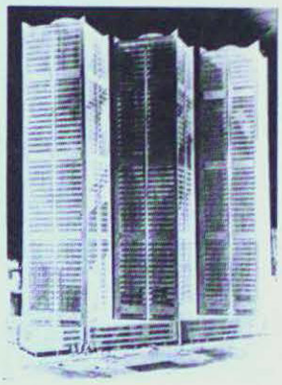
STOCK EXCHANGE TOWER, MONTREAL



A Critique of:

PLACE VICTORIA

Reprinted from the June, 1966 issue of the ***Architectural Review.***

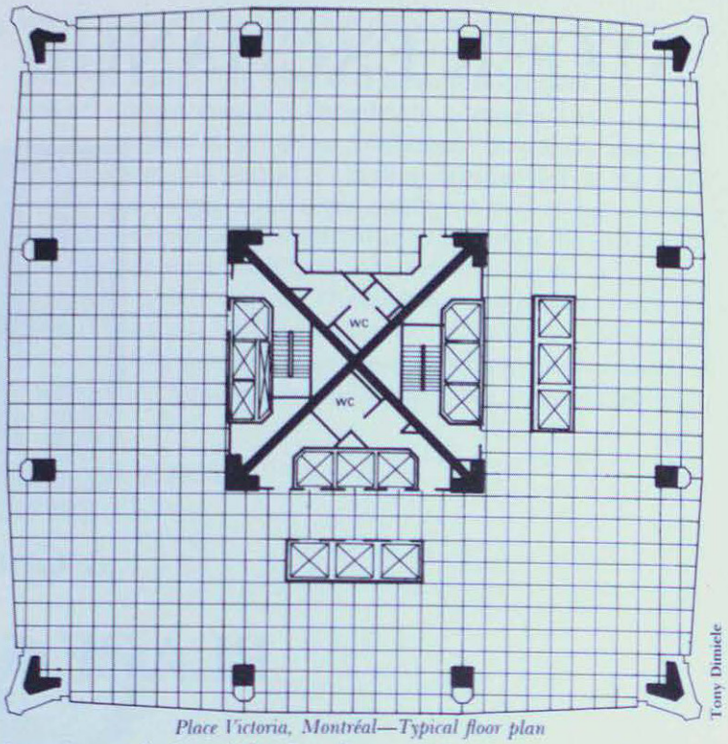
This new building, officially opened on October 17, 1965, is commonly referred to as the Place Victoria—presumably by analogy with another magnificent tall office building built recently in the heart of Montreal: I. M. Pei's Place Ville Marie. But whereas the most striking feature of the latter is its provision of spacious open-air pedestrian plaza at street level within the boundaries of the site chosen for development, the Montreal Stock Exchange Tower adjoins an existing plaza (i.e. Victoria Square) which it was simply intended to complement and enhance.

That it does enhance it is incontestable; but it does so in a manner probably quite unforseen by Luigi Moretti when working on the initial project four thousand miles away. As actually built, with its four facades parallel to the surrounding street pattern, this single tapering prismoidal shaft, shooting 624 feet into the sky, forms a superbly dominant focal point to Victoria Square—a small and previously insipid rectangle occupied by a dismal garden surrounding the two symbols of French and English civic pride respectively: a statue of the then reigning monarch and a public convenience.[1] But it should be noted that Victoria Square measures only about twice the area occupied by the tower now constructed beside it. The original scheme was for *three* such towers, set diagonally and continuously, whereby the longitudinal axis of the complex would have been at right angles to Victoria Square. To my mind, this solution, though financially lucrative in its provision of three million square feet of rentable office space, would have disastrously overpowered its setting; for though the perspective published by Moretti, seems to imply, with a kind of Piranesian *bravura*, that this massive cliff of zig-zag curtain-walling would have formed the boundary to a vast plaza at least 600 feet wide extending northward, in fact only the end corner would have faced Victoria Square, which is to the east and constitutes merely a minute fragment of the space implied by the sketch.

So far only one tower has been built, though a second is unfortunately intended to occupy the rear extremity of the site. The internal planning of the tower is not original except in so far as it relates to the novel structural system employed; but this is one of its virtues as compared with Nervi's earlier Pirelli Building which, despite its many real merits, was conceived by the client (according to Reyner Banham's appraisal in AR, March, 1961) more in terms of publicity than of functional efficiency. The economic problems of tall office buildings—such as the ratio of elevator shafts to the total subdivisible rentable floor area, and the optimum qualities of perimeter walling—were solved many years ago, wherefore originality in this domain is only likely to be achieved at the expense of values extraneous to the basic problem. Not that there is anything intrinsically wrong with this kind of originality. On the contrary, when the shape of a skyscraper is conceived in terms of, say, the peculiar configuration of the site, or of the dominant character of its immediate environment, it would seem to be of particular interest and merit. But clearly such special conditions make the resultant building less useful as a model for buildings elsewhere, and it is precisely because such restrictive conditions did not radically influence the structural design of the Montreal Stock Exchange Tower that it can be regarded as a paradigm of universal validity.

Since the original concept of the building was produced by Nervi and Moretti, and since Nervi is uncontestably the greatest designer of reinforced-concrete structures who has so far graced this planet, it will be tempting for future historians to attribute all the merits of the stucture to them, and any jarring qualities to the Canadian architects, engineers and contractors who built it. It would, however, be most unfair to take such a prejudiced approach, especially as some of the most attractive features of the design, such as the visible diagonal trusses of the "mechanical floors," and the bowed curtain walling cantilevered in front of the sructural columns, do not appear on Moretti's published perspective. Moreover, if Nervi had been allowed by Quebec law to take full personal responsibility for this 10m. stucture, it is by no means certain that he would have persisted with his original plan for leaving the structural concrete of each corner shaft exposed. I myself wish he had. But in a city where the outdoor temperature often drops to fifty degrees below freezing point, the possibilities of thermal distortion in the four monolithic shafts, each half as high again as the Pirelli Building (where the

Robert Bianchini



Tony Dimiele

Place Victoria, Montréal—Typical floor plan

structural concrete was also encased externally, despite the temperate climate) are such that any engineer, however intrepid, might be forgiven for not taking the risk of a kind which few clients and even fewer lawyers would ever be likely to condone if anything went wrong.

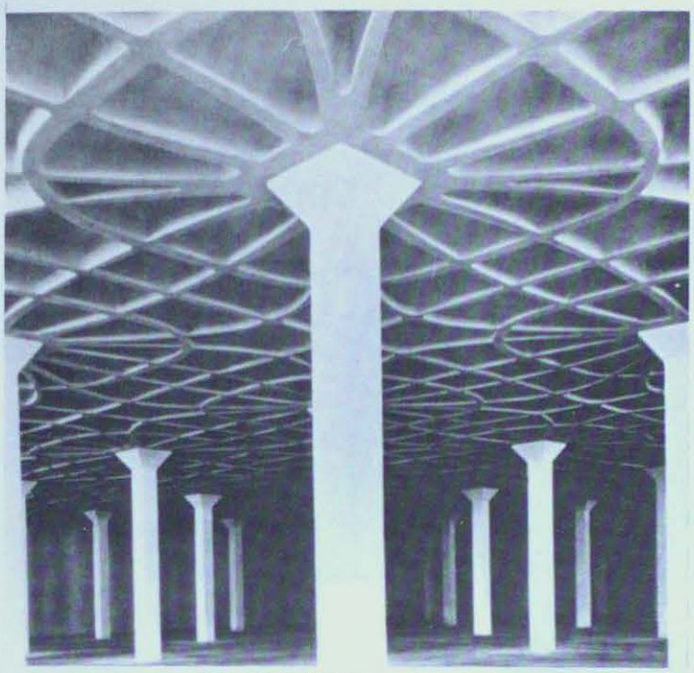
There is, however, another important, though perhaps more controversial, reason for being cautious in assessing the extent, if any, to which Nervi and Moretti's original concept has degenerated as a result of their enforced association with local architects and engineers. It is now common for art-historians (whose views on these matters are, according to Nervi himself, extremely unreliable[2]) to assert that Nervi is essentially a designer of thin shells and folded slabs; a notion which derives partly from the tendency of his biographers to emphasize—very properly—his long-span single storey structures,but mainly from one of the Neo-Plasticist dogmas enshrined in *Space, Time and Architecture*[3]. In fact, it is apparent from an inspection of Nervi's various short-span multi-storey structures, such as the Bologna Tobacco Factory, that he not only uses what some writers derisively dismiss as "post-and-lintel concrete structures" but that these buildings are essentially refinements of the system patented by Hennébique in 1892, i.e. rectangular columns, haunched beams, and ribbed plates for the floors.[4]

Admittedly, Nervi's plates usually have ribs which span in two directions instead of one, to produce intersections of extra-ordinary beauty. Moreover, at the suggestion of Aldo Arcangeli, who was one of his assistants involved in the design of the Gatti Wool Mill, Rome, he elaborated these ribs further by making them follow sinuosities ostensibly representing the isostatic lines of the floor's principal bending moments. But such refinements are not only of questionable structural authenticity; they can only be justified aesthetically when the soffit is left visible. Thus in those of his buildings which require, by their function, the inclusion of complex electrical and mechanical gadgetry in the ceilings, simple ribbed-plate floors based on a standardized rectangular grid are evidently considered by him to be most correct.

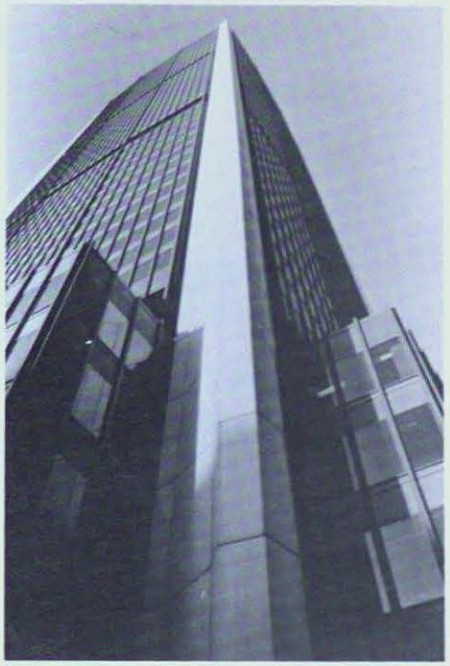
This issue of ribbed plates versus slabs was of crucial importance in the design of the Montreal Stock Exchange Tower, because whereas in steel-framed skyscrapers, the decisive factor in designing the floors is usually their depth, here it was their weight. In other words, it was not only considered more economical, but was structurally manditory, to design a floor of minimum weight rather than of minimum depth. For the spans and live loads given it would doubtless have been possible to make all the floors of simple solid slabs; i.e. of constant thickness throughout. But the enormous weight of forty-seven such floors would have required so many wasteful and elaborate structural devices to resist the instability to be anticipated in the event of an earthquake, that any solution of this kind was out of the question. The floors, as built, therefore consist of 3-inch plates combined with 18-inch ribs, the latter being spaced at intervals of approxiametly six feet. It should be noted that this was the type of floor always envisaged by Nervi, although his initial project was later modified by the local engineers, who changed the positions of the pairs of intermediate columns (superimposing them behind the cutain-walling on each of the four facades), and suppressed the beam originally conceived as spanning between the corner supports.

The two most striking elements of the overall concept are, first, the so-called "mechanical floors" and, secondly, the corner supports themselves. The "mechanical floors" at the seventh, nineteenth and thirty-second levels do indeed contain a certain amount of mechanical equipment and ducts; but they are essentially a means of joining the central core (consisting of X-shaped shear walls of solid reinforced concrete, which house the escape stairs and most of the lifts) to the corner shafts on the exterior. By this means the tower, which stands on a site as liable to earthquake tremors as San Francisco, is given the fullest possible rigidity. The three great pairs of diagonal trusses, each about 23 feet deep, which link the central core to the corner shafts, are partially visible from outside, and they undoubtedly give the tower a variety and novelty which is all the more attractive, to me at any rate, because they are structurally needed.

The corner supports of the tower taper gradually from the ground to the top storey with an entasis which greatly contributes towards the elegance of the building's silhouette. Admittedly, the visible surface is simply a veneer; indeed, the space between each monolithic structural shaft and the precast slabs which encase it is so large that a man can climb up between the two faces for periodic inspections. But, the ve-



Gatti Wool Mill, Rome—Structure



Robert Bianchini

neer follows faithfully the shape of each structural support, which consists of a continuous prong of roughly triangular section, diminishing in thickness towards the top.

Nervi first seems to have put forward this concept when collaborating with Ponti on the Pirelli Building; but in Montreal it achieves a far nobler, authentic and more eloquent expression, and the importance of its evolution cannot be too enthusiastically stressed. The traditional concept of multi-storey reinforced-concrete buildings—valid enough when the height of the building does not greatly exceed its width—has been that of a series of superimposed standardized floors supported by simple cylindrical or prismatic columns. These columns normally decrease in cross-sectional area at each successive floor, since the total superimposed load naturally becomes less in proportion to the distance of each floor from the ground. The system is in itself perfectly logical, since it not only corresponds to the statical requirements of vertical loading, but allows all the faces of all the columns to be vertical— an advantage which is evident whenever the intervening spaces have to be partitioned or glazed. But such a concept relies, for its ultimate justification, on the assumption that a building is something that stands on the ground: an assumption which therefore regards the soil-condition as an independent problem, to be solved after the initial design for the building has been accepted. According to this notion, all buildings may be envisaged theoretically as constructed on solid rock, whether the "rock" be real or artificial; and it is well displayed in the *Unité d'Habitation* at Marseilles, where there is in fact no stuctural continuity whatever between the bases of the *pilotis* and the reinforced concrete substructure buried in the ground. Nervi, however, with his genius for discovering the essential nature of each structural problem, perceived that in a skyscraper, where the height is many times the width, the stucture does not simply rest on its foundations; it is vertically cantilevered from its roots. And he therefore evidently concluded that however much the foundations may be submerged, their existence should be attested by the continuously sloping profiles of the structural elements they engender above ground.

The structural system used in Montreal Stock Exchange Tower is at present unique; but only unscrupulous individualism can prevent it from becoming the prototype of a whole series of skyscrapers of comparable design, scattered throughout the world. It will undoubtedly be an honour for Montreal if the future students of architectural history make a special visit to that city to see this splendid building. But it will be a far greater honour for Nervi, reflecting glory back on the architectural profession itself, if the other cities also give themselves the benefit of such an environment, whereby each metropolis will be able to boast of its debt to this great engineer in the words of the most famous of all architectural memorials: "If you seek his monument, look around you."

And as few buildings are beautiful unless every line and column of their mass have reference to their foundation, and be suggestive of its existence and strength, so nothing can be beautiful in art which does not in all its parts suggest and guide to the foundation, even where no undecorated portion of it is visible; while the noblest edifices of art are built of such pure and fine crystal that the foundation may all be seen through them...

Ruskin: *Modern Painters* (1843)

NOTES:

Others concerned in the design were: associate architects, Greenspoon, Freelander and Dunne; consulting architect, Jacques Morin; structural engineers, D'Allemagne and Barbacki; consulting engineers, Letendre and Monti; mechanical and electrical engineers, James P. Keith Associates.

1. It is, however, characteristic of the bi-culturism and bi-lingualism which has haunted the Province of Quebec for over a century that the statue—the characteristic central feature of French urban squares—is inscribed "Queen Victoria," whereas the monumental public convenience is inscribed "Vespasiennes."
2. See, for example, the article published in *Architecture d'Aujourd'hui*, No. 99 (December, 1961-January, 1962), of which the following is translated extract: "The fact that art criticism is thought out by non-technicians who, in most cases, are led to examine painting, sculpture and architecture from the same point of view, has certainly contributed in deflecting the analysis and interpretation of the constructive elements of a work of architecture, and in causing such analyses and interpretations to concentrate on strictly formal characteristics."
3. The fact that the forthcoming fifth edition of Giedion's famous book will include a chapter on Jörn Utzon without any mention of Nervi's scathing criticism (published in *Casabella*, July, 1959) of the Sydney Opera House (effusively praised by Giedion, though it will not even be completed, let alone tested acoustically, for at least another four years) would seem to support this assumption.
4. I tried to show in my book on *Auguste Perret and his Precursors* that Perret also simply took Hennébique's system and refined it. But Perret, of course, had no training or mathematical competence as an engineer, and relied entirely on consultants, such as Louis Gellusseau, for structural analyses.