

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured covers/  
Couverture de couleur
- Covers damaged/  
Couverture endommagée
- Covers restored and/or laminated/  
Couverture restaurée et/ou pelliculée
- Cover title missing/  
Le titre de couverture manque
- Coloured maps/  
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/  
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/  
Planches et/ou illustrations en couleur
- Bound with other material/  
Relié avec d'autres documents
- Tight binding may cause shadows or distortion along interior margin/  
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/  
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- Additional comments:/  
Commentaires supplémentaires:

- Coloured pages/  
Pages de couleur
- Pages damaged/  
Pages endommagées
- Pages restored and/or laminated/  
Pages restaurées et/ou pelliculées
- Pages discoloured, stained or foxed/  
Pages décolorées, tachetées ou piquées
- Pages detached/  
Pages détachées
- Showthrough/  
Transparence
- Quality of print varies/  
Qualité inégale de l'impression
- Continuous pagination/  
Pagination continue
- Includes index(es)/  
Comprend un (des) index
- Title on header taken from: /  
Le titre de l'en-tête provient:
- Title page of issue/  
Page de titre de la livraison
- Caption of issue/  
Titre de départ de la livraison
- Masthead/  
Générique (périodiques) de la livraison

This item is filmed at the reduction ratio checked below/  
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

# CANADIAN CONTRACT RECORD

A WEEKLY JOURNAL OF  
PUBLIC WORKS • TENDERS •  
ADVANCE INFORMATION •  
AND MUNICIPAL PROGRESS

EVERY THURSDAY

THIS PAPER REACHES EVERY WEEK THE TOWN AND CITY CLERKS, TOWN AND CITY ENGINEERS, COUNTY CLERKS AND COUNTY ENGINEERS THROUGHOUT CANADA.

Vol. 4.

NOVEMBER 23, 1893

No. 40

**THE CANADIAN CONTRACT RECORD,**  
PUBLISHED EVERY THURSDAY  
As an Intermediate Edition of the "Canadian Architect and Builder."

Subscription price of "Canadian Architect and Builder" (including "Canadian Contract Record"), \$2 per annum, payable in advance.

C. H. MORTIMER, Publisher,  
CONFEDERATION LIFE BUILDING, TORONTO.  
Telephone 2362.  
64 Temple Building - Montreal.  
Bell Telephone 2299.

Information solicited from any part of the Dominion regarding contracts open to tender.

ADVERTISING RATES ON APPLICATION.

At its Convention held in Toronto, Nov. 20 and 21, 1889, the Ontario Association of Architects signified its approval of the CANADIAN CONTRACT RECORD, and pledged its members to use this journal as their medium of communication with contractors with respect to advertisements for tenders.

The following resolution was unanimously adopted at the First Annual Meeting of the Province of Quebec Association of Architects, held in Montreal, Oct. 10th and 11th, 1890: "Moved by M. Perrault, seconded by A. F. Dunlop, that we the Architects of the Province of Quebec now assembled in Convention being satisfied that the CANADIAN CONTRACT RECORD affords us a direct communication with the Contractors, Resolved, that we pledge our support to it by using its columns when calling for Tenders."

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

## TO CONTRACTORS

Sealed Tenders, endorsed "New Parliament Buildings, Victoria, Contract No. 2," will be received by the Honourable Chief Commissioner of Lands and Works up to one o'clock p.m. of Thursday, 30th November, 1893, for the several trades required in the erection of New Parliament Buildings at James Bay, Victoria, B.C., viz.:-

1. The excavator, mason and bricklayer's work.
2. The carpenter and joiner's work.
3. The slater's and plasterer's work.
4. The copper-smith's work.
5. The smith and ironfounder's work.
6. The plumber's work.
7. The painter's work.

Tenders will be received for any one trade or for the whole work.  
The plans, details, &c., as prepared by F. M. Rattenbury, Architect, can be seen at the office of the undersigned on or after Monday, October 16th, 1893, and complete quantities clearly describing the whole of the work can be obtained on payment of \$50 for each trade. This sum will be returned to the contractors on receipt of a bona fide tender.

Each tender must be accompanied by an accepted bank cheque equal to two per cent. on the amount of each trade tendered for, which will be retained as part security for the due performance of the work. The cheque will be returned to unsuccessful competitors, but will be forfeited by any bidder who may decline to execute a contract if called upon to do so.

The lowest or any tender not necessarily accepted.  
W. S. GORE,  
Deputy Commissioner of Lands & Works,  
Lands and Works Department,  
Victoria, B. C., September 28th, 1893.

## TENDERS FOR AN

### ARC ELECTRIC LIGHT PLANT

Sealed tenders will be received at my office up to 6 o'clock on THURSDAY, NOVEMBER 30TH, for an ARC ELECTRIC LIGHT PLANT for the City of London, Canada, including boilers, engines, etc.

Plans and specifications may be seen at this office.  
A. ORMSBY GRAYDON,  
City Engineer.  
ALD. F. J. FITZGERALD,  
Chairman No. 3 Committee.

## TENDERS.

### TO CONTRACTORS.

Tenders will be received addressed to the undersigned, up to 5 p.m. on

Saturday, the 25th inst.,

for the Mason and Brick work, Carpenter work, and Structural Iron work, and up to 5 p.m. on

Wednesday, the 29th inst.,

for the Painting and Glazing, Plastering, Roofing, Galvanized Iron and Plumbing required in the entire remodelling of the store and premises, No. 214 Yonge Street, for MESSRS GUINANE BROS. Plans and specifications may be seen on the premises, to give Contractors an opportunity of examining the old building.

F. H. HERBERT, Architect,  
24 Toronto Arcade.



## Notice to Contractors

Tenders will be received by registered post, addressed to the City Engineer, Toronto, up to 11 o'clock a.m. on SATURDAY, DECEMBER 9TH, 1893, for the following:

### A FIVE-FOOT STEEL PIPE

for the Extension of the Yonge Street Sewer.

Tenders will also be received in the same manner, and on the above date, for the necessary Piling and Laying of the Said Pipe.

Plans and specifications may be seen and forms of tender obtained on and after Saturday December 2nd, 1893, at the office of the City Engineer. A deposit in the form of a marked cheque, payable to the order of the City Treasurer, for the sum of 5 per cent. on the value of the work tendered for under \$1,000, and 2 1/2 per cent. on the value of the work tendered for over that amount, must accompany each and every tender, otherwise it will not be entertained.

All tenders must bear the bona fide signatures of the contractor and his sureties (see specifications) or they will be ruled out as informal. The committee do not bind themselves to accept the lowest or any tender.

DANIEL LAMB,  
Chairman Committee on Works,  
Committee Room, Toronto, Nov. 22, 1893.

## CONTRACTS OPEN.

MAGOG, QUE.—The Town Council has decided to purchase a chemical engine.

COATICOOK, QUE.—The Medical Health officer has condemned the water supply.

WINNIPEG, MAN.—The St. Andrew's Society is considering the erection of a new hall.

SIMCOE, ONT.—N. C. Ford, Town Clerk, invites proposals until the 4th of December, for the purchase of \$9,200 worth of debentures.

CLINTON, ONT.—The Clinton Organ Co., whose building was burned down some weeks ago, will probably rebuild their works at Elora, Ont.

VICTORIA, B. C.—It is reported here that an electric tramway to the Alberni mines will be built on China Creek and a smelter erected at its terminus.

THREE RIVERS, QUE.—The factory of L. P. Trotter, Axe Manufacturing Company, destroyed by fire a few weeks ago, will be reconstructed on a larger scale.

AYLMER, QUE.—The Town Council has passed a by-law for the construction of a waterworks and sewerage system, which will shortly be submitted to the ratepayers.

NEW WESTMINSTER, B. C.—It is stated that the governing council of the Columbia Methodist College will next summer erect the first portion of the buildings of the institution, at a cost of \$12,000.

NIAGARA FALLS, ONT.—Application will be made to Parliament by the Niagara Falls Electrical Railway Bridge Company to build a bridge across the Niagara river, between the Falls and the whirlpool, and to operate thereon an electric railway.

CAUGHNAWAGA, QUE.—The village Council has petitioned the Dominion Government to provide a system of fire protection. A regular system of waterworks is not practicable, and it is proposed to use fire engines to be supplied from the river and from wells sunk throughout the village.

ST. THOMAS, ONT.—Mr. Jas. A. Bell, C. E., has received instructions from the Council of the County of Elgin to prepare plans for rebuilding the Port Stanley bridge. The new structure will have two spans of about 110 feet each, built of iron or steel, with 16 ft. roadway. The contract will be awarded before the first of the new year.

STRAITFORD, ONT.—David G. Baxter, architect, is preparing plans for the following work: Double residence on Cambria street for De La Framier Bros., photographers, to be built of pressed brick, with metallic lathing, Adamant plaster, steel-clad baths, Daisy hot water heaters and Safford radiators, cost \$8,000; large bank barn, 90 ft. x 250 ft., with all iron stable accessories, etc., for Mr. John Baxter, at St. Pauls, Ont., to be of brick and stone, cost, \$4,000, cloistered pass-

ageway between St. James church and its school-room, and for alterations in interior of school room, cost \$1,200; alterations in South Abbey, this city, cost \$2,000.

LONDON, ONT.—The Grand Trunk Railway Company will erect at once a \$2,000 addition to their offices here.—At the last meeting of the Water Commissioners it was decided that new steam pumps and another main line were necessary. The cost of a cast iron pipe line is estimated at \$78,000.—Mr. John Taylor, Queen's avenue, will erect a brick cottage on Piccadilly street. Estimated cost \$1,000.

MONTREAL, QUE.—It is the intention of the Consumers' Gas Company next year to erect a gasometer at Cote St. Paul with a capacity of one million feet.—The Road Committee has given notice that a sewer will be constructed on Mount Royal ave., from St. Hubert street to Maple street.—Mr. St. George, City Surveyor, recently had an interview with the C. P. R. officials in regard to the building of a bridge over the C. P. R. tracks at the entrance of the Brock street tunnel.—The Canadian Pacific Railway Company has not yet decided on the final location of the route of the Montreal and Ottawa railway. The matter will be discussed at the next meeting of directors, and the location finally decided upon.—The St. Jean Baptiste Electric Light Company propose erecting shortly a new power station adjoining their present works at the corner of Rachel and Mountain streets.—The Bell Telephone Company contemplate the erection of an addition to their factory on Aqueduct street at an early date.

HAMILTON, ONT.—The Board of Works has decided to recommend to Council that tenders be called for the supply of lumber for 1894, to be sent in before the 29th of January.—The old Post-office building on James street will be sold to the three city associations, the Wentworth Historical Society, the Hamilton Association, and the Canadian Club. Plans for the necessary alterations are now being prepared.—The foundations of the proposed smelting works will be constructed this winter.—The proposed new incline railway at Wentworth street is likely to become an accomplished fact, the company having applied for incorporation. The estimated cost is placed at under \$25,000. Mr. J. W. Lake, has left for New York to get designs for new machinery.—Building permits have been granted as follows: Robert Gordon, pair two-story brick dwellings on Hess street, between George and Main streets, cost \$5,200, also for alterations to two houses, to cost \$1,000; B. C. Arnett, two-story brick dwelling on Main street, between Wentworth street and Sanford avenue, cost \$1,500; George Gobborn, two two-story brick dwellings on Catharine street, between Picton and Ferris streets, cost \$1,800; S. Sheek, two-story brick dwelling, corner Aberdeen and Fairmount avenue, cost \$1,500; Wm. Powell, two two-story brick dwellings on Jackson st.,

between Bay and Pearl streets, cost \$2,000.

**TORONTO, ONT.**—Mr. F. H. Herbert, architect, 24 Toronto Arcade, will receive tenders until 5 p. m. on Saturday, the 25th inst., for the mason and brickwork, carpenter work and structural iron work required in remodelling Messrs. Guinane Bros. shoe store, 214 Yonge street. Plans may be seen at the store.—The Lorne Park Company report that several persons are negotiating for the purchase of lots at the Park on which to erect summer cottages next season.—A permanent sidewalk will be constructed on Carlton street, from Yonge street to Seaton street.—The Sheppard Publishing Company have purchased property at No. 22 and 24 Adelaide street west as a site on which to erect their proposed building.—At a meeting of the York County Council held last week the Engineer recommended that immediate steps be taken to erect a new bridge at Woodbridge. The cost is estimated at \$3,000.—Tenders are wanted at No. 193 Church street, until Saturday, the 25th inst., for remodelling two houses on Shuter street.—The City Engineer has been instructed to prepare complete plans of all the work proposed to be done on the water front, and submit the same to the Property Committee.—At a meeting of the Public Library Board held last week, it was decided to ask for tenders for fittings for the art-room and two rooms on the first floor, the cost to be in the neighborhood of \$850.—Building permits have been granted as follows: John Stark, det. 2 story and attic bk. residence, n. w. cor. Park Rd. and Woodland ave., Rosedale, cost \$8,500; Reinhardt & Co., 2 story bk. and stone office and boiler room, Mark st., cost \$3,000; Widmer Hawke, 2 story bk. stable, rear s. w. cor. Wilton ave., and Jarvis st., cost \$2,000.

**OTTAWA, ONT.**—At the last meeting of the Board of Works, the City Engineer presented his report on the proposed trunk sewer. The total length of the sewer is estimated at over six miles, to be built of brick. From Concession st. to the Rideau Canal, it will be three feet six inches deep, by two feet four inches wide. After crossing the canal these dimensions will be increased to four feet six inches by three feet. The total number of brick necessary is estimated at \$4,000,000 from Concession street eastward. The total cost of the trunk sewer through the entire district including \$4,000 which is recommended for the enlargement of the present main sewer and a new iron discharge pipe with piers is estimated at \$360,750. To meet this expenditure it is proposed to issue debentures if the by-law for the sewer is adopted by the ratepayers at the January election.—Plans have been prepared by Mr. G. F. Stalker, architect, for a concert hall and assembly room, to be erected on Wellington street. Tenders will be called for shortly.—A company with a capital stock of \$95,000 is applying for incorporation to build a new opera house in this city. The promoters of the company are Messrs. Thos. Askwith, John B. Brouse, Wm. Johnstone, Wm. Stewart, Andrew Mills, R. P. Harris, T. F. Nellis, S. J. Davis, Henry Burgess and Henry C. Monk. Their solicitors are Messrs. Nellis and Monk. Options have been secured on several properties, and work will be commenced in the spring.—Mr. F. J. Alexander, architect, has the following work in hand, to be executed next spring: summer cottage at Lake Temiscamingue, Que., for Mr. M. Brown, of Philadelphia, U. S. A., cost, \$3,000; two detached villa residences for Sanford Fleming, C. E., C. M. G., to be built on Daly avenue, this city; two semi-detached residences for Mr. W. Burland, to be erected on Slater street.—E. F. E. Koy, Secretary Department of Public Works invites tenders until Thursday, the 30th inst. for the construction of a hot water heating apparatus in the public building at West Farnham, Que.

Stamp & Frank, painters, of Hamilton, have assigned to W. Anderson.

**FIRES.**

Two residences at Moncton, N. B., owned by G. H. Barnes, of Sussex, and Daniel White, were destroyed by fire a few days ago.—A saw mill at Ethel, Ont., owned by Wm. Milne was burned on the 18th inst. Insurance on building and machinery \$1,800.—The Dominion hotel at Campbellford, Ont., owned by Mr. Mahoney, and occupied by Messrs. White & Dewey, was damaged by fire last week to the extent of \$1,000.—The Carvelli residence, at the corner of Waterloo and Cliff streets, St. John, N. B., was burned on the 16th inst. Loss, \$45,000, insurance \$10,000.—Humphrey & Trites' large saw mill at Petitcodiac, N. B., was destroyed by fire recently. Loss, \$15,000, covered by insurance.—The Christian Brothers' school on Sussex street, Ottawa, a fine cut stone structure, was destroyed by fire on Thursday of last week. Loss \$50,000; insurance \$11,000.—A business block on Rideau street, owned by Sheriff Sweetland, was damaged to the extent of \$2,500 on the same date.—The store and dwelling of Mr. Jos. Tully at Springville, Ont., were destroyed by fire on Monday last.

**CONTRACTS AWARDED.**

**OTTAWA, ONT.**—G. M. Bayly, architect, has awarded contracts as follows for a residence for Mr. Jos. Foster, to be erected on Concession street: John Robertson, masonry and brickwork; Thos. Shore, carpentry; Thos. Cleary, plastering; plumbing and painting not let.

**ANCHORING BOLTS IN STONE.**

To a paper read before the Washburn Mechanical Engineering Society of Worcester, Mass., by Mr. E. F. Miner, we are indebted for the following facts regarding the holding power of anchor bolts in stone:

The tests were made on a Fairbanks testing machine in the mechanical laboratory of the Worcester Polytechnic Institute, for the purpose of determining the strength of the fastening of a cast-iron journal plate to a stone column. The materials tested were babbit metal, lead and sulphur.

It was necessary that the bolts should not enter the stone over 6 inches and that they should be capable of easy removal without injuring the stone. For the purpose of the test a tap bolt was prepared, 1 3/4 inches in diameter, 9 inches long, with a thread 6 3/4 inches long. The thread was V shape 1/2 inch pitch, cut nearly sharp on top, and about three-sixteenths of an inch wide at the root, thus leaving a wide space between threads to allow the setting to fill easily about the screw. In all the tests, with one exception, the bolt was set in stone 6 inches; in the test with lead pipe, 6 1/2 inches. The stones were prepared in 10 inch cubes, faced on three adjacent sides and were of dark Bradford granite from Stoney Creek, Conn. The holes in the stones were as nearly as possible two inches in diameter, 6 1/2 inches deep, and in three of the tests tapered, so that at the bottom the diameter was 2 1/2 inches.

The loads were applied slowly, and measurements for extension made at each 500 pounds increment. At every additional 5,000 pounds the setting was allowed to remain five minutes with the load applied. Measurements for extension were taken by calipering the distance between the iron clamp straps.

**TEST NO. 1**—Babbit metal setting, an inferior grade of metal, quite hard and brittle. Up to 10,000 pounds there was an extension of 3-128ths of an inch, due to the babbit metal and stone coming to a firm bearing. After remaining five minutes under the load of 10,000 pounds no change was apparent. Between 10,000 and 15,000 pounds there was no extension, but after the five-minute period at 15,000 pounds the bolt had drawn out 1 inch. At 16,000 pounds the stone split. It had previously been used with a lead setting, and no doubt been weakened thereby.

**TEST NO. 2**—Lead setting, lead melted and poured in about the bolt. Hole in the stone tapered. Up to 2,500 pounds there was an extension of 1 inch. From

2,500 to 5,000 pounds there was no change; but after standing five minutes under 5,000 pounds the bolt had drawn out 1-64th of an inch. Above 6,000 pounds and up to 13,000 pounds, at each additional load of 1,000 pounds there was an extension of 1-128th of an inch, after which measurements were not taken. At 13,000 pounds, power from the engine was applied and an attempt made to pull out the bolt; the tension ran up to 33,000 pounds, when the lead gave way rapidly and the load fell off.

**TEST NO. 3**—Lead pipe setting in a straight hole. The internal diameter of the pipe was 1 1/2 inches and the external two inches. The pipe was made to fit nicely in the stone, the last inch in length being driven. The bolt was then screwed into the pipe and made to cut its own way, thus forming a thread in the pipe 1/2 inch deep and forcing the lead out into all the irregularities in the sides of the hole. Up to 4,000 pounds there was an extension of 1-32nd of an inch, but between that and 10,500 pounds there was no change. Between 10,500 and 13,000 pounds there was an extension of 1-128th of an inch. Above this latter point each additional load produced its proportional amount of extension. In applying the power from the engine the tension rose to 25,000 pounds, and then fell rapidly from that point.

**TEST NO. 4**—Sulphur setting, in tapered hole. Up to 10,000 pounds there was no perceptible change in the bolt or setting. Above this point the extension became a measureable quantity, but at a load of 19,000 pounds it had become only 3-64ths of an inch. Beyond this no measurements were taken. At a load of 31,125 pounds the stone split. It was thought that at this point the sulphur setting showed signs of movement, though it is difficult to say anything definite. The fragments of sulphur from the broken stone showed no signs of crushing.

**TEST NO. 5**—Sulphur setting in a straight hole. Up to 20,000 pounds there was no measureable movement in either bolt or setting; at the end of the five minute period at 20,000 pounds there was an inch but beyond this there was no further accumulated extension of 1-128th of an extension through the remainder of the experiment. At 29,000 pounds the pressure of the iron clamps cracked off a corner of the stone and the load dropped 1,000 pounds; otherwise nothing was affected; at a load of 31,515 pounds, one of the iron straps holding the stone broke and ended the experiment.

The tests with sulphur were the most satisfactory in every way, and that was the material selected for use. In the experiments with lead and babbit metal, there was a very perceptible movement under a slight load or until the metal and stone had come to a firm bearing. This would seem to be due to the contraction of the metal on cooling. In both experiments with lead the failure was between the lead and the stone.

**BUSINESS NOTES.**

Mr. J. Courtney, plumber, Queen street east, Toronto, has assigned to W. A. Campbell.

A statement of the affairs of John Sims & Co., plumbers, 145 Church st., Toronto, showed the liabilities to be \$10,827 and the assets, \$26,452. It is likely that a settlement will be effected at 30 cents on the dollar.

The following items are reported in the *Legal and Commercial Exchange*: E. Lacasse & Co., plumbers, St. Henri, Que., have dissolved partnership.—Fortin & Son, sash and door factory, Vancouver, B. C., have sold out.—Wencelas Brunet has registered to carry on business as plumbers in Montreal, under the style of Hetu & Brunet.—Rochon, & Frere, contractors, Montreal, are offering to compromise at 35 cents on the dollar.—Gillard & Rufus, builders, and John C. Reid, painter, of St. John, Nfld., are applying for insolvency declaration.—Andrews & Stevenson, contractors, Glencoe, Ont., have dissolved partnership, Mr. James Stevenson, continuing the business.

**MUNICIPAL DEPARTMENT.**

**THE MANUFACTURE AND USE OF PAVING BRICK.\***

The generic term brick includes within its meaning classes of material of such wide variations in their particular qualities as to need a more definite classification when considering the adaptability of such classes to particular purposes.

So when we consider a certain class of this material for street paving it must not be confused with other classes manufactured for other purposes and perhaps entirely unfit for this particular use. These manifold qualities of brick are due partially to methods of manufacture, but more largely to greatly diversified qualities of the clay from which the brick are made.

Clays may be classed as to their origin and occurrence as follows:—Residual clays result from the disintegration of rocks in place. The soluble and binding materials are leached out and washed away and leave the insoluble materials in a more or less divided form, as clay. This takes its character from the character of the rock from which it is derived, modified by the action of water. Some of the purest clays are derived in this way from feldspathic rocks from which the alkalis have been leached, leaving a clay closely resembling kaolin (pure clay). Other less pure clays are derived from the disintegration of limestone, sandstone, &c. In each case, however, soluble constituents are almost entirely gone, leaving the insoluble silicates, quartz grains, alumina and ferric oxide. 2. Drift clays are the result of the mechanical action of the ice during the glacial period, by which the various formations were ground up and mechanically transported and redeposited largely without the aid of water. These clays represent the character of the mother rock much more accurately than those of class 1. as in this case the soluble matter is largely retained and not leached out, except by the action of the water, since their deposition. 3. Alluvial clays reworked and redeposited by fluvial agencies.

4. Indurated clays, or argillaceous rocks and shales, are formations resulting from the disintegration of the earlier rocks by various influences and their re-formation into new strata. They have usually been subjected to great pressure from the superincumbent rocks, to which pressure they owe their physical character to a large extent.

Of the deposits of clay above named the clays from the carboniferous period are most widely utilized for the manufacture of paving brick. At Columbus, O., the Devonian shales or the product of their disintegration, is utilized, while at Syracuse the Salina shale is found available. Some few drift clays are also successfully used for the manufacture of a fair quality of paving brick, notably at Decatur, Jacksonville, and Urbana, in Illinois. A mixture of drift clay and carboniferous clay is utilized at Brazil, Ind., for the manufacture of paving brick. The accompanying map shows the distribution of the carboniferous deposits east of the Rocky Mountains and also the outline of the drift area. It also shows the location of the principal paving brick factories and the principal cities which are now using this material for paving within the territory shown.

As may be judged from its wide occurrence and manifold compositions, clay varies widely in its extreme characters, but all material to be classed as clays must have certain constituents in common. The essential ingredient is a hydrous silicate of alumina, known as kaolin, which, according to Professor G. H. Cook, is composed of

Silica .....	46.3
Alumina .....	39.8
Water .....	13.9

This may be considered a pure clay, and is rarely, if ever, found in nature. To this is commonly added in varying quantities, silica, lime, magnesia, ferric oxide, polish and soda. The presence of these substances, which may be regarded as the impurities of clay, and the physical conditions under which they exist, caused the wide variation of the clays themselves, and to a great extent in the manufactured product made therefrom.

Pure alumina will resist the highest temperature of the blast furnace, in which crystalline quartz (silica) will be only slightly affected, both being practically infusible. Alumina shrinks, warps and cracks greatly in drying, but gives plasticity and adhesiveness to the clay and strength to the product. Silica prevents cracking and distorting, the more silica being present the less shrinkage. But the more silica the less plasticity and adhesiveness of the clay and the less strength and greater brittleness. Lime and magnesia, while infusible in themselves or with alumina, fuse in the presence of an excess of silica, as do also several other common ingredients of clay, and form a "vitrified brick."

It is found that potash has the most active fluxing effect on clay, after which follow soda, lime, magnesia and iron in the order named. To "vitrify" a clay should contain at least 3 per cent. potash, 3 1/2 per cent. of soda, 27 1/2 per cent. of lime or magnesia, or 8 per cent. of iron, or a combined proportion of any of all these fluxes equal to these amounts. An appreciable less amount of these fluxing elements will leave all the product more of the nature of a firebrick, unvitrified and porous

\* From a paper by Mr. D. W. Mead, read before the International Engineering Congress at Chicago Exhibition.

**MUNICIPAL ENGINEERS, CONTRACTORS, AND MATERIALS.**

and as a rule unfit for paving purposes. A greater portion than above specified is desirable, and will make the clay more easily vitrified at a less heat, and is to some extent a measure of its economic manufacture, as a lower heat and consequently less fuel will be required in its burning. Too great amount of these fluxes, amounting perhaps to three times the quantities above mentioned, will render the clay hard to handle on account of great fusibility. According to Richter, lime and magnesia are more active fluxing agents than potash and soda. The presence of lime or magnesia in a paving brick in reasonable quantities is not believed by the writer to be detrimental to the brick if it exists in a finely divided state and is intimately commingled with the other constituents so that a silica of lime or magnesia will be formed in the burning.

(To be Continued.)

**DEBENTURES WANTED.**

Municipalities issuing debentures, no matter for what purpose, will find a ready purchaser by applying to **G. A. STIMSON, 9 Toronto Street, Toronto.** N.B.—Money to loan at lowest rates on first mortgage.

Established 1841.

**THOROLD CEMENT**

MANUFACTURED BY

ESTATE OF JOHN BATTLE,  
Thorold, Ontario.

GRAND TRUNK RAILWAY CO. OF CANADA.  
CHIEF ENGINEER'S OFFICE,  
HAMILTON, ONT., Oct. 17, 1893.

REPRESENTATIVES OF THE  
ESTATE OF JOHN BATTLE,  
THOROLD, ONT.

Gentlemen: In reply to yours of September 19th last as to the cement manufactured at the John Battle Works, Thorold, Ontario, we have been using it on this Division of the Grand Trunk Railway for many years, and have found it to be of good quality.

Yours truly,

JOSEPH HOBSON,  
Chief Engineer.

**WILLIS CHIPMAN, B.A.Sc.,**

M. Can. Soc. C.E.; M. Am. Soc. C.E.;  
M. Am. W. W. Ass'n.  
**CIVIL AND SANITARY ENGINEER**  
Water Works - Sewerage  
Sewage Disposal  
103 HAY STREET TORONTO.

**J. McDougall, C. E.,**  
ENGINEER COUNTY OF YORK,  
Consulting Engineer for Municipal Work.

Electric Railways and Bridges.  
COURT HOUSE, TORONTO.

**JOHN GALT**

C. E. AND M. E., M. CAN. SOC. C. E.,  
Consulting Engineer.

20 Years' Practical Experience in England, United States and Canada in Civil, Sanitary, Hydraulic, and Mechanical Engineering.

SPECIALTIES:  
WATERWORKS, SEWERAGE, ELECTRIC RAILWAYS.

Office, Rooms 99 and 100,  
CANADA LIFE BUILDING, TORONTO.

**Fire Bricks and Cement**

DRAIN AND WATER PIPES  
SANITARY EARTHENWARE  
LONDON PORTLAND CEMENT  
GUARANTEED GENUINE.

Paving and Scoria Bricks for Stables,  
Sidewalks, Yards, etc.

Large quantities on hand and to arrive. We handle only the best quality. Prices lower than ever.

**F. HYDE & CO.**

31 Wellington Street, MONTREAL,  
Sole Agents for

THE "GRAHTRYX" SMOKE TEST AND  
DISINFECTING MACHINE.

**PORTLAND CEMENT**

BEST AND CHEAPEST IN TORONTO.

JOSSON, PETERS and BURHAM Brands for highest class work.  
WHITE HORSE, R. W., IMPERIAL, &c., FROM \$2.00 PER BARREL.

Nichols, Smythe & Co., - 25 George St., Toronto.  
CEMENT CONTRACTORS TO THE CITY OF TORONTO.  
Telephone 1948 or call and see us.

**CANADA PIPE AND FOUNDRY CO. . . .**

MANUFACTURERS OF

. . . . Cast Iron Pipes and Special Castings

Works: MONTREAL AND ST. HENRI, QUE.  
CORRESPONDENCE SOLICITED.

**THE STANDARD DRAIN PIPE CO.**

OF ST. JOHNS, P. Q., (LIM.)



Manufacturers of

Salt-Glazed,  
Vitrified  
**SEWER  
PIPES**

Double Strength  
Railway Culvert Pipes,  
Inverts, Vents,

AND ALL KINDS OF FIRE CLAY GOODS.

**STEVENS & BURNS**

London, Ont.

To Municipal Corporations and Contractors:

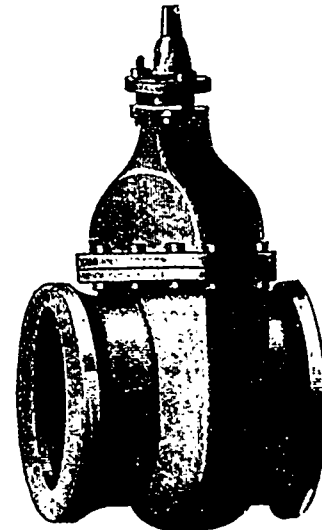
. . . WE MANUFACTURE . . .

**Hydrants, Valves, Valve Boxes**

and Water Works Supplies generally,

INCLUDING

Tools for tapping mains under pressure  
and Service Brass Work of all descriptions.



**THE ENGLE CREMATING CLOSET**

A SUBSTITUTE FOR PRIVY VAULTS  
AND CESS POOLS.

A PERFECT SANITARY TRIUMPH,

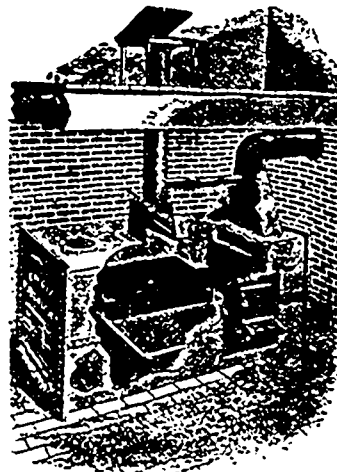
Applicable to the uses of schools, colleges, hospitals, factories, asylums and dwellings.

This closet is invaluable where sewer and water privileges are not obtainable, possessing all the convenience of the modern water closet.

Manufactured and erected in sizes suitable to any number of persons, by

**TORONTO FURNACE & CREMATORY CO., LTD.**

8 & 10 Queen St. East, TORONTO.



WRITE FOR CATALOGUE CONTAINING FULLEST INFORMATION AND EXPLANATION.

**THE G. & J. BROWN MFG. CO.**

Railway and Contractors' Plant.

**BRIDGE BUILDERS**

BELLEVILLE, ONT.

**Drummond McCall Pipe Foundry Company,**

MONTREAL

MANUFACTURERS OF

**CAST IRON WATER AND GAS PIPES**

WORKS: LACHINE, QUE.

PRICES ON APPLICATION.

**Ontario Water Meter Co., Ltd.**

MANUFACTURERS OF

**WATER METERS**

Meter Supports, Dial Extensions, Fixture Locks, Water Curt Registers, Strainers, Coupling Seals and Reservoir Indicators.

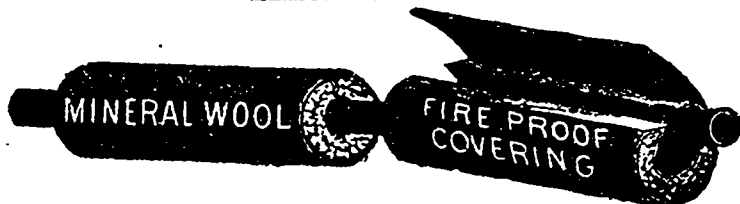
Send for Price Lists and Testimonials. Our meters are adopted and in use in over 500 cities and towns in Canada and the United States. Highly endorsed by leading Engineers. A guarantee for five years given with all Meters. All information furnished on application to

A. C. WINTON, Secretary-Treas.

Office: No. 23 Toronto Street, Toronto, Ont.

MUNICIPAL OFFICIALS should see to it that in the erection of town and city PUBLIC BUILDINGS, the installation of water works plant, etc., the advantages of . . .

**MINERAL WOOL**



are made use of for deadening sound in floors and partitions, insulation of heat and cold, fireproofing, etc., also SECTIONAL MINERAL WOOL COVERING for steam pipes, boilers, exposed water pipes, etc.

CANADIAN MINERAL WOOL CO., Limited, 122 Bay Street, Toronto.

Montreal Agent:

GEO. R. THOMPSON & CO.,

GEO. A. COWAN, Room 23, 204 St. James St.

Agents, Winnipeg, Man.



**CENTRAL BRIDGE AND - -  
- - ENGINEERING COMPANY,**  
(LIMITED)  
Peterborough, Ont.  
WM. H. LAW, Manager and Engineer.  
MANUFACTURER OF

**RAILWAY AND HIGHWAY BRIDGES**

Viaducts, Piers, Roofs, Turntables and  
Girders in Steel and Iron.  
Tension members forged without welds. Riveting  
done by hydraulic or compressed air machines.  
Specialties: Good workmanship and strict adherence  
to specifications and drawings.  
CAPACITY: 2,000 TONS PER ANNUM.

**ISAAC USHER & SON,**  
THOROLD, ONT.  
Manufacturers of

**QUEENSTON CEMENT**  
Proved by Government tests to be the best Cana-  
dian natural cement. Write for prices, &c.

OUR SALES OF  
**"BURHAM"**  
Portland  
Cement..

for the past 8 months have been  
**25,499 GASKS.**  
"Burham" Brand outranks all others.  
Try it and be convinced.

Sole Consignees for Canada:  
**MCRAE & CO., OTTAWA**

Prices of Building Materials.  
CONDITION OF THE MARKET.  
The demand for builders' supplies continues  
well. Few sales of any importance are being  
made of lumber, brick and sand, and no improve-  
ment is looked for until the opening of the spring  
trade. The fall trade in paints and oils is nearly  
over, and as a result the market is quiet. Glass  
is reported steady in Toronto and quiet in Mon-  
treal. A moderate but satisfactory demand is  
reported for plumbers' supplies and iron pipe.

**LUMBER.**  
CAR OR CARGO LOTS.

Toronto.		Montreal.	
\$	\$	\$	\$
1/2 to 3 clear picks, Am ins.	33.00@36.00	40.00@45.00	
1/2 to 3 upper, Am ins.	37.00	40.00 45.00	
1/2 to 3, pickings, Am ins.	26.00	27.00 30.00	
3 inch clear		52.50 60.00	
1 x 10 and 12 dressing and better.	20.00 23.00	18.00 20.00	
1 x 10 and 12 mill run.	16.00 17.00	10.00	
1 x 10 and 12 dressing.	20.00 22.00	18.00	
1 x 10 and 12 common.	13.00 14.00	8.00 10.00	
1 x 10 and 12 spruce culls.	10.00 11.00	10.00 11.00	
1 x 10 and 12 culls.	9.00	10.00	
1 inch clear and picks.	28.00	30.00 35.00	
1 inch dressing and better.	20.00	18.00 20.00	
1 inch siding, mill run.	14.00	15.00 14.00 16.00	
1 inch siding, common.	12.00	13.00 12.00 14.00	
1 inch siding, ship culls.	11.00	12.00 10.00 11.00	
1 inch siding, mill culls.	9.00	10.00 9.00	
Cull scantling.	8.00	9.00 8.00 9.00	
1/2 and thicker cutting up plank.	24.00	26.00 22.00 22.00	
1 inch strips, 4 in. to 8 in. mill run.	14.00	15.00 12.00 15.00	
1 inch flooring, common.	11.00	12.00 11.00 12.00	
1 1/2 inch flooring.	16.00	17.00 14.00 15.00	
1 1/2 inch flooring.	16.00	17.00 14.00 16.00	
XXX shingles, sawn, per M.			
16 in.	2.50	2.60 50 2.70	
XX shingles, sawn.	1.50	1.60 1.60 1.70	
Lath.	2.40		
<b>WARD QUOTATIONS.</b>			
Mill cull boards and scantling Shipping cull boards, prom- iscuous widths.	10.00	13.00	13.00
Shipping cull boards, stocks Hemlock scantling and joist up to 16 ft.	11.00	12.00	10.00
Hemlock scantling and joist up to 18 ft.	12.00	13.00	12.00 13.00
Hemlock scantling and joist up to 20 ft.	13.00	14.00	13.00 14.00
Scantling and joist, up to 16 ft.	14.00	14.00	
" " " 18 ft.	15.00	15.00	
" " " 20 ft.	16.00	16.00	
" " " 22 ft.	17.00	17.00	
" " " 24 ft.	19.00	19.00	
" " " 26 ft.	20.00	21.00	
" " " 28 ft.	22.00	23.00	
" " " 30 ft.	24.00	25.00	
" " " 32 ft.	27.00	27.00	
" " " 34 ft.	29.50	29.50	
" " " 36 ft.	31.00	31.00	
" " " 38 ft.	33.00	33.00	
" " " 40 ft.	34.00	36.00	

Toronto.		Montreal.	
Cutting up planks, 1 1/2 and thicker, dry.	25.00 28.00	25.00 26.00	
Cutting up planks, 1 1/2 and thicker, board.	18.00 24.00	18.00 22.00	
Cedar for block paving, per cord.	5.00	5.00	
Cedar for Kerbing, 4 x 14, per M.	14.00	14.00	
1 1/2 in. flooring, dressed, F.M.	26.00 30.00	28.00 31.00	
1 1/2 inch flooring, rough, B.M.	18.00 22.00	18.00 22.00	
1 1/2 " " dressed, F.M.	28.00 30.00	27.00 30.00	
1 1/2 " " dressed, B.M.	18.00 19.00	18.00 19.00	
1 1/2 " " dressed.	18.00 20.00	18.00 22.00	
1 1/2 " " dressed.	12.00 15.00	12.00 15.00	
Headed sheeting, dressed.	20.00 25.00	22.00 25.00	
Clapboarding, dressed.	12.00	12.00	
XXX sawn shingles, per M			
18 in.	2.60 2.70	3.00	
Sawnlath.	2.50 2.60	2.50 2.60	
Cedar.	2.90	2.90	
Red oak.	30.00 40.00	30.00 40.00	
White.	37.00 45.00	35.00 45.00	
Basswood, No. 1 and 2.	30.00 30.00	28.00 20.00	
Cherry, No. 1 and 2.	70.00 90.00	70.00 80.00	
White ash, No. 1 and 2.	24.00 35.00	30.00 35.00	
Black ash, No. 1 and 2.	20.00 30.00	18.00 30.00	
Dressing stocks.	16.00 22.00	16.00 22.00	
Picks, American inspection.	30.00	40.00	
Three uppers, Am. inspection.	50.00	50.00	
<b>BRICK—M</b>			
Common Walling.	7.50	6.00	
Good Facing.	9.00	8.50	
Sewer.	8.50 9.00	8.50 9.00	
<b>Pressed Brick, Per M:</b>			
Plain brick, f. o. l. at Milton	16.00		
" " 2nd quality	14.00		
" " 3rd	8.00		
Hard Building.	4.50		
Moulded and Ornamental, per 100.	3.00 10.00		
Roof Tiles.	24.00		
Diamond locking tile.	16.00		
First quality, f. o. b. at Camp- bellville.	18.00	25.00	
2nd quality, f. o. b.	14.00	20.00	
3rd	11.00	17.00	
Ornamental, per 100.	3.00 10.00	3.00 10.00	
Tiles.	24.00	26.00	
Plain brick, "A" f. o. b. Don Valley	18.00	25.00	
" " "B"	16.00	22.00	
" " "C"	13.00	18.00	
Trojan or Buff.	24.00	30.00	
Ornamental, per 100.	3.00 60.00	3.00 60.00	
Plain brick, f. o. b. Port Credit	18.00		
" " 2nd quality	13.00		
" " 3rd	10.00		
Hard Building.	8.00		
Ornamental, per 100.	3.00 10.00		
<b>SAND.</b>			
Per Load of 1 1/2 Cubic Yards	1.25	1.25	
<b>STONE.</b>			
Common Rubble, per toise, delivered.	14.00	14.00	
Large flat Rubble, per toise, delivered.	18.00	18.00	
Foundation Blocks, per c. ft.	50	50	
Kent Freestone Quarries Moncton, N. B., per cu ft., f. o. b.	1.00		
River John, N. S., brown Freestone, per cu. ft., f. o. b.	95		
Ballochmyle	80	65 75	
New York Blue Stone.		1.05	
Granite (Stanstead) Ashlar, 6 in. to 12 in., rise 9 in., per ft.		25	
Moat Freestone.	70	80	
Thomson's Gateawbridge, cu. ft.	75	80	
Credit Valley Rubble, per toise, delivered.	13.00 14.00		
Credit Valley Brown Cours- ing, per superficial yard.	2.50 3.00	2.90	
Credit Valley Brown Dimen- sion, per cubic foot.	90	90	
Credit Valley Grey Coursing, per superficial yard.	1.50 2.00	2.15	
Credit Valley Grey Dimen- sion, per cubic foot.	75	8	
Madoc Rubble, delivered, per toise.	14.00 14.50	14.00 14.50	
Madoc dimension floating, f. o. b. Toronto, per cubic ft.	70	52	
Ohio Freestone, No. 1 Blue Promiscuous, f. o. b.	60		
No. 1 Blue Dimension.	65		
No. 1 Buff Promiscuous.	80		
No. 1 Buff Dimension.	85		
The above prices means freight and duty paid.			
2 in. sawed flaging per sq. ft.	11		
2 1/2 " " " "	13 1/2		
3 " " " "	16 1/2		
4 " " " "	22		
5 " " " "	27 1/2		
6 " " " "	33		
Duty to be added to these prices.			
Quebec and Vermont rough granite for building pur- poses, per c. ft. f. o. b. quarry	33 1.50		
For ornamental work, cu. ft.	35 2.00		
Granite paving blocks, 8 in. to 12 in. x 6 in. x 4 1/2 in., per M	50.00		
Granite curbing stone, 6 in. x 20 in., per lineal foot.	70		
<b>SLATE.</b>			
Roofing (8 square).			
" red.	16.00	20.00	
" purple.	9.00	10.00	
" unslating green	8.50	6.00	
" black	8.00	7.50	
Terra Cotta Tile, per sq.	22.00		
Ornamental Black Slate Roof- ing.	8.00		
<b>PAINTS. (Per gal.)</b>			
White lead, Can., per 100 lbs.	6.25 6.50	6.00 6.25	
" zinc, Can., "	6.50 7.50	7.50 8.00	
Red lead, Eng., per 100 lbs.	5 1/2	6 1/2	
" venetian, per 100 lbs.	1.60	1.75	
" vermilion.	90	90 1.00	
" Indian, Eng.	10	12 10 12	
Yellow ochre.	5	10 4 6.	
Yellow chrome.	15	20 15 20	
Green chrome.	7	12 7 12	
" Paris.	25	40 20 20	

Toronto.		Montreal.	
Black lamp.	25 25	12 25	
Blue, ultramarine.	15 10	12 18	
Oil, linseed, raw, Imp. Gal.	65 63	63 65	
" " boiled	68 71	66 68	
" " refined.	78 85	75 75	
Putty.	2 1/2 2 1/2	2 1/2 2 1/2	
Whiting, dry, per 100 lbs.	75 1.00	60 75	
Paris white, Eng., dry.	90 1.25	90 1.10	
Litharge, Am.	6 1/2 8	6 1/2 8	
Sienna, burnt.	15 20	12 15	
Umber.	8 1/2 12	12 15	
<b>CEMENT, IRON, etc.</b>			
Cement, Portland, per blu.	2.50	2.10 2.25	
" English	2.75	2.10 2.25	
" Belgium	3.25	2.95 2.02	
" Rotterdam.	1.50		
" Queenston.	2.25		
" Napanee.	1.50		
" Hull.	1.50		
" Genar.		2.65 2.85	
" London		2.45 2.90	
" Newcastle		2.35 2.50	
" Belgian		2.30 2.40	
" Canadian		2.25 2.30	
" Roman		2.75	
" Paris		4.50 4.75	
" Superfine		6.50 7.00	
Keene's Coarse "Whites"		4.50 4.75	
Calced plaster, per barrel.		1.55 1.70	
Fire Bricks, Newcastle, per M		16.50 21.00	
Scottish		24.00 30.00	
Lime, Per Barrel, Grey.	40		
" White.	55		
Plaster, Calced, N. B.	2.00		
" " N. S.	3.00		
Hair, Plasterer's, per bag.	80	1.00	
<b>HARDWARE.</b>			
Cut nails, 5d & 6d, per keg	2.40	2.25	
Steel " "	2.50	2.35	
<b>CUT NAILS, FENCE AND CUT SPIKES.</b>			
40d, hot cut, per 20 lbs.	5	5	
30d, " "	10	10	
20d, 16d and 12d, hot cut, per 100 lbs.	15	15	
10d, hot cut, per 100 lbs.	20	20	
8d, 9d, " "	25	25	
6d, 7d, " "	40	40	
4d to 5d, " "	60	60	
3d, " "	1.00	1.00	
2d, " "	1.50	1.50	
4d to 5d cold cut, not polished or blued, per 100 lbs.	50	50	

Toronto.		Montreal.	
3d to 4d cold cut, not polished or blued, per 100 lbs.	90	90	
<b>PINK BLUED NAILS.</b>			
3d, per 100 lbs.	2.50	2.50	
2d, " "	2.00	2.00	
<b>CASING AND BOX, PLOORING, SHOOK AND TOBACCO BOX NAILS.</b>			
12d to 30d, per 100 lbs.	50	50	
10d, " "	60	60	
8d and 9d, " "	75	75	
6d and 7d, " "	90	90	
4d to 5d, " "	1.10	1.10	
3d, " "	1.50	1.50	
<b>FINISHING NAILS.</b>			
3 1/2 to 2 1/2 inch, per 100 lbs.	85	85	
2 to 2 1/2 " " "	1.00	1.00	
1 1/2 to 1 1/4 " " "	1.15	1.15	
1 1/4 to 1 1/2 " " "	1.35	1.35	
1 1/2 " " "	1.75	1.75	
1 " " "	2.25	2.25	
<b>SLATING NAILS.</b>			
5d, per 100 lbs.	85	85	
4d, " "	85	85	
3d, " "	1.25	1.25	
2d, " "	1.75	1.75	
<b>COMMON BARREL NAILS.</b>			
1 inch, per 100 lbs.	1.50	1.50	
3/4 " " "	1.75	1.75	
3/8 " " "	2.25	2.25	
<b>CLINCH NAILS.</b>			
1/2 and 3/4 inch, per 100 lbs.	85	85	
3/4 and 1 " " "	1.00	1.00	
1 " " "	1.15	1.15	
1 1/4 and 1 1/2 " " "	1.35	1.35	
1 1/2 " " "	2.00	2.00	
1 3/4 " " "	2.50	2.50	
<b>SHARP AND FLAT PRESSED NAILS.</b>			
3 1/2 inch, per 100 lbs.	1.35	1.35	
2 1/2 and 2 1/4 " " "	1.50	1.50	
2 and 2 1/4 " " "	1.65	1.65	
1 1/2 and 1 1/4 " " "	1.85	1.85	
1 1/4 " " "	2.50	2.50	
1 " " "			