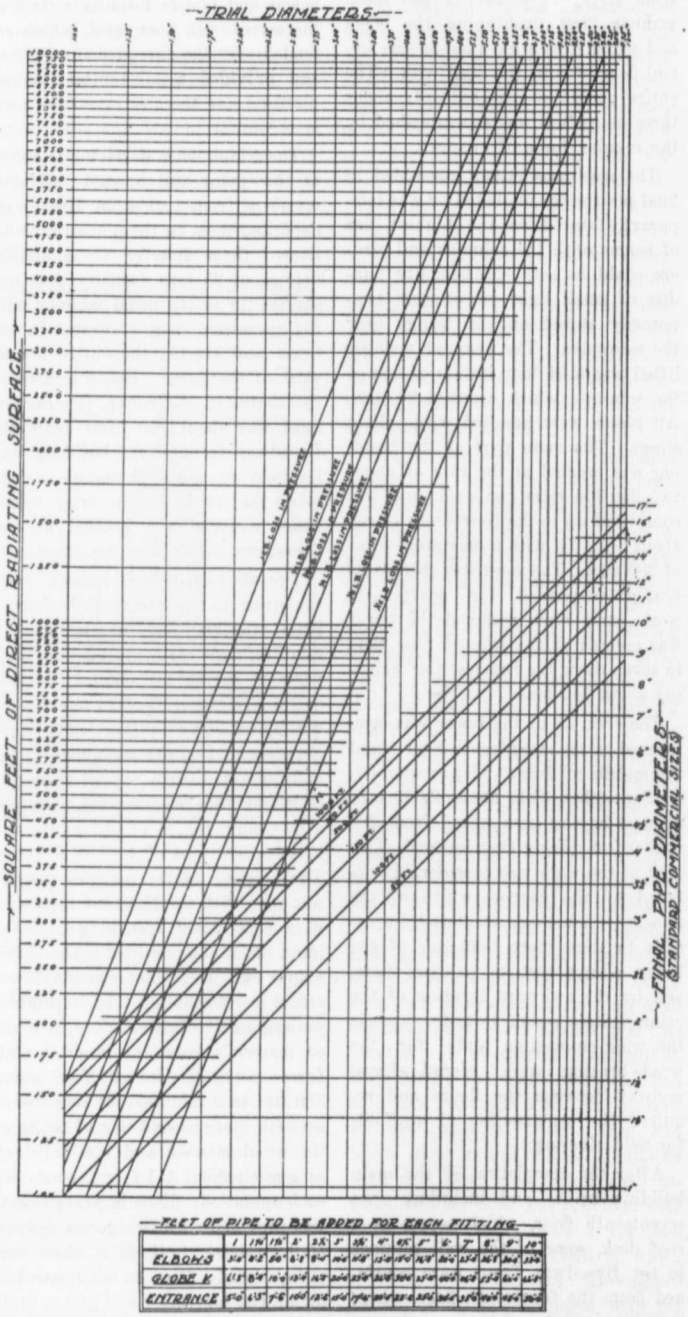
Distance, 50 ft.

Desired drop in pressure, 3-8 lb.

Direct radiation, 2,200 sq. ft.

Find the intersection of 2,200, with the diagonal representing 3-8 pounds loss. Follow same down vertically to the 50 foot distance diagonal, and from new point of intersection follow horizontally to the right-hand margin. Nearest pipe size, 3 inches.

Where the pipe supplying the radiation contains a large number of fittings, or other conditions make such a refinement necessary, it is advisable to add to the actual distance of the radiation from the source of supply, a distance equivalent to the resistance offered by the fittings, the value of which, expressed in feet of pipe of the same diameter as the fitting, will be found in the table below. Where the size of pipe is to be found in such a case, the size of the fittings to be allowed for should be determined from the trial diameters on the top of the diagram. That is, having found the



FEET OF PIPE TO BE ADDED FOR EACH FITTING

	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10
ELBOWS	3'0	4'5	5'0	6'3	8'0	9'0	10'0	12'0	13'0	15'0	18'0	21'0	24'0	27'0	30'0
GLOBE V	17'0	8'0	10'0	13'0	16'0	20'0	23'0	26'0	30'0	33'0	40'0	46'0	53'0	60'0	66'0
ENTRANCE	5'0	6'5	7'6	10'0	12'6	15'0	17'6	20'0	22'6	25'0	30'0	35'0	40'0	45'0	50'0

DIAGRAM FOR DETERMINING PIPE SIZE TO SUPPLY DIRECT RADIATION AT VARYING LOSSES AND DISTANCES.

intersection of the radiation line with the desired loss diagonal, follow this up, vertically, and the nearest pipe diameter will be the one which should be used in determining the revised distance to be used in the final operation.

Example: If in the above example the pipe supplying the radiation contained 3 elbows, and a globe valve, we would proceed as follows:

Find the intersection of 2,200 with 3-8 pound loss diagonal, as before. Follow same upward and find the trial diameter, in this case 3 1-2 inches. In the table on the bottom of the diagram it will be found that three 3 1-2 inch elbows are equal to 35 feet of pipe, one 3 1-2 inch valve 25 feet 4 inches, say 25 feet of pipe, and, as there are three 3 1-2 inch elbows, and the 3 1-2 inch entrance to the radiating system or unit, there will be five 3 1-2 inch entrances in all, which is equal, according to the table, to about 86 feet. The resistance offered by the fittings and valve will therefore be equal to 35 plus, 25 plus 86, equals 146 feet. Add to this the actual length of the piping, 50 feet, and we have for our revised distance, allowing for the fittings, 196 feet. Now, finding the original intersection of the 2,200 with the 3-8 pound loss diagonal, follow the same downward to the nearest distance diagonal to 196 feet, which in this case is 250 feet. From the intersection thus found, follow same horizontally to the right, and in the left-hand margin of the diagram read the actual commercial size required, very nearly 4 inches. The result found in the above example is slightly over 4 inches, but since the distance used was considerably above that actually required, 4 inches should be sufficient.

In the above examples it has been assumed that the diameter is the unknown quantity, but, of course, if other factors than those assumed in the above example are known, the unknown quantity, whether it be radiation, loss in pressure, or distance, can be readily found, by proper use of the diagram.

$40,000 debentures have been sold by Chatham, Ont. at 94 and accrued interest.

STEEL HARDENING BY ELECTRICITY.

In a recent issue of Le Genie Civil, there is described by T. Garnier a comparatively new and simple method for hardening steel by electricity. The tool to be hardened is put in electric connection with the positive pole of the battery or other source of current; in similar connection with the negative pole, there is a cast iron tank full of carbonate of potash dissolved in water. The current is regulated by a rheostat. The tool is plunged to the desired depth in the solution, just as for hardening in the usual manner; the current is then switched on and the tool heated to the same degree as would be required in ordinary hardening. When the proper temperature has been reached and held for the desired time, the current is switched off and the tool left in the bath, which latter, by the simple act of switching off the current, is at once converted into a hardening bath.

Another method, which permits of hardening places on the surface of pieces, where the dipping process would not accomplish the desired object, is local heating with the electric arc. Here the tool or other article is laid on a copper block, and an ordinary arc carbon held in a safety holder; the electric connections with holder and block being made, the carbon pole is touched to the piece to be locally hardened. Of course the heating is both intense and local; the work-piece is at once plunged into the ordinary hardening bath, and when one place is hardened the next may be heated, and so on. The electric current may also be used to draw the temper of a hollow object. Instead of using a red-hot iron rod to plunge in the bore, a cold rod is employed, which is used as a resistance in the circuit of a secondary current of about 2 volts tension. The temperature of the iron rod gradually rises, and when the work-piece has reached the desired color the current is shut off. This method is said to produce less liability to cracking than the old-fashioned way of drawing the temper with a hot rod.—Mining Reporter.

FILES AND THEIR USE.

To choose a flat file, turn its edge upward and look along it, selecting one which has an even sweep from end to end, and having no flat places or hollows. To choose a half-round file, turn the edge upward, look along it and select that which has an even sweep and no flat or hollow places on the half-round side, even though it be hollow in the length of the flat side.

In draw filing, take short, quick strokes, which will prevent the file from pinning and scratching. Long strokes, no matter how long the work may be, are useless save to make scratches. Remember it is less the number of strokes given the file than the weight placed upon it that is effective; therefore when using a rough file, stand sufficiently away from the work to bring the weight of the body upon the forward stroke. New files should be used at first upon broad surfaces, since narrow edges are apt to break the teeth if they have the fibrous edges unworn.

For brass work use the file on a broad surface until its teeth are dulled; then make two or three strokes of the file under a heavy pressure upon the edge of a piece of sheet iron, which will break off the dulled edges of the teeth, and leave a new fibrous edge for brass work.

Use bastard cut files to take off a quantity of metal of ordinary hardness; second cut in fitting, and also to file unusually hard metal; smoothing to finish in final adjustment or preparatory to applying emery cloth; dead smooth, to finish very fine work; float file on lathe work.

To prevent files from pinning, and hence from scratching, properly clean them, and then chalk them well.

In an electrolytic method of sharpening files, the tool is connected with the positive pole of a battery of twelve Bunsen cells, and then placed in a bath of 40 parts of sulphuric acid in 1,000 of water. The negative electrode is a spiral copper wire encircling the file without touching it. The process requires ten minutes and the renovated files are declared to be satisfactory as when first made.

Contracts Department

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

CONTRACTS OPEN.

Asquith, Sask.

James Mallas, treasurer, invites applications for the purchase of $2,300, eight per cent 20-year school district debentures.

Balcarres, Sask.

A long distance telephone line is to be constructed to Port Qu'appelle, 32 miles distant.

Barrie, Ont.

The Fleming Aerial Ladder Company are negotiating with this town for the erection of a $26,000 factory.

Bobcaygeon, Ont.

The Department of Railways and Canals are considering the construction of a dam at this place.

Brandon, Man.

The by-law to raise $10,000 for the erection of a caretaker's residence and for cemetery improvements has been withdrawn owing to the financial stringency.

A measure will possibly be submitted to the ratepayers at an early date providing for the erection of a large depot for the city crushing plant.

Calgary, Alta.

A new machine shop is to be added to the works of Mathew and MacNaughton at a cost of $6,000.

Cobalt, Ont.

The local municipal councils have granted a franchise for an electric railway to the Central Railway Company. A start on the construction of the Cobalt-Liskeard section will probbe made next spring. This section alone will cost in the neighborhood of $250,000.

Coquitlam, B.C.

Hon. F. J. Fulton, Provincial Secretary, reports the intention of the Government to erect an asylum here at a cost of $200,000.

Daysland, Alta.

A site has been acquired by La Corporation Episcopale Catholique Romaine de St. Albert upon which they will build a church, school, residence and large hospital.

Deseronto, Ont.

The ratepayers have approved a by-law granting a bonus of $20,000 to the Deseronto Furniture Company.

Dresden, Ont.

The construction of a new $8,000 library has just commenced.

Dominion, N. S.

Specifications are being prepared for the installation of a water system in connection with which two electric pumps will be necessary; estimated cost $26,000.

Edmonton, Alta.

Tenders are being taken for the construction of the 120-mile section of the G.T.P. west of this city. Bids for the work will close December 23rd after which date contracts will be awarded for the Yellow Head section.

Negotiations are under way for the erection of the new Royal Alexandra Hospital which is to cost something like $150,000.

A new $24,000 block of stores is to be built on First street by W. J. Webster.

The $120,000 addition which is being built at the General Hospital is to be completed by June next. At the rear of this building a small power house will be erected.

The Davis, Cromer, Willow Point, Campbell Lake, Sulitjelma and Franklin school districts have been empowered to borrow sums aggregating $5,700 for building purposes.

F. Crandell, purchasing agent of the G.T.P., arrived in the city recently for the purpose of securing 600,000 railway ties.

Fernie, B.C.

A petition will be submitted to the council by the inhabitants asking for the construction of a subway under the Great Northern track.

Fielding, Sask.

A new flour mill will be erected here early in the spring by the Stratford Milling Company.

Goderich, Ont.

The effects of the Goderich Engine and Bicycle Company, Limited, which include an engine factory, machine shop and other buildings, together with a well equipped machinery plant, are offered for sale by B. L. Doyle, Master at Goderich, who will receive tenders up to December 19th.

Guelph, Ont.

The Government have been requested to erect a new winter fair building in this city. At present they are planning the enlargement of the existing structure.

Hull, Que.

The Minister of Public Works, acting upon the reports of Mr. Vallee, Engineer of the Department, has ordered the city to immediately undertake the repairs of the Gatineau bridge or else to close the structure.

Indian Head, Sask.

The Town Council are considering the proposition of a Mr. Eaton, of Nebraska, to establish a plant here for the manufacture of gas from straw for lighting and heating purposes.

Lavenham, Sask.

A. Dykeman is contemplating the erection of an elevator here next season.

Leduc, Alta.

N. Pederson is about to establish cement block works in this locality. The building is already in hand and the machinery will shortly be installed.

Lethbridge, Alta.

All preparations have been made for putting in a steel plant at the Royal Collieries' property; estimated cost $30,000.

Lloydminster, Sask.

Two new school buildings are to be built here at an early date.

Tenders have just been taken by the committee of the local Anglican church for the erection of a rectory.

London, Ont.

The city council have decided to construct a sewer to White's warehouse in the east end of the city and the work will shortly be put in hand.

A new company, to be known as the King Edward Hotel Company of London, has been formed with the object of building a new hotel at a cost of $22,000 or of purchasing another building and remodeling same. Amongst those interested in the project are George C. Gibbons, K.C., E. Meredith, K.C., Thomas Beattie, M.P., and Phillip Pocock, the well known shoe factor.

The City Engineer has been instructed by the Board of Works to prepare plans for a new belt line in the north end of the city.

H. F. McNaughton, Secretary, Department of Public Works, Toronto, will receive tenders up to December 19th for the erection of the Hygienic Institute, plans of which may be seen at the Department and at the office of Moore & Henry, architects, this city.

Londonderry, N.S.

All the requests of the Drummond Mine Company including the Nepisguit River power project have been granted.

Markdale, Ont.

Negotiations are being carried on with J. Graham, of Toronto, with a view to the establishment of a large plant to develop the marl beds at Bell's Lake.

Mount Forest, Ont.

Tenders will be received by W. G. Perry, town clerk, up to December 18th for $19,971, 5½ per cent 10, 20 and 30-year debentures.

Moncton, N.B.

L. Higgins, who recently obtained concessions from the city council for the removal of his shoe factory from Yarmouth, will commence the construction of a new building early in the spring.

Montreal, Que.

The attention of the City Council has been called to the dangerous condition of the old fire station at the corner of Craig and Chenneville streets and the renovation of the building will probably be put in hand at an early date.

The Finance and Market Committee have practically closed an arrangement with the C.P.R. by which the company undertake to build a new cattle market in the east end of the city at a cost of $180,000.

Of the total sum of $3,000,000 which the road committee will ask for next year, no less a sum than $1,500,000 is intended to be spent on street improvement. Other amounts recommended to be voted were as follows: wooden sidewalks, $200,000: repairs to permanent pavements, $150,000; to complete the new corporation yard, $40,000; for a new asphalt plant in the west end of the city, $40,000; for a new corporation yard in the north end, $40,000; for grading streets, $43,000; for removing snow from other streets, $35,000; for new street gullies, $25,000.

A sum of $260,000 is required by the Water Committee for next season's work. The amount will be expended solely upon the better equipment of the department and repairs to machinery.

Property at Clarke avenue has been purchased as the site for the new Protestant Infants' Home.

Electric driven machinery is to be installed in the large new addition of the British American Dyeing Company at Verdun.

A permit has been granted for the new post office which is to cost $448,000.

Newcastle, N.B.

D. Pottinger invites tenders up to December 14th for the building of an enlargement to the engine house at this place. Specifications at office of Chief Engineer, Moncton, N.B., and with the local postmaster.

New Westminister, B.C.

Before the Fraser river sawmills are re-opened considerable improvements to the plant will be made. Better docking facilities are to be provided, the sheds are to be enlarged and new machinery added.

The Government will be asked to build a new land registry office in this city.

Niagara Falls, Ont.

In addition to the by-law to raise $23,000 for school buildings the ratepayers will also be asked to sanction an expenditure of $15,800 for waterworks and $5,800 for a garbage chute.

Ottawa, Ont.

L. K. Jones, Secretary, Department of Public Works, will receive tenders up to February 1st for the construction of the second section of the Trent Canal.

The Board of Health have renewed their recommendation for the submission of a by-law to raise $25,000 for a public abattoir.

Charles MacNab, County Clerk, wants tenders up to December 12th for one hundred toise of quarry stone; also, up to the same date for fifty cords of dry hard wood, black birch and rock maple, and twenty cords of soft wood mixed.

Peterborough, Ont.

The manufacturers' committee have recommended council to grant a fixed assessment of $15,000 for ten years to the Peter Hamilton Company.

After this year all iron castings required for sewerage and waterworks will be purchased by tender. At present the castings are bought from local firms as required.

Applications for fixed assessment have been received from the Peterborough Canoe Company and the Auburn Woollen Company.

A movement has been started with a view to the acquisition of a library building. Andrew Carnegie will probably be invited to assist the scheme.

The Peterborough Hospital are just receiving the remaining portion of the Charlotte J. Nicholls' legacy, which includes a grant of $30,000 for a new wing.

Port Arthur, Ont.

The city will expend $8,000 on the purchase of a 250 horse power motor generator to provide additional power for the street railway.

A large eastern firm are understood to be negotiating with the town with a view to the establishment of a pulp and paper mill.

It is reported that the Canadian Northern Coal and Ore Dock Company will shortly proceed to double the capacity of their plant here.

Attention has been directed to the lack of a public hall in this city and a committee has been appointed by the council to prepare plans for a suitable building.

Prince Albert, Sask.

An American match firm are understood to be negotiating with the town for the location of a $300,000 factory in this vicinity.

Revelstoke, B. C.

Tenders are invited by H. Floyd, City Clerk, up to December 27th for the construction of a sewerage system, specifications of which may be seen at the City Hall.

Strathcona, Alta.

In connection with the $100,000 gas producing plant which is to be erected here by the International Gas Heating and Lighting Company, Cleveland, Ohio, it is understood that tenders for laying the mains will shortly be taken.

St. Catharines, Ont.

A fund has been started to raise $75,000 for a new hospital.

Yorkton, Sask.

The Government have purchased a site on Third avenue for the proposed $60,000 post office and customs house.

Toronto, Ont.

The Presbyterians of this city at a recent mass meeting pledged themselves to raise $100,000 for the new buildings of Knox College.

The Niagara power by-law to raise $2,750,000 for a distributing plant will be submitted to the ratepayers on January 1st.

Owing to the unfavorable financial and labor conditions now prevailing, the Colonial Investment and Loan Company have decided not to erect the

proposed ten-storey building on King street. The company will however carry out extensive alterations to their present premises.

Tenders will be received by Mayor Coatsworth, Chairman, Board of Control, up to December 19th for the installation of refrigerators at the new morgue on Lombard street. Specifications at office of City Architect.

Plans are said to have been prepared by the Christian Scientists of this city for a magnificent temple to cost $150,000.

The Collegiate Institute at Toronto Junction are asking the conncil for $17,000 to cover the cost of an addition of four rooms and gymnasium.

Recent building permits include: Walter Dean, 3-storey wood storehouse and workshop, Queen street West, $2,000; Orr Bros., Ltd., 2-storey and attic brick dwelling, Shaw street, $3,000; E. P. Atkinson, 2 detached 2-storey brick dwellings, Howard avenue, $6,000; Winnett & Wellinger, 2-storey brick warehouse, corner Columbus & Sorauren avenues, $12,000; David Storton, 1 pair semi-detached 2-storey and attic brick dwellings, Dufferin street, $3,500; Toronto Hat Mfg. Co., addition to factory, Adelaide street West, $4,000; Thomas Lewis, 2-storey brick dwelling, Davenport road, $2,500; Grenadier Ice Co., 1½-storey frame ice house and stable, Browns avenue, $5,000; F. Courtmanche, 2 detached 2-storey brick dwellings, College street, $4,500; L. C. Sheppard, 1 pair semi-detached 2½-storey brick dwellings, Ossington avenue, $4,400; L.C. Sheppard & Co., 4 pair semi-detached 2-storey brick dwellings, Leeds street, $14,400; H. Larkin, 1 pair semi-detached 2-storey brick dwellings, Dovercourt road, $7,500; F. White, 2-storey brick store and dwelling, Riverdale avenue, $3,000; W. H. Cawthra, 3-storey brick and stone store, Yonge street, $19,000; Lever Bros' Limited, 3-storey brick factory, Eastern avenue, $45,000.

Vancouver, B.C.

$800,000 is to be spent during the coming year on the following improvements: concrete sidewalks, $100,000; pavements, $400,000, and sewers, $300,000

A. Grossman will erect a 10-storey building corner of Abbott and Hastings streets at a cost of $175,000.

Plans are being prepared with a view to the enlargement of the jail. It is possible however that the electors will be asked to sanction a measure providing for the erection of a new building.

A. McKay Jordan, chairman of the finance committee, will receive tenders up to December 26th for $145,800,50-year five per cent City of North Vancouver debentures.

Owing to their unsanitary condition several buildings were recently destroyed by the fire brigade. These included sheds and outbuildings of the Royal Hotel, two sheds adjoining Royal hotel on Water Street, stable and 2-storey frame building rear of Grand hotel, five frame dwellings on Pember Street and one on Abbott Street.

Estimates for bridge construction, for which a by-law will shortly be submitted to the ratepayers, now total $1,120,000, apportioned as follows: Granville street, $520,000; Cambie street, $250,000; Westminister avenue, $170,000; coal harbor, $70,000; expropriation, $60,000; approaches, $40,000 and compensation to owners, $10,000.

A meeting will be held on December 18th to further discuss the building of a $25,000 sanitarium at North Vancouver.

Wm. McQueen, City Clerk, wants tenders up to to January 2nd for supply of brass goods and galvanized pipe according to specifications at the Waterworks office, City Hall.

Machinery is being installed by the B.C. Sulphite Company at Swanson Bay for the manufacture of pulp and paper. A new turbine wheel weighing fourteen tons was recently imported from Pennsylvania.

Recent building permits include:— D. Roberts, frame dwelling, Seymour street, $1,300; Armishaw & Gilbert, frame candy factory, Hornby street, $1,000; R. T. Copley, frame dwelling, Second avenue, $1,500; J.B.Edwards, frame cottage, Ninth avenue, $1,000; C. E. Woodruffe, Third street, frame dwelling, $4,800; J. McDevitt, frame dwelling, Princess street, $1,500; H. J. Edwards, frame cottage, Keefer street, $1,000; A. W. McDonald, frame dwelling, Fifth street, $1,600; Charles Gray, frame dwelling, Third street, $1,500; Hood Brothers, brick store and apartment building, Hornby street, $22,000; Evans & Lougheed, frame dwelling, Columbia street, $3,000.

Victoria, B.C.

F. C. Gamble, Public Works Engineer, wants tenders up to December 1st for the super-structure metal for the North Arm Bridge, Fraser River. Specifications at office of Provincial Timber Inspector, Court House, Vancouver, and at the Department of Public Works, this city.

A by-law to raise $2,000 for municipal buildings at Oak Bay will shortly be submitted.

The C.P.R. are taking tenders for clearing the 48 miles of right of way for the E. & N. extension between Alberni and Nanoose on Vancouver Island.

In connection with the construction of the Fraser river bridge, about 600 fir and cedar piles, varying in length from 20 to 45 feet, will be required and tenders for same will be received by the Chief Commissioner of Lands and Works up to December 31st.

It is reported that a factory will be built in this locality for the manufacture of "mitchellite," the new explosive.

Wetaskiwin, Alta.

The local Roman Catholics will erect a handsome church at a cost of $60,000.

Wingham, Ont.

The Ontario Railway and Municipal Board have approved a by-law to raise $1,800 by debentures for extensions to the waterworks.

Winnipeg, Man.

Announcement is made by the Provincial Government that a new jail will be constructed in this city next year at a cost of $150,000.

Sidewalk and sewer construction is to be carried out on Preston avenue and Grove, MacGregor and Charles streets at an estimated cost of nearly $5,000.

The Board of Control have decided that the street railway company must erect waiting rooms at the corner of Main street and Buchanan avenue also at the corner of Selkirk and MacGregor, at the city limits, St. James.

Yellowgrass, Sask.

A covered skating rink will likely be built at this place in the near future.

CONTRACTS AWARDED.

Espanola, Ont.

Dixon Bros., of Campbellford, have been awarded a contract for the new bridge over the Spanish river at this place.

Kincardine, Ont.

The contract for the new post office in this town has been let to William Nicholson, of Wingham, at $17,000.

Massey, Ont.

The Department of Public Works have awarded the bridge contract at this town to the Algoma Steel Bridge Company, of Sault Ste. Marie; approximate cost, $12,500.

Montreal, Que.

The Structural Steel Company have secured the contract for the new boiler house at $680.

Peterborough, Ont.

The contract for the new Catholic

Church has been awarded to Langford and Sheeny at $44,311.

Sydney, C.B.

Rhodes, Curry and Company have secured the contract for the new power house of the Sydney and Glace Bay Railway Company at $25,000.

Temiskaming, Que.

Long and Twain, contractors, of Haileybury, have obtained the contract for the construction of a winter road twenty miles in length to the Montreal river mining district.

FIRES

Elevator at Wood Bay, Man., property of Smith Grain Company, Winnipeg; loss $6,000.

Buildings of King Bros., J. Broadfoot, R. Hopper, Wood & Gibson, Lumber and Hardware Company, Brighton Hotel Company and others at Alameda, Sask; loss $2,000.

Buildings of William Kennedy, and Clarke and Buchanan, Summerside, P.E.I.; total loss $10,000.

Factory of Tombyll Upholstering and Frame Mauufacturing Company, Limited, Montreal; building loss $20,000.

Building of Jackson Engraving Company, Winnipeg, Man.; loss not ascertained.

Offices aud machinery of the Quebec Daily Telegraph, Quebec, Que.; loss $15,000.

Structural steel plant and building of Kelly Bros. and Mitchell, Winnipeg, Man., loss $10,000.

Hotel Bureau, Montmorency Falls, Que., totally destroyed, loss $15,000.

Buildings of J. McArthur, H. Howe and others, Little Current, Manitoulin, Ont.; loss $70,000.

Town hall building at Longueuil, Que.; loss $4,000.

Barn of C. MacKinnon, Charlottetown, P.E.I.; loss $22,000.

NEW COMPANIES.

Freemasons' Hall, Limited, Toronto, Ont., incorporated to build new masonic quarters, capital $50,000. Incorporators, Frank Saunders, W. J. Guy, R. M. Larter, W. M. Holtby, G. Gander, and R. S. Muir, all of Toronto.

Brandon Shoe Company, Limited, Aylmer, Ont., incorporated, capital $30,000. Incorporators, Alexander Brandon, O. Peterson, W. Findlater and J. C. Bram, all of St. Louis, Missouri.

Credit Valley Brick Company, Limited, Toronto, Ont., incorporated, capital $50,000. Incorporators, W. Schumacher, of Glen Williams, Ont., and W. B. Bentley, G. A. Turner and James Watt, of Toronto, Ont.

Wentworth Real Estate and Building Company, Limited, Hamilton, Ont., incorporated, capital $25,000. Incorporators, C. B. Munger, C. W. Robinson, S. G. McAllister and C. W. Place, all of Hamilton, Ont.

King Edward Hotel Company, of London, Ontario, Limited, incorporated, capital $40,000. Incorporators, E. Meredith, G. C. Gibbons, R. M. Toothe, P. Pocock and T. Beattie, all of London, Ont.

Lobo Telephone Company, Limited, Lobo, Ont., incorporated, capital $10,000. Incorporators, N. A. Graham, A. E. McKay, D. R. Owens, H. J. Marsh and others.

Winnipeg Safe Works, Limited, Winnipeg, Man., incorporated, capital $50,000. Incorporators, F. H. Robinson, Walter Pace, J. E. Robertson and C. R. White, all of Winnipeg, Man.

John Deere Plow Company, Limited, Winnipeg, Man., incorporated to manufacture agricultural implements, capital $500,000. Incorporators, W. Butterworth, W. L. Velie, G. W. Mixter, S. Hosford, all of Moline, Ill., and H. W. Hutchison, of Winnipeg, Man.

Walbridge Manufacturing Company, Limited, Mystic, Que., incorporated as manufacturers of machinery, capital $20,000. Incorporators, L. A. Knight and others, of Manchester, N. H; also B. W. Gauthrie, A. S. Walbridge and A. E. Bockus, all of Mystic, Que.

Maison Jean Paquette, Limited, Montreal, Que., incorporated as hardware merchants and manufacturers, capital $300,000. Incorporators, O. Paquette, Jean Ducharme, J. H Pelletier, F. J. Vasillon and others.

BUSINESS NOTES.

Aubin and Martin, contractors, Montreal, Que., have registered; J. B. Pauze and Company, of the same city, have dissolved and J. B. Pauze has registered.

A new stone and marble firm, L. Fressinet and Company, have registered at Three Rivers, Que.

The assets of J. Decarie & Sons, brick manufacturers, Montreal, are advertised to be sold on December 13.

Paquette and Mayer, builders and contractors, Montreal, have registered.

The Portage la Prairie Construction Company, Limited, are applying for authority to change the name of the concern to H. Stephens Brick Company, Limited, with permission to take over the business now being carried on at Portage la Prairie, Man., by Henry Stephens.

The interests of the Fairchild Company, Winnipeg, Man., have been acquired by the John Deere Plow Company, of Moline, Ill., re-organized under the title of the John Deere Plow Company of Canada.

Wood, Gundy & Company, Toronto, were awarded the $50,000 county of Oxford debentures which were recently offered for sale. The bonds bear 5 per cent interest and are due in thirty annual instalmenrs.

BUILDING NEWS.

The G.T.R. have placed orders with different Canadian and U.S. builders for one hundred freight and passenger locomotives, to cost $1,500,000.

An echo of the Crystal Hall disaster at London, Ont., has just been heard in the Forest City, where action was entered last week against W. J. Reid and others to recover $15,000 on behalf of the 4 children of the late Mr. and Mrs. Howitt, two of the victims.

At Charlottetown, Prince Edward Island, last week, fire destroyed the famous Glenaladale Barn, one of the largest and best equipped buildings of its kind in the Dominion. The barn was the property of Major C. McKinnon but was built for John A MacDonald by his uncle, Sir William MacDonald of Montreal. A feature of the building was a complete waterworks system. The loss amounts to $22,000.

Contractor Gunn, who has the contract for the fine bridge which the C. P.R. are building at Lethbridge, Alta., does not intend to make any halt during the winter months. "With proper care and precaution" says Mr. Gunn, "concrete can be laid as well during the frosty weather as in the fine." One hundred and forty men, more than thirty teams and eight steam engines are at present on the job.

Certain American capitalists have been so impressed with the possibilities of the district between the Muskoka Lakes and Sudbury that they are going to invest several million dollars in mineral development and in the erection of pulp mills. They are confident that the spruce forests in this region can permanently supply a number of the largest mills. L. O. Armstrong, colonization and industrial agent of the C.P.R., was recently in Chicago conferring with the promoters of the project and we understand that initial steps towards the establishment of these important industries will be taken in the spring.

The Canadian Northern Railway Company's new wharf at Toronto has just been completed at a cost of $150,000. It is the largest in the Queen City and has considerably improved the waterfront.

CEMENT AND CONCRETE

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

Waterproofing Under Heavy Pressure.

The excavation for a well 6 feet in diameter and 80 feet deep, for a shot tower built for the Equitable Powder Company, of East Alton, Ill., was recently made in sand, gravel and clay which carried large quantities of water, and a perfectly waterproof concrete lining provided for it under particularly difficult conditions. The works of the power company are two miles from the Mississippi river, but owing to the many and varied strata of sand and clay encountered in the excavation, it is considered that the course of the river was at one time over the site. A test hole put down at the latter to a depth of 40 feet with a 2 inch pipe determined that about 10 feet below the surface was a stratum of sand, 6 to 8 feet thick, which changed gradually into coarse sand and gravel containing a large amount of water. Under this sand and gravel was a bed of blue clay, followed in order by strata of fire clay, quicksand and then clay again.

A well with a clear diameter of 6 feet being necessary, and a 9 inch concrete lining having been adopted, an excavation at least 7.5 feet in diameter had to be made. The nature of the materials to be passed through was considered to be such that a one-piece casting of constant diameter could not be forced down. Accordingly the casing was made in eight vertical cylindrical sections, built of 5-16 inch boiler plate. Each of these sections had a 1 1-2 by 3 inch reinforcing ring at the top and bottom, the top ring being riveted to the outside and the bottom ring to the inside of the casing. The section at the top was 10.5 feet in diameter, the next one below it, 10 feet 1 inch, and so on, each section differing by 5 inches from the previous section in order that the various sections could be telescoped and the joint between the reinforcing rings calked with oakum. Each section was prevented from sliding down over the one below it by 1-2 by 3 inch angles bolted to it; these angles also locked the sections together.

The first and second sections were put down without any difficulty, the excavated material being taken out in buckets raised to the surface by a hoisting engine, and the water encountered discharged by a steam siphon. The real difficulties were first encountered in sinking the third section when the water began to flow in such quantities that the siphon could no longer handle it, so a 500 gallon duplex pump was installed. This pump was set on a platform swung at the bottom of the excavation on a wire cable suspended over a chain block at the top of the well, enabling the platform to be lowered or raised as desired. The pump could only just handle the water that flowed into the excavation from the coarse gravel encountered in sinking the third section. The sinking of the last few feet of the latter was in clay and was accomplished without difficulty.

In sinking the fourth casing, however, work was nearly stopped when the cutting edge entered a bed of quicksand. The section was finally forced through the quicksand with eight jack screws, spaced equally around the rim. After penetrating about 18 inches into the clay below the quicksand, the power afforded by these jack screws was found to be inadequate to force the shell down further, so this section was left 1 foot above its proper place. By this time the water had been nearly shut off by making the excavation slightly smaller than the ring, the remaining clay forming an almost watertight joint. During the sinking of this and all the subsequent sections the joints between the latter would occasionally break loose and until they could be calked again large volumes of water carrying sand and clay would pour into the excavation. This calking could only be done with great difficulty, as the leak would travel around the casing and force out the oakum in fresh places. The joints could not be made tight enough so they could be poured with lead, and no other means could be devised to make them dry enough to permit concrete to be deposited against them, for of course the smallest leak would have washed out the green cement.

The large horizontal pump was found to be unsuited to the work, so a vertical outside packed plunger pump with a capacity of 33 gallons a minute was secured. At this time there was a leakage of only 5 to 6 gallons a minute, which came through the joints or followed down the outside of the casing and came in at the bottom. Good progress was made for a time under these conditions, when suddenly a stream of water forced its way up through the clay in the bottom, and the large pump was placed in service again. The last clay was removed 10 to 12 feet below this break, leaving a bed of sand carrying a heavy flow of water. After considerable difficulty with the pump, the casing was forced down by working the jacks and excavating the sand simultaneously. After sinking the section 7 or 8 feet in this manner the pressure on the outside of the casing caused the water to gush forth and pile 3 or 4 feet of sand up in the bot-

tom of the excavation. By carefully removing this sand and at the same time forcing the casing, a foot or more could be gained before another rush of sand and water would temporarily suspend the work, making progress slow.

The leaks which occasionally developed at the joints had meanwhile carried so much sand and clay into the excavation that the surface of the ground had cracked and settled over an area 40 feet in diameter around the mouth of the well. This sinking finally became so marked that the decision was made not to go any lower, for although the last section had not been put down an extra 7 feet of depth was gained by the settling of the ground at the surface. Before preparations could be made to build the concrete lining, however, a heavy flow of water broke through between the fourth and fifth sections and the subsequent movement of the soil around the casing squeezed the latter to an egg shape. Fearing the entire casing might collapse, the well was allowed to fill in order to balance the pressure on both sides of the casing. As this occurred late in the fall, operations were suspended until spring.

A steam driven deep well pump, with a Cook well point, was set up when work was started in the spring, and proved very satisfactory in keeping down the water. When the latter had been removed it was found that about 20 feet of material had filled in at the bottom of the excavation. As soon as this was removed the sand again began to come in, but the bottom was readily sealed with two layers of sacks of concrete. The water was then permitted to rise in order to relieve the pressure on the concrete while it was setting. When this concrete was hard, the water was drawn down again and 30 inches of concrete laid over that in the sacks. A rectangular opening was left in this floor for the well point on the suction of the deep well pump. This opening was covered with steel plates placed around the well point and a 12 inch concrete floor laid over the whole bottom. A 5 inch threaded pipe fitted with a flange was also placed through the floor to prevent the water pressure coming on the latter if the pump failed. This 5 inch pipe was provided with a blank flange tapped for a 1 inch and a 2 inch pipe which was used later in filling the opening around the well point.

The concrete lining was placed in forms built of 2 by 4 inch lagging spiked to circular ribs. These forms were made in sections 10 feet long, the length of each section of the casing, and were built in six segments. New ribs were required for each section owing to the changes in the diameter of the excavation, but the lagging was used repeatedly. The forms were made above ground and the segments lowered into the well, where those of a section could be bolted together and beveled ready for the concrete in 2 or 3 hours.

The angle braces on the casing which were not already sheared off when the water was drawn down in the spring were removed. The joints between the sections were then calked with fresh oakum, and dried white pine tongue and grooved wedges were driven into them with sledges. In spite of these precautions the joints continued to leak so they were covered with strips of tin, leaving a hollow at the joint through which the water was conducted to a pipe leading through the forms.

The concrete mixture consisted of 1 part Portland cement, containing 1 1-2 per cent. by weight of Medusa waterproofing compound, 2 parts of coarse river sand and 4 parts of crushed limestone, which would pass through a 1 inch screen and be held on a 1-4 inch screen. Tests of various waterproofing substances, such as a mixture of alum and soft soap and hydrated lime, were made before the work was commenced, with the result that the Medusa compound was adopted. Test blocks of concrete containing 1 per cent. of this compound mixed with cement showed no penetration over 1-16 inch in depth after being soaked for 48 hours in hot water, while plain concrete mixed in the same manner was found to be saturated under the same conditions.

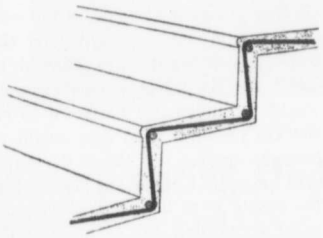
No night work was done in placing the concrete, but the damp air in the well prevented the latter from attaining much of a permanent set over night, and the surface of the finish work was carefully washed with neat that had been left in the concrete to handle the water from the joints in cement each morning. The water was allowed to rise in the well as the concrete was brought up, and after the work was finished was allowed to stand for six weeks so the concrete would be sufficiently hardened to resist the pressure head that would be brought against it. When the water was pumped out the various pipes the casing were filled. The compartment containing the point of the pump was finally filled through the 2 inch pipe in the flange on the 5 inch pipe left in the floor. A certain amount of seepage was expected through the lining, but after remaining damp for several months the concrete became as dry as concrete above ground.

The 2 to 3 inch cracks in the surface of the ground around the mouth of the well were washed full of sand, and then a square several feet larger than the footing for the building was excavated to a depth of 14 feet, the upper 6 feet in sunken ground and the remainder in solid earth. The bottom of the excavation was then covered with sand on which the footing walls and piers for the tower were built, the remainder of the excavation being filled to the ground level again with earth. Elevations determined on the footing walls showed a slight settlement when the full load of the superstructure was first placed on them, but this has now ceased and the tower has not been strained in any way.

CONCRETE STEPS.

Concrete may be advantageously used in the construction of steps, particularly in damp places, such as areaways and cellars of houses; and in the open, where the ground is terraced, concrete steps and walks can be made exceedingly attractive. Where the ground is firm it may be cut away as nearly as possible in the form of steps, with each step left two or three inches below its finished level. The steps are formed, beginning at the top, by depositing the concrete be-

hind vertical boards so placed as to give the necessary thickness to the risers and projecting high enough to serve as a guide in leveling off the tread. Such steps may be reinforced where greater strength is desired or



where there is danger of cracking, due to settlement of the ground.

Where the nature of the ground will not admit of its being cut away in the form of steps, the risers are moulded between two vertical forms. The front one may be a smooth board, but the other should be a piece of thin sheet metal, which is more easily removed after the earth has been tamped in behind it. A simple method of reinforcing steps is to place a half-inch steel rod in each corner, and thread these with quarter inch rods bent to the shape of the steps, as shown in figure, the latter being placed about 2 feet apart. For this class of work a rich Portland cement concrete is recommended, with the use of stone or gravel under one-half inch in size. Steps may be given a half-inch wearing surface of cement mortar mixed in the proportion 1 part cement in 2 parts sand. This system, as well as many others, is well adapted for stairways in houses.—Extract from Farmers' Bulletin No. 235, United States Department of Agriculture.

CLEANING A PAINTED WALL.

A little ammonia added to warm water answers admirably for this purpose. The advantage of ammonia is that it evaporates and leaves no residue; borax, soda and similar salts are apt to leave a residue which does not evaporate.

THE PRIMING OF RAW WOOD.

In answer to a correspondent of that journal who inquired as to the best material for priming raw wood on the exterior of some dwelling houses in process of erection, a recent issue of "The Painters' Magazine" presents the following: Our unbiased opioion on the question of priming exterior wooden surfaces is invariably in favor of pure white lead, the hydrated carbonate of lead, ground in pure raw linseed oil as fine as possible, and reduced with at least six gallons of well settled pure raw linseed oil to the one hundred pounds of keg lead, with not over one quart of pure oil and turpentine japan in addition. This is recommended for soft wood, such as hemlock, white or red pine, etc. For southern pine, the raw oil might be reduced to about five and one-half gallons, the deficiency being replaced by turpentine.

If the primer is to be followed by green or other dark colors, it should be tinted lead color with lampblack; if for yellow tints it may be stained with finest French yellow ochre. When ochre is used only to give a buff tint to a priming of white lead and therefore not in excess, it is perfectly safe to employ it, but we should not advise equal parts of white lead and ochre, unless the lumber be very soft and spongy. Under no condition, however, would we put ourselves on record as advising the use of ochre for priming, because we have any number of proofs that the material is too brittle and, in fact, as a rule too coarse to enter the pores of the wood along with the oil and when the oil is finally absorbed by the wood, the ochre is left without sufficient binder and is very apt to cleave off, taking the top coats along with it. If this does not happen during the life of the first painting, it almost invariably happens after repainting. The worst suggestion made to you by the painter, however, is that of using the so-called white ochre for priming. In the first place, this name is given to the most inferior grade of white paint that can be designed, as it does not contain, as a rule, anything but barytes and zinc white, both of which are unfit for foundation work, which priming really is in painting.

GROWING DEMAND FOR IMPERIAL PLASTER.

Stinson-Reeb Builders' Supply Company, Limited, Montreal, who have for some time been handling the products of the Imperial Plaster Company of Toronto, found the demand for these well-known and reliable wall plasters so heavy that they have just completed the erection of a thoroughly equipped plaster mill. It is conveniently located between the Canal bank and St. Ambroise street, with both Grand Trunk and Canadian Pacific Railway shipping facilities. By this arrangement the raw materials can be brought in by both rail and water and shipments of goods made without delay.

"Imperial Plaster" (hair, mortar and wood fibre) as manufactured under patent rights of the Imperial Plaster Company, of Toronto, will be the product. Besides the above, it is the intention of this progressive firm to manufacture a special "finish" to be used in connection with their plasters. Local orders and whole or broken carload lots for outside delivery will receive prompt and careful attention.

Descriptive booklet and very attractive calender for 1908, together with price list, may be had by calling or addressing 188 William street, Montreal.

THE MORTAR OF ANCIENT BUILDERS.

It has been for many years a hidden secret from builders how masons hundreds and thousands of years ago managed to make mortar which practically defied the ravages of time. In the ruins of our old castles, churches, etc., one will frequently see an overhanging arch, the other side of which has been battered down, perhaps, by canon balls years ago. This fragment seems to defy the laws of gravitation owing to the excellent building of the mortar. It is now stated that the Hungarian chemist, Brunn, has discovered the secret of this, having compounded a liquid chemical which renders certain kinds of matter proof against the effects of time. Professor Brunn asserts that it doubles the density of nearly every kind of stone and renders it waterproof.

THE WORLD'S IRON AND STEEL PRODUCTION.

The total output of iron ore for the world for 1905 is about 114 million tons, 78 per cent. of which is produced by the United States, Germany, Great Britain and Spain, in the order given. The output of 1905 exceeds that of 1904 by over 20 million tons, 15 million of which are accounted for by the increased production in the United States, whose output now considerably exceeds the combined output of Germany and Great Britain. The United States produced over 14 1-2 million tons in 1905, but this was exceeded in 1882 by our maximum output of over 18 million tons. Preliminary figures for 1906 show a total production for the United States of 50 million tons (7 million more than the previous year), 26 million for Germany (3 million increase), and about 15 1-2 million for Great Britain. The world's production of pig iron for 1905 was about 53 1-2 million tons, the United States accounting for nearly 23 million, Germany nearly 11 million, and Great Britain nearly 20 million. The three countries combined account for four-fifths of the world's output. The figures at present available for 1906 show an increase of over 500,000 tons for Great Britain, nearly 1 1-2 million for Germany, and over 2 1-4 million for the United States. These figures are higher than any previously recorded, and show the output for 1906 to be about 58 1-2 million tons. Most of this pig iron is utilized in the production of steel, the use of which has increased remarkably during recent years. The world's total steel production for 1905 was about 43 million tons. The figures for the United States, Germany and the United Kingdom for 1905 are respectively 20, 10 and 6 million (approximately) tons, and are not officially collected by the Governments of the various countries, but are based on returns of the asociations representative of the iron and steel industry. The preliminary figures for 1906 show the United States to have attained an output of 23 1-2 million tons, Germany 11 million, and Great Britain 6 1-2 million tons.

Prices of Building Material

PRESSED BRICK, Per M.

TORONTO PRESSED BRICK AND TERRA COTTA WORK

	F.O.B. Milton, Ont.
Red No. 1	$13 00
" 2	11 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 00
" Backing	7 00

Moulded and Ornamental from $2.00 to $5.00 per 100. Terra Cotta String Courses and Frieze, 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
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 Macadamized Roadways

Please write to head office, 34 Toronto St. Toronto, for catalogue and prices.

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 1¼ 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	$35.00 to $38.00	
Ash, black, 1sts and 2nds, 1 to 1¾ inch	33.00	35.00
Birch, M. R. 1 inch	21.00	22.00
" 1¾ inch to 2	23.00	24.00
Basswood, Common and better, 1 to 1¾ inch	25.00	26 00
Basswood, 1¾ to 2 inch	26.00	28.00
Elm, soft, mill run, 1 to 1¾ in.	23.00	24.00
Elm, rock, mill run, 1 to 1¾ in.	26.00	28.00
Maple, common and better, 1 to 1¾ 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 1¾ inch	44.00	46.00
Oak, quartered, 1sts and 2nds	70.00	80.00