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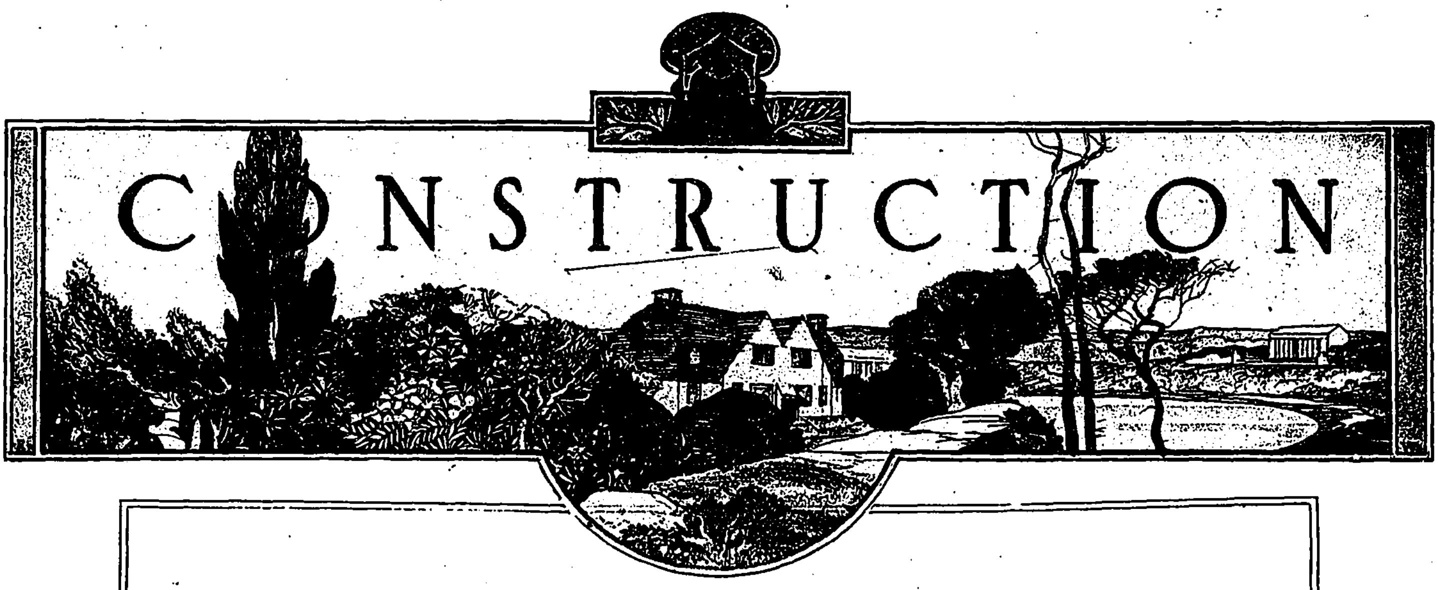

January, 1920 Volume XIII., No. 1

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Frontispiece

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GRAPHIC ARTS BLDG., TORONTO, CANADA

BRANCH OFFICES

MONTREAL NEW YORK

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THE HUNTER BUILDING.

NEW GOVERNMENT OFFICES, OTTAWA, ONT.

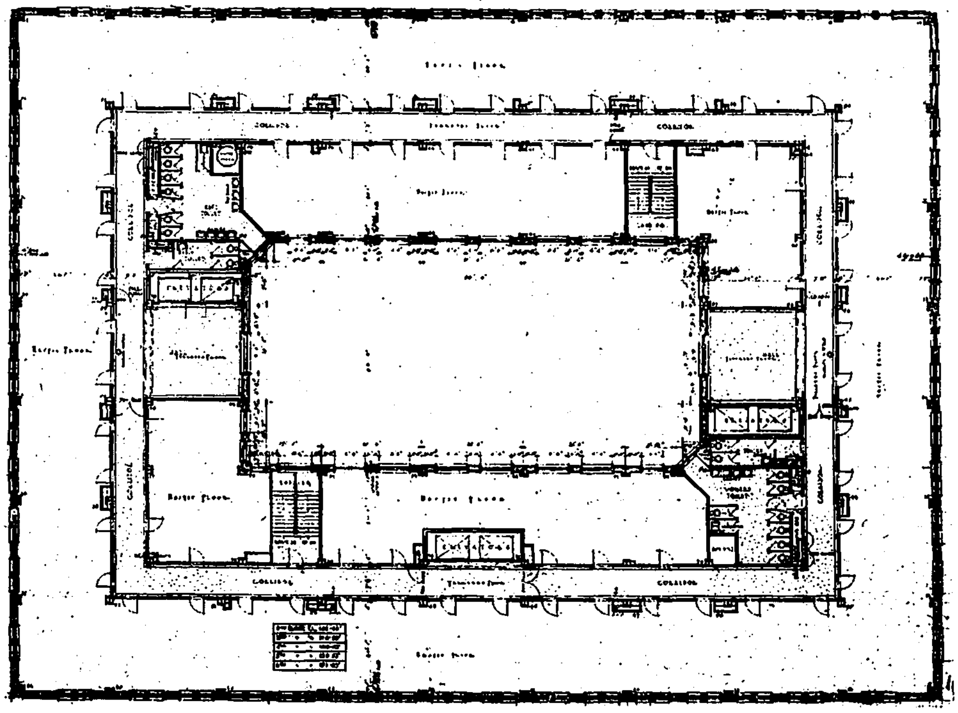
New Government Offices, Ottawa, Ont.

THE new Hunter Building just completed at Ottawa, centralizes under one roof various departmental staffs which have been heretofore scattered throughout the city, and thus ensure the more speedy and convenient transaction of Government business. Owing to the urgent need for accommodations for this purpose, and the fact that its erection was undertaken during the war period, the Government on strictly economical grounds deemed it inadvisable at the time to consider a building of a more monumental type. For the same reason the completed structure was also considered as an isolated unit, and does not conform to the official plan of Ottawa which was prepared jointly for the city and the Government at a cost of $70,000.

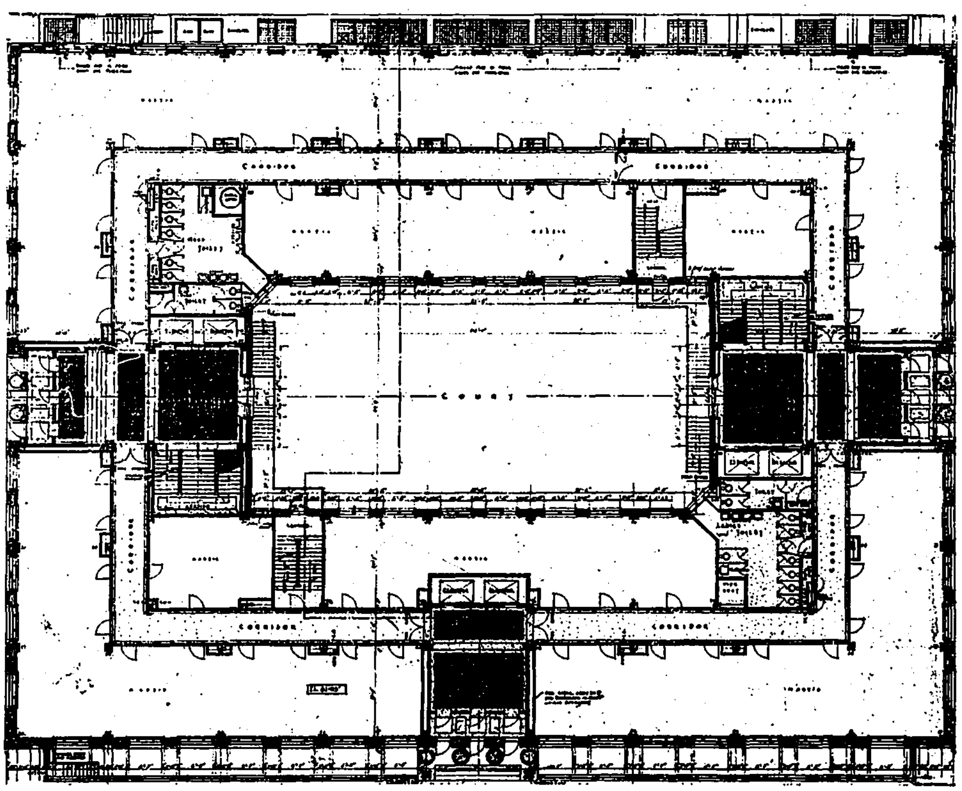
The building has therefore been designed and planned along the commercial lines of a modern office building and so constructed as to most economically meet the requirements for which it is intended. The frame work is of skeleton steel construction encased in concrete and carried on steel columns from the foundation rock. The floor system is of reinforced concrete with mastic finish and the partitions throughout are of gypsum blocks. Granite is used to approximately the ground floor level, with two stories of limestone above, the remaining stories being a light tapestry brick with stone trimmings and backed by twelve-inch hollow tile.

Entrance to the building is obtained from O'Connor, Queen and Albert streets, through vestibules to the elevator halls, from which corridors on the several floors give access to the various offices. The main entrance halls on the ground floor have marble dadoes and marble mosaic floors, all other halls and corridors having terrazzo floors with a seven-foot cement dado finished with white vitrolite enamel.

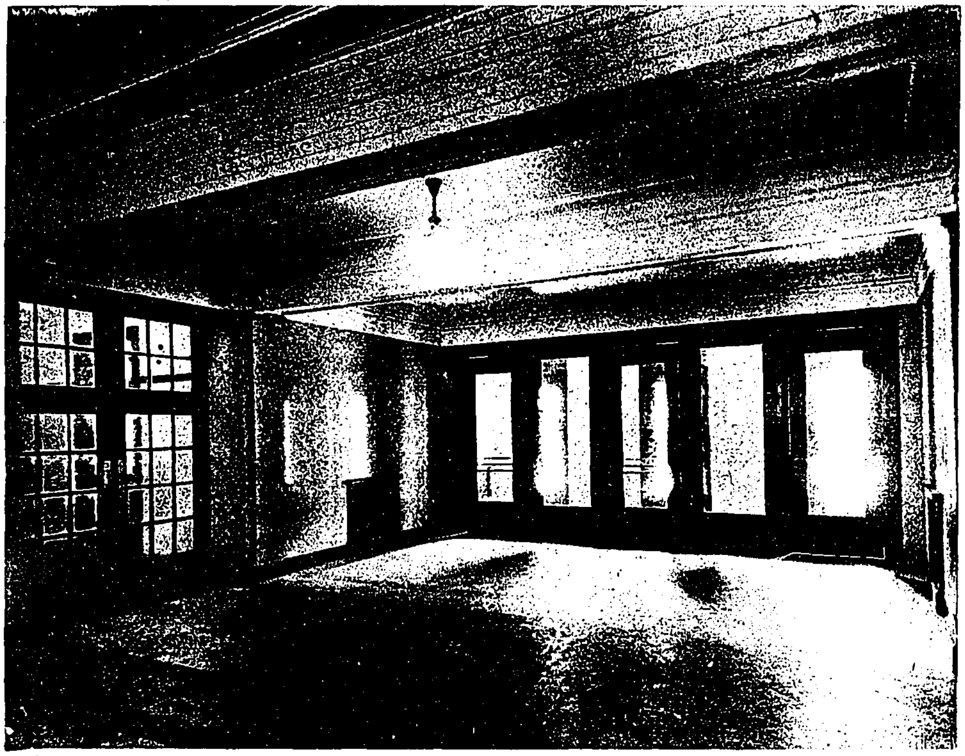
There are three batteries of elevators of two cars each, one battery at each of the three entrances, which ensure speedy distribution to all



TYPICAL FLOOR PLAN.



GROUND FLOOR PLAN



MAIN ENTRANCE HALL, HUNTER BUILDING, OTTAWA, ONT.

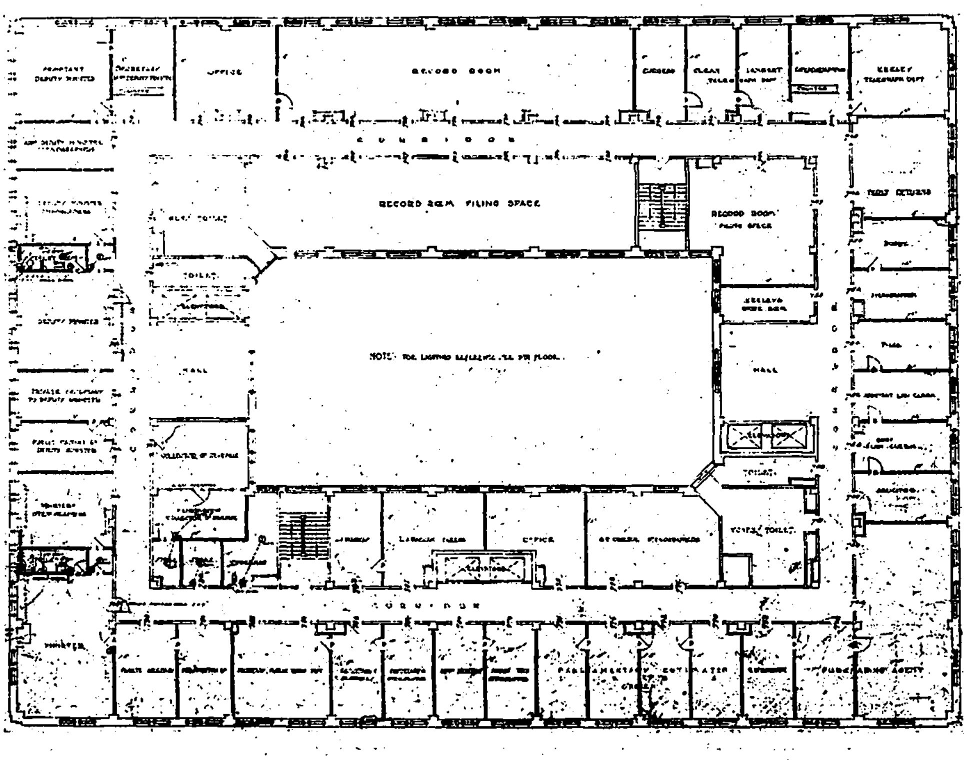
offices throughout. Ample provision has also been made for fire escape stairs inside the building, running from the basement to the roof; also for two stand pipes with hose attachment on each floor. The general equipment, including the various staff lavatories, is modern and sanitary in character, and a vacuum cleaning system is installed for cleaning the offices, corridors and halls. Steam is employed to heat the structure, a vacuum steam-heating plant being utilized for this purpose. The ventilation is accomplished by two large plenum fans, air washers, etc., placed in the basement with a system of fresh air to the corridors throughout.

The building was designed by the Chief Architect's staff of the Department of Public Works, Ottawa. It is nine stories above the sidewalk level, and cost approximately a million and a half dollars.

Educational Block
Kingston, Ont.

A perspective drawing, detail and plans are also shown in this issue of the new educational block now in course of erection at the Royal Military College, Kingston, Ont., which will provide accommodation for three hundred cadets. This building will consist of a large central portion with tower containing main entrance hall with marble staircase leading to upper floors and marble staircase leading to upper floors and basement. The east and west extensions provide class-rooms, lecture rooms and administration offices. The northern annex contains a large assembly room with galleries and machinery hall in the basement for applied science.

At present there is only being erected the central portion (without the tower), the west wing and the assembly room annex.



SEVENTH FLOOR PLAN, HUNTER BUILDING, OTTAWA, ONT.

The drawings and specifications were also prepared by the Chief Architect's staff of the Public Works Department, Ottawa, and the construction is being supervised locally by a representative of this staff. The contractors are Pigott and Healy.

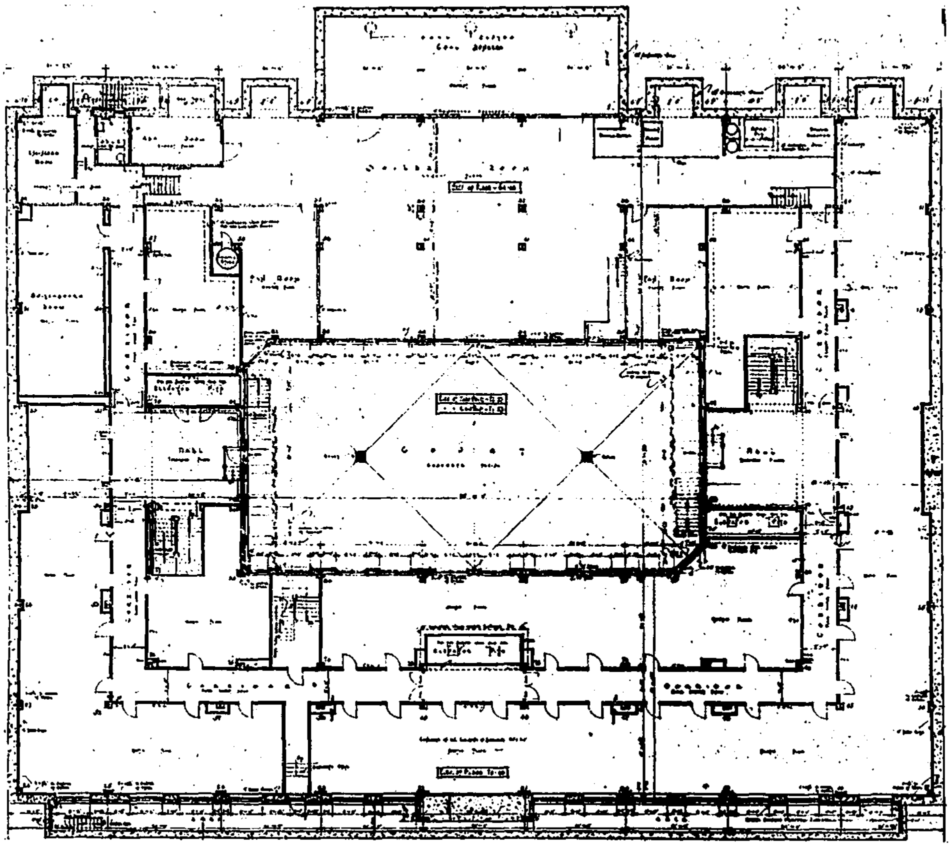
The building is fireproof throughout, the outer walls being constructed of limestone and floors of reinforced concrete, the roof of steel covered with concrete and asbestos slates. The halls, corridors, wash-rooms, etc., are finished in terrazzo with marble borders.

Mechanical ventilation

of the most up-to-date method is provided, and the building is lighted throughout by electricity and heated by steam, the direct and indirect method being adopted owing to the exposed position of the building.

The assembly hall and all halls and corridors are finished in quartered oak, and a large and commodious stage is provided in the assembly hall together with all required exits, etc.

Owing to the high cost of materials and labor, everything has been considered with a view to economy as far as possible without loss of efficiency, or the fact that the building is the central feature of the most important Dominion Government Educational Institution in Canada.



BASEMENT PLAN, HUNTER BUILDING, OTTAWA, ONT.

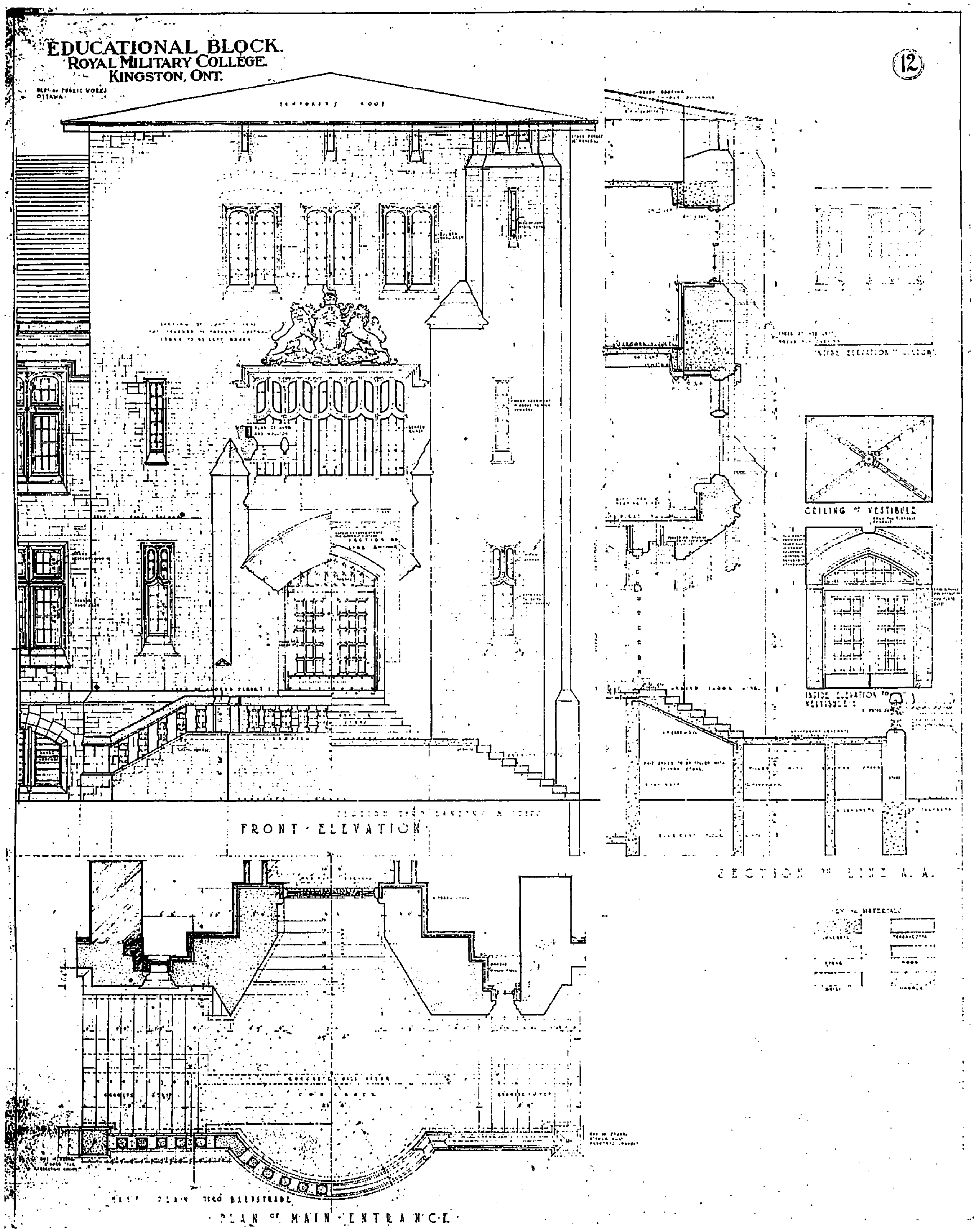
Rustless Steel

The "Scientific American," in describing a new kind of rustless steel, states that the new metal, with a bright surface and able to resist the corroding effect of air, water and acids without staining, was discovered just prior to the outbreak of the war, and was immediately commandeered by the British Government for use in airplane construction and for purposes where strength and durability, combined with rust-resisting qualities, were invaluable.

The steel is a Sheffield invention, and was chanced upon largely by accident. A local metallurgist, Mr. Harry Brearly, author of numerous standard works, was experimenting in the armament shop to find a means of preventing erosion in gun tubes. After some of his experiments he noticed that certain pieces of chrome steel had not not suffered from corrosive influences under conditions which would have rusted ordinary steel. He followed up this clue, and what is known as stainless steel was eventually worked out and added to Sheffield's metallurgical triumphs.

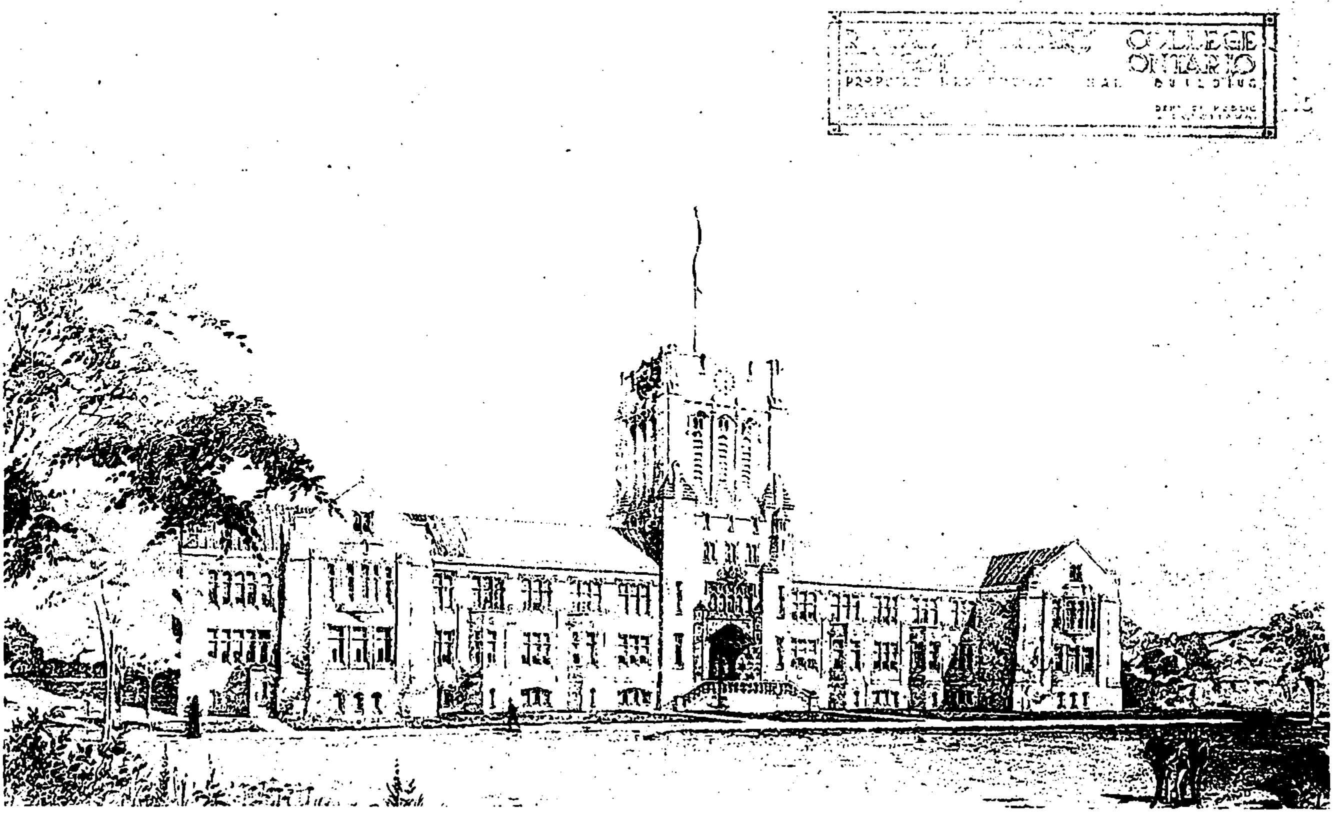
A by-law for a new bridge to be erected over the Grand River has been carried by the ratepayers of Brantford, Ont. The structure will cost $211,000.

CORRIDOR AND ELEVATORS, HUNTER BUILDING, OTTAWA, ONT.

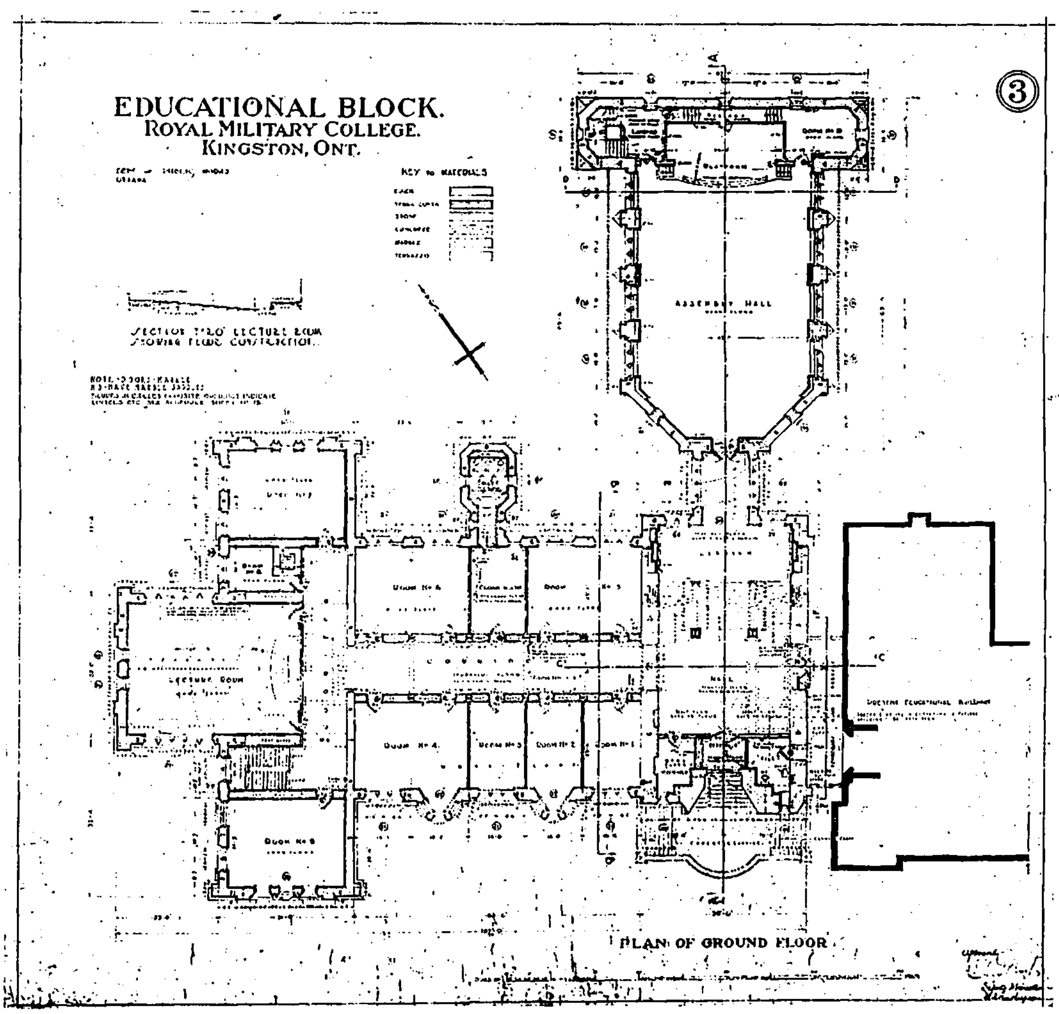


DETAIL OF MAIN ENTRANCE.

NEW EDUCATIONAL BLOCK, ROYAL MILITARY COLLEGE, KINGSTON, ONT.



PERSPECTIVE VIEW.
NEW EDUCATIONAL BLOCK, ROYAL MILITARY COLLEGE, KINGSTON, ONT.



GROUND FLOOR PLAN.

Foundation Work—Bank of Hamilton Building, Winnipeg

An engineering problem of interest in connection with the new Bank of Hamilton Building, Winnipeg, illustrated in our previous issue, was involved in the construction of the foundations which were carried through to rock by the Chicago well method. Under this ten-storey structure there are in all 28 piers, of which twelve are 5 ft. in diameter, and sixteen 4 ft. 6 in. in diameter. These are built of 1:2:4 concrete and reinforced with one-half inch spiral rods and 1 inch vertical rods. This reinforcing extends down from the top of the pier to a distance varying from 9 ft. to 11 ft. 6 in.

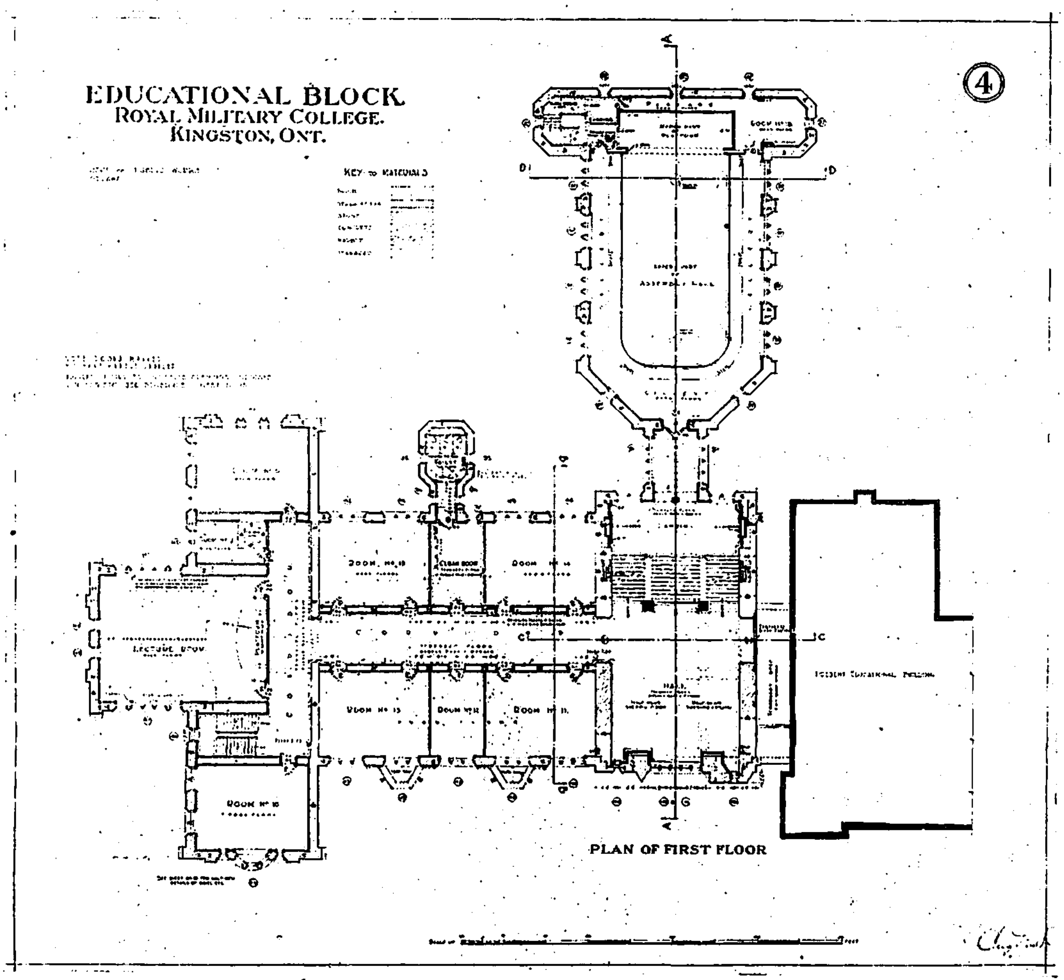
The average depth of the rock was 62 ft. below the sidewalk level. The upper portion of the excavation was through typical Winnipeg blue clay, and the last 10 ft. or 15 ft. was through hard pan. The rock was found to be fairly uniform in elevation, and with the exception of a few cases, was clean and solid, and it was not necessary to remove any of it.

All the piers were sunk before the old six-storey brick building was taken down. Tripods were set up on the floor of the main banking room, and openings were cut in the floor through which the excavation was handled. Two lines of tripods were set up at once, working alternate rows of piers, and alternate piers in each row. Two steam hoists in the streets operated continuously two endless cables, which drove the nigger heads over the welds. The line from the bucket in the well was snubbed around this constantly revolving nigger head, and the excavated material thus brought to the surface. It was dumped direct into wheelbarrows and was carried out on to a platform on McDermott Avenue, where it was dropped into wagons.

As the excavation proceeded, the wells were lagged with 2 in. x 6 in. rough lumber. This lagging was held in place by ¾ in. x 3 in. iron rings. When hard pan was reached, the lagging was stopped, as the remaining material stood up well without it. The hard pan was very difficult to dig. This material when wet is easy to handle, but the absence of water made the operation almost as expensive as rock excavation.

The concrete mixer was set up in the basement of the building, and the materials were conveyed to it by gravity from storage piles at the street level. The concrete was distributed by buggies and deposited in the wells through 10-in. pipes.

A day and a night shift were worked to-



FIRST FLOOR PLAN, NEW EDUCATIONAL BLOCK, ROYAL MILITARY COLLEGE, KINGSTON, ONT.

gether throughout. Each shift did 10 hours, and the record set up was very creditable. The excavation started on May 20th, 1916, and the 28 piers were sunk and the concrete poured by June 20th, 1916. This is an average of one pier excavated and concreted per day.

A 90 h.p. boiler was set up on the sidewalk in case water troubles should develop. However, no water was encountered except a small amount from the surface, and the pumps were never operated. On account of the Smoke By-Law, coke was used instead of soft coal for all boilers.

Now that Winnipeg has abandoned its many wells from which it formerly secured it supply of water, it will be interesting to see how the rising water level throughout the city will affect the clay upon which so many buildings depend for their support. As pointed out previously, the clay encountered in the work just described was very hard and very dry.

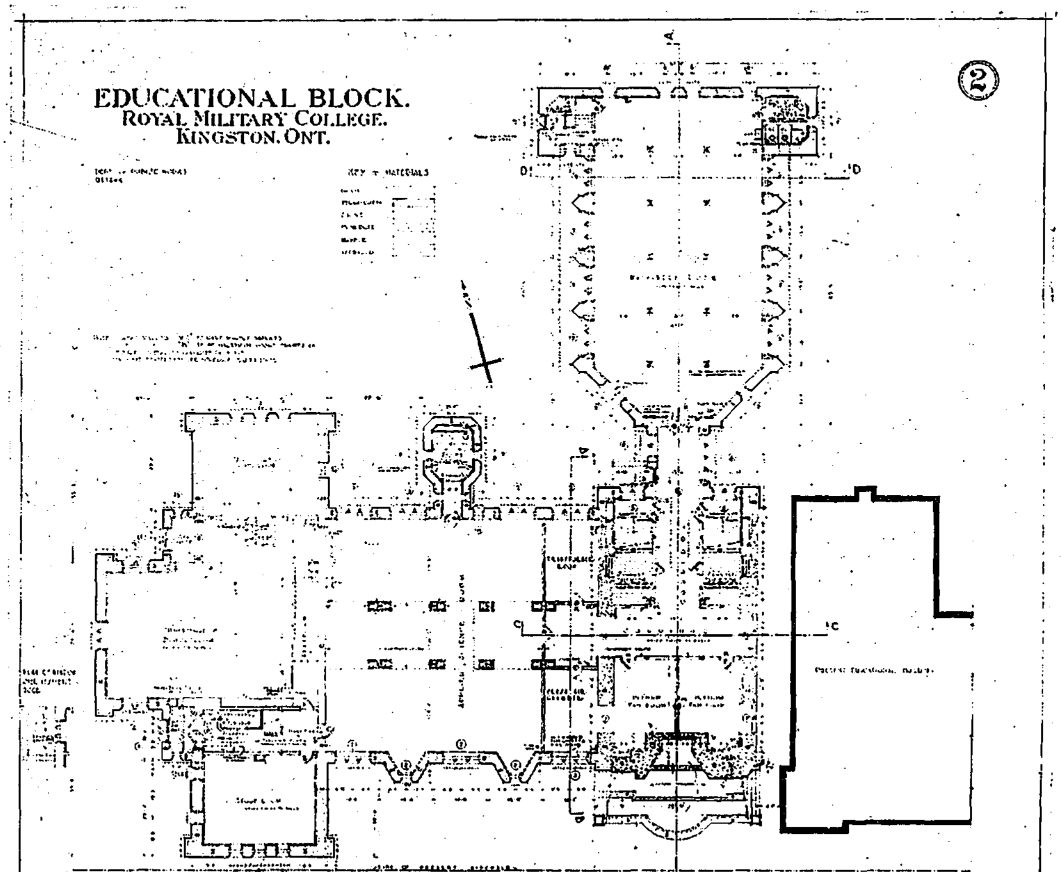
The foundation work was done by The Foundation Company, Limited, of Montreal and Vancouver, under the supervision of J. D. Atchison, Architect, of Winnipeg.

Housing Architect Appointed

The following personal item appeared in a recent issue of the American Architect:

"J. H. Appeldorn, formerly of York & Sawyer, and recently with the U. S. Shipping Board Emergency Fleet, Housing Corporation, has been appointed architect and general superintendent for the Modern Housing Corporation of Michigan and the Modern Dwelling Corporation, Ltd., of Canada, both subsidiary companies of the General Motors Corporation. He desires catalogues sent to his office, 435 Woodward Avenue, Detroit, Mich."

The Canadian company is at present carrying out an important housing project for the General Motors Corporation at Oshawa. A number of the houses have already been completed. They are said to be very creditable as to design and grouping, with considerable variety to plan and elevation, which will result in an attractive scheme when the project is fully developed.



BASEMENT PLAN, NEW EDUCATIONAL BLOCK, ROYAL MILITARY COLLEGE, KINGSTON, ONT.

At the annual meeting of the Toronto Builders' Exchange, the following were elected officers for the following year: President, C. Blake Jackson; Past President, A. D. Grant; First Vice-President, J. M. Scott; Second Vice-President, W. H. Painter; Treasurer, John Aldridge; Secretary, David J. Davidge. Directors, John V. Gray, T. L. Fraser, James Phinnemore, W. E. Dillon, J. Robert Page, Jas, Munro, Jas. McLeod.

Heating Problems Produced by Some of the Modern Methods of Building Construction

*By W. B. MacKay, A.M.E.I.C.**

THE early history of the modern sciences is more or less legendary and traditional, which leaves much to surmise. The primitive races in the valleys of the Tigris, Euphrates and the Nile, were many decades upon their way towards civilization, as we know it, before we began to learn anything of their history. This we know, however, that as the human family grew, it spread out and there are now branches of the original peoples in every quarter of the globe with remnants of their ancient mythology still observable. Sufficient for our purpose is the fact that we find human beings living under remarkable and severe conditions. The Eskimo in the far north, who is compelled to go without fire for months at a time, and the people of the Tropics who never see snow, and know nothing of frost. The ranges of temperature are from 60 below zero, to 120 degrees above—a full range of 180 degrees in the extremes.

The civilization of every country has been largely determined by the geographical conditions; the characteristics of the land and climate in which any race dwells, shape the mode of living and thus influence their intellectual culture.

It is said of Egypt that the climate is equable and of warm temperature, snow and frost being wholly unknown, while storm, fog and even rain are rare. This is true in a measure of the other valleys, so that while some protection against heat was necessary, there was no necessity to provide against inclement weather, hence the climate developed the qualities of their architecture.

The mention of the use of fire in their history is largely the sacrificial fires of their ancient philosophy. They recognized the part which the sun, the source of heat and light played, recognized it to this extent that it was a large part of their religion. The following extracts from a book on their ancient philosophies serves to show the veneration of that great luminary:

"The Syrian damsels sat weeping for an Adoni, mortally wounded by the tooth of winter." Adoni was the name of the mythical creature representing the sun. Indeed, the worship of the sun was the basis of all ancient religions. Almost every nation in the cradle of the human race had mythical being whose strength or weakness, virtues or defects more or less described in the sun's career through the seasons. To those ancient peoples light and heat were profound mysteries, as indeed they are to us. As the sun caused the day and his absence the night, when he journed north, spring and summer followed him, and when he journed south, autumn, inclement weather, cold and long dark nights ruled the earth. As his influence produced the leaves and flowers and ripened the harvest and brought the regular inundation, he necessarily became to them the most interesting object of the material universe, author of life, heat and ignition. The sun was to them the efficient cause of generation, for without him there was no movement, no existence, no form. He was the innate fire of bodies, the fire of nature. He was to them immense, indivisible, imperishable and everywhere present. It was the need of his light and heat and of his creative energy that was felt by all men and nothing was more fearful than his absence. The sun's influence, so beneficient, caused it to become identified with the principal of all that was good."

North to them was the place of death. The abode of winter and desolation, and naturally so because with such an easy means of livelihood as was provided by irrigation and the fertile land of the valleys mentioned, there was little incentive to explore beyond the unknown north. But as time marched on and with the development of the present day civilization, we find in the north temperate zone, the place once looked upon with fear and trembling by the simple-minded ancients, the greatest race on the face of the earth, the Anglo-Saxon, whose sons successfully fought the enemy under every sky and in every climate, in peace as well, we can proudly think of the achievements of Scott at the South Pole, Perry at the North, Livingstone and Stanley in the heart of Africa, and countless others, and more intimately to Civil Engineers, Colonel Everest, who, nearly a century ago began the wonderful trigonometrical survey of India. As mentioned before, our geographical location has had a great deal to do with the development of that wonderful and mysterious "power of resistance," in fact, the medical fraternity has coined the phrase very much as we more generally speak of "the Human factor."

Going over the history of architecture, practically nothing is mentioned about any system or systems of heating, except in isolated cases. Quite evident the earliest race adapted themselves by food and raiment to withstand the ex-

* Paper read before the St. John Professional Meeting of the Engineering Institute of Canada.

tremes of temperature; but there are instances such as the Roman Thermae or Baths of Rome, particular mention is made in a non-technical way to the system, the remains of which are founds in the Baths of Caracalla, here is found hot water and warm air heating, but note the difference from the methods employed to-day. The heated air was passed through a system of tile ducts under the floors, and did not enter directly into the room. The hot water was circulated around the rooms in open troughs covered with a bronze grating. These baths served the same purpose as our modern Turkish bath.

An extract from Architectural History on the Wonders of Roman Architecture regarding the use of Fountains, is quoted here. "Additional interest was given to the interior by the perpetual streams of running water issuing from the mouths of sculptured lions in marble or brightly polished silver falling into capacious marble basins and producing a delicious cooling effect in hot, sultry weather." The significence of this will be dealt with later.

It, however, remains to be said that the use of brassiers, burning charcoal was more generally the means of heating in cold weather. The remarks often made regarding raiment worn by these people refers only to that used while inside, when outside they clothed themselves with coarse heavy garments.

Referring to England in the 14th Century, mention is made of the open fire in the centre of the building in that part known as the "great hall," provision being made in the roof by louvers to carry off the smoke. Later on a greater increase of warmth was found necessary, as greater comfort was demanded, and the opening out of the coal industry, by cheapening fuel, led to each room having an open fire-place with chimneys, which later on became architectural features carefully treated. In the time of Elizabeth the great hall fire-place was richly carved with the coat of arms of the owner. For physicological effect, huge tapestries and draperies with their warm colors were hung about the walls, and, it is said, that in winter, straw or rushes were strewn over the floors of these great baronial halls.

It will be seen that the open fire has come down through all the ages and still plays a part even to this very day. Much sentiment is attached to this system of heating, the sole benefit of which is derived from the radiant heat of the fire.

Stoves made of cast iron on the principle of an open fire-place improved the effect by the addition of exposed heating surface, making the result obtained more economicall and less wasteful.

The advent of steam, and the progress made in the last few generations, have made their demands upon all branches of applied sciences. The demand for more effective and more efficient heating and also the necessity of more applicable methods at the same time minimizing the fire hazard, has brought about the development of the various systems we have to-day. Their modern application is very recent, with rapid growth on more or less unscientific lines. Briefly and generally we make use of the elements of air and water.

The sun is nature's heating plant and accomplished all the things the ancient attributed to it. Man's substitute was the open fire. Your own observations of the effects derived are easily recalled. In both cases it is the application of direct heat of a radiant kind, so intense at times as to blister and burn the parts of the body exposed to it, yet with only minor effect on the surrounding atmosphere.

The systems of heating now involved in engineering problems and applied to our modern buildings are of a vastly different character. We use circulations of water, the vapor of water and air with the application of some of the basic laws of physics.

Applying heat to a building in these days is not only to keep body and soul together and supply warmth and comfort, but is in reality the attempt to create ideal summer conditions in winter. In fact we might god still further . . . rob winter of its cold and summer of its heat. In other words, producing an equable climate, conducive of the best results of maximum attainment or production with the minimum of stress and fatigue.

Benefited by the experiences of the past we have to-day efficient and rather wonderfully contrived systems of heating, vastly improved.

Many conditions arise that require special treatment. The adopting of any one particular system to meet all conditions is hardly practicable, therefore a study of the exact conditions as they exist, or may come into existence, is the first step in the design of a heating plant. We have for choice heating by hot water, by steam, or by warm air.

Hot water heating is divided into several classes, ordinary open tank gravity circulation, accelerated circulation by putting a system under pressure, and forced circulation by means of circulating pumps. The first is usually applied to residences or small buildings, the second is merely an attempt to create a more rapid circulation and extend the effectiveness to include a greater area. Each have their field, principally where constant heating is required. The wide range of temperatures, available in the heating medium, make these systems flexible enough to meet all the usual winter conditions, and when the piping system is properly installed, give good results. Of course, with such a slight force exerted it is necessary to keep well within the limits laid down by the laws of gravity. Forced circulation combines all the advantages of the ordinary gravity system and at the same time overcomes all the restrictions of the same. It has many commendable features, particularly flexibility, as the water temperature may be varied over a wide degree and even the circulation increased or decreased slightly making it further adaptable. The arrangement of the piping may be anything that will accommodate itself to structural conditions: pipe sizes are small and the radiating surface need not be so generous as in the case of the gravity system. It is a system well adapted to certain kinds of central heating as the grades of the piping can follow the natural grade. All special apparatus required, in fact everything except piping and radiators can be located in one point, at all times under the observation of the man in charge. Where the waste heat of exhaust steam is available, as is generally the case, it is used to heat the water and the condensation is returned to the boiler feed pump, without having to first travel all through the heating system and radiators. It obviates the necessity in underground conduits of having drips and drip trays at low points and inaccessible places. But, like all other systems, has disadvantages and limitations, it must be kept in operation constantly in cold weather to prevent freezing up at the most exposed parts.

The proportinating of the piping system for forced circulation of hot water involves a rather nice, intricate problem in hydraulics, the difficulty experienced is increased by the lack of data on the friction of small piping, steam fittings, valves, etc., at low velocity, all of which must be considered in order that the circulation be adequately equal to and well balanced with centrifugal pumps designed for the exact head, so as to operate noiselessly and without vibration. The motive power is usually direct connected steam turbines with the exhaust steam passed into converters and used to heat the water, a separate live steam heater being provided as a make-up when the exhaust is not sufficient and as a stand-by.

There are instances where the boilers are used as hot water boilers and the water circulated by motor driven pumps. There are also cases where the jacket water from large gas engines is utilized.

Regarding steam plants, there are also classifications. The simple one-and-two pipe systems, supplied direct from low pressure boilers, or from high pressure lines through pressure reducing valves, or supplied direct from the exhaust side of an engine. The principal weakness of these one-and-two pipe systems is the tendency of air binding and short circuiting, frequently causing the condensation to be held in suspension, giving rise to the annoyances of water hammer.

With the gravity return system, where steam is taken direct from the boiler and the condensation returned back by gravity, the boilers must be set low enough to give clearance between the water line of the boilers and the lowest point of the mains, sufficient to provide against flooding the mains by the deferentials of pressure between the flow and return.

With systems supplied through pressure reducing valves, or from exhaust, the condensation is usually returned, for economy to a hot well or receiver, to be returned to the boilers as feed water.

As mentioned before, air-binding is the chief difficulty. Steam will go anywhere it is piped, without much urging if the air can be easily displaced.

The systems just mentioned are dependent upon automatic air valves to vent the air from each radiator and other parts of the system. The best of these valves are delicate in their parts and adjustment, the orifices in some cases being as small as a needle and are easily put out of commission by the accumulation of dirt or grit, either from inside or outside the system. Two pipe systems with hand operated valves on both flow and return, are easily upset. If some person happens to close either valve and forgets to close the corresponding valve, in some cases requiring a complete shut down to allow the water accumulated, and held back in the system to flow out. Aside from hammering and banging in the system, these vents are liable to sputter and spit water occasionally, or hiss steam, to the decided annoyance of the occupants of the room. These conditions have been slightly improved by the use of an air line system in which all venting valves were coupled to a system of small piping and connected to a vacuum pump or exhauster, of which there are numerous types.

The more improved and the latest development are two pipe vacuum and vapor systems, in which each radiator is equipped with a radiator trap at the return end of the radiator which passes condensation and air only, into the system of the return piping, and closes against the escape of steam. Similar traps of larger capacity are provided to relieve the mains of condensation at the extremities and at intermediate points where necessary.

The most successful radiator trap is the thermostatic disc type, which is actuated by the temperature of the steam. The disc contains a volatile fluid especially compounded to respond to wide ranges of temperature and is hermetically sealed. The disc is always deflated when cold, so the trap is always open, except to the passage of steam.

Both vacuum and vapor systems are almost identical in design. Where the magnitude of the plant demands, the condensation and air are pumped out of the system, creating a low vacuum, making it possible in the case of exhaust steam heating to do away with any back pressure. In either case they are essentially nonpressure systems, as invariably the piping is designed for a deferential working pressure of from 4 to 16 ounces pressure. These plants will safely carry or operate up to 10 lbs. pressure, or will work on 8 to 10 inches of vacuum, but no advantage is gained; with the increased pressure, a slightly higher temperature is available, but only slight. With the higher vacuum, unless everything is absolutely tight, the vacuum pump is required to do the extra work of pumping the infiltrated air out of the system. Vacuum systems may be extended to include almost any number of buildings requiring to be heated from the one source and is easily made adaptable to overcome any conditions or obstacles. Its general use is the outcome of experience gained, and offers possibly the greatest opportunities of effecting the highest economies. One distinct advantage with vacuum or vapor systems is the fact that when the plant is not in operation no possible harm can be done to either it or the building by freezing up.

The first cost of installation is also in its favor.

We now come to warm water heating, laying aside the ordinary domestic installation, there is found in very general use, hot blast systems, in which the heated air is circulated by blowers. Examples of these installations are found in machine shops, foundries, roundhouses and other establishments in which there are tremendous leakages of air by opening large doors. There are, however, examples of blower heating systems, which have been brought to a very high degree of refinement, in which the air is carefully conditioned, all dust and impurities removed and a stated degree of humidity and temperature maintained under automatic control. These systems are applied to schools, theatres, auditoriums, churches, art galleries, etc., of the more expensive kind, as well as certain factories for special process work.

It may be said that for certain classes of work and certain conditions requiring to be produced, blowing heating offers the greatest advantages. For instance, in the Ford plant, the heating was accomplished by locating the apparatus on the roof with the ducts run along, branching off and passing down through the centres of the columns, discharging air through small openings for each floor, thereby occupying practically none of the cubical contents or floor space of the building.

By the use of air washers it is not only possible to provide clean, pure, humidified air in winter time, but it is also possible to cool the air on hot summer days, making the plant effective both summer and winter. This is particularly true in textile fabric weaving plants, where the necessity of a proper atmosphere brought about the development of the modern air washing apparatus, which, scientifically applied to some of the principles used by the Romans in their fountains. In the air washer, cooling by evaporation is the chief principle.

Time does not permit any lengthy discussion of any particular application of these systems. They are, however, intensely interesting and worked out on rather unique lines. The application of these systems require skilled judgment of a mature and well-reasoned kind being used in order that the economy and the best results are obtained. Combinations of this with other systems are frequently used to obtain certain results.

Modern building construction has undergone many changes of which you are all familiar. The following are brief comparisons of heat losses from various materials commonly encountered:

An equal thickness as far as possible has been taken to more readily compare the relative heat losses expressed in B.T.U.'s per square foot per degree difference per hour.

THICKNESS AND CHARACTER OF WALLS.

	(Factor)
12 in. limestone, furred and plastered	.52
12 in. standstone or concrete, furred and plastered	.47
12 in. marble or granite, furred and plastered	.40
12 in. marble or granite-hollow, furred and plastered	.30
12 ni. ordinary brick wall, furred and plastered	.30
12 in. ordinary brick, plastered on the brick.	.29
12 in. ordinary brick, furred and plastered.	.24
12 in. hollow brick, furred and plastered	.22
Brick veneer, sheating, studs, lath and plaster	.17
Frame, sheating, paper, clapboard, no plaster	.27
Frame, sheating, paper, clapboard, lath and plaster	.24
Frame, sheating, paper, clapboard, lath and plaster—back plastered	.21

MISCELLANEOUS.

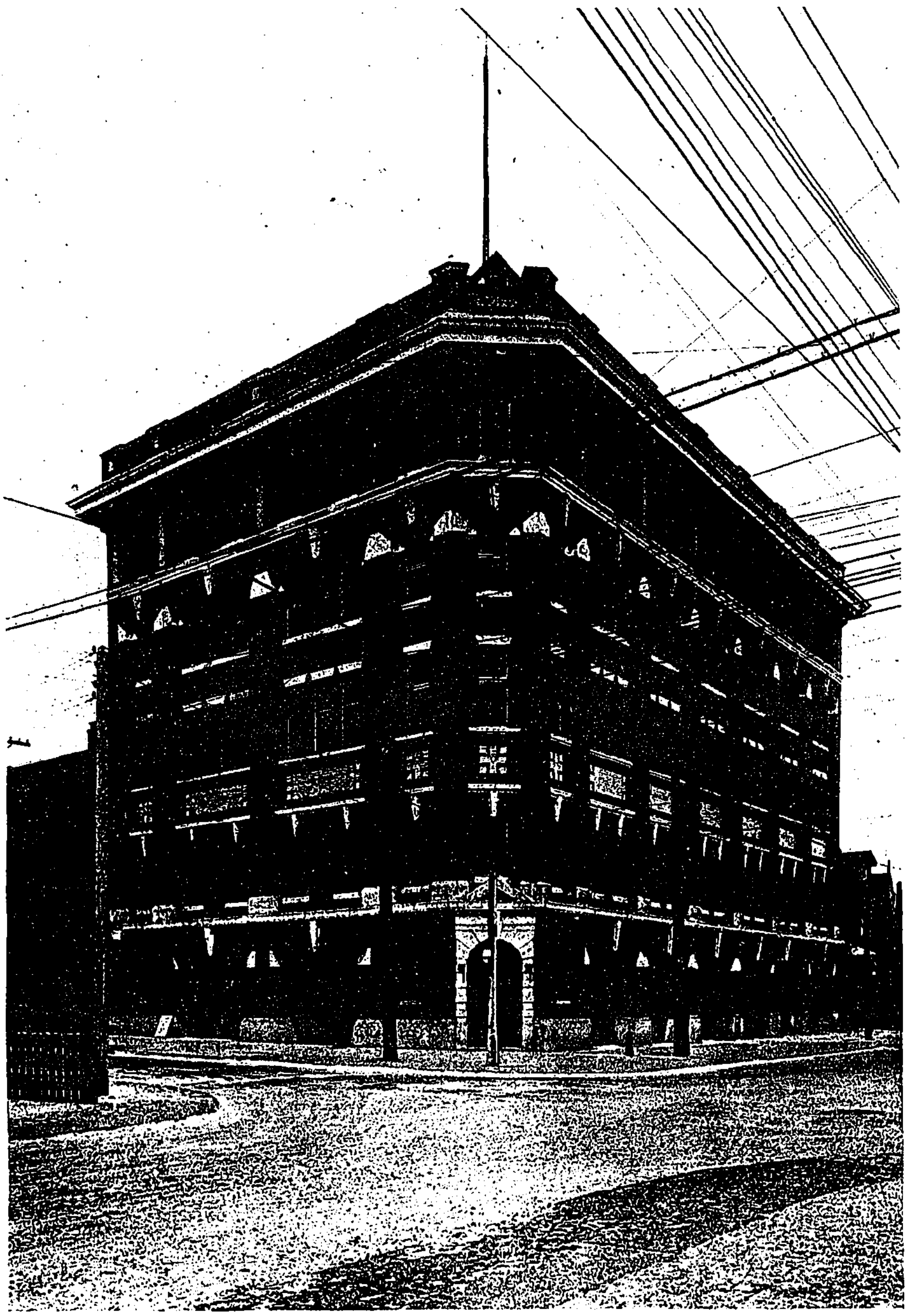
3 in. slab of solid concrete	2.00
3 in. slab of cinder	1.00
3 in. slab of gypsum	.40
Glass	1.40

The above factors are compound factors and may vary considerable, for instance porous brick is by virtue of the confined air cells, a better insulator than the more solid and impervious material, but by absorbing moisture will materially change.

(*Continued on page* 24.)

Ideal Bread Company's Building, Toronto

In the matter of organization, or routing of work, the new factory of the Ideal Bread Company, Toronto, involved a problem which required special study. Besides this was the factor of providing adequate storage for flour and other materials used on a large scale in the making of bread, as well as the need of special sanitary considerations and the maintaining of constant temperatures in various of the departments where the mixing of ingredients and baking is done.



IDEAL BREAD COMPANY'S BAKERY, TORONTO.
SYDNEY COMBER, ARCHITECT.

The only special structural feature apart from the usual requirements is the heavy support or floor slabs carrying the travelling oven on the third floor. The building itself is of steel frame and concrete construction, five stories high and fire resisting in type. Windows on all sides adequately light the interior, the ceilings being lofty—in some cases 17 feet high. The interior of the walls are lined with hollow terra cotta blocks and finished in pure white Keen's cement throughout, with white glazed tile dadoes.

Practically all the entire ground floor is used for shipping purposes, the entrance for the delivery wagons being through seven large doors to a wagon area, which is arranged around the bread room located in the centre. This bread room is approximately 60 by 60 feet. In addition there is a receiving clerk's office and a large auto truck platform scale, which gives complete supervision and control and permits of the weighing and checking of all goods received for storage in the basement.

The basement which is used for flour and general storage purposes is very lofty and well aired. Special provision has been made in water proofing the walls and floors so as to ensure an absolutely dry interior. This floor is about four feet below the level of the sewer, but provision is made to effect perfect drainage. The basement also contains the boiler room, fuel bins, etc., a type of boiler being installed which, in addition to heating the entire plant, also provides live steam for use in manufacturing and baking the bread.

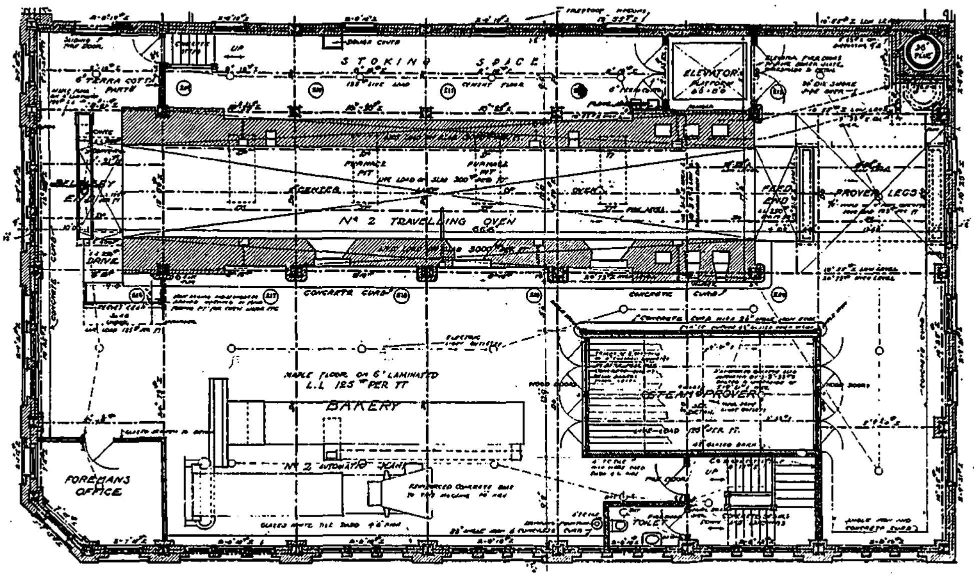
From the large bins in the basement where it is deposited after sifting, the flour is automatically lifted and discharged into weighers over mixers on the fifth or top floor. Here all the ingredients are prepared and discharged into huge mixing machines on the floor below. The water is brought to the right temperature for mixing in a 1,000 gallon tank.

The fourth floor is especially designed and used as a dough room and contains a battery of mixers and room for the great troughs in which the dough is deposited for several hours after mixing. Special humidifying apparatus is provided and a high and even temperature constantly maintained. The subsequent process of manufacturing the dough into loaves, as well as the baking of the bread, is done on the third floor, mechanical equipment being used throughout. A special feature is the huge travelling ovens of which there are two, weighing over 900 tons each. These ovens are seventy feet long and have a capacity of nearly 7,000 loaves per hour.

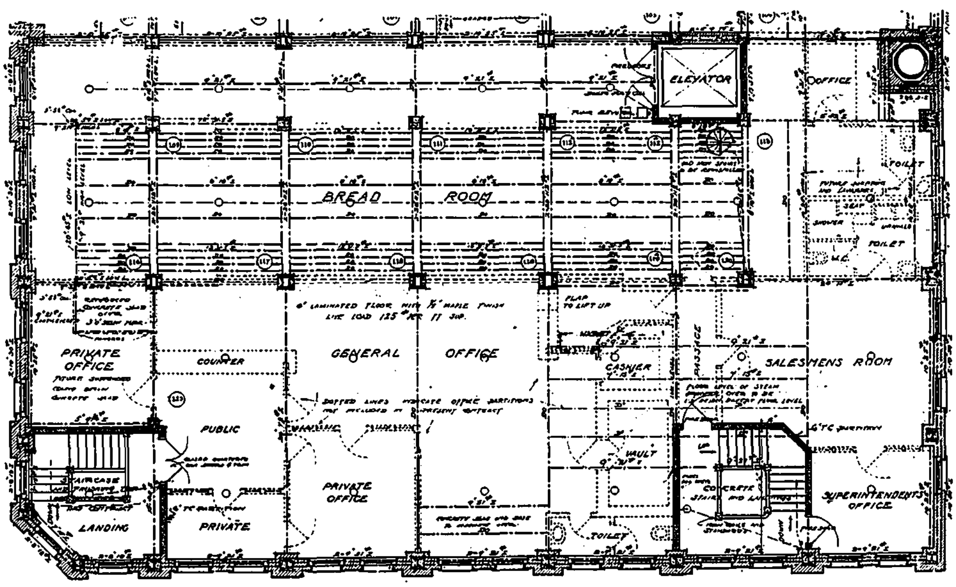
After the bread is baked it is carried by conveyors to the second floor where the wrapping, packing and cake departments are located, and thence to the shipping room in the basement. The second floor also contains the ovens and machinery for the making of rolls, buns, etc., as well as the general offices, superintendent's room and salesmen's offices which are accessible from both the main and the factory entrances.

The building is equipped with numerous drinking fountains, also lavatories on each floor, together with shower baths and locker compartments necessary in the interest of sanitation and for the comfort and convenience of employees.

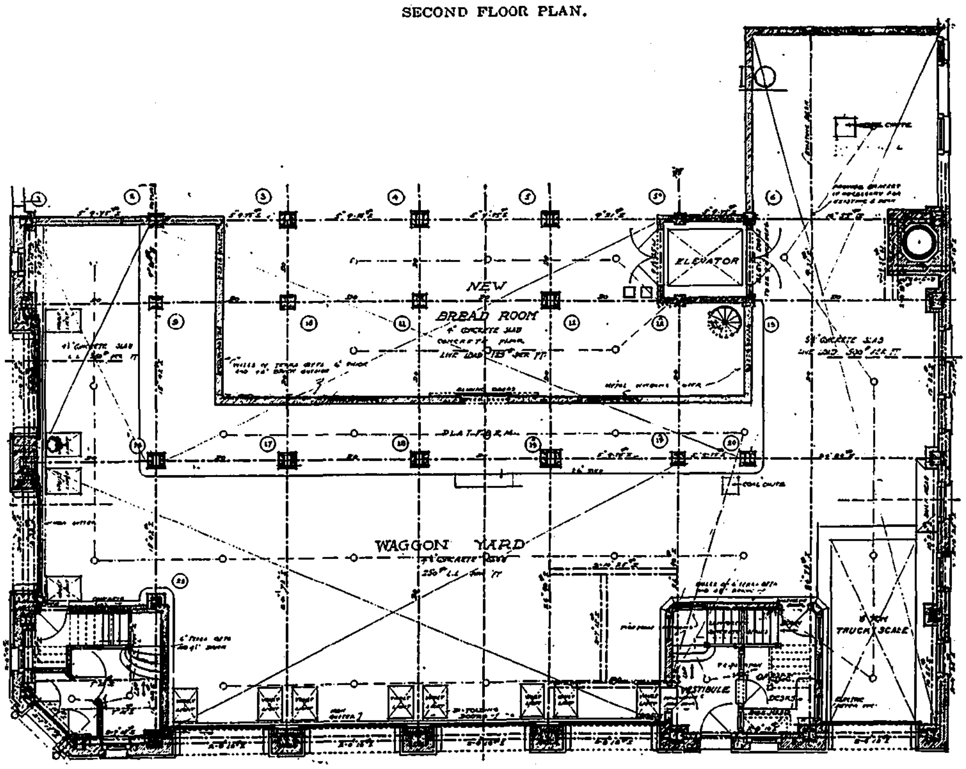
In addition to the mixing room, the fifth floor



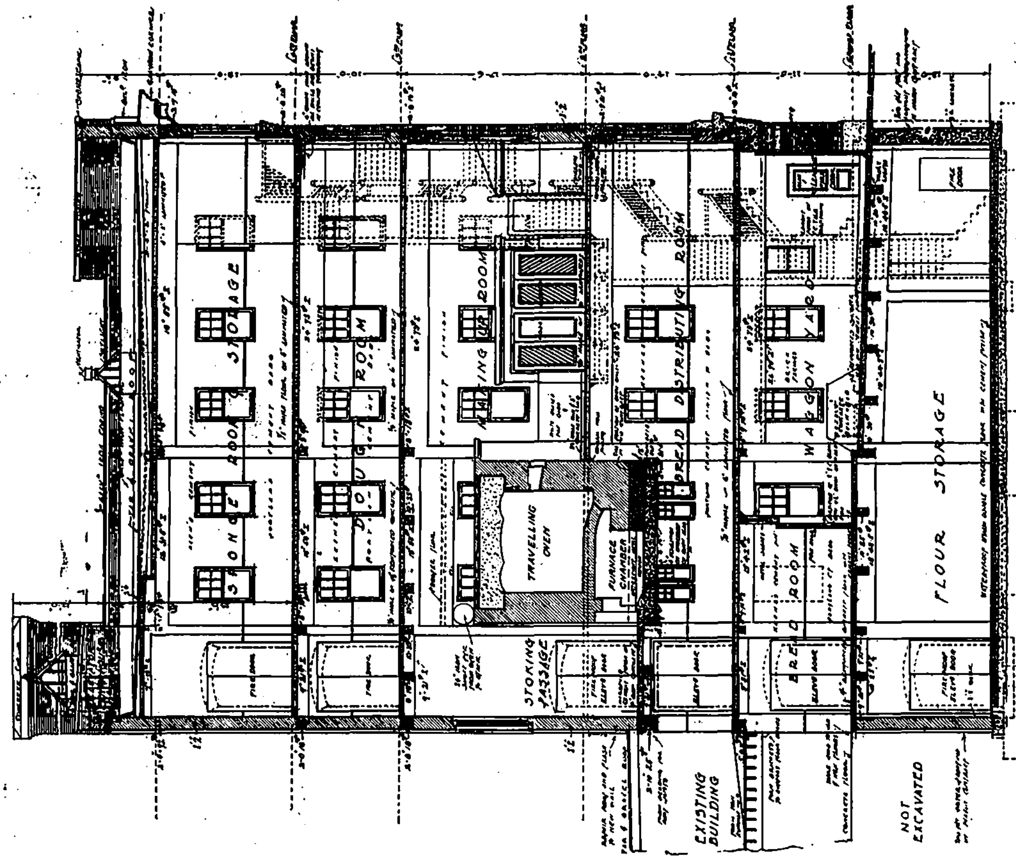
THIRD FLOOR PLAN.



SECOND FLOOR PLAN.



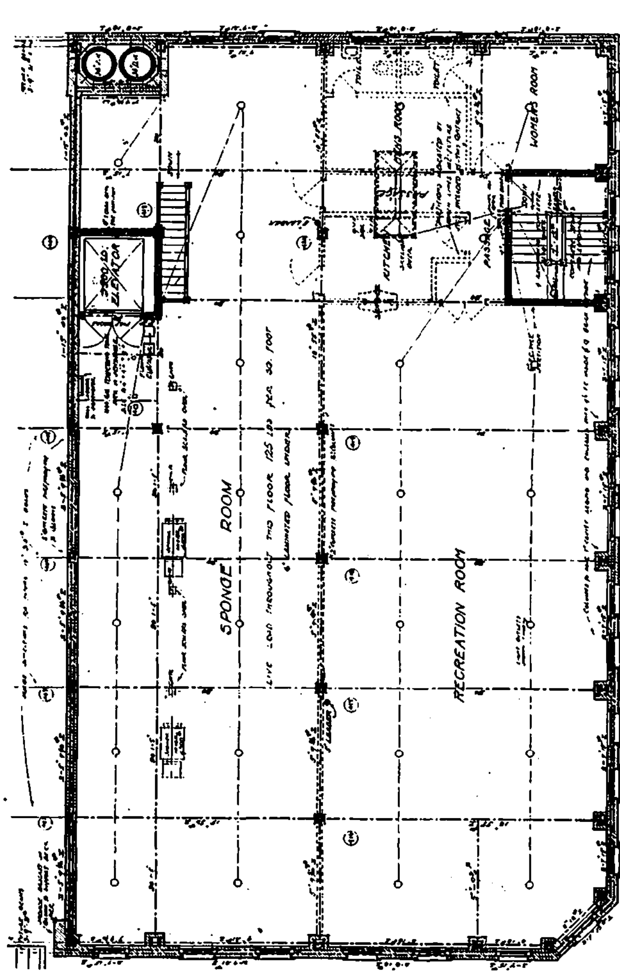
GROUND FLOOR PLAN.



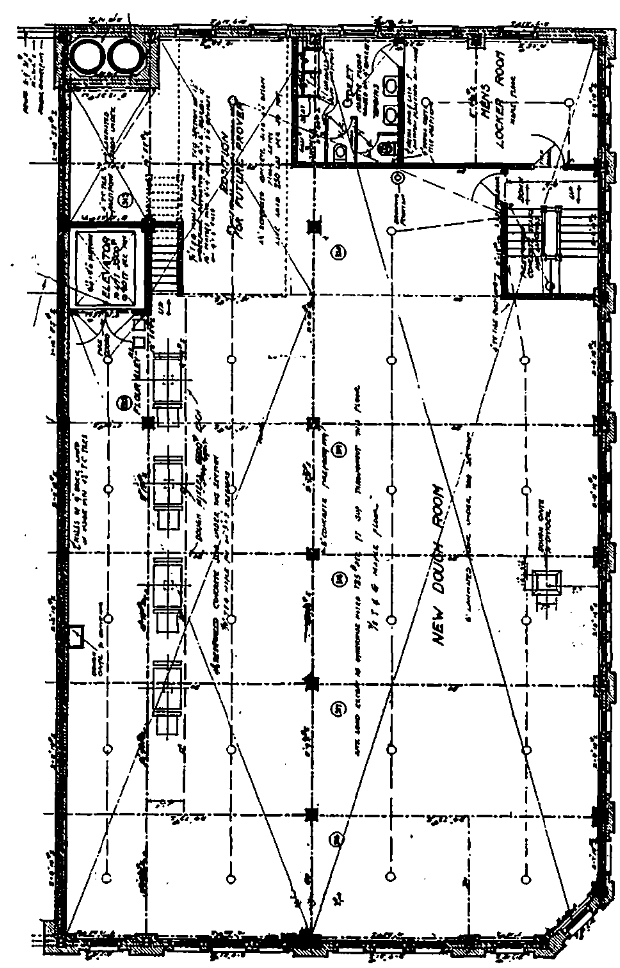
CROSS SECTION.

IDEAL BREAD COMPANY'S BAKERY, TORONTO.

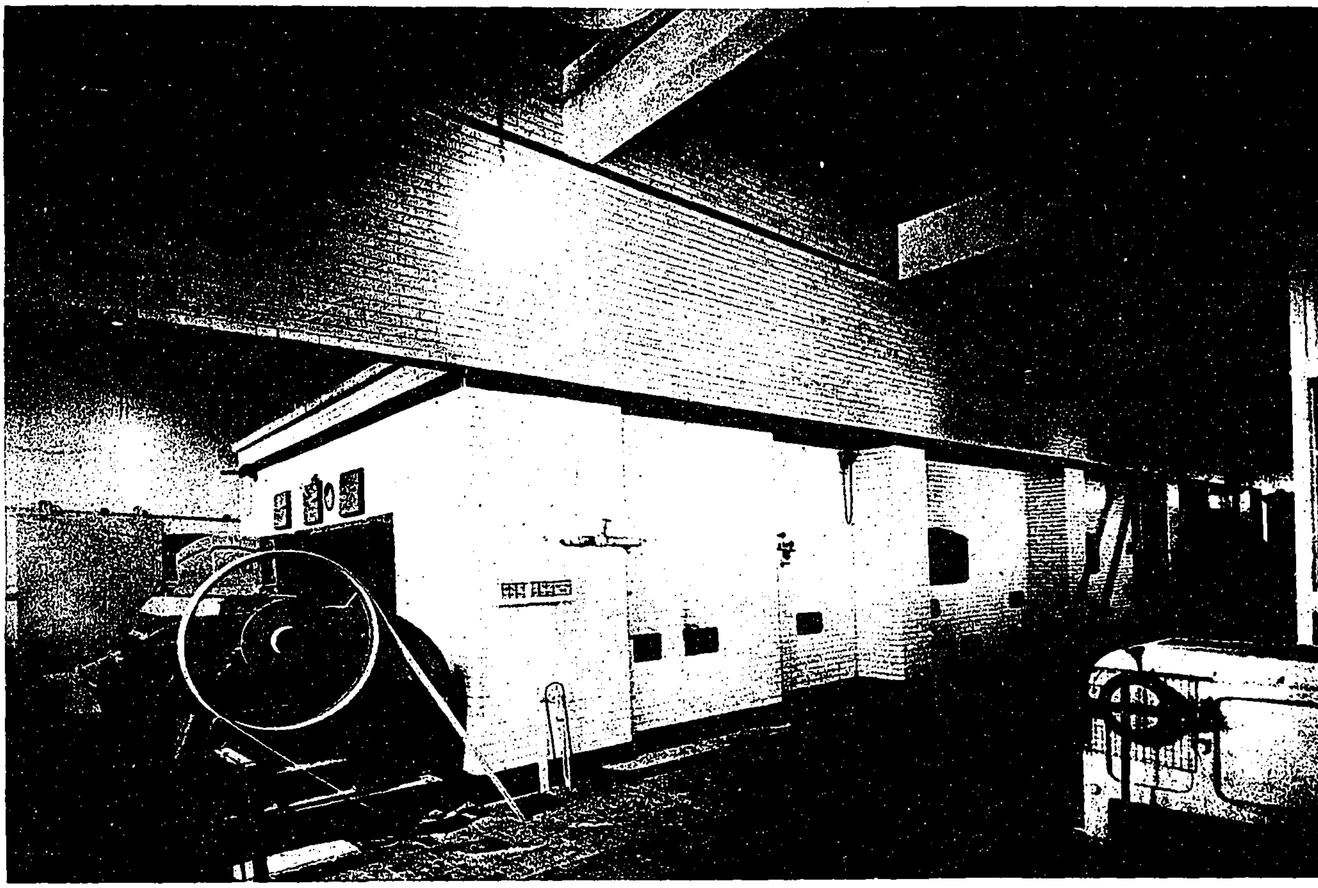
SYDNEY COMBER, ARCHITECT.



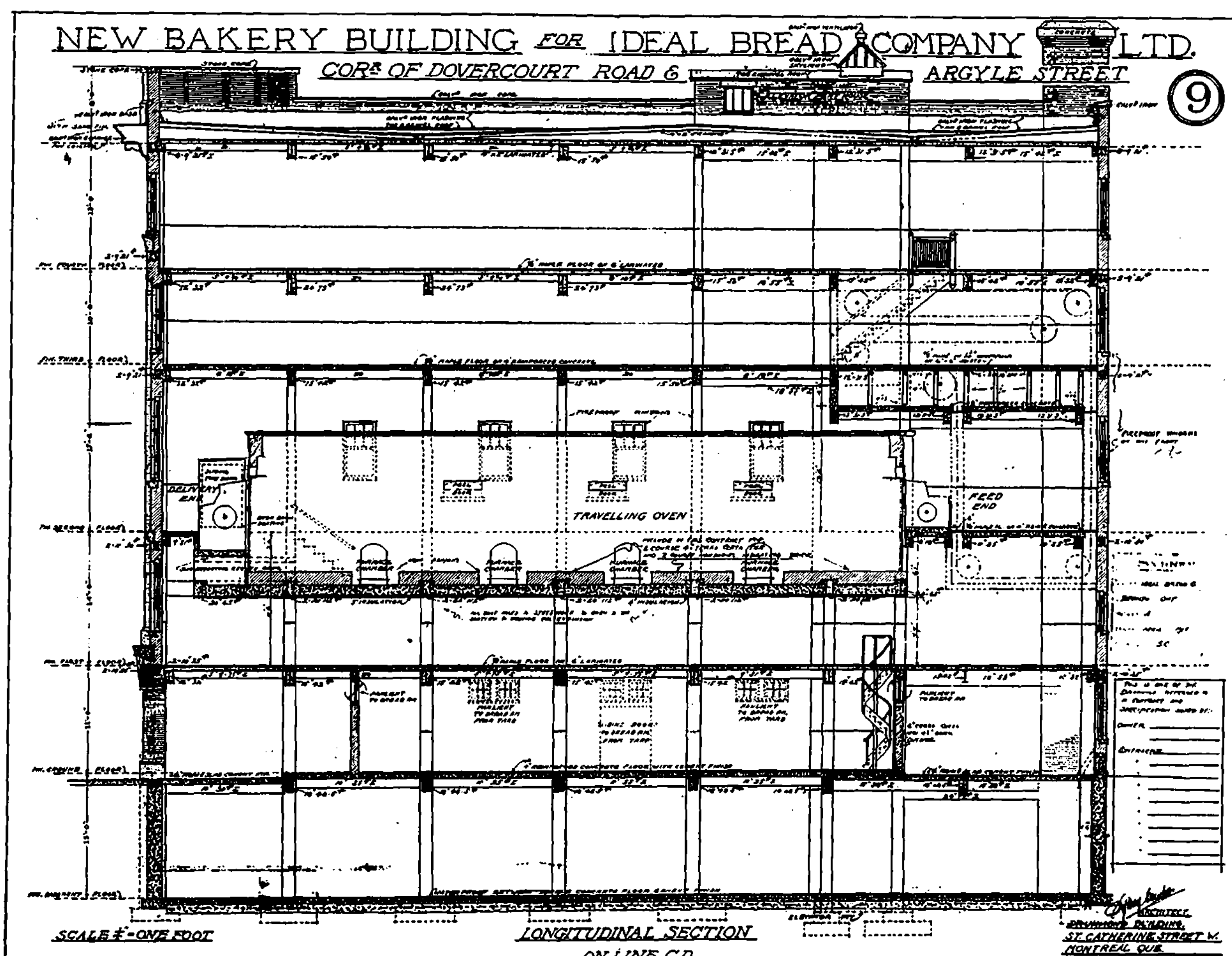
FOURTH FLOOR PLAN.

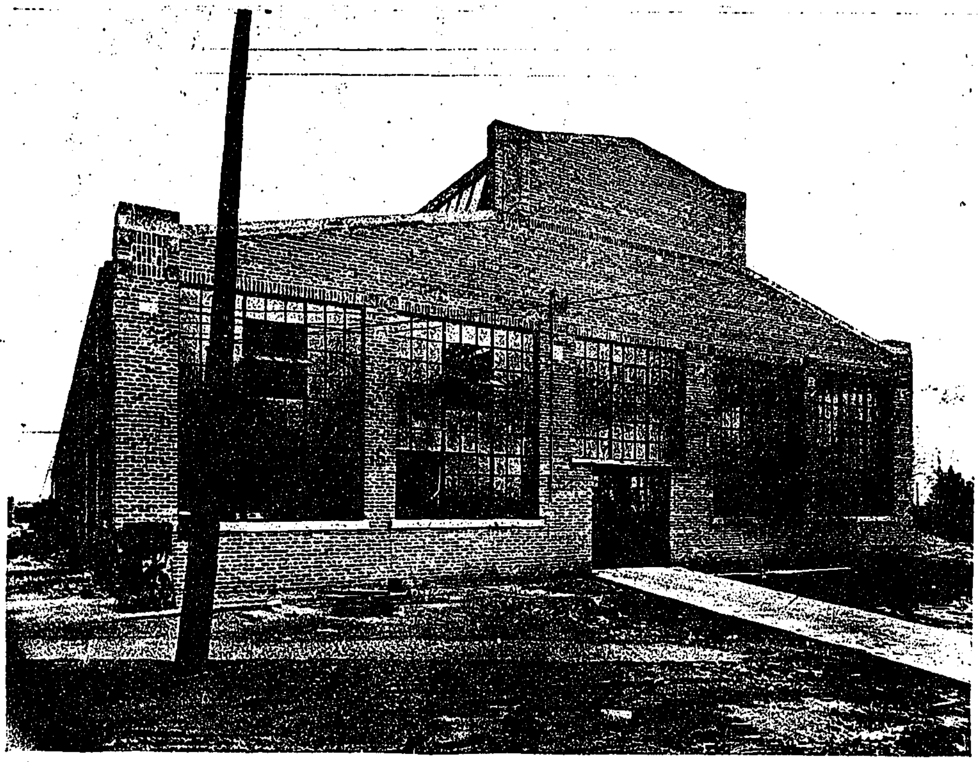


FIFTH FLOOR PLAN.



VIEW OF TRAVELLING OVEN IN WHICH THE LOAVES GO IN AT ONE END AND COME OUT BAKED AT THE OTHER.





NEW HEAT TREATING BUILDING, DOWSLEY SPRING & AXLE COMPANY, CHATHAM, ONT.

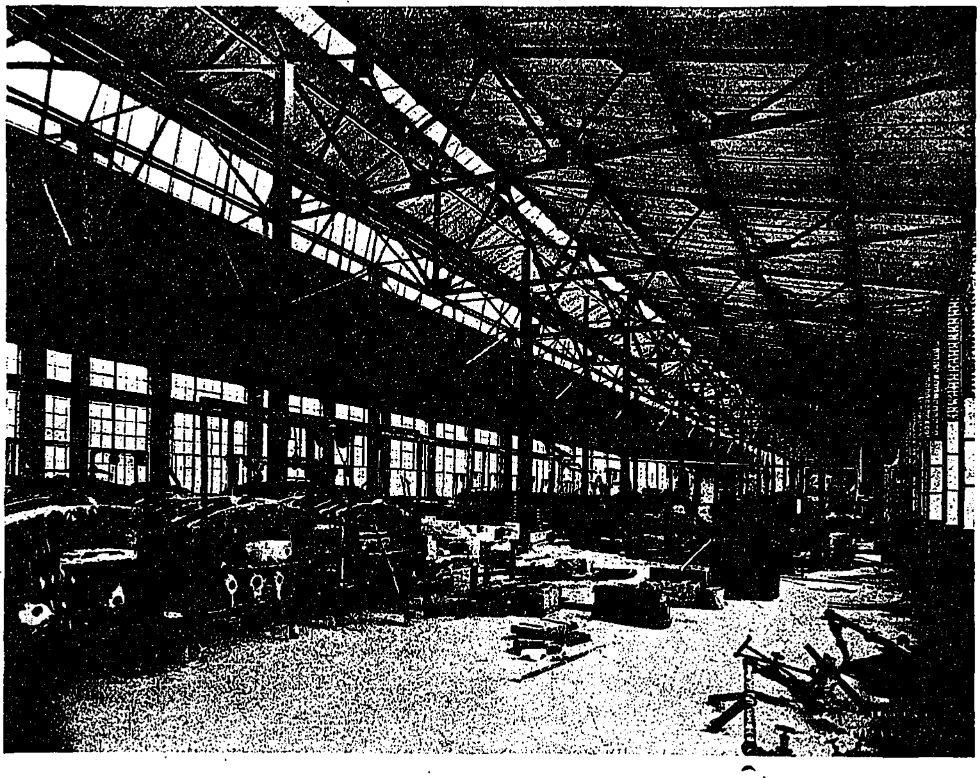
contains a large assembly hall provided with platform, etc., and capable of seating 400. This is for concert and social entertainments which are held for the benefit of the employees and their families, certain evenings being reserved for the public when the plant is open to inspection.

Factory Rebuilt in 30 Days

A very good record was recently achieved at Chatham, Ont., where a new factory unit was erected in 30 working days, following a fire on September 11th which destroyed one of the main buildings at the plant of the Dowsley Spring & Axle Company. The fire burned the original building to the ground and resulted practically in a total loss including most of the machinery. One of the oil tanks in the heat treatment section became ignited and the flames rapidly spread to the roof framing. Owing to the deposit of oil that had settled on the upper portion, the fire spread with great rapidity and was only checked by a fire wall towards the end of the building after the major part was destroyed and the walls pulled in leaving a mass of machinery, scarred building material and debris.

By working night and day shifts the Dowsley Spring & Axle Company were able to clear away most of the debris in rapid time. In the meantime architects were called in and co-operated with the officials of the company in making a new layout and designed an up-to-date fireproof one-storey building 75 ft. wide by 339 ft. long, agreeing to complete the structure in 30 working days.

The general layout and construction of the building is well illustrated by the accompanying photographs. A centre aisle of 15 ft. used for internal trucking determined the location of the centre columns, leaving a 30-ft. span on each side to the walls and the columns are spaced longitudinally about 28 ft. apart. Special care was taken to render the new unit a daylight factory and a comparison of the lighting of the new and old buildings on a dull day brings out the advantages of the former.



INTERIOR VIEW, SHOWING STEEL SUPPORTS AND ROOF SYSTEM.

DIRECT VIEW THROUGH THE DOWSLEY SPRING & AXLE COMPANY'S HEAT TREATING BUILDING

Owing to the large amount of gasses evolved from the furnaces, special attention was given to the ventilation and internal circulation of the air both in the location of the ventilators in the steel sash and in the location of the monitor ventilators, and also in the shape of the roof selected. The steel sash in the side walls are equipped with a complete run of vertically pivoted ventilators and also one large horizontally pivoted ventilator in each main section. The monitors are operated in 56-foot sections and admit of any combination with the side wall ventilators. This arrangement has proven to be very satisfactory.

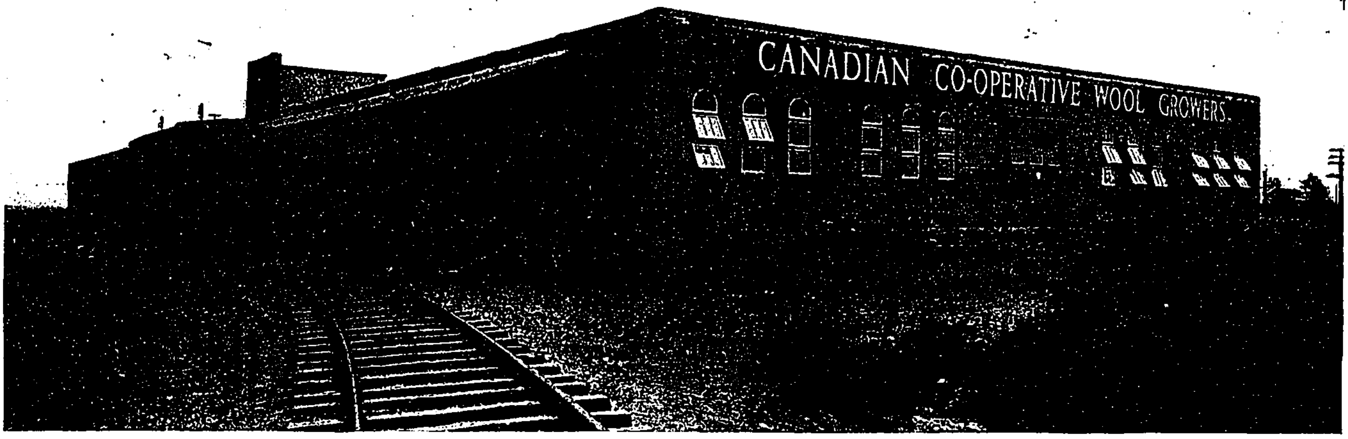
The design of the steel framing is based on a patented system of roof trussing which effects a considerable saving in the steel construction. The roof is of gypsum block construction spanning about 6 ft. 6 in. resting on steel purlins. One of the features of this roof apart from its pre-eminent fireproof and insulating qualities is the speed with which it can be erected. The foundations are of concrete, the walls of brick and steel sash construction, the roof of gypsum block construction covered with a built-up asphalt roof, metal flashing, etc. The building has a structural steel frame and the floor of the building is of concrete containing trenches for the oil, water and pyrometer equipment. Up-to-date sanitary arrangements are also provided and the building is lighted with a complete conduit system of wiring containing special provision for night lights.

The agreement to provide the owners in 30 working days with a building to carry on the operations of making springs, was signed on September 15th, and on October 20th the company were manufacturing springs in the new furnaces of the rebuilt structure.

Toronto starts off well—it is expected that permits will total over a million in January.

Canadian Co-operative Wool Growers Ltd., Warehouse, Weston, Ont.

The owners' problem was to get a good-sized building, basement and one storey, capable of having a second storey added. The situation had to be reasonably convenient to their head office in Toronto, it had to have direct rail connection, especially with the C.P.R. for receipt of wool from the west, as well as proper road connections for haulage by motor truck. Since raw wool i nbags gives only a light floor load even when piled as high as is compatible with easy handling, it can be safely put on floors lighter than the minimum allowed for warehouses under the usual city building by-laws. The result of these considerations was the choice of a site a short distance out of West Toronto, adjoining the C.P.R. right of way, and just at the southeast corner of the town limits of Weston. The site is irregular, the building is placed with its south side at the south line of the prop-



WAREHOUSE OF CANADIAN CO-OPERATIVE WOOL GROWERS LIMITED, (NEAR) WESTON, ONT. SHEPARD & CALVIN, ARCHITECTS.

erty, leaving space beyond, and next the C.P.R. for expansion, since a power plant and workmen's houses are contemplated.

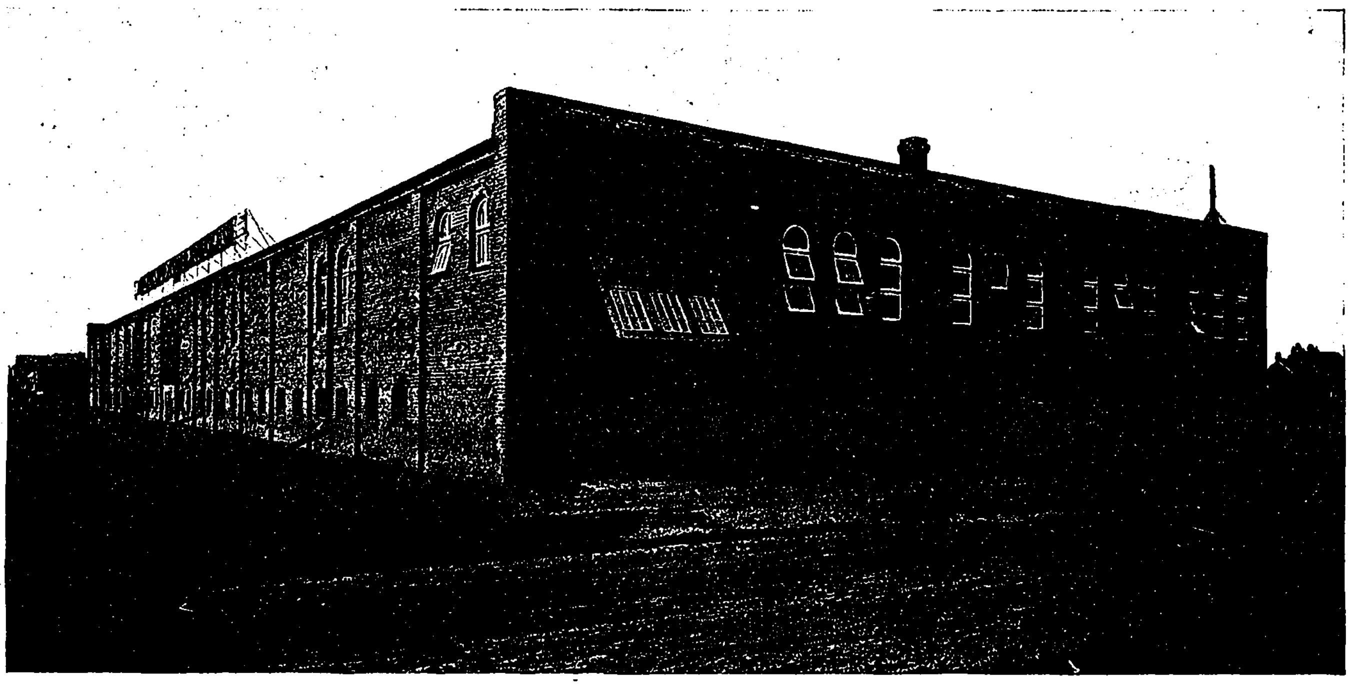
The building is of simple slow-burning, mill construction type. The usual monotony of exterior of such buildings has been avoided by the piers, and by the shape and grouping of the windows. At one end is a ramp to admit of trucks being driven down from grade level into the basement. Along the north side is a loading platform, the main floor being at car floor height. An open roof covers the platform, supported on steel brackets from the wall.

The freight elevator has a platform 10 ft. x 10 ft., speed 40 ft. per minute. The stair enclosure is next the elevator shaft. The building is unheated except for stoves in the office space, cut off from east end of the main floor by a wood and glass screen.

The total area of the two floors is about 40,000 sq. ft., and the building cost complete with display signs, electric fixtures, and all other sundries, about ten cents per cubic foot. Excavation work was begun first week in April, 1919, and the building was occupied at the beginning of July, 1919.

Sarnia to Build 600 Dwellings

It is reported that W. R. McEachren & Sons, Limited, Toronto, are organizing a syndicate to build about six hundred dwellings to relieve the present housing shortage at Sarnia, Ont. The project has the endorsation of the local Chamber of Commerce and work on the houses is to start early in the spring. During the past year the Sarnia Housing Commission expended about $70,000 in building twenty-two houses that cost between $3,000 and $3,200 each.



VIEW SHOWING OFFICE ENTRANCE.

Tapestry

Around Arras, in Flanders, circles forever the charm of pure beauty and stately majesty, although to-day the place itself is a dismal wreck. It is stated in a recent New Orleans paper that beauty and the charm of Arras lies in the one word "Tapestry." The first tapestries in Europe were made by Flemings, and made in Arras. Indeed, so noted were the weavers of Arras that the word itself became a synonym for "Tapestry." Shakespeare uses this in Hamlet, as when "Hamlet stabs Polonius behind the Arras," meaning the great curtain, or tapestry, hung in royal apartments.

The art of tapestry-making was first introduced into England in 1620, and introduced by William Sheldon. He established looms at Mortlake. Now, "tapestry" is the art of painting by the weaving of colored threads intertwined on lines stretched vertically (high-warp tapestry) or horizontally (low-warp) which become one web, combining lines and tones.

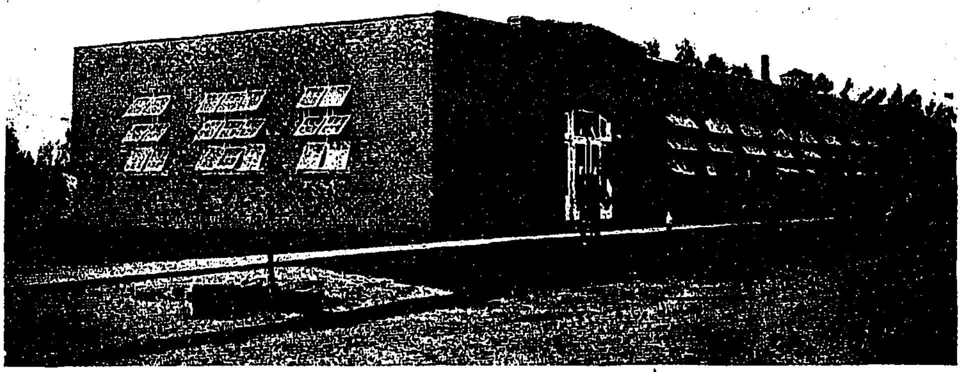
The skillful tapestry weaver is himself an artist; he interprets and he creates designs, called cartoons, which are the soul of his work. Tapestry-weaving was known to the ancients, to the Egyptians, and to Grecian women. Tapestries figure in Holy Writ. They were so costly that they could only be owned by kings.

The Saracens, or Arabs, who founded an Art, a Religion, and an Empire, introduced tapestry into Europe. The largest and most complete tapestry-weavings are the great textile pictures, or storied wall-hangings, of the fifteenth and sixteenth centuries, made in Arras and Brussels. The stories on tapestries ranged, in subject, from the Greek myths and gods to the doings of kings and to Scriptural subjects and lives of saints.

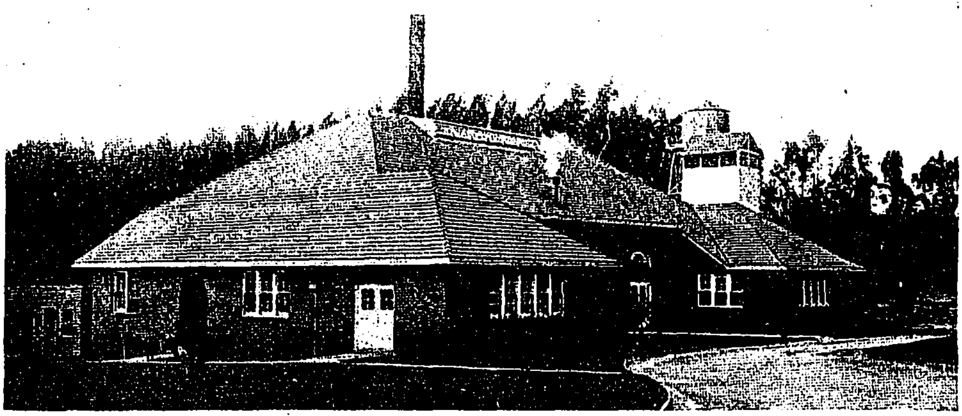
When the Spanish persecutions overflowed the Netherlands and Arras, tapestry-weaving was driven into France, where the Grand Monarque, Louis IV, a lover of splendor and patron of the arts, immediately purchased the house of Jean Gobelin, 1622 A.D., who was a genius in weaving, and the king turned the house into a factory, in which tapestries for the adornment of palaces should be made. Thus, the great name was born, from the name of their maker, for the noblest tapestries in the world—the Gobelins.

One century earlier, in 1519, the Pope Leo X paid from the Vatican Exchequer, one thousand pounds each for the ten cartoons to Raphael, to be copied into a tapestry.

Spain to-day owns the incomparable collection of Arras Tapestries, thus Arras is immortal, for her heroes and her art.



A WAREHOUSE BUILDING.



—Reprinted from American Architect.

POWER HOUSE.

The Draftsman

Address given before the Draftsmen's Association of Toronto, by Chas. S. Cobb, Architect.

THE world of building, construction and engineering owes a great debt to the draftsman. The man who through long hours pushes the pencil and guides the tee-square working out the intricacies of detail upon which the success or failure of some great building, or some great bridge, or some huge dynamo, depends or perhaps only twirling circles which indicate the rivets in an I beam, performs a vital function in the society of to-day.

The architect, the engineer, the builder could do nothing without the draftsman. The mason, the carpenter, the steel worker, the foundryman must all be guided by the knowledge, the skill, the discernment of the man in the office who, first poring over his drafting board, has thought the way through on paper and sounded the unknown sea and charted with certainty and precision the way to produce and assemble all of the intricate parts which go to make up the complicated engineering or architectural structure, or some complex piece of almost super-human machinery.

Any agency which will assist the draftsman to become more proficient in his work, to stimulate him to self-development, to raise him out of the hum drum of office routine, to increase earning ability, to improve his relations with his employer and his associates, and in short make his daily life broader, richer, more interesting and agreeable, deserves the support of all interested in the noble profession of construction be it architectural, civil or mechanical engineering or any of the allied callings.

It is with this idea in view that I welcome the opportunity to address this gathering of draftsmen in an effort to add some small portion of support, interest and sympathy for your movement.

"Esprit de corp" is the French word for "spirit of the company" or team work. No more valuable asset can be had for any office, architectural or engineering, than this. It means loyalty, co-operation, perhaps personal sacrifice for the good of the group.

As Kipling said:

"It ain't the guns nor armament
Nor funds that they can pay,
But the close co-operation
That makes them win the day.
It ain't the individual,
Nor the army as a whole;
But the everlastin' team work
Of every bloomin' soul."

The ideal of every office should be to develop a high spirit of pride in its work, and everything that tends to maintain and improve that position before the public. Let no draftsman think, no matter how simple his duties may be, that his work is lost in the fabric of his office's product. The total is a collection of individual efforts and all contribute surely and certainly to success, mediocrity or failure.

In a recent trip to Detroit I went through a great automobile plant, and there I followed the rough castings, entering at one end of the plant, through operation after operation, a hole being drilled here, a bolt fastened there, always progressing and developing and changing from the crude elemental materials until finally the finished chassis of a truck emerged complete, ready for service, from the end of the plant. A thousand hands had added their quota of human effort to make this almost human piece of machinery. It was a beautiful illustration of team work and a wonderful example of co-operation with the draftsman as no small element in the ultimate result.

It is team work, co-operation, collective effort and understanding that makes the complex life of to-day possible, and happy the drafting office where such co-operation exists.

What should the employer, employee and public expect from each other?

The employer expects to get from the employee: service, economy of effort, efficiency, speed, loyalty, co-operation, team work "Esprit de corp," good workmanship, cheerfulness, energy, initiative, willingness, good habits and resulting good health and efficiency.

The employee expects to get from the employer: a good wage, an increased wage for increased service, good working conditions, appreciation, consideration, opportunities for advancement and improvement.

The public expects to get: Service at as reasonable a cost as possible; efficiency, speed, co-operation and a fine regard for the owner or buyer's interest.

The draftsman of to-day will be the architect or the engineer of to-morrow. This is inevitable. The offices higher up must and will be filled from the ranks. The race is to the swiftest, and eduction, efforts for improvement, conscientious execution of each day's duties, is the only sure way for advancement. Luck cuts very little figure in this world. As Thomas Edison has aptly said, "Success is one-tenth inspiration and nine-tenths perspiration." Personal development is the one sure way toward a betterment of your position in Life. Development of oneself produces something which no one can take away and the frame of mind that can laugh at fate.

If one of the main objects of this organization can be made the stimulation of all means toward the mental, moral, and physical improvement of its members, it will indeed perform a function and in my mind go a great way toward the achievement in a constructive way of its aims.

For the architectural draftsmen may I suggest the "Atelier" as a possible assistance toward improvement.

"Atelier" is the French word for studio. In Paris it is the Atelier system through which students in architecture are trained. Various ateliers under the supervision of eminent architects carry on their activities independently, but are all under the control of the Ecole des Beaux Arts, or College of Fine Arts, which issues all the programmes for the student problems and conducts the judgment of the problems after the drawings have been received from the various ateliers.

The "Atelier" system was introduced into New York City some years ago by prominent architects, many of them graduates of the Beaux Arts in Paris, as a means to stimulate architectural education among draftsmen, especially those young men of ability to whom had been denied the opportunities of college or technical school education. The success which has attended these efforts has been outstanding.

At present in Toronto means of education outside the University are practically limited to what can be picked up in the architectural offices of the city. Some offices offer considerable advantages and encouragement of such student effort, others disrgeard it entirely and depend largely upon the daily work in the office to produce the desired development. The great benefit which an atelier could effect in Toronto would be the bringing together of draftsmen from different offices with varying degrees of ability, and by problems solved by them together would through the resulting stimulation, or, as the French call it, "emulation," produce development and advancement which could hardly be possible if the draftsman had to depend upon his own detached and separate effort.

A room in the down-town section, properly heated and of sufficient size, would be required with some simple equipment in the way of drafting tables and boards. Practicing architects could undoubtedly be persuaded to give periodic criticisms of the work and act as committees of judgment. This would have the two-fold benefit of bringing the draftsman before the architect in an informal way and of placing in a most favorable light outstanding ability, and would result in mutual advantage.

Efforts to improve the wage conditions should form a very important function of such an organization as this. Some draftsmen in the past have not been paid as much as they should, a few perhaps have been paid more than they really earned. Any efforts which tends to determine just what draftsmen should be paid in relation to their varied stages of proficiency, should be welcomed by both employers and employees.

A draftsman like any other worker must produce in saleable goods: (1) enough to pay his wages; (2) enough more to pay his proportion of "overhead," which means office rent, supplies, stenographers' services, taxes, interest on investment in plant, etc., etc.; (3) still some more in the way of profit for his employer. Unless he does at least these three essential things he is not holding his end up and cannot hope for advancement. His ability to produce in excess of his wages depends entirely as to whether his wage will be increased.

The surest and best way to bring this about is by increased skill through education, reading, self help and development. This is the constructive way, the sure way, and the satisfactory way. The efficient man is seldom neglected in business life; he not only grasps opportunities as they are presented, but makes opportunities and see that he is prepared to make the best use of them.

This Association is a good thing. The architects have their societies, the engineers theirs, and certainly the draftsmen should have an association. We hear a great deal these days about strikes—whole section of workers collectively refusing to work unless certain conditions are complied with. I have no doubt that the strike has been in many cases the only resort, and has often obtained important results which would have been secured much more slowly by less drastic means. Then, again, we see strikes inflicting great hardship on the public at large, and others failing completely after causing their participants hardship and loss of earnings. Wages have undoubtedly been raised in some instances by the agency of the strike, only to be passed back again to the consumer in vastly increased cost of commodities.

This organization could undoubtedly employ this means toward improving the condition of its members from a wage standpoint, but I mistake the intelligence of the members, if they cannot see a more constructive way, and that is the devising of means of increasing the individual abilities of its members, and through increased service secure in the one sure way an ultimately increased reward. This is the constructive way.

You can adopt the slogan of the "Union," or you can seek the ideals of a higher craft, a "Draftsman's Guild," perhaps, whose leaders can see that service, efficiency, devotion to the high ideals of better craftsmanship, better understanding of the problems of each one's job; that that is the one sure way toward permanently and constructively improving your conditions collectively and individually.

Heating Problems Produced by Modern Methods of Building Construction

(*Continued from page 13.*)

Confined dry air is the best insulator as for example the best commercial pipe covering for steam piping is 85 per cent. magnesia, because of the large percentage of minute air cells held in suspension and unable to circulate.

In working out the details of a heating system, it is first necessary to ascertain the heat losses from the various rooms or apartments to be heated, and apply the proper amount of radiating surface to offset the loss for a stated set of conditions, which are usually determined from the local conditions or requirements.

To attempt to give any arbitrary rule is entirely out of the question, as it would prove more misleading than enlightening. There is, however, this statement to be made in the interests of economy:

All buildings constructed of such materials as are subjected to heavy transmission losses, must be very thoroughly insulated, otherwise the effects on the occupants subjected to the artificial atmosphere produced, often overlooked and not easily understood, is detrimental even beyond our recognition.

The characteristics of the present systems of heating are of an entirely different nature to the radiant heat derived from the open fireplace. With the open fire, as before mentioned, the heat is of a radiant kind, but with direct radiation, in either water or steam heating, the heating effect is derived entirely from the circulation of air collecting the heat from the radiators by convection.

There is a physiological side which must be considered, produced by prevailing conditions, often causing severe strain and enervating fatigue. The purpose of the atmosphere is to keep our bodies in a state of health and aerate the blood. The food we eat is chemically changed by the various processes, and with every chemical action heat is generated and the body must lose this heat, if the normal blood temperature is to be kept constant.

In the opening paragraphs of this discourse mention was made of the extremes of heat and cold, not unusually met with, yet the temperature of the blood remains absolutely constant when a person is in good health.

There is spread over the whole surface of the body, an elaborate nervous system, which nature has saddled with the responsibility of maintaining an absolutely constant blood temperature. The body loses heat by conduction, radiation, evaporation, as well as small quantities carried off by breathing and the moisture contained in the breath.

Nature has placed in the atmosphere three physical functions, namely, temperature, humidity and movement of air, which are the all-important factors, and it is only when we seriously disturb any one of these three factors that we experience trouble, and if persisted in, causes a breaking down of the human system, giving rise to serious disorders. For instance, if a person is so placed that the body is unable to be cooled by the presence of an envolope of stagnant air, the sun's rays will quickly produce sun stroke or heat prostration. In certain cases, under similar conditions, the heat from an open fire place will produce the same effect in a more modified degree.

In order to better understand the effect of the physical properties of the atmosphere, let us examine the chemical characteristics as related to bodily health and comfort. It is necessary to have a clear understanding of the process of respiration or breathing and the changes which take place in the air in the respiratory tract—At the beginning it should be clearly under stood that the lungs are never filled with pure air, even under the most favorable conditions, because breathing is only a frequently repeated slight dilution of the air remaining in the throat and larger bronchial tubes after expiration.

The air that is exhaled out of the lungs after being mixed with a certain proportion of outside air is again drawn into the lungs as a mixture which does not even remotely approach chemically pure air. This results in making respiration a continuous instead of intermittent process and so provides for a constant supply of oxygen, necessary to the life of the tissues.

It will be seen that any changes in the proportion of oxygen and carbon dioxide, which is likely to occur in the air of a poorly ventilated room will have no appreciable effect upon the air within the lungs.

Pure outside air is a mechanical mixture of oxygen and nitrogen with traces of CO_2. The oxygen content is about 21 per cent. and hardly ever falls below 20 per cent. in the poorest ventilated rooms. As air in the lungs contains about 16 per cent. oxygen under normal conditions, it is evident that any changes which may take place in the oxygen content of the surrounding air will have but slight effect internally. Furthermore, the supply of oxygen in the lungs is not dependent upon outside conditions, but is regulated by the amount of carbon dioxide dissolved in the blood, and this in turn acts upon certain nerve centres, which control the depth and rate of breathing. If the carbon dioxide falls too low, stimulation of the nerve centres ceases, and the process of respiration does not take place till the proper proportion has again been accumulated. The normal proportion of carbon dioxide in the air of the lungs is about 5 per cent., and is automatically kept at this point by the action of breathing.

Under these conditions the effect of impure air, so called, is an unnoticeable increase in the action of the lungs through faster and deeper breathing; thus, the function of breathing is dependent entirely upon internal rather than external conditions.

The evil smell of crowded rooms has long been accepted as proof of the existence of harmful poisons; as a matter of fact, such odors come from secretions of the skin; from food eaten, decayed teeth, foul breath of dyspepsia, soiled clothes, etc., etc. While such a mixture of odors is offensive and disgusting, it has been proven to be harmless in so far as its direct effect upon health is concerned.

Recent investigations show that the effect usually attributed to foul air and poor ventilation is due to the physical condition of the air rather than the chemical condition.

As mentioned before, the body must be relieved of the heat produced and experiments show that an ordinary adult will produce, and must be relieved of enough heat in the course of an hour to raise one thousand cubic feet fifteen or twenty degrees. This heat is constantly carried away from the body, partly in the air exhaled, but chiefly through the skin by convection, conduction and evaporation of perspiration. It is evident that the prompt removal of this heat will depend very largely upon the atmosphere surrounding the body: upon the temperature, humidity and the movement of the air.

The physiological effect upon the human body of over-heating is a derangement of the vaso-motor nerve system. For example, a cool wind striking the skin will stimulate through the sensory nerves, the vaso-motor nerve constrictors, which in turn cause the small vessels near the surface to contract and drive the blood deeper in the tissues and so preserves the bodily heat. A warm wind or other source of external heat causes dilation and draws the blood to the surface, thus cooling it more rapidly. It will be seen that with no two human beings alike, with the complicated and intricate nature of the human body, the strain and nerve tension of some classes of work, the tremendous variations, etc., etc., lead us to believe that we are up against hopeless conditions in attempting to produce ideal summer climates inside during winter weather.

Humidity has a decided effect upon conditions. Too much humidity accompanied by a high temperature, will retard the cooling of the body, as is usually the case in a poorly ventilated room, and becomes doubly harmful because of the combination. You have probably observed women in an overcrowded theatre with the temperature high, gasping for breath and almost fainting, fanning themselves to overcome the effects and bring relief (temperature, humidity and movement of air again.) Women, on account of an extra layer of fatty tissue, which nature has omitted from man, will show signs of distressing conditions more rapidly than men in the above instances, yet will feel quite comfortable outside, with much lighter clothing.

Due to the alteration of the percentage of humidity in the air in a heated room, a perceptible movement of the air will cause a heavier convection loss from the exposed parts of the body, which frequently causes congestion or colds, due to the uneven cooling of the body. Yet these conditions could be magnified many times in a natural atmosphere where nature has compensated the temperature and humidity, with the opposite effect and pleasing sense of exhiliration. Such, for instance, as driving in an open automobile.

We are confronted with these facts that the remedy is an exact knowledge of all the factors entering into the problem, not separately, but as a co-relative and collective whole, and what relation each bears to the whole. In this there is room for some valuable research work.

Possibly the best summary of this paper will be to examine in what manner of means does the construction of our modern buildings effect the occupant.

In the present day, we have some wonderful buildings and further heated by systems the very acme of mechanical perfection. The builder is justly proud of his accomplishment, the engineer has achieved success in the application of mechanical skill, yet that human element frequently called the "Layman," having to perform the daily task of living and working in the atmosphere enclosed by the building, is frequently far from satisfied. Call up to your mind those constant and familiar remarks from all sources and all kinds of people, heard on every side; these questions are logical, but have we the answer ready? It is feared much must be gone through before the answer is unfolded. Let us analyze briefly the room in which this meeting is being held. It is easy to imagine a condition to begin with, where the temperature inside and outside are equal, the walls and windows are neutral, and there is no transmission of heat: now follow the action as the outside temperature drops, a loss of heat is caused inside as well, the walls transmitting the residual heat to restore the balance inside and outside; as the outside temperature keeps dropping a point is reached where, in order to be comfortable, we must resort to supplying artificial heat. Let the outside temperature keep on dropping, we simply supply more artificial heat to maintain the comfortable temperature inside; as the difference between the inside and outside temperatures increases, so is the heat loss increased in a slightly greater proportion, the amount lost has to be added by artificial means.

The walls, windows and other surfaces of this room exposed to the lower temperatures, are the barriers purposely constructed to conserve the heat loss and upon the character of the construction will depend the amount of heat that will be required to maintain the comfort zone inside.

In addition to the heat loss another factor is encountered, namely, infiltration of outside air increasing as the temperature outside drops, displacing air already heated with air requiring to be heated.

These are the factors commonly treated to determine the size of the radiators, glass, wall and air changes. Incidentally a room of this character would have, in winter weather, a complete air change, due to infiltration directly, and from other sources, of approximately once every thirty minutes.

In the process of off-setting these heat losses the cubic contents of the room in the air contained, must carry the heat content necessary to provide for the loss and leave, as a net result, the desired temperature for comfort, usually measured five feet from the floor (the breathing line) at a point near the centre of the room, where the average will prevail.

It is easy to imagine still further what the result will be if the barrier between the inside and outside be rendered less effective by increasing the glass area and decreasing the insulating qualities of the wall construction; greater heat must be added to the cubical contents to supplement the extra loss; getting further away from natural atmospheric conditions.

The excessive heating required to meet some of the conditions becoming more common every day, causes a rather serious dispersal of the humidity contents, and this tendency leads to nervous irritability, lassitude, dryness of the throat and nasal passage, additional strain on the glands secreting moisture, also the effect of decomposing the organic matter in the air, giving it that dry, burnt, stuffy sensation; also natural dust robbed of the neutralizing effect of the humidity causes irritation.

The amount of moisture contained in a natural atmosphere of 70 degrees, is generally about 5 to 6 grains per cubic foot, corresponding roughly to 50-60 per cent. saturation. The amount contained varies considerably, at 32 degrees, for instance, 100 per cent. saturation will give only 2 grains per cubic foot, and at zero only .5 grain, so that with air at 30 degrees outside and a natural humidity of 60 per cent. the effect of heating this air up to 70 degrees reduces the humidity to about 15 per cent., or less than the dryest climate known.

The variations in humidity give rise to the sensible temperatures registered by the body. It has doubtless been observed that certain rooms are comparatively cool at a high relative temperature, while other rooms are warmer at a lower temperature. On examination the psychometric chart, 58 degrees at 60 humidity corresponds to 75 degrees at 30 per cent. humidity, both of these would maintain the same sensible temperature as far as the body is concerned.

The deduction resolves itself into this: If the character of the exposure and construction produce high transmission losses, we depart far from the natural conditions; the comfort zone creeps higher up the scale, necessitating higher inside temperatures being maintained, increased cost of heating plant, increased expenditure of fuel.

If in designing and constructing our modern buildings, more thought be given to the insulating qualities of the materials used, and even if, in the choice, the first cost be slightly increased, there will be good returns on the extra outlay. It will be saved in plant, fuel, etc., and at the same time the effect upon the artificial atmosphere will be less drastic, adhering closer to the natural, lessening the physical strain of adjusting ourselves to the conditions that must of necessity be produced that we may carry on.

These remarks are directed particularly to the industrial situation, as there is an earnest desire on the part of everyone to create better working conditions.

The human factor is the vital problem, produced by some of the methods of modern building construction.

In olden days the construction of buildings, and even the furnishings, were made to accommodate themselves to the heating and the limitations were recognized. In these days, in many instances, no thought is given to the various phases of the conditions produced and very sketchily outlined herein.

This subject is very deep, covers a broad field; any part of which would readily enlarge itself into a subject of its own.

Ontario to Build 5,000 Houses Under Housing Act in Spring

Over sixty municipalities availed themselves of the advantages offered by the Ontario Housing Act during the past year. About 1,500 houses in all have been under construction, including a considerable number which have already been brought to completion. The loan for these amounted to between $4,000,000 and $5,000,000. According to a recent issue of the Public Service Bulletin, the plans of these various municipalities for next spring contemplate the construction of about 5,000 more houses. In all it is probable that the Province will be asked to spend $20,000,000 by the end of 1920.

CONSTRUCTION

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Toronto Live Stock Arena

The ratification of the Live Stock Arena by-law by the ratepayers of Toronto again brings to the foreground the question of a comprehensive plan for all future buildings and improvements at the Canadian National Exhibition. It would indeed be a mistake to set down the building or to design the structure without due regard to the relation it will bear architecturally to future buildings and improvements. It is rather to be hoped that the new arena, which will cost one million dollars, will form the nucleus of an ultimate scheme reaching a dignity and composite character equal to the distinction and prestige which the exhibition has won as the greatest annual event of its kind. The opportunity which presents itself is therefore one which should not be neglected. The citizens of Toronto have provided generously for this building, and they have every reason to expect that in the matter of design it will be given the best expert attention. The arena itself will be utilized for a number of purposes. Besides providing facilities for the judging of live stock, it is also to be used for athletic events and conventions. It should therefore represent an important unit in the contemplated scheme of expansion which is at present under consideration. As the Toronto "Globe" editorially points out, the Exhibition Board would do well to take counsel with competent professional advisers before proceeding with any extensive rearrangements of the exhibition grounds.

O.A.A. Council Meeting

At a meeting of the council of the Ontario Association of Architects on January 6, it was decided to take up the matter of revising the present schedule governing charges for plans by members of the Association. Response to a letter sent out by President Herbert E. Moore showed the question to be one of general interest and resulted in a committee being appointed with instructions to submit a report embodying recommendations at a subsequent meeting. Several applications for membership were also considered, Messrs. Chris C. Thompson, D. S. Cameron, R. W. Catto, and Benj. Brown being admitted as associates.

Building Costs

Building costs have recently been the subject of a certain amount of newspaper comment which might lead to the inference that the price of materials has taken an unprecedented jump. Such, however, is not the case. The rise in the cost of building materials has been gradual and less precipitate perhaps than in any other line, and any recent advance is due to economic changes which under existing conditions cannot be avoided. In fact there is no valid reason why any owner should not go ahead with contemplated work. He will certainly pay more than in the pre-war period, but he will in all probability pay it with less hardship than at that time. The crux of the situation is simply this: Wages are high, commodities are high, and the earning power of the manufacturer, business man and labor are on a proportionate basis. In other words, earning power and prices have remained relative.

By the same token present investments will not be seriously affected by any subsequent change, so that the owner who builds now even if prices and value decrease is not going to find himself any the worse off. It simply means that he bought at the relative value of the dollar, and that any decrease which might come (and this is as yet a remote probability) must necessarily affect business, industry and labor alike. The whole thing is pretty much governed by the law of ratio.

Everyone knows by experience that the power of the dollar to-day is greatly diminished as compared with its pre-war value, but then there are more dollars. If through any subsequent economic change dollars become fewer, their value will be correspondingly increased. Hence no projected work should be deferred. Even if an owner is confronted with the necessity of disposing of his building later on and at that time be forced to take less than the property cost which, allowing for ordinary depreciation, would only be in a case where all values are down, the loss would be more apparent than real. He could then easily erect another building equally as good for the price at which he sold, and his money at the same time would go much further in buying all other commodities than it does at the present time.

The individual who intends to build should therefore not reckon his costs on the basis of prices of a few years ago, but more on what he has to pay for commodities in all other lines to-day. If this is done, the word "abnormal" as frequently used, can hardly be construed so far as building materials are concerned to imply a disproportionate advance. In a word, prices can only be regarded as high when considered on the basis of pre-war costs, and although a scarcity of a few materials may influence their market value, quotations for building products on the whole are only relative to costs governing all other necessities.

Priestman Wage-Fixing Scheme

The Higher Production Council of Great Britain has recently announced a new plan for fixing wages, known as the Priestman Scheme, which has been devised by a firm manufacturing machinery in London, England. By this new scheme a standard of production is established; that is the amount of work produced by the ordinary effort of a certain number of men, this standard being the basis of pay. Through increased individual effort this standard can be exceeded, and every employee receives a percentage on his wages for all output in excess of his standard. It is explained that the friction often caused by piecework is thus eliminated, and a maximum output is more possible. The Higher Production Council describes the scheme as the "solvent of many, if not all, of the difficulties now facing industry." The firm initiating the scheme has increased its average output by 50 per cent. through the operation of the scheme.

Provincial Builders and Supply Association to Meet

It is announced that the Provincial Builders and Supply Association of Ontario will hold a convention at the King Edward Hotel on February 10-11-12. Invitations have been sent out by Secretary Wright to the various exchanges and builders' associations throughout the Province, and also to the various cities and towns where the trade has not been organized. The meeting will be the most important that has yet been held covering the interests it represents, and present indications point to a large attendance. The business of the convention will be in charge of the following committees: General Convention and Entertainment Committee, P. L. Fraser, W. E. Dillon, and C. T. Penn; Resolution Committee, R. Marson, Stratford; Committee on Joint Industrial Council of the Building Trades, N. Gibbs, Sarnia; Technical Education and Apprenticeship, E. R. Dennis, London; Universal Building By-laws for Ontario, C. F. Till, Toronto; International Agreements, H. Hayman, London; Organization, Membership and Publicity, P. L. Fraser, Toronto; Legal Affairs, Mr. Norton, Sarnia; Lien Law, W. E. Dillon, Toronto; Workmen's Compensation Act, Geo. Gander, Toronto; Code of Ethics, M. F. Gibson, Toronto.

Control of Spreading Fires

The measures popularly advocated to control the spread of fire are four in number, namely, fire prevention, fire limits, fireproof construction, and fire departments. None of these alone can prevent a conflagration, and records show that together they have failed in almost every instance.

Fire prevention is the attempt to reduce the frequency of fires. The preponderance of disasters from unknown and trivial causes appears to forbid hope of controlling conflagrations by strictly fire prevention methods. It has been previously pointed out that, on the average, only one in 20,000 fires has reached the magnitude of a conflagration. That one fire is the problem demanding solution. If fire prevention successfully reduced the occurrence of fires in Canada to 100 per annum, there is no assurance that the spreading fire would not be one of the hundred. That depends largely upon the location of the outbreak and the character of its environs. When a small frame dwelling in Hull, Quebec, caught fire, that was the identical place where Hull and Ottawa began to burn. A similar occurrence in an isolated farm dwelling in a country district would have been equally serious so far as the individual building was concerned but it could not have resulted in the partial destruction of two cities. To debar conflagrations, therefore, fire prevention must not only diminish the frequency of fires, but also establish the confines of the occasional outbreaks that occur.—J. Grove Smith, in "Conservation."

Building Summary, 1919

Building operations in Canada during 1919 more than doubled the amount of work carried out in the preceding year. Reports received by CONSTRUCTION from thirty-eight important centres give a total for the twelve months just closed of $73,684,453 as against $35,454,930 in 1918. On the basis of percentage this represents a collective gain of 107.82 per cent., and shows a resumption of activities rapidly approaching and in some cases equalling the prewar scale. The figures in a number of cases are incomplete, in that they represent the total for the year only up to December 20, when figures were submitted, while it is known that in several instances important permits were issued after that date.

Cities.	No. of permits for 1919.	No. of permits for 1918.	Total cost of buildings 1919.	Total cost of buildings 1918.	1919 compared with 1918 Increase % (x) Decrease % (†) Increase per cent.
Toronto	7,456	4,353	$19,470,000	$8,535,331	x112.19
Hamilton	1,409	752	5,025,135	2,471,764	x103.30
Brantford	500	336	1,097,455	760,000	x 44.40
St. Catharines	694	....	861,636	463,917	x 85.72
London ,Ont.	1,178	774	2,108,720	876,660	x148.54
Guelph	....	....	600,759	84,935	x607.16
St. Thomas	195	91	285,525	54,935	x424.91
Stratford	....	....	378,736	89,786	x321.82
Kitchener	325	153	1,176,622	236,062	x398.41
Niagara Falls	234	105	876,889	356,716	x145.57
Windsor	996	371	2,561,370	570,305	x349.11
Walkerville	....	....	2,008,000	153,000	x558.82
Peterborough	193	159	196,638	241,251	† 18.60
Ottawa	546	256	3,123,225	2,577,322	x 21.18
Kingston	517	456	653,279	318,943	x104.82
Brockville	....	....	57,150	32,800	x 72.20
Owen Sound	60	35	100,000	30,000	x233.33
Sault Ste. Marie	....	....	1,016,740	271,395	x274.63
Sudbury	....	....	321,400	101,875	x215.48
Fort William	154	115	627,080	535,615	x 17.07
Port Arthur	269	247	1,708,051	629,666	x171.26
Montreal	2,119	1,481	9,738,735	4,883,673	x 49.85
Sherbrooke	135	....	914,350	....	......
Quebec	683	538	2,134,219	904,375	x135.98
Three Rivers	333	220	1,149,150	641,800	x 79.05
Halifax	1,198	1,481	5,194,806	2,857,855	x 81.77
Truro	47	....	155,000	....	......
St. John	49	26	—*506,540	351,323	x 48.18
Winnipeg	....	....	2,908,200	2,050,650	x 41.71
Brandon	57	55	98,537	99,022	† .004
Moose Jaw	....	....	577,000	567,645	x 1.60
Regina	....	....	1,696,520	1,006,000	x 68.64
Saskatoon	354	275	1,403,535	604,715	x132.09
Edmonton	303	126	918,346	351,510	x161.26
Lethbridge	72	51	162,110	135,550	x 19.59
Medicine Hat	61	41	254,843	78,390	x225.09
Vancouver	1,233	829	2,271,361	1,440,384	x 57.69
Victoria	313	146	466,141	289,760	x 60.87
Total (38 cities)	21,673	13,472	$73,684,453	$35,454,930	x107.82

* 169 permits for repairs, additions and alterations involving an expenditure of $118,300 not included in the above amount.

Figures submitted since the above summary was completed give Weston, Ont., a total for the year of $205,730.

Toronto has the largest total amounting to $19,420,000, which is an increase in excess of ten millions in the value of permits over 1918. In Montreal the value of permits was $9,738,735, or approximately 50 per cent. more than the corresponding figures. Halifax undertook developments involving $5,194,806. Vancouver invested $2,271,361, and Winnipeg registers a total of $2,908,200, despite the serious tie-up experienced during last summer's strike. All places intermediate to these points likewise made substantial progress. A feature worthy of note is the fact that eighteen of the thirty-eight cities reporting show investments of over $1,000,000 and upwards. Only two decreases were noted in the entire list, and these are both relatively small, in one case amounting to a mere fraction of one per cent.

In Ontario a most remarkable growth is indicated by comparative figures from various centres. London and the border cities of Windsor and Walkerville are well over the two million mark, while at Brantford, Kitchener, Sault Ste. Marie and Port Arthur, the totals noted involve amounts of slightly over a million and upwards.

Besides Montreal's figures, progress in the other parts of the Province of Quebec is made evident by Sherbrooke's investment of $914,350, and the totals of Quebec City and Three Rivers amounting to $2,134,219 and $1,149,150 respectively. Truro and St. John have substantial amounts further east.

Edmonton's total of approximately one million, and the respective amounts in Regina and Saskatoon of $1,696,520 and $1,403,534, as well as the gain in Victoria, and other prairie and coast cities, reflect the headway made in the West.

The accompanying table of figures gives the comparative amounts for 1918-1919 based on permits issued in the thirty-eight cities reporting and the percentage of increase or decrease in each case.

The Outlook for 1920

Replies to an enquiry sent by CONSTRUCTION to the building inspectors and city engineers of various municipalities are very optimistic in tone, and indicate a heavy volume of building work for the coming year. Practically every section in the Dominion is looking forward to a period of activity which if fully realized will witness operations approaching, if not equalling, the heavy investment of the boom days of 1910-11. We append herewith the reports received, which, in a number of cases, give specific information as to the character of work in contemplation.

HAMILTON, ONT. — From recent enquiries and plans furnished this office, and enquiries for and the sale of sites, both for business and dwelling purposes, the prospects look very bright for the coming year. Two large factories will be built this winter, work starting on them almost immediately, one for the Carr Fastener Co. and the other for the Firestone Tire Co.

WM. J. WHITELOCK, *Building Inspector.*

TORONTO, ONT.—The outlook is very bright for a large building year.

G. V. PRICE, *Assistant City Architect and Chief Inspector.*

OTTAWA, ONT.—Included in proposed work for the coming year is a civic hospital to cost $1,500,000, and the Salvation Army Maternity Hospital, which will involve an expenditure of $100,000.

R. HENHAM, *Building Inspector.*

BROCKVILLE, ONT.—Among contemplated improvements for 1920 is a paper mill and the probable erection of an iron foundry.

GEO. K. DRURY, *Town Clerk.*

KINGSTON, ONT.—Present indications point to a good building year.

R. J. MCLELLAN, *City Engineer.*

LONDON, ONT.—Prospects look good for the coming year. A permit has just been issued for the new medical school, costing $300,000, which brings thte total for the year just closing to $2,408,720, as compared with $876,660 in 1918.

A. M. PIPER, *Building Inspector.*

GUELPH, ONT.—The outlook for 1920 is already very bright. Among projected industrial work is a factory for a large American firm which is coming to Guelph.

F. MCARTHUR, *City Engineer.*

ST. THOMAS, ONT.—Work to be carried out during 1920 will include operations by the Housing Commission, which is at present getting out plans. As to the probable extent of operations, definite figures are not available.

W. C. MILLER, *City Engineer.*

STRATFORD, ONT.—Expect record building year; preparations now being made for a number of developments.

City Engineer.

SAULT STE. MARIE, ONT.—The prospects for the ensuing season are very promising, although I am not in a position as yet to report anything definite, other than proposed extension to the High School and new Technical School, each involving the sum of $110,000. With the urgent demand for houses here, there is every likelihood that the government housing scheme will again go ahead this year, so that with certain business blocks in contemplation, the prospects are indeed very promising.

J. GOURLAY, *City Engineer.*

OWEN SOUND, ONT.—Several factory additions are being talked of at the present time.

CHAS. J. PRATT, *Building Inspector.*

KITCHENER, ONT.—Building prospects for 1920 are very promising. Several large extensions to factories are contemplated, including an addition to the Kaufman Rubber Co. and an additional building for the Lang Tanning Co.

B. G. MICHEL, *City Engineer.*

BRANTFORD, ONT.—The building outlook is good.

T. HARRY JONES, *City Engineer.*

SUDBURY, ONT.—A considerable number of houses will likely be built this year. No assurance as yet as to extent of operations.

BUILDING INSPECTOR, *Per George Elliott.*

FORT WILLIAM, ONT.—The building outlook for the coming season is fair.

S. MCNAMARA, *Building Inspector.*

QUEBEC CITY.—The prospects for 1920 are far better than they were at the beginning of the year just ended, and it is expected that the total for building operations will be over three millions.

A. D. TRUDEL, *Assistant Building Inspector.*

THREE RIVERS, QUE. — Between 300 and 500 houses must be built this coming spring to provide for increasing population. Altogether prospects are bright. The shipyards are already preparing new buildings and machinery for iron shops, and the pulp and paper interests setting up new plant.

ALD. MARTEL, *City Assessor.*

SHERBROOKE, QUE.—Location has been decided and plans drafted for model housing scheme involving erection of 100 homes in 1920, and an additional hundred in 1921. Other prospects include several commercial blocks, a rubber tire factory and an extension to the Connecticut Cotton Mills, costing approximately $250,000 for building alone. Lots have also been purchased by private individuals for the erection of residences quite apart from the proposed housing scheme.

W. L. MCSWIGGIN, *Building Inspector.*

TRURO, N. S.—Dwellings are the only class of buildings in contemplation at the present time.

J. J. W. CAMPBELL, *Town Engineer.*

ST. JOHN, N.B.—There is no tangible evidence to guide one in making predictions as to the immediate future. A great deal will depend upon the cost of materials.

JAMES CARLETON, *Building Inspector.*

HAIFAX, N.S.—Work in contemplation includes a new theatre, several churches and large apartment houses. The outlook is very bright.

W. R. FEGAN, *Assistant Building Inspector.*

SASKATOON, SASK.—The outlook for the year points to a considerable amount of construction work. The following new work is assured and the money provided for same:

New collegiate, $350,000.

City Hospital extension, $250,000.

Normal School to be erected by the Provincial Government.

Extension of Victoria Public School.

Completion of Physics and Engineering Buildings, University.

Completion of Mayfair Public School.

These two latter only have foundations in at present.

There is also talk of a new theatre, new bank building, several warehouses and stores and a number of dwellings. GEORGE D. ARCHIBALD, *City Engineer.*

REGINA, SASK.—Providing there is no shortage of materials or labor, the prospects for the coming year are very bright. The following is a list of projected buildings for this season, and their value:

Mastertons, garage	$ 30,000
Hardings, garage	30,000
Whelans, garage	18,000
Wood Vallance, warehouse	200,000
Leader Pub. Co., warehouse	10,000
Fairbanks Morse, warehouse	110,000
Winnipeg Ceiling Co., warehouse	40,000
Marshall Wells, warehouse	150,000
Merchants Bank, bank	175,000
City of Regina, hospital additions	85,000
City of Regina, pavilion	25,000
City of Regina, car barns	60,000
City of Regina, disposal works addition	30,000
City of Regina, exhibition buildings	60,000
Sask. Co-operative Creameries offices	200,000

R. BLAXHAM, *Superintendent of Construction.*

MOOSE JAW, SASK.—Plans for several business blocks are now being prepared by local architects, and at least one large school and additions to two existing schools will be constructed during the year. It is also expected that, the C.P.R. will commence construction of a new depot here to cost $500,000, early in the spring.

J. CLARK KEITH, *Building Inspector.*

BRANDON, MAN.—Large buildings contemplated for 1920 include the General Hospital, to cost $250,000; Nurses' Home at the Hospital for the Insane to cost $150,000. The building outlook is good.

Building Inspector.

EDMONTON, ALTA.—There is quite a number of large buildings under contemplation and a few to be completed that have been held up by earl ywinter this year. Warehouse additions are far short of the demand at present, and this also applies in regard to dwellings which are quite inadequate to meet the demand, due to growth in population. Herewith are mentioned a few of the important buildings which will in all likelihood go ahead:

Reinforced concrete warehouse and offices for Marshall Wells, part 8 storey and part 2 storey, 100x150.

Brick building for the Edmonton Journal, 3 storeys, 50x150.

Brick building for a Union Telephone Station, part 3 storey and part 2 storey, 50x150.

Brick warehouse and offices for Carroll & Wilson, 4 storeys, 100x150.

Brick building for Bank of Toronto, stores and offices, 4 storeys, 50x85.

Flour mill for Western Canada Flour Mill Co., 4 storeys.

Public garage, 2 storeys, 50x150.

New theatre for Empire Theatre Company.

New Anglican Church.

BUILDING INSPECTOR, *Per W. Thoms.*

LETHBRIDGE, ALTA. — Several large structures are under consideration for 1920. The city will also likely make application for its share of the government housing. M. W. MEECH, *Building Inspector.*

MEDICINE HAT, ALTA.—At the present time several structures of importance are contemplated and all indications point to considerable activity throughout the season. R. B. PYPER, *City Engineer.*

VANCOUVER, B.C.—The outlook for next year is, on the whole, promising. One $500,000 theatre is projected, and the present house shortage will necessitate many dwellings being put up.

ARTHUR J. BIRD, *Building Inspector.*

The H. Mueller Mfg. Company, Limited, are sending out an artistically printed wall calendar to the trade. It shows a very excellent engraved bird's-eye view of this firm's large modern plant at Sarnia, Ont.

CONTRACTORS and SUB-CONTRACTORS

As Supplied by the Architects of Buildings Featured in This Issue.

DOWSLEY SPRING & AXLE CO.'S PLANT, CHATHAM, ONT.

Gypsum Roof, Ebsary Fireproofing & Gypsum Block Co.
Structural Steel, Canadian Des Moines Steel Co.
Steel Sash and Monitors, Trussed Concrete Steel Co.
Roofing, Carmichael Waterproofing Co.
Sheet Metal, Carmichael Waterproofing Co.
Painting & Glazing, W. H. Palmer.
Plumbing, J. W. Draper.

CANADIAN CO-OPERATIVE WOOL GROWERS, LIMITED, WAREHOUSE.

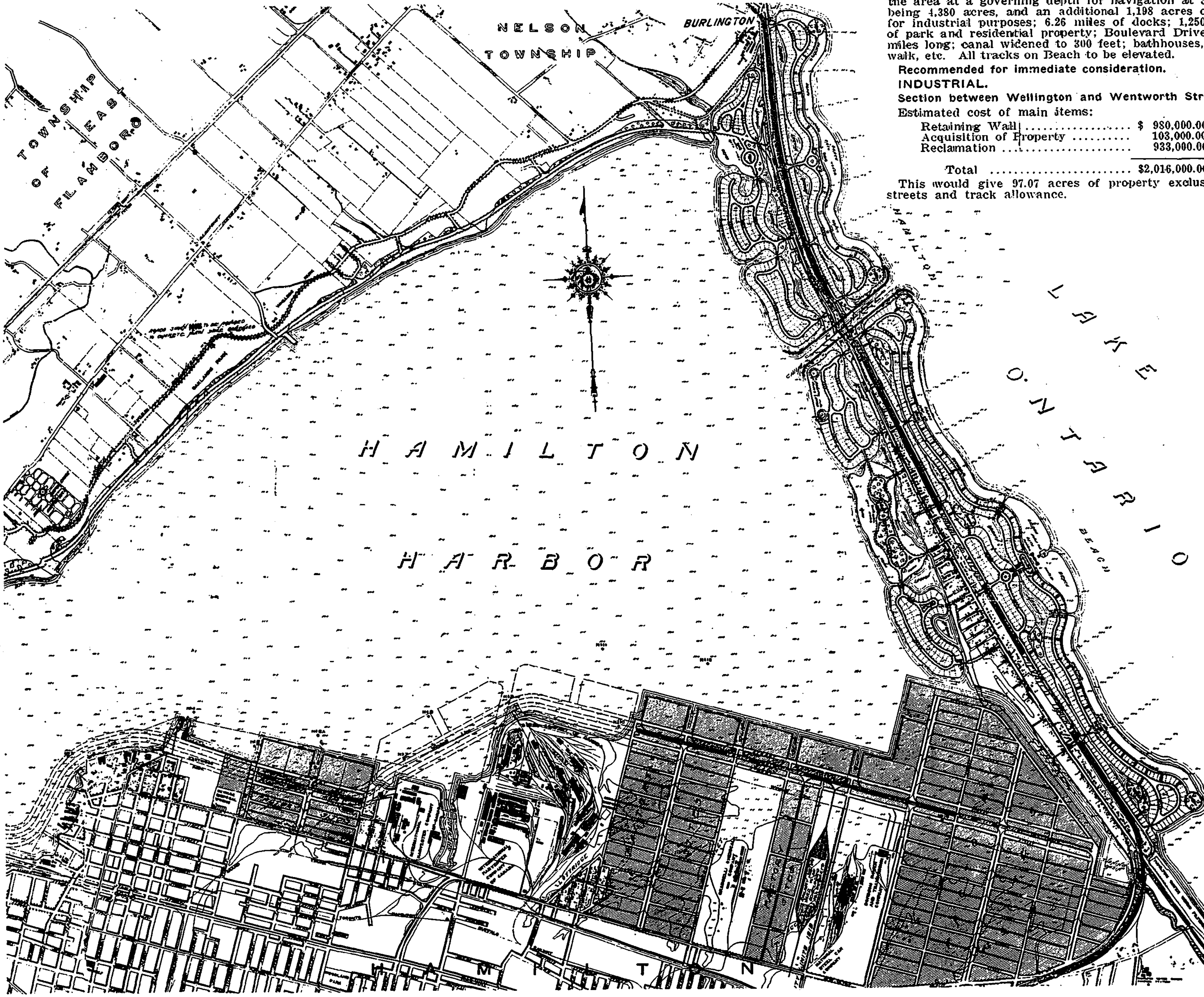
Carpentry, J. Robert Page.
Display Signs, J.E. Richardson & Company.
Drainage, A. H. Read.
Electric Wiring, Bennett & Wright.
Elevator, Otis-Fensom Company.
Masonry, J. Robert Page.
Roofing, Reggin & Spence.
Steel Work, Hepburn & Disher.
Wire Window Guards, Shipway Iron & Wire Manufacturing Co.

EDUCATIONAL BLOCK, ROYAL MILITARY COLLEGE, KINGSTON, ONT.

Heating, Plumbing and Ventilating Work, McKelvey, Birch Co.
Electric Work, H. W. Newman Electric Co.
Structural Steel, Hamilton Bridge Co.
Plastering, R. D. Clark & Sons.
Roofing and Sheet Metal Work, Thomas Irwin & Son.
Cut Stone, Ritchie Cut Stone Co.

HUNTER BUILDING, OTTAWA, ONT.

Plastering, P. B. Baxter.
Mastic Floors, Canadian-Johns Manville Co.
Ornamental Iron, Canadian Ornamental Iron Co.
Glass, Consolidated Plate Glass Co.
Plumbing, W. G. Edge, Limited.
Heating, W. G. Edge, Limited.
Ventilation, W. G. Edge, Limited.
Electrical, A. A. Giddings & Co.
Interior Trim, George M. Mason, Limited.
Sheet Metal, Hollow Metal and Kalamein, McFarlane-Douglas Company.
Elevators, Otis-Fensom Elevator Co.
Painting, W. H. Reid.
Roofing, J. D. Sanderson & Co.
Cut Stone and Granite, Tyndall Quarry Co.
Marble, Tile, Terrazo, Jas. Walker Hardware Co.
Hardware, Jas. Walker Hardware Co.
Prism Lights, Luxfer Prism Co.
Plumbing Fixtures, Imperial Products Co.
Radiators Fixtures, Imperial Products Co.
Radiators, Taylor Forbes Co.
Boilers, E. Leonard & Son.
Ventilation, Canadian Blower & Forge Co.
Boiler Feed Pumps, Darling Bros.
Vacuum Cleaners, United Electric Co.
Heat Regulator System, Canadian Powers Regulator Co.
Radiator Traps, C. A. Dunham Co
Stokers, Galt Stoker Co.
Filters, New York Consolidated Jewel Filter Co.
Steel Furniture, Steel Equipment Co.
Structural Steel, Dominion Bridge Co.
Cement, Canada Cement Co.
Gypsum Blocks, Ontario Guypsum Co.
Brick, Milton Pressed Brick Co.
Hollow Tile, National Fireproofing Co.



Proposed Water Front Development, Hamilton, Ont.

The completion of the entire work as shown on Water-front Development Plan would give Hamilton a harbor, the area at a governing depth for navigation at 30 feet, being 4,380 acres, and an additional 1,198 acres of land for industrial purposes; 6.26 miles of docks; 1,250 acres of park and residential property; Boulevard Drive, 18.98 miles long; canal widened to 300 feet; bathhouses, board walk, etc. All tracks on Beach to be elevated.

Recommended for immediate consideration.

INDUSTRIAL.

Section between Wellington and Wentworth Streets.

Estimated cost of main items:

Retaining Wall	$ 980,000.00
Acquisition of Property	103,000.00
Reclamation	933,000.00
Total	$2,016,000.00

This would give 97.07 acres of property exclusive of streets and track allowance.

The Dominion Government have already made initial appropriation of $100,000.00.

Beach and Park Development:

Estimated cost of main items:

Reclamation	$1,486,000.00
Bridges	300,000.00
Channel wall at south end	700,000.00
Total	$2,486,000.00

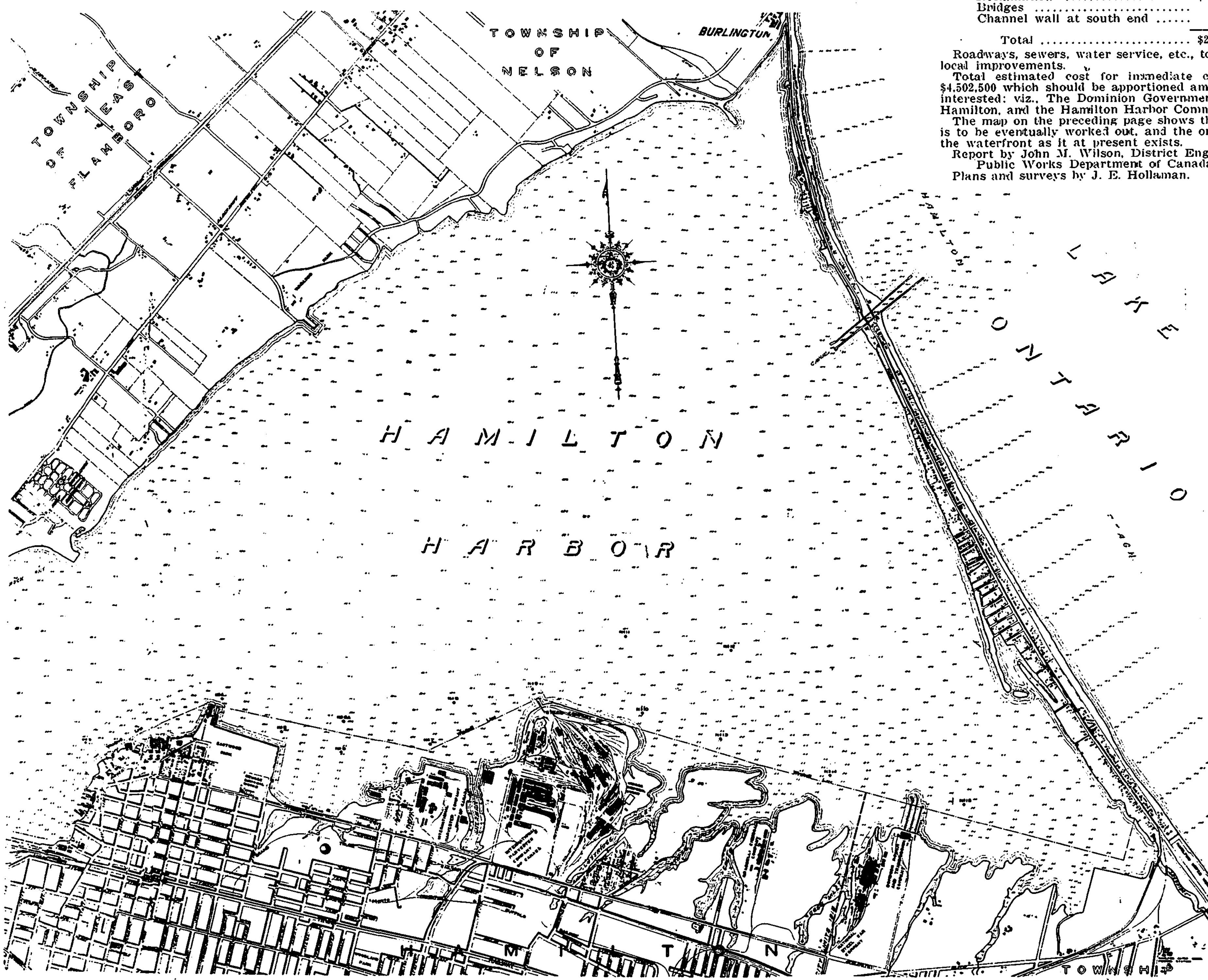
Roadways, sewers, water service, etc., to be charged as local improvements.

Total estimated cost for immediate consideration is $4,502,500 which should be apportioned among the parties interested: viz., The Dominion Government, The City of Hamilton, and the Hamilton Harbor Commissioners.

The map on the preceding page shows the scheme as it is to be eventually worked out, and the one on this page the waterfront as it at present exists.

Report by John M. Wilson, District Engineer,
Public Works Department of Canada.

Plans and surveys by J. E. Hollaman.



Conference on Concrete House Construction

An event of special importance, particularly in view of existing conditions, is the National Conference on Concrete House Construction to be held at the Auditorium Hotel in Chicago, from February 17 to 19, inclusive. While designated "national," the scope of the conference, according to the announcement, is intended to include both Canada and the United States. Its object is to consider the housing problem in both countries, and to present, crystalize and make available information regarding the most modern practice in the construction of concrete houses and concrete housing projects.

It is hardly necessary to emphasize the vital need which exists at the present time for home building, or to point to the apparently unsettled condition which is to be found in many industrial centres due to a lack of adequate housing facilities. Although some efforts have been made here in Canada during the past year to relieve the situation, we have not as yet made hardly more than a start toward providing the actual dwelling accommodations required. For some time, in fact, the shortage of houses has attracted public attention not only to the immediate necessity for more houses, but also to the fundamental need for housing of the sort that makes for good homes and happy and contented people.

In other words, it is generally recognized that a house must be more than just a shelter and the community more than just a group of houses. Individual ownership of the home creates pride in the community and makes for good citizenship. More and more, home builders are realizing the necessity of building economically and permanently. Demand for information has been so great and practices so varied as to make the need felt for the standardization of the practice of constructing concrete houses.

The coming Chicago conference will therefore not only make an effort to devise some means for meeting this demand, but will pay especial attention to the methods of financing home building, community planning, fire protection and methods of construction of the various types of concrete houses.

The following committees have been organized:

Architecture and Design.
Community Planning.
Financing Permanent Homes.
Fire Prevention and Insurance Rates.
Building Codes.
Monolithic Concrete Houses.
Special Unit Houses.
Concrete Block Houses.
Concrete and Cement Roofing.

Many well known organizations are co-operating in this movement, among them being the American Concrete Institute, the Associated General Contractors of America, the Concrete Products Association, the Portland Cement Association, the Illinois Society of Architects, the Illinois Chapter of the American Institute of Architects, the U.S. League of Building and Loan Associations, and many other organizations of local and national influence.

Other organizations which will meet in Chicago at the Auditorium Hotel during the week the conference is in session, are the American Concrete Institute, the Concrete Products Association, the Concrete Block Association, and the American Concrete Pipe Association.

The conference will be attended by architetcs, contractors, community planners, cement product manufacturers, industrial and real estate development concerns, building and loan associations, and others interested in various phases of the housing problem.

CONSTRUCTION desires to acknowledge the receipt of a 1920 Vest Pocket Diary, which is being mailed to friends and customers by the Canadian Westinghouse Company, Hamilton, Ont. In addition to space available for daily notations, it contains considerable general information for everyday use, as well as a number of tables and data in regards to belting, wiring, turbines and condensers, mechanical stokers, generators, railway motor ratings, tractive efforts, thermometer ratios, etc.

Sixteen Storey Hotel for Montreal

The Montreal City Council has adopted a resolution endorsing the erection of a sixteen-storey hotel. The proposal is now before the Administrative Commission with which any amendment to the present regulations restricting the height of buildings to ten stories must originate. Several prominent citizens including Lord Shaughnessy and President Beatty of the C.P.R. are interested.

Convention Date Changed

In order to avoid conflicting with the annual meeting of the Engineering Institute of Canada, to be held in Montreal, the Association of Canadian Building and Construction Industries have changed the date of the Ottawa Conference to February 2nd, 3rd and 4th, instead of January 27th to 30th, as previously announced. Sessions will be held in the Chateau Laurier, commencing at 10 a.m. on Monday, February 2nd, and continue throughout the period mentioned.