that 9-inch walls are permitted by the by-law for severer conditions of loading than exist in curtain walls. Perhaps the best example of this is the use of 9-inch walls for the external, load-bearing walls of dwellings two stories in height. While curtain walls sustain only their own weight for one story of height, these bearing walls carry the entire weight of the floors and roof in addition to their own weight, for two stories in height.

A further abuse in the matter of curtain walls exists in the requirement that they shall be increased by 4½ inches in thickness below the uppermost 75 feet of the building and by an additional 4½ inches for each 60-ft. section below that. For the same story heights, curtain walls in the lower stories carry no more load than those in the upper stories and the thickening is no guarantee that falling walls may not break through into the building. Windows are allowed on any side of a building and may fill entire panels of wall space, as they very often do for the first story or two above ground.

The practical effect of this indefensible curtain wall specification is to increase the weight and size of the wall girders, wall columns and wall footings, to add a great deal of unnecessary brick, concrete or tile to the walls and to reduce the available floor space. Actual estimates show a financial waste for this reason alone in representative buildings running into thousands of dollars. For a 10-story building, say, 80x100 ft., the waste, neglecting the value of lost floor space, is from $7,000 to $10,000. In a memorandum submitted by Mr. A. H. Harkness, of Harkness and Oxley, consulting engineers, to Judge Denton in the recent enquiry into the City Architect's Department, it was shown that the cost of the Dominion Bank Building was increased by $14,200 by reason of the requirement that curtain walls shall be thickened below the top 75 feet of the building. Of this, $9,200 was for extra masonry and $5,000 for extra steel. Mr. Harkness also calculated that the loss in *annual* rental value because of the reduction in available floor space is $5,900. Capitalized at 6 per cent., this amounts to an investment of approximately $100,000. For the Canadian Pacific Railway Building, the cost of excess masonry was $6,150 and of excess steel $3,900, making in all, $10,050. The loss in annual rental value is $5,150, which when capitalized represents an investment of about $85,000. In the case of a large building in another city where the same antiquated regulations are in force the waste of steel alone involved in the thickening of curtain walls below the top 75 feet was 800 tons with a value of $45,000, not counting the cost of the masonry nor the value of the lost space.

SAFE LOADS ON BRICK WORK AND MASONRY.

Sub-section 19, page 44.—According to tests made in the University of Toronto laboratories, the average crushing strength of ordinary brick masonry laid in lime mortar is 67 tons per square foot, and when laid in cement mortar, 122 tons per square foot. In view of these results it is interesting to note the following safe loads per square foot specified for brick masonry in the Toronto by-law:

Kiln run bricks laid in lime mortar	4 tons
Ordinary brick laid in Portland cement mortar	6 tons
Hard brick laid in lime mortar	7 tons

It is thus evident that in Toronto the average factor of safety required for ordinary brick laid up in lime mortar is 17, and for ordinary brick work with Portland cement mortar no less than 20. For walls, piers or other like supports a factor of safety of over 10 or 12 is uncalled for and its requirement results in a great waste of material.

A striking commentary on the lowness of the allowable pressures on brick masonry is afforded by comparing them with the following permissible loads per square foot on soils established by the by-law:

Gravel and coarse sand, well cemented	8 tons
Dry, hard clay	4 tons
Sand, compact and well cemented	4 tons

From the above two tables it is evident that a well compacted gravel or coarse sand is considered to be capable of sustaining more load than any one of the three grades of brick masonry mentioned and twice as much as kiln run bricks laid in lime mortar.

It is of interest to note, too, that with respect to the load that would result in dangerous, crack-producing settlements, the factor of safety involved in the above permissible soil pressures is from 2 to 3, while the factor of safety required on brick masonry is from 17 to 20.

A study of the available records of tests of brick masonry indicates that the specified safe loads on brick work might, with perfect security, be increased 33 per cent., and still allow a factor of safety of at least 12. The waste in brick piers, as at present constructed, is therefore 33 per cent.

The safe pressure on walls and piers of concrete is also much too low and should be increased.

CAST IRON COLUMNS.

Section 16, page 74.—In view of the results of tests on full-sized cast iron columns, and the large element of uncertainty attending their manufacture and use, the safe loads specified for these columns in the by-law are undoubtedly excessive. A factor of safety of less than four, which the by-law permits in the case of the most heavily loaded columns is manifestly insufficient when it is remembered that with the far more reliable material, structural steel, the factor of safety demanded is four. No acknowledged authority known to the writer sanctions a factor of safety of less than 5 for cast iron columns and for this reason the safe loads allowed by the by-law should be reduced for certain columns by over 20 per cent.

PLATE GIRDERS.

Sub-section 4, page 77.—The provisions of the by-law respecting plate girders are not in accordance with good engineering practice. In order to satisfy them, girders must be made considerably heavier than would be required for the support of the same loads in most of the railway and highway bridges of the country. Thus, a plate girder constructed according to either the specifications of the Canadian Pacific Railway, the Grand Trunk Railway, the Canadian Northern Railway, the Dominion Government, the Ontario Government, or the Canadian Society of Civil Engineers would not be acceptable for use in a building in Toronto. The absurdity of this is still more apparent when it is remembered that a bridge girder must withstand large and uncertain stresses due to impact and vibration and is subjected to rapid corrosion from moisture and locomotive gases, while a building girder carries quiescent loads and is but little exposed to corrosion. Another remarkable fact is that plate girders in bridges built by the Works Department of the City of Toronto, and conforming as they do to the above-mentioned authoritative specifications, would not pass the city building by-law, and would be regarded as unsafe by the City Architect's Department. On the other hand, if all the city bridges are safe, there is an