Legislature for an act to incorporate the Toronto and Collingwood Air Line Railway and Navigation Company, with power to construct and operate a railway from a point in or near Collingwood to a point near Toronto.—A project is on foot to utilize the water of the Credit River for power purposes. Incident to the scheme will be the building of a dam, the formation of a lake, two miles long, for a fish reserve. The promoters of the scheme are Sir Melville Parker, Mr. William McKenzie and Ald. J. Enoch Thompson.—Another meeting was held on Tuesday last to consider the erection of a suitable memorial to the late W. H. Howland. It was decided to solicit subscriptions for the erection of a new drill hall at the Mimico Industrial school, towards which Mr. H. A. Massey has already donated the sum of $3,000. The cost of the building, according to plans already prepared will be about $8,000. The erection of a monument in Queen's avenue was also considered.—Building permits have been granted as follows: M. Nasmith, 14 Maitland st., three att. 2 story and attic bk. dwellings, 124-6 Bond st., cost $6,000; C. Page, Lowther ave., 2 story bk. add. in rear and alterations to 202-210 Yonge st., cost $6,000; R. A. Graydon, det. 2 story and attic bk. dwelling, Homewood ave., cor. Maitland Place, cost $5,000; J. C. Price, det. 2 story and attic b. f. dwelling, 105 Morse st., cost $1,300; Dr. Temple, alterations to stores, 440 Spadina ave., cost $2,000.

FIRES.

The St. Urbain Academy, situated on St. Urbain street, Montreal, was damaged by fire recently to the extent of $3,000.—Four large buildings at Yarmouth, N. S., owned by Walter Thompson, were destroyed by fire on Tuesday last. The loss is partly covered by insurance.—The Methodist church at Munster, Ont., a brick structure valued at $3,000, was destroyed by fire on Saturday last. The loss is covered by insurance.—Comyn Bros. furniture store at Wingham, Ont., was burned on the 8th inst.—Fire at Sault Ste Marie, Ont., on Monday last destroyed McQuarrie's grocery store, Thomas' stationery store and Stark's shoe store. Loss, $10,000; partly covered by insurance.—A building at 700 Queen st. west, Toronto, owned by the Land Security Co., was damaged by fire last week to the extent of $1,000.—E. Teucut's office and Downing Bro's. butcher shop at Lucan, Ont., owned by William Stanley, were burned to the ground recently. The loss is covered by insurance.—The residence of Mr. M. Brown, at Rat Portage, Ont., was destroyed by fire on the 5th inst.

CONTRACTS AWARDED.

SMITH'S FALLS, ONT.—Mr. R. S. Nichols, of Toronto, has been awarded the contract for new public school to be erected in this town, his price for the work being $7,000.

REGINA, N. W. T.—The Council have purchased from Mr. J. D. Ronald, of Brussels, Ont., his World's Fair gold medal steam fire engine. Price, $3,200, including automatic steel tubular heater.

TORONTO, ONT.—Mr. Geo. F. Bostwick, has been awarded the contract for the new fittings of the Ontario Bank in this city, also for the offices of Messrs. John Stark & Co. and the Queen City Oil Works, Front street east.

VANCOUVER, B. C.—Mr. T. McKinnon has been awarded the contract for the erection of the Inns of Court building at the corner of Hastings and Hamilton streets. The building is being erected by Dr. Powell, from plans prepared by Mr. R. M. Frippe, architect, and will extend 2 feet on Hastings street and 120 feet on Hamilton street.

HAMILTON, ONT.—The Finance Committee has accepted the tender of the Bank of Hamilton for the purchase of $2,250,000 worth of debentures, the price being $2,274,000. The other tenderers were Messrs. Wyatt & Jarvis, of Toronto, and the Bank of Montreal.—The directors of the Hamilton, Grimsby and Beamsville railway has awarded a contract to Messrs. Ahearn & Soper, of Ottawa, for building eleven trolley cars. They have also ordered 50 tons of copper wire from the Eugene F. Phillips Electrical Works of Montreal.

ARCHITECTURAL COMPETITIONS.

Plans are invited until Feb. 20th for a Court House at Pittsfield, Ill. Particulars may be obtained on application to the County Clerk, Pittsfield, Ill

BUSINESS NOTES.

Longueil & Hubley, plumbers, Halifax, N. S., have dissolved partnership, Mr. R. Longueil continuing the business.

Mr. R. Audet has been appointed liquidator of the estate of N. Lemieux & Noel, wholesale and retail hardware merchants, Quebec.—Messrs. Theriault & Campagne have formed a partnership as stone contractors in Montreal.

The *Legal and Commercial Exchange* report the following: P. S. McManns, contractor, Moncton, N. B., has assigned.—Nelson & Maughan, sash and door manufacturers, Richmond, Que., have dissolved partnership.

FACTORS OF SAFETY FOR STEEL GIRDERS.

BY GEO. H. BLAGROVE.

In the tests for steel to which we have referred, it will be noticed that no compressive tests are prescribed. In the kind of steel we have been describing it is usual to reckon the compressive as equal to the tensile resistance, although it is generally rather more. Assuming that we can have steel girder plates whose ultimate tensile and compressive resistance are not less than 28 tons per inch, what factors of safety must we employ? Mr. C. A. Marshall, when lecturing before the American Society of Civil Engineers in 1887, observed, from experiments upon wrought iron and steel, that, with solid bars, the elastic limit was the chief factor in determining the ultimate resistance of struts of ordinary length. This observation, of course, has reference to transverse strains, and is therefore equally applicable to girders. Mr. Marshall's experiments showed that steel whose ultimate tensile resistance was about 30 tons or more had an elastic limit of about 18 to 19 tons, or from 3·5 to nearly ⅔. In wrought iron of about 25 tons ultimate tensile resistance, he found the elastic limit from about 5·7 to ⅔. These are higher proportions than in the steel, but then we know that wrought iron is in this respect subject to great variations. In Styffe's experiments, previously quoted, steel containing ·4 to ·42 per cent. of carbon showed an ultimate tensile resistance of 31·07 tons, with an elastic limit of 15·3. In the report of the Steel Committee (1868-70) we find records of experiments upon Bessemer steel showing an ultimate tenacity of 33·66 tons, with a yielding stress, of 16 tons, and sometimes more; and Lowmoor steel with an ultimate tenacity of 27·8 to 24·07 tons, and an elastic limit of 14 to 12 tons. The committee found that the stress at which the material broke down was in all cases nearly the same for tension and compression that the amount of compression and extension by equal forces per unit of area was nearly equal, and that it was less for steel than for wrought iron. Bauschinger's experiments upon Terniz steel containing ·55 per cent. of carbon showed an ultimate tenacity of 35·9 tons, with elastic limits of 20·98 tons for tension and 22·22 tons for compression. In experimenting with repetitions of stress upon mild steel plates having an ultimate tenacity of 28·5 tons, he raised the elastic limit from 15·6 to 19·4 tons by 6·68 million repetions of a load of 16 tons. It would appear that had the load been kept below the original elastic limit, the metal would have endured an indefinite number of repetitions of it without fracture. Hence we might infer that a live load of nine tons per inch would be perfectly safe. Wohles's experiments upon cast-steel axles showed that a live load of 23 tons was equivalent to a mixed load of 38·2 tons, whence it might be inferred that where we could use a live load of nine tons a mixed load of 14·8 tons would be admissible. It would not be wise, however, to approach so near to the elastic limit as this, though it is certain that we may employ lower factors with steel than with iron, owing to the greater homogeneity and uniformity in quality of the former material. The homogeneity of mild steel was forcibly illustrated in experiments by the Board of Trade, reported in 1881. The ultimate tensile strength and the yield point were the same whether the stress was applied lengthwise or crosswise to the plates tested, only the ultimate elongation and contraction of sectional area differed. The following are some of the results quoted:

—	Yield point in tons per inch.	Ultimate tenacity.	Percentage of elongation in 10 in.	Percentage of contraction.
⅞ in. plate tested lengthwise...	19	31	23.5	46
Ditto, tested crosswise....	19 1	31.4	21.2	39 9
1 in. plate tested lengthwise...	14 9	28	30.6	50.4
Ditto. tested crosswise....	14.8	28	25.6	42.4

We can only rely upon a limit of working strength equal to half the ultimate strength, and we can approach nearer to this limit than in wrought iron, owing to the greater uniformity in the quality of the metal. It is generally agreed that the working stress of 6½ tons per inch, prescribed by the Board of Trade for steel bridges, is far too little for economy. Barlow prescribes the working stresses of eight tons for plates and nine tons for bars.

Mr. F. T. Reade, in a paper on "The Application of Iron and Steel for Building Purposes" read before the Royal Institute of British Architects in 1889, prescribed a working stress of seven tons per inch for dead loads upon steel girders, somewhat curiously allowing 8½ tons for mixed loads. Possibly it is intended that, with dead loads, a margin is left for the further occurrence of occasional live stresses; otherwise we should naturally take a high working stress for dead loads. R. H. Thurston, in his work on "The Materials of Engineering" (New York, 1883), Part II., page 341, prescribes the following factors on the ultimate strength of soft steel: dead, 3; live, 6: shock, 8; and the following on the elastic limit: dead, 1; live, 2; shock, 3. This evidently assumes the elastic limit at one-third of the ultimate strength. As we have shown, it is more that this, and about one-third of the ultimate strength, or about nine to ten tons, would be a safe stress for dead loads. For mixed loads 8½ tons would be proportionately safe, taking five tons for live loads.

(To be Continued.)

HOW TO MAKE GRANITE COLUMNS.

Granite for columns, balusters, round posts and urns is now worked chiefly in lathes, which, for the heaviest work, are made large enough to handle blocks twenty-five feet long and five feet in diameter. Instead of being turned to the desired size by sharp cutting instruments, as in ordinary machines for turning wood and metal, granite is turned, or rather ground away, by the wedge-like action of rather thick steel discs, rotated by the pressure of the stone as it slowly turns in the lathe. The discs, which are six or eight inches in diameter, are set at quite an angle to the stone, and move with an automatic carriage along the lathe bed. Large lathes have four discs, two on each side, and a column may be reduced some two inches in diameter the whole length of the stone by one lateral movement of the carriage along the bed. The first lathe for turning granite cut only cylindrical or conical columns, but an improved form is so made that the templets or patterns may be inserted to guide the carriages, and columns having any desired swell may be readily turned. For fine grinding and polishing the granite is transferred to another lathe, where the only machinery used is to produce a simple turning or revolution of the stone against iron blocks carrying the necessary grinding or polishing materials.

MUNICIPAL DEPARTMENT.

HEIGHT OF BUILDINGS IN LONDON.

The London County Council, at a recent meeting, adopted the recommendation of the Building Act Committee that the proposed Bill to be introduced next session to consolidate and amend the Acts relating to streets and buildings in the County of London should contain clauses providding:—

(*a*) That the existing buildings should not be raised or extended so as to contravene the provisions of the Bill as to height and open space in front which are applicable to new buildings, or where they already contravene such provisions they should not be raised or extended so as to make matters worse.

The next recommendation was designed to meet a grave defect in the existing law, whereby the Council had practically no control over such buildings as blocks of artisans' dwellings not fronting any street, but enclosed in a courtyard exclusively belonging to them.

(*b*) That domestic buildings not abutting upon any streets shall be subjected to restrictions as to height and open space about them similar, mutatis mudandis, to those to which buildings abutting on streets are subject.

As regarded the difficulty of setting back buildings in old streets or on old foundations, they thought the setting back should be compulsory, and, as regards the public convenience, there was no sufficient reason why the public should not pay a fair price for what it required. They therefore recommended:

(*c*) That buildings erected anew upon old foundations shall, unless the Council otherwise allow, be subject to the same restrictions of height as new buildings erected upon new sites.

(*d*) That buildings erected anew upon old foundations, or erected in old streets, shall, unless the Council otherwise allow, be set back at the same distance from the centre of the road, as applies to new buildings erected on vacant land, but that in their case the owner shall not be compelled to give up the public way the land so left free from buildings.

It was becoming more and more the practice to erect large blocks of buildings which entailed certain peculiarities of construction. Amongst others, it was often found necessary to light many of their rooms by internal areas or courtyards; therefore they recommended

That provision be made for the adequate ventilation of internal areas of shafts constructed with a view to providing light and air to rooms in domestic buildings, and for regulating the dimensions of the same.

As the law stood at present, the committee often found itself in a difficulty as to new streets; therefore they recommended:

(*f*) That it should be an offence to lay out any new street without the sanction of the Council in writing.

(*g*) That in cases arising in the administration of the Building Act the Council shall have power, under proper safeguards, to close or divert useless roads, paths, or rights of way.

(*h*) That the Council be empowered to frame by-laws to regulate lamps, signs, or other things attached to houses and overhanging the public way, such by-laws to be enforced by the vestries.

LEGAL DECISIONS AFFECTING MUNICIPALITIES

W. P. ST. GEORGE VS. TOWN OF LONGUEIL.—This action was taken because the town used street gulleys which were alleged to be an infringement of plain