PLACE VICTORIA: A JOINT VENTURE BETWEEN LUIGI MORETTI AND PIER LUIGI NERVI

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INTRODUCTION

Place Victoria stands alone amongst Moretti's many buildings. The very fact that it deviates ideologically and formally from the rest of his oeuvre makes the project significant and revelatory of Moretti's architecture and of the man. The project neither follows the architectural principles of his prewar Rationalist period, nor those of his later expressionist phase. This divergence from his lifelong thinking is more the result of circumstances than the outcome of a re-evaluation of a well-defined design approach. The saga of the design process is a fascinating one for it illustrates how Moretti's early ideas for the urban skyscraper changed continuously with his increased knowledge and awareness of the problem. He began by attempting to redefine the form and the use of the modern high-rise, but ended with an elegant landmark rather than a breakthrough. Instead of the heroic sculptural object he had hoped to create, he produced a highly functional and very beautiful tower. By Moretti's earlier (and later) standards, the final version of Place Victoria is a remarkably disciplined and controlled work of architecture in which the usual concerns for self-expression and visual exhilaration are absent. This new formal clarity and structural logic are in great part attributable to his collaborator, engineer, Pier Luigi Nervi. The concept of Place Victoria is the outcome of a coming together of a radical architect and a conservative engineer.

In culture and temperament, Nervi and Moretti were opposites. Nervi was trained as a structural engineer, and eventually became one of the 20th century's acknowledged authorities in reinforced concrete design. He was a rationalist, unsentimental in his approach to solving problems, and uncomfortable in the world of the subjective. He asked simple questions which ultimately would provide him with valid answers. Nervi had the soul of a mathematician who believed in the laws of geometry and mathematics. He often said that significant structures were logical, economical, and pure expressions of the forces at work. Above all, Nervi was a builder[1] who was passionate about constructional methods. When presented with a design proposal by one of his colleagues, he would ask early on in the presentation how it could be built. Moretti, on the other hand, would speak of the expressive powers of a building, of poetic logic and of obscure intuitive feelings. Yet, despite these differences in culture and temperaments, Place Victoria is the outcome of many friendly intellectual duels between Moretti, the passionate formalist, and Nervi, the rationalist builder. Both influenced the other, both challenged the design ideas of the other, both needed each other.

[1] Nervi, together with his sons, owned and operated a construction company for many years.

PLACE VICTORIA IN THE CONTEXT OF MORETTI'S CAREER

Luigi Moretti had two very distinct professional careers, during which time he designed a large number of noteworthy buildings. His first career began shortly after he completed his architectural studies in the early 1930's and ended at the outbreak of Word War II. In 1946 he resumed his architectural practice which he continued uninterruptedly until his death in 1973. What makes Moretti's oeuvre unique amongst the major Italian architects of his time is the paradoxical nature of the two careers. Although one can trace a common architectural denominator between the two periods of his practice, each phase was governed by its own explicit ideological position

Even if a number of Moretti's prewar buildings were extremely good and even provocative, the brightest stars in his extensive architectural firmament belong to his postwar period. His very best buildings constitute some of the unique emblems of modern Italian architecture. The buildings of his first career, which began in earnest with the Casa Ballila project in Rome, clearly belong to International Rationalist Movement current at the time. In terms of aesthetic sensibility, his early buildings borrowed from the architectural vocabulary that was used the most progressive architects in Europe. Nonetheless, it revealed was a paradoxical stance in Moretti's work. He borrowed the language of the progressive architecture of the era, yet the ideological underpinnings were in direct opposition to the revolutionary left-wing ideals of the Modernist movement. His prewar work, and especially the planning projects, make frequent and obvious references to Antiquity and to Imperial Rome, and represent a conservatism that was in tune with Fascist ideology and Mussolini's desire for monumental architecture and self-important urbanism.

The work of the second career departed fundamentally from that of the early Rationalist orthodoxy and focused instead on the formal and expressive dimensions of architecture. The pre-eminent concerns of his prewar work, namely, logic, response to program, and simplicity of construction were replaced by more subjective and visual preoccupations: manipulation of form and space, use of ornament, and visual excitement. This radical shift of position can be interpreted as a partial repudiation and denial of the earlier work. Moretti never explained or justified this paradigmatic shift from Rationalism to Formalism, and one is left to guess that there was a parallel shift in his political, social and aesthetic concerns.

Moretti's iconic buildings are, without a doubt, Il Girasole Apartment in Rome, Villa La Saracena in Santa Marinella, Watergate in Washington, and Place Victoria in Montreal, all buildings dating after 1947. Place Victoria is unique amongst these buildings of Moretti's latter career. Il Girasole and La Saracena are very Roman buildings whose spirit grows out of a Mediterranean architectural culture of sculptural forms, exotic spaces, and complex compositional gestures. These are projects in which Moretti alone controlled all the aspects of the design. Watergate, on the other hand, may not have a Roman precedent as the other two projects, but its forms, spaces and its rich ornamental qualities certainly bear some allegiance to the Baroque architecture of Rome. Place Victoria is closer in spirit to North American architecture than to Rome, or even to Europe. Unlike the other projects, Place Victoria was very much a joint endeavor between Moretti and Nervi, in which Nervi's contribution was nearly as equal to that of Moretti. Nervi was indisputably the greatest designer of reinforced concrete structures of 20th century, a fact which Moretti readily

acknowledged. Though Moretti was in command of the overall concept of Place Victoria, the development of the concept, and especially that of the towers, was done in joint venture with Nervi.

I had the opportunity to work for two consecutive years on Place Victoria starting at the early conceptual phase of design right through to the construction stage. Although I was attached to Studio Moretti, I attended many of the working sessions with Nervi, and was party to numerous professional exchanges between the two. These were often passionate and protracted, but always respectful and productive. It was never a situation of one or the other being first, but one of equals. Nervi was ever-present and was consulted continuously, for he, more than anyone on the design team, had a clear command of the structure and the problems of the high-rise. He saw the skyscraper primarily as major structural problem where logic, safety, and economics governed over all other considerations. Moretti shared these views only partially, for he never surrendered his belief that the expressive powers of architecture were, at the very least, equally important. Moretti would not limit his mandate to mere problem solving.

By the time Nervi was given the mandate to co-design Place Victoria, he had already conceived one of the significant high-rise buildings in Europe, the thirty one-floor Pirelli Building in Milan for which he had specified a concrete skeleton as an alternative solution to the traditional American skyscraper which was universally built with a steel frame. Moretti had never dealt with a building taller than fourteen floors[2], but he was not in the least daunted by the task of designing what was to be the highest structure in the Montreal at the time, and the highest reinforced concrete skeleton in the world. He relished the challenge and even hoped to redefine the form of the modern office tower environment through this project.

RATIONALISM REVISITED

Moretti began his architectural career as a Conservative Modernist whose work was in tune with that of the Italian Rationalist Movement as first defined by the Gruppo 7[3]. Two projects virtually defined his prewar architectural thinking: the Casa del Ballila in Trecate, Novara (1934-36) and the casa del Ballila in Trastevere, Rome (1932-37). These were mature works of architecture, given the relative youth Moretti, and represent faithful continuations of the well-established Rationalist tradition of the time[4]. Once he resumed his professional activities in 1947, Moretti's views on architecture changed course fundamentally. Rationalism was jettisoned in favor of an approach that was more personal and lyrical, more expressive of purpose, was visibly self-conscious, and sculptural to the extreme. The first building he designed in his new architectural life was the

[2] The casa-Albergo on Via Corridoni in Milan, which was completed in 1950, and the Residential and Office Complex on the Corso d'Italia, also in Milan and completed in 1956.

[3] Seven young architectural students at the Politecnico in Milan started the Grouppo 7. The members were Ubaldo Castagnoli (replaced by Adalberto Libera), Guiseppi Terragni, Luigi Figini, Guido Frette, Gino Pollini, Sebastiono Largo, and Carlo Rava.

[4] The early urbanistic projects, such as the Piazzale dell'Impero at the Foro Mussolini, or the project for the Piazza Imperiale and for the Theatre at the E42, in Rome are embodiments of authoritarian rituals and Fascist notions of order. In no way can these projects be considered progressive or modern.

Girasole Apartment Building (1947-1950) in Rome. It was the opening salvo of his second career and a clear repudiation of the old order, the start of an exploration of a new ideology. What became evident about Moretti's latter career is that the early *avant-garde* impulse was gone. One is at a loss today to understand that the same author conceived Casa del Ballila and Il Girasole.

After Il Girasole, which was universally praised by critics and historians, Moretti's architecture became ever more sculptural and expressionistic with each new mandate. Feeling and subjectivity became dominant concerns in his work, with the exception of Place Victoria, which to this day, is celebrated as a paradigm of rationalism and structural elegance. However, contrary to the early and more dogmatic position of the Italian Rationalist Movement, Place Victoria owes no allegiance to any particular ideology. Its conceptual premise not based on any polemical stance, but on intellectual logic, functional purpose, structural common sense, and aesthetic rigor. If Place Victoria constitutes a significant and unique departure from Moretti's postwar work, it is primarily due to the contribution of Pier Luigi Nervi whose demanding understanding of architecture and construction allowed for little subjectivity and uncertainty.

Nervi's sense of logic contrasted sharply with that of Moretti's. Nervi's was based on pragmatism, a sense of economy, and concern for good construction. Logic, to Moretti was not a matter of scientific exactitude or of pragmatic responses to functional exigencies. His was a logic that was closer to that of the painter or the musician, as it related to the inter-relationship of objective and subjective aspects of architecture. Moretti interconnected logic to aesthetic judgment, to formal coherence, to correct correlation of form to space, effective and affective expression of structure, to relationship of parts to whole, and most of all, to the larger-than-life expressive power of architecture.

Moretti had never confronted the problem of designing a building of the scale and nature of Place Victoria which comprised three one-million square foot office towers to be placed on a relatively small site. With no specific program other than to provide a totally flexible office space capable of suiting any typical North American tenant, the office tower was to be a container of generic and multifunctional space. In the beginning, Moretti struggled with this notion of absolute objectivity. Spatial flexibility entails spatial and formal neutrality. Unusual spaces or forms are a constraint which hampers spatial flexibility. Moretti tried at first to oppose the extreme logic of the office tower, but eventually came to accept it as a fact life.

Moretti's vision was also hindered by the structural imperatives of a 47-storey high concrete skeleton. One notes that in the early design studies of Place Victoria, Moretti's impulse was to depart from the unavoidable logic of the skyscraper. Eventually, the demanding structural requirements which began as a constraint for Moretti became a challenge, and eventually his most important instrument of design. Nervi's influence was particularly important during the early design stages, and his involvement provided an assurance that Moretti's design could be sustained by structural and construction means. Nervi profoundly disliked structural or formal acrobatics of any sort. He believed in the concept of repetitive modules and simplified construction systems. He was the voice of reason and moderation that contained Moretti's zeal for expressionistic exuberance, and in the end, both agreed on all major issues and were supportive of each other.

STEEL VERSUS CONCRETE

Until Place Victoria was commissioned, virtually all the high-rise buildings were built with a steel skeleton. This tradition, which had began in Chicago at the end of the 19th century, continued virtually without interruption to the present day. Steel affords many advantages when building high. A steel skeleton is relatively easy to assemble, its component parts are simple to lift in place, the assembly is not affected by rain, cold, or extreme heat, and it is possible to attain a high degree of dimensional precision. Most importantly, the physical dimensions of the columns are relatively small, thus affording greater planning flexibility and more rentable office space. Because there are so many precedents for skeletal buildings made of steel, problems related to design and construction are well known. The concrete skeleton often was used for low to medium-height buildings, but never for the skyscraper.

The first modern concrete-framed high-rise of significance in Europe was the Pirelli Tower in Milan built in 1956-1958[5]. As was the case for Place Victoria, the design of the Pirelli Tower was a joint effort between an architect and an engineer, Gio Ponti and Pier Luigi Nervi. The Pirelli Tower became an instant architectural landmark and set an important structural and formal precedent. The tower is shaped in the form of a pointed egg and is divided transversally into three sections by two full-height concrete bearing walls. At each end of the tower are situated a pair of large concrete columns. Except for two intermediate bearing walls, the space is column-free. Contrary to conventional practice, the beams are placed longitudinally rather than transversally. This strategy of having longer beams carrying larger loads and putting more weight on fewer columns required the columns to be larger. With this notion of the larger span, Nervi established a new principle in tower design, namely, the structure of the high-rise would perform more efficiently and its cost would be reduced if all the columns were to work in compression, no matter how large the wind or earthquake-loads.

In the conventional steel skeletons of a high-rise, columns are relatively small, close together, and carry lesser loads. When significant lateral wind-forces are exerted on the building, the tower has a tendency to bend, much like the trunk of a tree in a storm[6]. The result is that on the leeward side, the columns have to sustain greater compression, while on windward side, they are stressed and work in tension rather than compression. Since the wind direction can change at any time, all columns must be designed to sustain both compression and tension. This implies a costly structural over-design of the columns. The principle which Nervi developed for the Pirelli Tower was applied to the design of the structure of Place Victoria. He was determined from the very start to use fewer but larger columns, which would perform as compression members at all times, irrespective of external conditions. Unlike other skyscrapers of equivalent size and height in Montreal, all floors of Place Victoria are column-free, and, contrary to one might imagine, the large span principle represented a significant savings in cost.

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[5] Not only was the Pirelli Tower the first significant concrete skyscraper, but it was the first to deviate from the rectangular slab-form prototype used up to that time.

[6] The same "bending" phenomenon appears in case of an earthquake because the vibrations of the earth exert forces on the tower that are identical to those caused by wind. In one case, the push on the tower is applied by the wind, in the other instance it is applied on the tower through the earth. Montreal is considered to be a high earthquake zone, equivalent to that of San Francisco.

A CONFLICT OF INTEREST

Nervi was known for the relatively low cost and the elegance of his structures. He had been elected to design the structure of Place Victoria on the strength of his reputation as Italy's best and most famous structural engineer. It was known to all is clients that his preferred construction medium had always been concrete, and, except for a few projects in which the use of steel was unavoidable, he never departed from the use of reinforced concrete. It is a material can be molded at will, is less susceptible to deterioration, and can be left exposed. Never did he consider designing the tower using a steel skeleton.

Because Place Victoria was to be the tallest concrete structure ever built, Moretti and Nervi were well aware that the project would set a new standard and give the project a prestige reserved for precedent-setting buildings. This was the case of the Empire State Building in New York, the Manadnock building in Chicago, and the Pirelli Tower in Milan. To the end of his life, Nervi remained unconvinced that the steel-skeletal structure, as used in North America, was ideal but because the American system was so time-honored and accepted by local engineers, no one ever questioned it anymore. Steel had become the vernacular structure of the high-rise.

Predictably, as soon as the project for Place Victoria was published in American professional journals, this new European precedent alarmed the American Steel Institute. It was obvious that their wish was to have the clients abort the concrete alternative. The Institute sent a delegation of specialists to Rome to convince the Immobiliare to espouse steel rather than concrete for the construction of the skeleton. As can be expected from any lobby group, the delegation praised the virtues and benefits of steel, and drew attention to the shortcomings of concrete. The delegation pointed out, quite correctly, that the skyscraper was an American invention that American engineers knew this particular building type far better than did Europeans, and that Italians were on the verge of committing an enormous error. Inevitably, this committee of "experts" sowed fear in the minds of the Italian clients.

As a result of these encounters, the Immobiliare believed a major blunder had been made and consequently commissioned one of New York's best-known structural engineering firms to evaluate Nervi's concrete proposal, and if possible, to come up with a cheaper steel solution. In Rome, all structural design work stopped, pending the outcome of the American study. Moretti and Nervi were outraged by the client's reaction to the self-interest of American lobbyists, in particular because this concern had surfaced so belatedly in the process. Eventually, the evaluative study proved the American Steel Institute's claim to be wrong. In fact, the steel solution as proposed by the American consulting engineering firm did not represent a savings, but would cost approximately ten percent more. There was an audible sigh of relief in Rome and a sense of victory for Nervi who had maintained all along that his solution was by far the least costly.

A PRINCIPLE OF A STRUCTURAL HEIRARCHY

Nervi was critical of the structure of the traditional North American skyscraper for he believed that its skeleton was too simplistic, not always efficient, and utilized too much steel. He felt that the

concept of the steel skeleton had never evolved despite the continuous increase in size and height of the high-rise. Very tall buildings were designed much like low buildings, except for their use of more and bigger columns. He criticized the usual dense grid of small columns that was repeated from bottom to top. Instead, he favored a hierarchical bearing system, which would make the structure more efficient, require less material, be more stable, and cheaper to construct. Not all structural parts of a tower need nor should perform in the same manner.

Nervi's proposal for the structure of Place Victoria was based on a hierarchical division of the structure into two systems: a primary system which would constitute the major support of the tower and provide its lateral stability against wind and earthquake loads; and a secondary system that would be limited to provide support the floors of the towers. This meant that even if one of the secondary columns were to fail, only that section of floors supported by the failed column would fall, but the tower as a whole would not collapse. The analogy he used was that of the human body: not all bones are the same, nor do they all fulfill the same function. The service core, together with the large corner columns and the four transversal trusses connecting the core to these columns constitutes the primary system *(Figs.1 and2).* The eight intermediate columns on the four sides of the tower constitute the secondary elements of the system. When speaking of structural stability of the tower[7], Nervi likened the skeleton to that of a skier using ski poles with outstretched arms for reasons of lateral stability. The core was the skier, the outriggers his arms, and the corner columns, the ski poles *(Figs. 1 and 2).*

THE TOWERS AND THE CITY

The initial scheme was for three contiguous towers set diagonally to the city grid. The axis of the three-tower composition would have been at right angle to Victoria Square. By turning the towers 45 degrees to the street grid, it was possible to bring them together in a much denser relationship than if they had followed the orthogonal geometry of the city. The first design brief called for about three million square feet of gross rentable space. It would have been impossible to insert so much building mass on that site without resorting either to a diagonal arrangement or building much higher towers.

On account of a radical change in the design of the vertical transportation system which became evident during the design development stage, the typical floor plate of the tower had to be increased to attain a reasonable net-to-gross rentable ratio. This enlargement of the towers made it impossible to retain the diagonal three-tower solution.

At the time Moretti received the commission, the area surrounding the site was one of vacant land, abandoned buildings, and a assortment of heterogeneous and mostly non-descript buildings. Being located between the historic precinct of the city and the new business core, the area had not yet found its true vocation. No one at that point in time could predict how the future development of the city would evolve. Two different planning studies were prepared, one by Harold Spence-Sales, a professor of urban planning at McGill University, and one by Sandy van Ginkel, a Montreal town

[7] These trusses measure 25 feet in height and are located at the 5th, 19, and 32nd floors. Because the trusses constituted a veritable spatial obstacle on these floors, it was decided to place all the mechanical rooms on these "truss" floors.

planner. These studies had little impact on the main design of the building for they were prepared after the fact. They only served to make minor readjustments and convince the City planning department that the project did indeed fit in the neighborhood. The van Ginkel study was more of an analysis of the site condition that an urban-planning guideline.

Like most major large office building projects at the time, contextual relationships and physical integration of a project to its immediate neighborhood was of minor concern *(Figs. 3 and 4).* Furthermore, Moretti saw the project as a heroic object to be implanted in the city, irrespective of immediate surroundings. He was conscious that the day would come when the square and its surroundings would be improved, partially on account of his own building, but he had no idea how the urban renewal of the area would ultimately manifest itself. Place Victoria was, at the time, situated in a zone in transition whose future he could not anticipate. Moretti's lack of genuine concern for context was not only true in the case of Place Victoria, but was displayed equally in most large-scale projects in the city, from the John Andrew's CIBC Tower to Mies van der Rohes' Westmont Square. The one conspicuous exception was I. M. Pei's Place Ville-Marie which remains, to this day, a sensitive response to the specificity of its site.

Had the tri-partite diagonal scheme for Place Victoria been built, it would have constituted a formidable 620-foot long wall in the city rising 625 feet above street level, thereby visually separating the lower town from the central business district. Peter Collins, one of the most astute architectural critics of the time, thought that the initial scheme was an urbanistic blunder. Collins wrote in his review of the building[8]:

> *To my mind, this solution, though financially lucrative in its provision for 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 (sic) curtain walling would have formed a boundary to a vast plaza at least 600 feet wide extending northwards, 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.*

Collins was right about the overpowering scale of Place Victoria. The initial project would have been visually a dominant insertion in the centre of Montreal, but its physical impact would have been sustainable given the condition of the area at the time.

DESIGN BY TRIAL AND ERROR

Well before the project was changed from the three-diagonal-tower proposal to the two parallel-tower scheme, the design of the actual towers was in constant evolution. It is an architectural fact of life that all projects, especially large ones, undergo many design transformations, given that the process is extremely complex and the number of consultants involved in the decision-making process is very large. As for all his projects, Moretti's primary preoccupation at the start of the design process was to define form and the making of an image. Being a non-functionalist at heart,

[8] Collins, Peter, STOCK EXCHANGE TOWER, MONTREAL, The Architectural Review, 1966, 832, pp. 432-438.

he did not try to derive a solution from any analytical investigation, from an examination of the program, or from a study of precedents. He saw the project as an opportunity to make an extraordinary architectural statement in the city, a stand-alone object. The fact that Moretti had never designed a high-rise building before was for him both an advantage and a disadvantage. He had no prejudicial views as to what a skyscraper ought to be, but he was uncomfortable at times with the complexity of the problem. What fascinated him most were the scale of the high-rise and its enormous sculptural potential, and these fascinations resonated in all his early studies.

Examining the progression of his initial sketches is a revelatory lesson of Moretti's design method. One of the first studies *(Figs. 5 and 6)* illustrates a diagrammatic exploration of possible tower shapes. The sketch demonstrates eight alternative forms. The three towers in each of the eight alternatives are identical. Except for one of the variants, all have a centrally-located mechanical service core. These are but simple diagrams but they laid the ground for the ultimate solution. It is interesting to note that from the very start, Moretti had wanted to have three identical towers standing on some sort of common base. I asked him once why three towers? Would he not consider two larger and higher ones which would have afforded him more planning leeway? He rejected the idea out of hand. With three, he felt, he could create a unified whole, but two would be a duality. It is ironic that the final project ended with a twin-tower solution.

This first study also illustrates an idea for the "plinth" buildings, which he saw more as infill blocks between the towers than a podium *(Fig. 6).* It may have been an intuitive move, but it became one of the guiding ideas for the design. These independent blocks would allow the corners of the towers to reach the ground and remain visible to the passer-by. He often said that if one could physically touch the bottom of a tower, one would experience the power of its height. Moretti was truly fascinated with height and verticality. Because the corners of the adjacent towers were to be so close together it was often said, in jest, that this would have been the only project in the world where one could touch two skyscrapers at the same time *(Fig. 7).* In the subsequent studies, Moretti did actually propose a continuous plinth building for the towers, but he raised it on pilotis to allow the structure to be visible at grade.

In the end Moretti selected the first of the eight options for the final solution, but he continued to devote some time examining the potential of the second alternative *(Fig. 8).* This alternative included a perspective of the second alternative in which the base is continuous, but is also articulated in such a way as to give the impression of "infill" blocks between towers. The sketch illustrates Moretti's inclination to break up the tower into smaller vertical blocks. He instinctively understood that size and scale are best felt when the larger elements are fragmented into smaller units. He often remarked that modern architecture had lost its sense of scale that facades of modern North American towers were made of window modules repeated both horizontally and vertically ad infinitum. He ridiculed these contemporary skyscrapers, calling them "one-two-three-infinity facades."

Subsequently Moretti explored the idea of creating a triad of identical but geometrically more complex forms *(Fig 9).* It was a combination of the diagonal and orthogonal plan in which the axes of the three towers ran in a north-south direction. In one option, the three towers were oriented the same way, while in the other alternative the central tower is flipped to create visual variety in the

composition. Both solutions would have resulted in a project with different north and south facades. He continued to explore the seventh alternative comprising towers which were symmetrical along both north-south and east-west axes *(Fig.10).* The designs shown in proposals D and E give no indication of the structural system.

Ultimately, it was the logic of the market-place and the economic realities of construction that determined both the square shape of the tower and the area of the typical floor plate. For Moretti, these functional and economic parameters became a constraint. In a final attempt to bring additional visual interest to the façades of the towers, he added arbitrary decorative elements, much like jewels on an item of clothing. These *appliqués*, consisting of giant multi-storey bay windows, surface-applied totemic shapes, and ten-storey high flagpoles had no *raison d'etre* and were structurally difficult to build *(Fig.11).* The idea of "decorating" the towers was soon abandoned.

Clear intimation of the final solution can be obtained from Figure 12, in which two important ideas become manifest for the first time: the strong vertical fragmentation of the tower into smaller blocks, and the visible presence of commanding corner columns. While the corner columns, in and of themselves, do not represent a *bona fide* structural system, they do constitute a metaphor of the tower's skeleton. These two central ideas were retained throughout the entire design process, and were in the end realized. Moretti used the idea of the powerful corner column as a means to give the towers a readable clarity. He saw the columns as compositional constants, while the rest of the facades could be treated as a variable. This interplay of constants versus variables *(Figs. 13 and 14)* became an unquestionable rule for all further design developments.

It was only at this stage of design that serious attention was given to other design and planning considerations. Until then, mechanical services, structural systems, vertical transportation systems, window washing methods, parking facilities and spatial modules had been laid aside in order to concentrate uniquely on the overall image of the project. Each of these considerations, however, presented Moretti with further limitations to his freedom to address formal problems. However, in the long run these long-circumvented realities provided order and rigor to the concept. It was the beginning of the final design phase. From this moment on, the nature of all discussions became more objective and purposeful, the level of arbitrariness and subjectivity subsided, and Nervi's much-needed involvement became more regular.

I recall one occasion when Moretti and Nervi were arguing over the reach of the cantilevers of the lower blocks of Place Victoria. Moretti expected it to be large, possibly ten to twelve meters. Nervi objected, maintaining that it could not be done without resorting to costly structural acrobatics which he was not inclined to do. Moretti retorted that some years before he had designed a tower in Milan[9] with a "modest engineer" who was able to design a 7-meter cantilever without difficulty *(Fig. 15).* Surely, an engineer of the stature of Nervi could do better; possibly make it twice as long. Nervi smiled and pointed out that even an architect like Moretti should be aware that the laws of statics do not alter with the personality of the engineer. Moretti understood, smiled, and agreed to end the debate on the cantilever.

[9] Commercial-residential complex in the Corso d'Italia in Milan.

THE SAGA OF THE CORNER COLUMN

Moretti's desire to overemphasize the four corners of the tower came early on in the development of the design. Nervi had favored the square plan for the tower over all forms as being the most efficient in terms of stability and resistance to wind and earthquake loads[10]. What's more, he emphasized the considerable structural role of the corners posts, which he proposed to place 45 degrees to the facades. These would be needed for reasons of lateral stability and as supporters of the outriggers, the proverbial ski poles of the tower. Since the corner columns where further way from the core than the intermediate columns on the facades, they would provide greater lateral stability to the tower. The further the sky poles are from the skier, the steadier his body. Moretti immediately embraced the idea of powerful corners and saw them as the metaphor of the tower's height and strength. The most important structural element of the tower was the core, but it could be experienced by the viewer. So the corner columns, which were visible from near and far, would be made expressive of the building's verticality and strength. To Moretti, these were the visible bones of the skyscraper *(Figs. 4 and 16).*

Once the idea of large corner columns was espoused, they became the basis of all further façade studies, and Moretti felt free to explore a number of variants, modulations, punctuations, fragmentations, and articulations of the facades in which the corner columns would play the preponderant visual role. I worked on the development of the shape of the columns for many months. Literally hundred of drawings, models, sketches, and photomontages were prepared. Nervi was often involved in the matter, though the fine tuning of their shape was left to Moretti.

When the Canadian real estate brokers were called in, they saw the presence of large corner column was a major rental handicap. They would eventually be responsible for the rental of the project and expressed great reservation about the presence of the corner columns. The corner of a building, they felt, was the preferred rental area and the space for which tenants paid the most rent. The Italian proposal obliterated part of the corner view. They were so obsessed with the idea of the column-free corner that they proposed that the single corner column be replaced by twins to liberate the apex on the corner. To Moretti and Nervi this was a non-receivable idea. Moreover, Moretti failed to grasp the premium Americans placed on the corner office. Having worked all his life in traditional Italian palazzos, he believed the prestige location was always the centre of the building, not the corner. Centrality, not distant corners, gave a space importance.

Moretti was fond of the exposed concrete surfaces in all of Nervi's buildings and had wanted the poured concrete surface of these massive piers to be left exposed, but the Montreal climate was too severe to leave part of the structure exposed to the elements. The temperature differential between the warm, internal concrete core and the cold, external corner columns could reach 50 or 60 degrees Celsius during cold winter days. This would produce unacceptable stresses on the structure. The only way to resolve the predicament of a structural system which is partially cold and partially hot was to make the corner columns part of the "internal structural system". In this manner the entire structure would be kept at room temperature, irrespective of the outside climatic conditions. Nervi

[10] Independently of its functional requirements or its contextual relationships, Nervi believed the ideal shapes for a high-rise building were, in order of merit, the circle, the square, and the triangle. The cruciform-shaped tower, as in Place Ville-Marie, is most unstable in terms of wind loads.

made references to the biological analogy to explain his point: in nature: animals have their 'structure' entirely inside their warm bodies or, like the turtle, entirely outside. None used both systems of internal and external bones.

Wrapping the corner columns with insulation would resolve the problem only in part, and would also conceal the concrete surface. Besides, the insulation would have to be protected with a permanent and weatherproof cladding. The obvious material to cover the insulated columns would be prefabricated concrete panels, which would never resemble the actual poured concrete. Nonetheless, the fear still lingered that the corner columns, which for the most part were outside the tower, could be subjected at times to extreme cold and unacceptable stresses. Nervi's solution to that problem was push the columns' cladding much further out to allow the ambient air of the tower to circulate freely around all faces of the column. By doing so, the entire tower, including the corner columns, would be wrapped with a continuous skin consisting partly of the transparent curtain wall and partly of the concrete panels around the columns. Moretti liked this solution because it increased the size of the columns by two feet all around. It was determined that the air gap had to be 24 inches all around, wide enough to allow a person to do maintenance work, when necessary *(Fig. 17).*

Previous to adopting the "continuous skin" solution, the discussions between Moretti and Nervi on the size of the corner columns were intense. Nervi had determined their size and shape according to their required bearing capacity. He had established the minimal cross-sectional area of the column at the base and the top as well as their location with respect to the tower's edge, but he acknowledged that Moretti could determine their actual shape as long as the specified size would be respected. Many months were devoted to finalizing their shape. When he noticed that Moretti had "inflated" their size substantially, he objected because their size was no longer the resultant of the arithmetic calculation of their bearing capacity. He noted that the maximum (diagonal) dimension at the bottom of the column was 16 feet. Moretti insisted on that size in the light of the scale and height of the tower. For Nervi it was a question of mathematics, for Moretti it was one of perception. It was a polite but firm battle of logic over feeling. Nervi firmly believed that there was a mathematical truth to any structural design and if followed rigorously, the result would always be beautiful. He spoke of the beauty of mathematics.

Finally, Nervi grudgingly gave in to Moretti and no more was said about it. A few months later after a site visit, Nervi confided in me that having seen the tower in situ, he had changed his mind. He had been wrong about the size of the corner column, and that he was pleased that Moretti had held his own. He then whispered in my ear: "Please don't tell the Architect what I said". I never did.

FROM THREE TO TWO TO ONE TOWER

Much has been written by architectural critics[11] about the transformation of the project from three diagonally placed towers, to two parallel towers, and finally to a single tower on the Square. It has been observed frequently that the project was considered too dense by the city's planning authorities and that the Montreal market could not absorb 3.000.000 square feet of rentable office space within

[11] See the article by Peter Collins, mentioned above.

a foreseeable future. Although the marketing argument held some truth, in reality the reduction of three to two towers was the outcome of a radical reconsideration of the vertical transportation system. Place Victoria's initial elevator system had been designed by the Milanese consultants whose expertise was derived from their involvement in the design of the elevator system for the Pirelli Tower. Moretti did not realize that European elevator standards were very different from those used in North America. The estimated elevator waiting time in the case of the Pirelli Tower was many times longer that the acceptable waiting periods in North America. In addition, the Pirelli Tower was owned by a single corporation that established all the working conditions for its employees, and for which an elevator waiting time of a few minutes was an acceptable norm. Place Victoria, on the other hand, was designed to house a variety of unknown small and large tenants, each one signing separate rental lease with a proviso that the elevator standards be equal to or better that that of the competing high-rise towers[12]. The initial elevator design for Place Victoria was determined by extrapolating parameters set for the Pirelli Tower. Once the Canadian consultants took over the technical dossier in order to prepare the construction documents, they examined all the technical aspects of the building. It soon became obvious that the proposed elevator system was totally inadequate, the number of elevators was too few, the cabins too small, their speed too low, and the local evacuation-time standards unacceptable[13].

Analysis of the system revealed that major redesign of the vertical circulation system was in order. Primarily, this meant a larger and more costly core with more elevators. By increasing the size of the core, the rentable area would be reduced considerably and the net-to-gross ratio of rentable area became uneconomical. The only option was to enlarge the three towers proportionally to the increase in size of the core. This resulted in a significantly larger tower which could no longer be fitted diagonally on the site. Only one solution remained: eliminating one of the three towers and orienting the two remaining ones orthogonally on the site. Contrary to what the media claimed, this radical change of concept from three to two-towers came about because of a fundamental blunder in the design of the elevator system. The change had nothing to do with market conditions or urbanistic considerations *(Figs. 18 and 19).*

Eventually, the owners of Place Victoria decided not to proceed with the second tower and ceded the land to another developer who wished to build a hotel instead. This meant that once again, a radical design change was required. There was no way that a hotel building could replicate the form, scale and size of an office tower and therefore Place Victoria could no longer be the twin-tower project that Moretti had envisaged. Nonetheless, he accepted the challenge to create a totally new composition of two dissimilar but related forms, a fusion of a pristinely-shaped tower and a freer curvilinear form for the hotel *(Fig. 20).* This was a formal strategy Moretti often used in other projects: harmony through contrast instead of harmony through continuity.

[12] Place Bonaventure, the Canadian Imperial Bank of Commerce Tower, CIL House, Place Ville-Marie, Westmount Square.

[13] There are many criteria used in the design of an elevator system for a skyscraper. Some are quantitative, others qualitative. The elevator waiting time criteria relates to both security and comfort. Major tenants usually specify the elevator conditions in their lease.

Unfortunately, Moretti was not chosen as architect for the new project; a local firm of architects received the commission. These architects had no understanding of Moretti's architecture and were incapable of making the hotel an integral part of a larger architectural composition. The hotel should have been, as Moretti envisaged, a complimentary and final component of Place Victoria. The actual hotel that shares the site is a banal building which makes a mockery of the elegance and the clarity of the Stock Exchange Tower. A project which began with great idealism was ended with crass corporate compromise.

LESSONS FROM PLACE VICTORIA

Moretti began to design Place Victoria with the most utopian vision of the skyscraper. He imagined infinite possibilities. He perceived the modern skyscraper as an Olympian sculptural form, and he hoped to give Montreal a landmark. Never did he think during the early days that his project could become a background building that would be merely another component part of the building fabric of Montreal. Moretti was an architect who overtly stated his desire to be the author of heroic buildings that made a statement. Now as he undertook the largest and most prestigious mandate of his career, he was not going lower his architectural ambitions.

What he learned painfully was that the skyscraper is an exceedingly complex building type. Because the modern office building has no real program except that of providing large areas of totally flexible space, Moretti believed that the primary design problem of the tower consisted of shaping an enormous volume that could then be filled with myriad neutral offices. By the end of the design process he came to learn that the skyscraper is as much a product of technology, economics, tax laws, real estate facts, code requirements, politics, financial speculation, fire safety, window washing systems and vertical circulation systems, as of traditional architectural design. The skyscraper cannot be conceived purely in aesthetic terms. Every moment along the design development route, new obstacles, new constraints, new objections, and new limitations arose. As exasperating as it was at times, in the long run, the design process was an enriching one - one that translated the early architectural gestures into a credible, realistic and expressive design.

Had Place Victoria been designed in the computer age, no doubt it would have been a very different building. I believe that Moretti could not have resisted the temptation to explore the infinite possibilities afforded by the computer. He would have used the computer to "travel" through the building, and would have used it to test the characteristics of the various spaces, however he would never have stopped developing his ideas on paper for drawing was second nature to him. As for Nervi, I can only speculate that little would have changed. He was a person who cherished efficiency and surely would have used the computer as a tool to reduce the drudgery of calculating the structural capacity of the various elements of the building. The structural premise, however, would have been based on his enormous experience and his clear personal vision. One cannot imagine Nervi trying to twist or bend or slope the tower for stylistic reasons. I imagine he would have used the computer as a sophisticated slide rule.

Then what are the ultimate lessons of Place Victoria? The first lesson is that great architecture is an act of reason, but reason alone will not produce a great building. Architecture is a compact between

the world of feeling and the world of reason. The second lesson is that two great minds with different views can produce magnificent results if they share a common vision and have sympathy for one another. Moretti alone would have produced a lesser building, as would Nervi alone. In the end, history does not necessarily provide one with all the right answers. During the course of the project I never heard Moretti make any historical references, which was unusual, given his phenomenal love for the past and for American architecture. It was as if he did not want to be burdened by the past. He expressed no interest in the earlier editions of the skyscraper. He wanted to produce a prototype.

IN SUMMATION

Place Victoria just celebrated its 40th birthday, and has remained to this day as relevant and elegant a work of architecture and engineering as when it was built. In architectural terms, Place Victoria is diametrically opposite to the self-indulgent and formalistic excesses of today's high- rise designs. The building speaks of rigor, discipline, brilliant engineering, architectural inspiration and intelligence, urbanistic common sense, and elegance. It remains a noteworthy exemplar of the union of logic and feeling, of science and art, of architecture and engineering, of American know-how and European sensibility. As a work of civil engineering, Place Victoria redefined the structure of the modern skyscraper and made it a powerfully expressive element.

Moretti believed that every work of architecture ought to be a unique work of art. While he cherished the process of design, he often appeared tormented by it. For Nervi, on the other hand, the design process was an exercise in serenity and logic. He saw design as a pleasurable problem-solving process. He avoided complications as much as possible, and believed in beauty resulting from simplicity and mathematics. He generously explained all his decisions in simple understandable language. Unlike Moretti, he believed that objectivity should govern over subjectivity. Had he lived today, he would have been most uncomfortable with the current desire for image-making. He disliked styling, though his buildings were always unique and often very beautiful. He never spoke of a search for a "new aesthetics". He simply spoke of building well, *costruire bene*. In a classic sense, Place Victoria is the epitome of graceful integration of technology, function and aesthetics. Its success can only be attributed to the meeting of two superior but different minds who enjoyed a close professional complicity and who attempted together to redefine the high-rise. One was obsessed with the "how" and the "why" of the building, the other with the experiential qualities and the cultural meaning of the modern urban high-rise.

I met with Moretti in Montreal a few times after Place Victoria was completed. He was unquestionably fond of the tower he had designed though he regretted its poor execution which had been the responsibility of the local architects. We spoke of all the early studies and how the design had changed over time, how the concept had evolved from three to two towers, and how the building's form had been reduced to a simpler and very elegant object. He was proud of the project, and he acknowledged that the rigor and discipline of Nervi had contributed to its great success.

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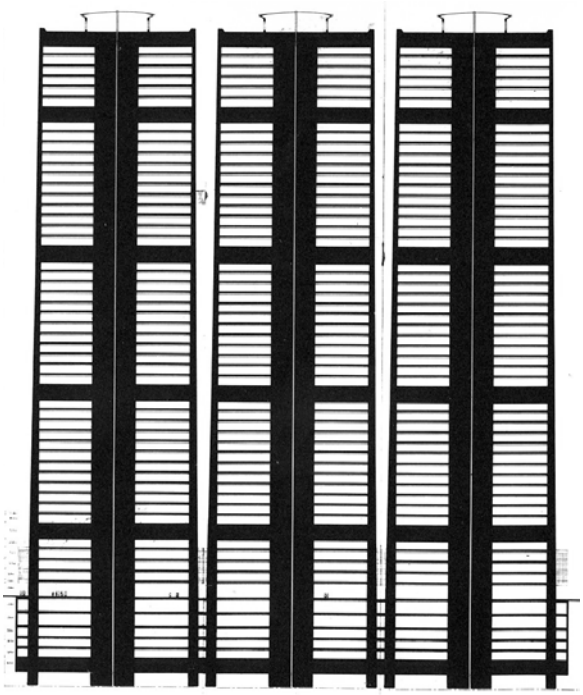

Fig. 1 Diagonal section of the tower taken through the shear wall of the core, the outriggers and the corner columns,

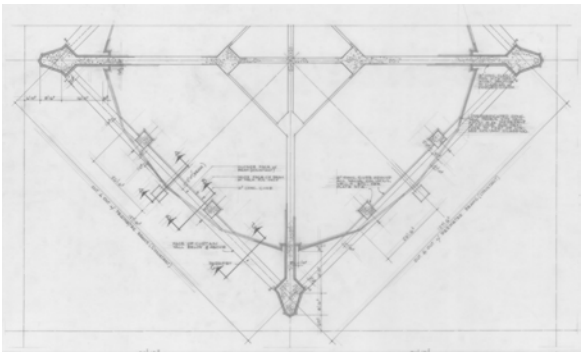

Fig. 2
Plan of the tower at the mechanical floors showing the connection of the core to the corner columns
Note the 8 lateral columns remain independent of the primary structural system

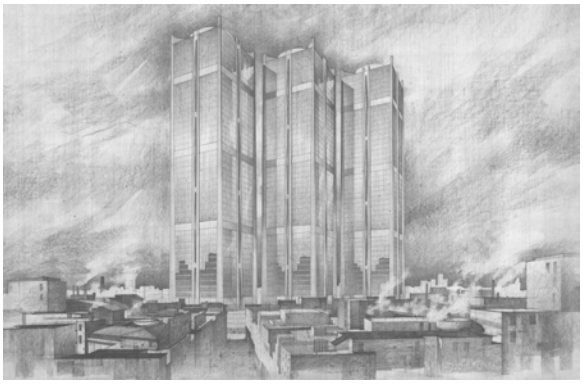

Fig. 3
Early perspective of the three diagonally-oriented towers
The towers bear little relationship to their immediate context

Fig. 4
Sketch of the base of the tower showing the proposed cantilevered section of the building
The prominence of the corner column leads the eye from the base to the top of the tower
The building is seen as an object unrelated to its surrounding

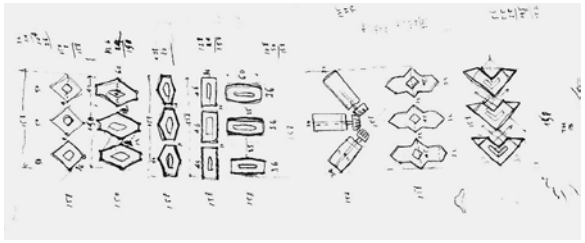

Fig. 5
An exploration of various tower forms and their possible inter-relationships
Except for the sixth variant, all indicate the use of a central core

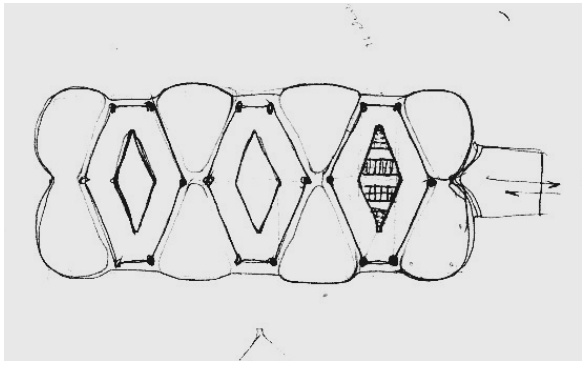

Fig. 6
An elaboration of the second alternative shown in Fig. 5
The base building is treated as a series on “infills” between the towers

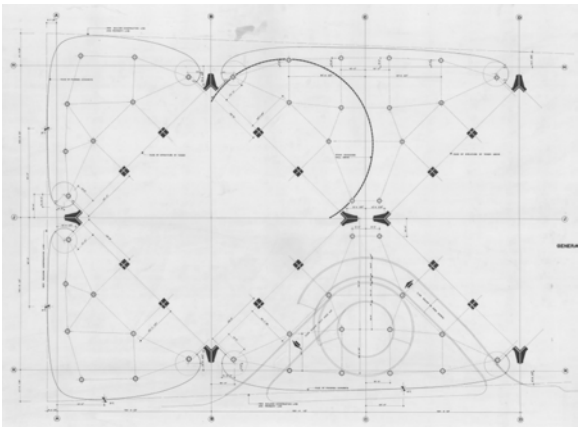

Fig. 7
Ground floor layout of the columns of the tower and base buildings
Note the proximity of the corner columns of two adjacent towers

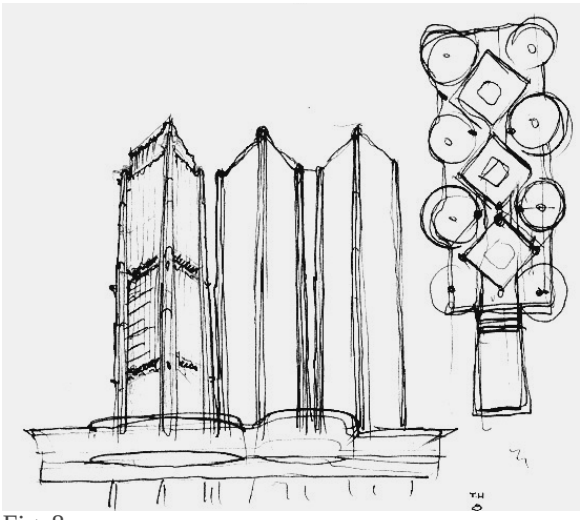

Fig. 8
A proposal to provide geometric clarity to the project by using circles and squares

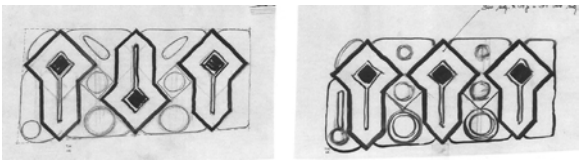

Fig. 9
Triads of identical towers with geometrically more complex forms
These arrangement lead to different appearance on the north and south sides of the project

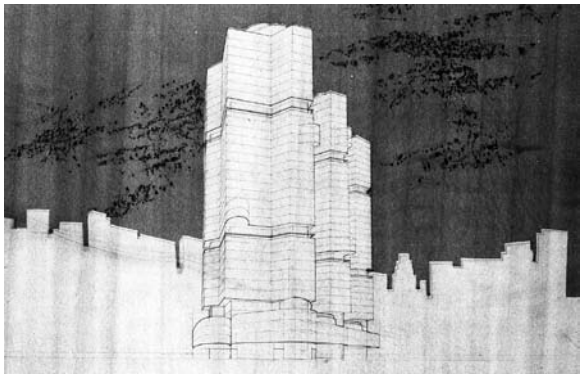

Fig. 10
The three towers are nearly identical are depicted as pure forms devoid of structure

Fig. 11
An attempt to make the towers more interesting thought the use of appliqués on the facades
There is a severe dichotomy between the base building and the towers above

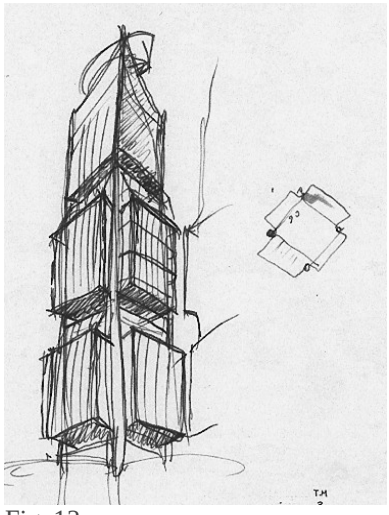

Fig. 12
The sketch indicates the preeminence of the corner columns and the fragmentation of the tower

Fig 13
The towers are depicted as an assembly of irregular, powerful blocks held together by the corner columns
The base building is seen as a series of curvilinear forms slipped between the towers

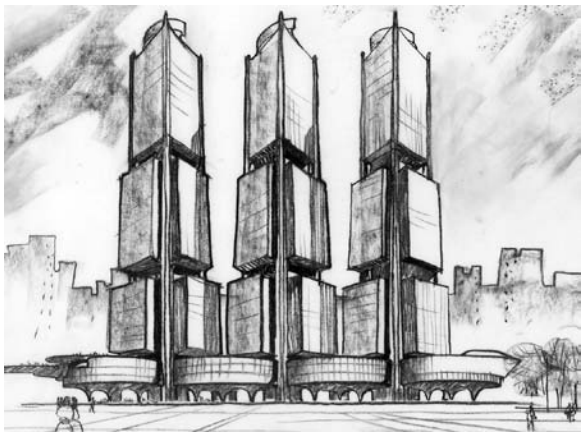

Fig. 14
The blocks shown in Figure 13 are standardized and the three towers are identical

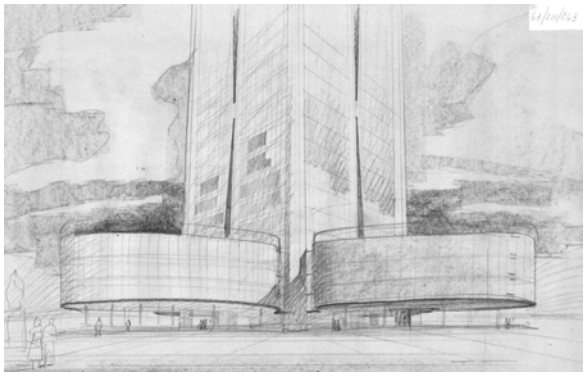

Fig. 15
A vision of extreme cantilevers of the base buildings facing Victoria Square

Fig. 16
View of the corner column

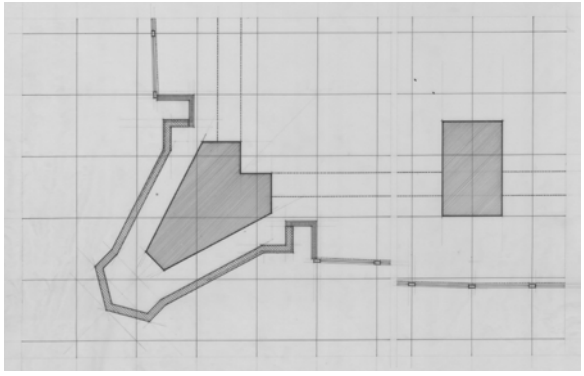

Fig. 17
Plan of the corner column at the base of the tower
Note the continuity between the glass curtain wall and the concrete cladding of the column

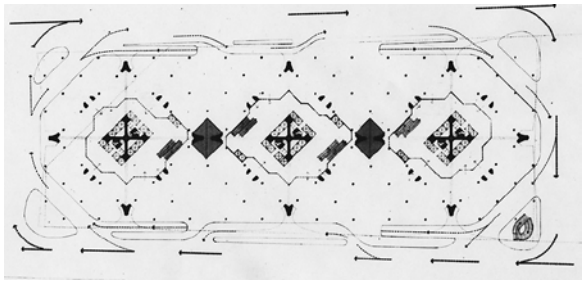

Fig. 18
Ground floor plan of the three-tower project
The dark squares between the towers are reflecting pools

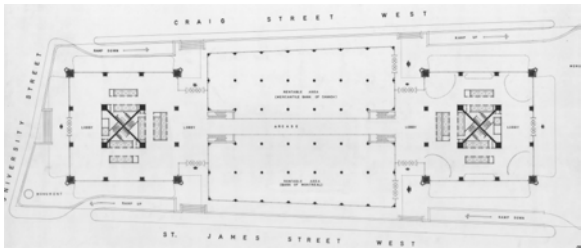

Fig. 19
Ground floor plan of the two-tower solution
The space between the towers is destined for commercial use

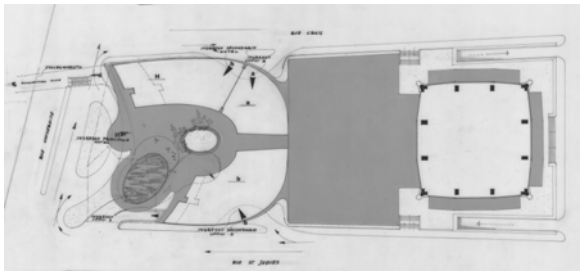

Fig. 20
Proposal for the hotel on the west side of the site
The public facilities are located in a low building while the rooms occupy a split crescent-shaped tower