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THE CONSTRUCTION OF A STEEL SKYSCRAPER IN GENOA. THE *TORRE SIP* BY BEGA, GAMBACCIANI, AND VIZIANO (1964-1969)

Vittoria Bonini, Renata Morbiducci

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Abstract

In 1964, the SIP Company entrusted Piero Gambacciani, Attilio Viziano, and Melchiorre Bega with the construction of the *Torre SIP* in Genoa, which was intended to serve as the regional company headquarters. Standing at a height of 105 m, the *Torre SIP* represents Italy's first instance of a skyscraper entirely constructed with a prefabricated steel structure. This paper explores the tower's history, spanning from its conceptualization to completion.
This essay delves into the pioneering industrial methodology applied to produce and realize its steel structure, starting with an overview of the skyscraper's contextual conditions and primary attributes. As a symbolic embodiment of progress in assembling prefabricated steel load-bearing structures, the tower stands out for the systematic and harmonious deployment of modern operational procedures.
In the design of the *Torre SIP*, the designers distinguished themselves by adeptly leveraging the potential of productive rationalization. Their accomplishment lies in creating a formally refined architectural artifact that transcends mere seriality while retaining strong linguistic connotations. By avoiding slavish adherence to technological coordination and pointless stylistic embellishments, the designers manifest a distinctly contemporary urban intervention, echoing the intent to position the building as "the last of a series and the first of another series".

Keywords

Genoa, *Torre SIP*, Skyscraper, Steel structure, Prefabricated structure.

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1. THE RISING CITY

In the 1950s, Genoa spearheaded various urban initiatives aimed at transforming the capital of Liguria into a thoroughly *modern* city. These transformations were made possible by the renewal opportunities presented during the city's reconstruction process, which became necessary due to the constant bombings during the Second World War. In 1953, the Technical Office of the city drafted the *Piano Particolareggiato di Piccapietra*, followed by the *Piano Regolatore di via Madre di Dio* in 1957 and the *Piano Regolatore di S. Vincenzo* in 1959. These plans served as implementations of the outdated 1932 masterplan *Piano Regolatore di massima delle zone centrali della città di Genova*, the outcome of a competition held two years earlier and updated in 1937 [1]. The recurring theme was integrating urban fabric gaps, preferably with newly constructed buildings.

Within the *Piano Regolatore di S. Vincenzo,* an area identified by the *Società Italiana per l'Esercizio delle Telecomunicazioni*, commonly known as SIP, was designated for the construction of a skyscraper intended to host

the regional headquarters of the company. The commission was assigned to architect Piero Gambacciani (1923-2008) and engineer Attilio Viziano (1923-2011) in 1964. They initially worked at the urban planning level. The design and implementation of the project continued with the contribution of architect and designer Melchiorre Bega (1898-1976). Among the three, Bega was the only one with experience in the construction of tall buildings. Between 1956 and 1959, he completed the *Torre Galfa* in Milan, 104 m high, with a reinforced concrete structure concealed by continuous curtain wall façades [2]. The building integrated into an area characterized by an evolving skyline, including notable structures such as the *Torre Pirelli* by Gio Ponti (1952-1961), the *Torre Velasca* by Studio BBPR (1950-1958), and the *Torre Turati* by Luigi Mattioni (1958-1960) [3]. The *Torre Galfa* is a work that «wants to belong to the city to which it belongs, does not seek to nullify the pre-existing environmental conditions, and aspires to be part of plans and new aggregations that modern cities require» [4]. Numerous reviews, praises from distinguished colleagues, international recognition, and widespread approval among Milan citizens followed the completion of the *Torre Galfa*.

The situation in Genoa, where Bega, Gambacciani, and Viziano operated, significantly differs. Pier Carlo Santini wrote in the pages of the *Ottagono* magazine in 1970: «With its proverbial closures, with that sort of impermeability and even mistrust towards modern debate and any new order that may arise for the future, [Genoa] seems to have the power to sterilize, consume, and empty every condition of culture. Every event, in itself commendable, appears to hold promising prospects and implications for a different and better tomorrow» [5]. Moreover, the first and only tall building in the city center dates to the late thirties, a result of the provisions of the *Piano Particolareggiato di Piazza Dante* drafted in 1934. In 1939, the first of the two skyscrapers defining the new urban spaces was erected, 83 m high, and designed by architect Giuseppe Rosso. It was followed in 1940 by the *Torre Piacentini*, also known as the *Torre dell'Orologio* (Clock Tower), designed by architect Marcello Piacentini and engineer Angelo Invernizzi, reaching a height of 108 m. In the sixties, albeit of lesser height, tall buildings emerged as isolated episodes. Among them, the *Torre San Camillo*, built between 1960 and 1967 in the Piccapietra area by the Mor and Sibilla Studio, reached 75 m. Another example of similar height is the *Torre Villa Bozano*, located in the Quarto district in eastern Genoa, constructed between 1960 and 1966 by engineer and architect Luigi Carlo Daneri.

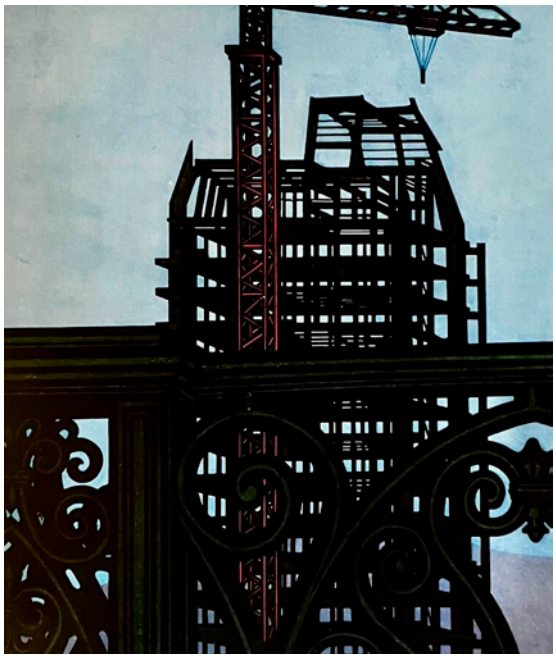
Figs. 1-2. *Photographs of the* Torre SIP *seen from Piazza Verdi and Via Fiume (1970). Source:* L'Architettura. Cronache e storia *174.*

The new *Torre SIP* would have emerged within a passage of the city that was both pivotal and controversial. In an article from 1970 published in the pages of *L'Architettura. Cronache e storia*, the designers clarified the contextual conditions at the outset: «The availability, at the time of the decision, of the area at the end of Via S. Vincenzo, where it opens into the large tree-lined square [Piazza Verdi], condensed and aligned positive parameters: an area regulated by a detailed plan with provisions for a multi-story building; adjacency to practically all urban transport network lines; proximity to Brignole Station; easy pedestrian connection to Via XX Settembre - De Ferrari, still today the 'city' of Genoa» [6] (Figs. 1-2).

Despite the building's placement within this urban context appearing as a practically feasible solution without disrupting the surrounding city, the lack of a comprehensive masterplan makes the location of the skyscraper seem arbitrary to most. Not because it is an unusual typology, but due to the absence of a preordained urban logic, architects are only expected to place a sudden "skittle" of a hundred meters anywhere in Genoa [7]. Using epithets such as "skittle" for architectures that evoke other representations due to their strong and distinctive formal characteristics is a recurring phenomenon in Genoa. Consider the *Casa A* building in the *INA-Casa Forte Quezzi* district designed by Luigi Carlo Daneri and Eugenio Fuselli (1956-1968), referred to as the "snake" or the *Pegli 3* complex by Aldo Luigi Rizzo (1980-1986), nicknamed the "washing machines"; or even the *Torre San Benigno Nord* skyscraper by Skidmore, Owings, and Merrill (1992), which earned the moniker "pencil".

Therefore, while the skyscraper initially raises some doubts and hesitations within the local community, especially concerning the choice of its location at the end of the Via San Vincenzo, the reaction from industry specialists is different. The *Torre SIP* would indeed have been the first example in Italy of a skyscraper entirely constructed with a prefabricated steel structure, a «modern technology serving engineers, architects, and builders», as stated in an advertisement created by the external relations office of Italsider in 1970 (Fig. 3). These are years when the topic of prefabricated steel buildings is becoming increasingly important. In 1965, coinciding with the beginning of the construction of the *Torre SIP*, an article was published in the Italsider magazine highlighting the potential of this construction system [8].

A symbol of the "measure of progress" in the assembly technique of steel load-bearing structures, the *Torre SIP* would stand out for the regularity and harmony of modern and entirely rational operational procedures employed. These procedures could ensure, at the same time, a refined experimentation in technological and formal architectural



Figs. 3-4. *Left: the Italsider advertisement. Right: the cover of the book* Le città del ferro, *featuring the* Torre SIP *illustrated by the artist Flavio Costantini (1967).*

design. It is not surprising that, in 1967, Italsider chose an image depicting the peak phases of the *Torre SIP* construction site – created by the artist Flavio Costantini – as the cover of the book *Le città del ferro*, dedicated to ten Italian cities that host the company's plants [9] (Fig. 4).

2. ON THE TECHNOLOGICAL FEATURES OF THE TOWER

The existing literature on the *Torre SIP*, also known as *Torre San Vincenzo*, is relatively scant. While mentioned in the previously cited publications related to the architectural work of Melchiorre Bega, the building does not find a place in architectural history textbooks. There is also a lack of a specific bibliography on the work of the other two authors, even though Gambacciani, particularly in Genoa, has accomplished much. However, the skyscraper appears, albeit approximately, in various publications dedicated to contemporary architecture in Liguria and Genoa [10-13] or Italian architecture of the 20th century [14-16].

The primary sources are articles that appeared in newspapers or industry magazines, written in the years immediately following the completion of the construction. Renato Pedio's article published in *L'Architettura. Cronache e Storia* in 1970 was a valuable source for preparing this contribution. This article provides a meticulous description of the technological and formal characteristics of the tower, accompanied by historical images and technical drawings. It also offers insights from the architects of the skyscraper, providing direct testimony to their design process. Below, an attempt will be made to synthesize the aforementioned characteristics, outlining an overall framework essential for the subsequent detailed examination of the construction of the prefabricated steel structure, a focal point of this contribution.

The volume of the building consists of a 105-meter-high steel structure, including twenty-eight levels, of which twenty-five are above ground (Fig. 5). This structure emerges from a detached reinforced concrete base, standing 30 m tall and encompassing eight floors, six above ground. The lower levels of the skyscraper integrate with this traditional structure through a series of small cantilevers placed along the relevant floors of the skyscraper. The entire structural complex is found on a reinforced concrete slab with a variable cross-section ranging from 70 cm to 125 cm. The foundation piles have diameters between 600 mm and 800 mm, with average lengths of 20 m, supported on a bed of limestone-marble consistency.

For the tower section, the structure, constructed according to the project specifications, consists of four multi-story rigid frame structures, two of which have four bays and three with five. The distance between the columns is 3.90 m. This structure manages the entire complex of horizontal forces due to the wind. With a Y-shaped cross-section, the corner columns connect the perimeter frames in pairs, absorbing the predominant part of the stresses from the horizontal forces acting on the frames. The columns of these frames are made of HE profiles with a section that decreases in size from the bottom to the top.

The composite slabs comprise a system of primary and secondary beams with I-shaped profiles (HEM and IPE) that support the steel decking and the reinforced concrete cast-in-place on top, which is 8 cm high. The torsional stresses from asymmetric wind loads are managed on each floor by a perimeter lattice ring element made of IPE beams partially embedded in the slab.

Crystals, metals, and types of cement forming the cladding elements are selected based on appropriate intrinsic properties and compatibility to provide filtration or insulation against physical factors in relation to the needs of the interior spaces and the overall planned technological conditioning system. All floors are designed and constructed with a layer for electrical and telephone installations, with outlets arranged planimetrically in a modular grid subordinate to the coordination module (132.5 cm); the walking surface is provided in vinyl sheets. The internal space distribution is achieved with removable wall panels related to the support system for sound-absorbing buffer ceilings; all fixed walls are finished in wood or enameled steel panels, where they form chases for cable passage, and in vinyl sheets when they have a cement structure.

In summary, here are the quantitative data for the skyscraper: a total construction volume of 75,000 m^3, with 56,000 above ground; a total floor area of 21,000 m^2, distributed as follows: public interaction areas, 5%; tech-

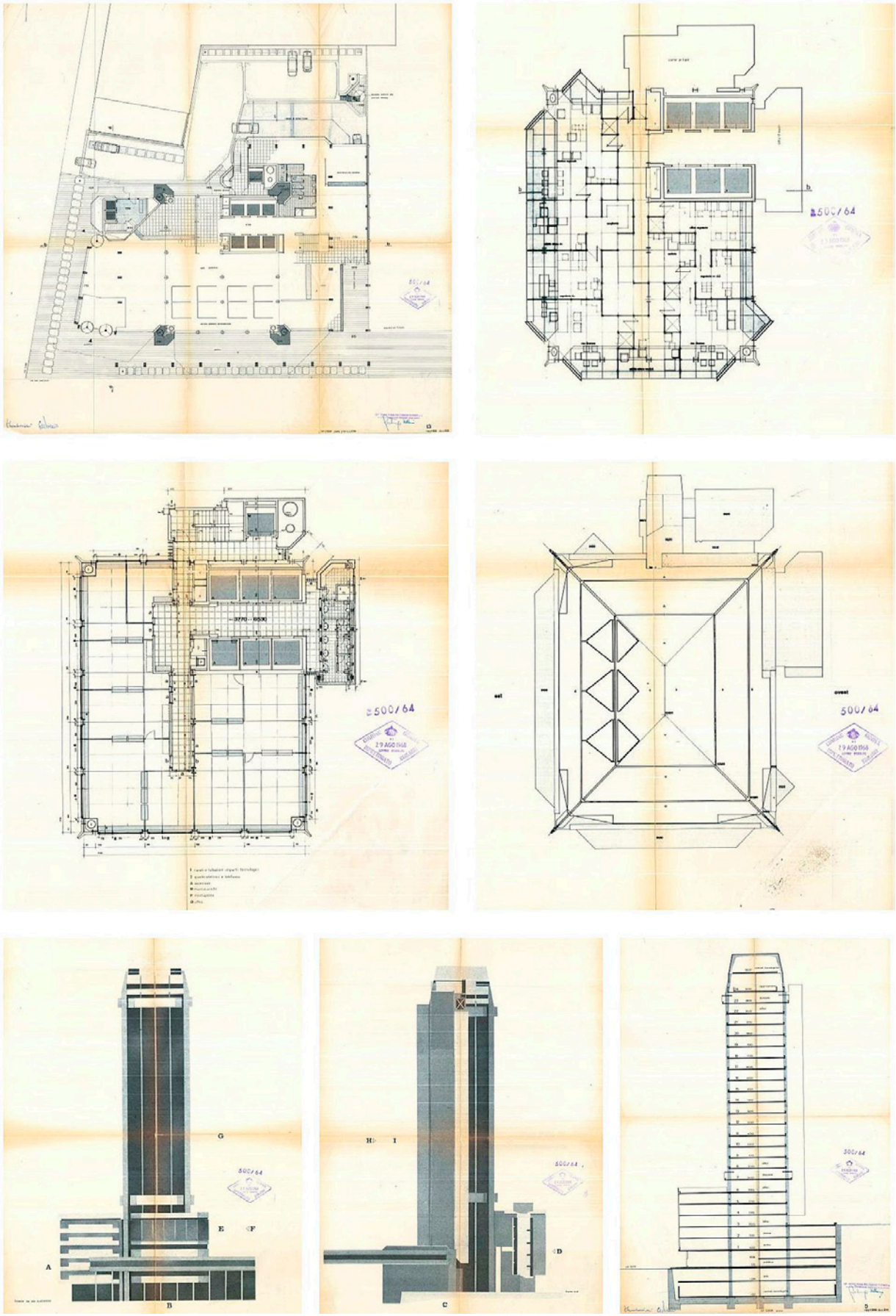


Fig. 5. *Project drawings. Top: ground floor plan and seventh-floor plan. Middle: type floor plan and roof plan. Bottom: elevation on via San Vincenzo, south elevation and section. Source: © Archivio Edilizia Privata, Comune di Genova.*

nical-administrative offices, 57%; sanitary facilities and corridors, 9%; vertical connections, 9%; parking, 9%; technological central offices, 12%. With a projection for an increase in the first decade of building utilization, it is designed for a maximum occupancy capacity of eight hundred people during full utilization.

In the vertical section, the distribution of functions across various floors is as follows:

- second basement: technological central offices;
- first basement: car parking;
- ground floor: public service;
- first floor: electronic center, cafeteria, kitchen, warehouses;
- second floor: electronic center;
- third to fifth floors: administrative offices and archives section;
- sixth floor: social and corporate institutions;
- seventh to twenty-second floors: accounting and technical offices;
- twenty-third floor: management and meeting rooms, secretariat;
- twenty-fourth floor: turbine motor-generator station.
- twenty-fifth floor: elevator machine room, electro generators, cooling towers.

3. NASCE UN GRATTACIELO: THE PREFABRICATED STEEL STRUCTURE

Almost nothing would be known about the design and construction of the steel structure, engineered by Riccardo Baldacci, if not for the considerable documentation work conducted by Italsider in 1968. They produced the movie entitled *Nasce un grattacielo (A Skyscraper is Born)*, capturing, for promotional reasons, the most significant moments of the construction of the SIP Tower, built by CMF (*Costruzioni Metalliche Finsider*) with steel supplied by Italsider. This movie is an extremely valuable original source from that era, the only one allowing for the detailed clarification of some distinctive aspects of this steel structure [18].

The movie provides fundamental preliminary data, namely the need and intention to give an industrial approach to constructing the skyscraper through the prefabrication of homogeneous elements produced in the factory and their subsequent assembly on-site. This serial production process allowed for an innovative and high level of productivity for that time. The documentary highlights individual parts of the structure being prepared in the carpentry workshop through a sequence of programmed operations and then moved steadily to the construction site, where they are assembled according to the project specifications.

The corner columns, conceived based on an interpretation of both aesthetic and structural motifs, are prefabricated in the workshop using a composition of custom-cut plates continuously welded to HE profiles with wide, parallel flanges. The base, which mirrors the star-shaped form of the column, is attached while the welding of its transverse ribs is in progress. Once on-site, the column is placed on the foundation slab in the designated position where the anchor bolts have been set; the narrator emphasizes «the simplicity and immediacy of the entire operation». The fabrication and subsequent installation of the other three corner columns proceed with a regular, coordinated work rhythm between the workshop and the construction site.

The installation then proceeds with one of the intermediate square columns on one side of the tower. The column consists of two HE beams, one of which is cut transversely in half and welded onto the web of the other. The dimensions of these columns, 520 mm x 300 mm, significantly limited in relation to the load, will decrease further as the building rises vertically. Simultaneously, the assembly of horizontal connections proceeds, which, proportional to the required section, consists not only of HE profiles but also of IPE profiles and welded beams. In 1964, the *Rivista Italsider* magazine published an article entitled *Travi per costruire* (Beams for Construction), detailing the specific requirements of IPE and HE parallel flange beams. According to the writer, these beams represent «a new contribution to solving the most challenging construction» [19]. During the lifting of an intermediate beam, the movie shows, at one end, a small balance set up for the worker who will perform the connection. Like all horizontal beams, this connection is made by bolting, first done with a manual wrench and

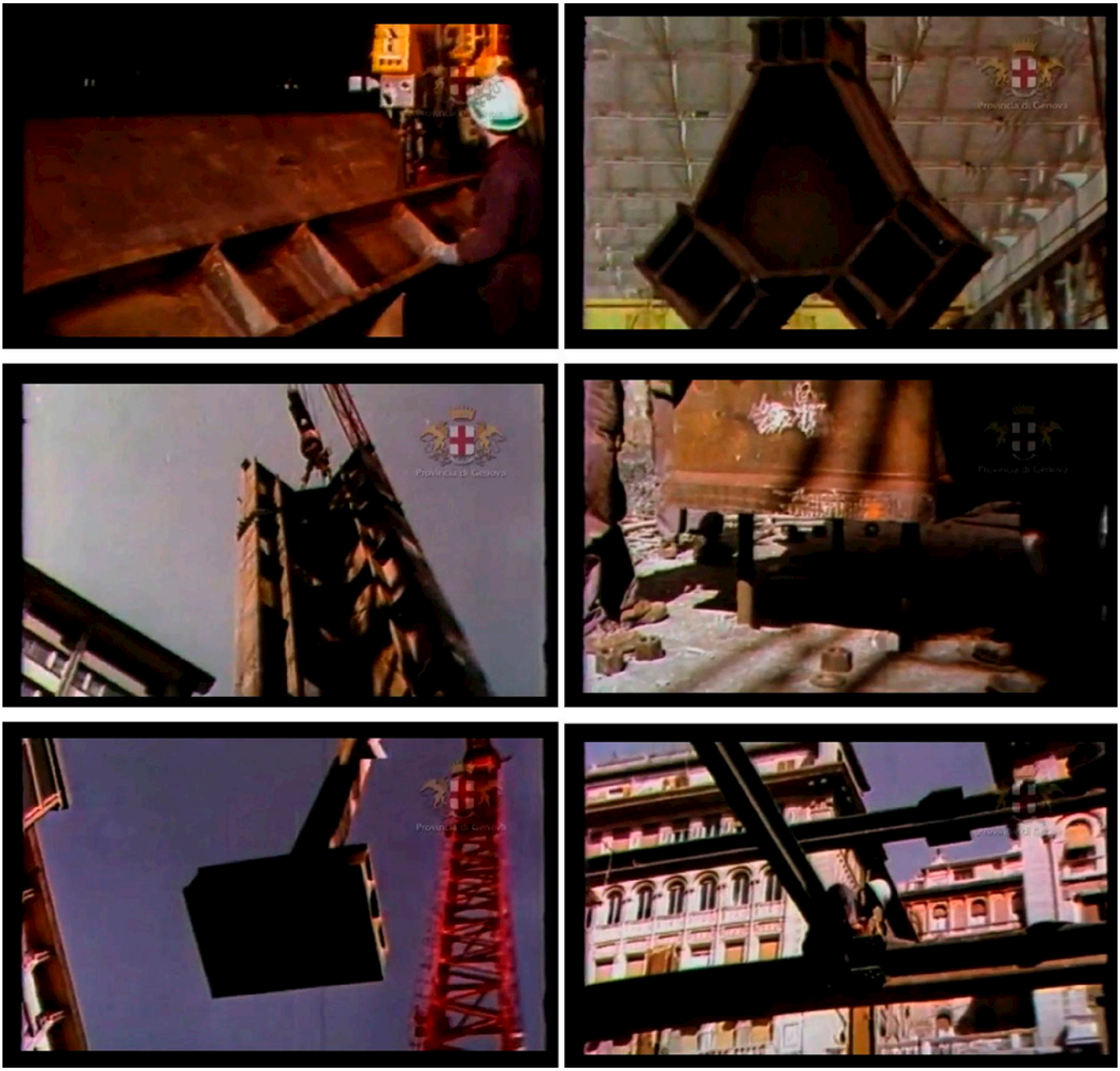


Fig. 6. *Frames from the movie* Nasce un grattacielo*: welding of the corner column and its base; the corner column lifted by the crane on site and the anchor bolts; an intermediate square column and the assembly of the horizontal connections. Source: © Archivio Audiovisivi, Città Metropolitana di Genova.*

subsequently with final tightening using an adequately calibrated automatic screwdriver (Fig. 6).

The process then involves lifting the triangular corner column segments, which are prepared on the ground and rigged for their movement, using a crane. The ability to use load-bearing elements of truly remarkable dimensions contributes to faster execution. These column segments reach a height of 14 m and encompass up to four building floors. The connection between the installed column segment and the new segment is made by welding the two matching ends, one of which is prepared in the workshop with a specific bevel to accommodate the welding bead.

In an extremely confined space, pre-assembly of structural units for sections of three and four stories is carried out at the construction site. The film shows the crane lifting a unit that covers over 100 m^2 of façade. The narrator states: «The emergence against the sky of these robust and slender frameworks of new dimensions gives the precise impression that even construction in our country embraces the momentum of great technological transformations.

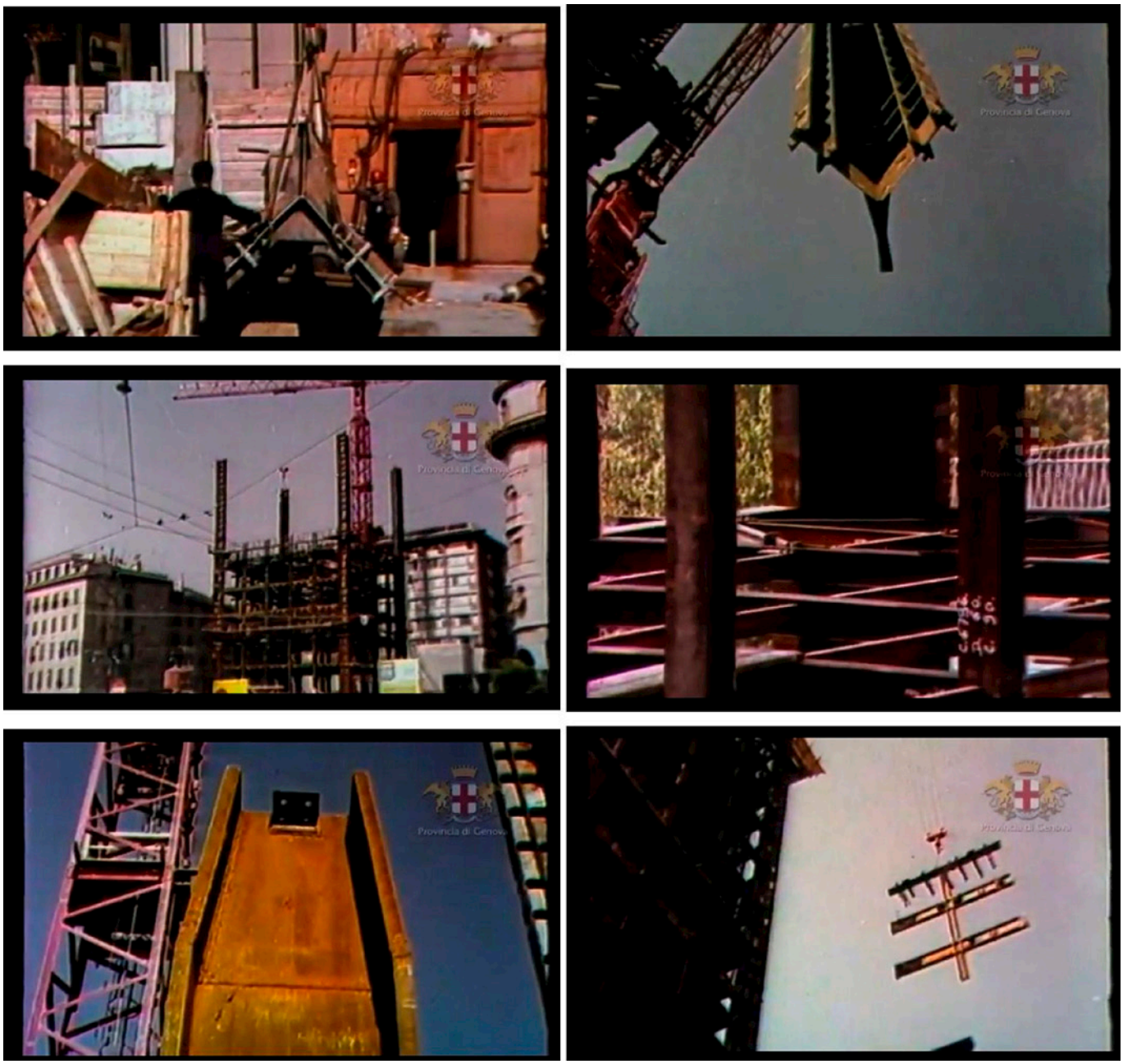


Fig. 7. *Frames from the movie* Nasce un grattacielo*: the segments of the triangular corner columns and their lifting; the tower under construction and the internal structural elements; reduction in the cross-section of an intermediate column and the lifting of a structural unit equivalent to 100 m². Source: © Archivio Audiovisivi, Città Metropolitana di Genova.*

With steel, it is possible to achieve an entire structural entity installed with a single crane lift, a task otherwise achievable with a variety of materials, excessive equipment uses, and a significant impact on time and labor».

To facilitate the integration of the unit into the structure, supports for service platforms used by assembly workers are attached to its upper beams. As the unit reaches its designated location, other work phases follow, such as joining the tower's internal structural elements. Plates with holes matching those already drilled in the side columns are welded to the ends of each beam in the workshop; the fastening is done using bolts. The structural elements for the stairwell group, which is planned as an attachment on one side of the tower, are also prepared on-site and placed continuously using the same assembly technique as the main core of the building. The insertion of the skyscraper into the environment becomes increasingly defined as the building rises; the tower begins to take shape in its proportions, integrating into the surrounding urban fabric (Fig. 7).

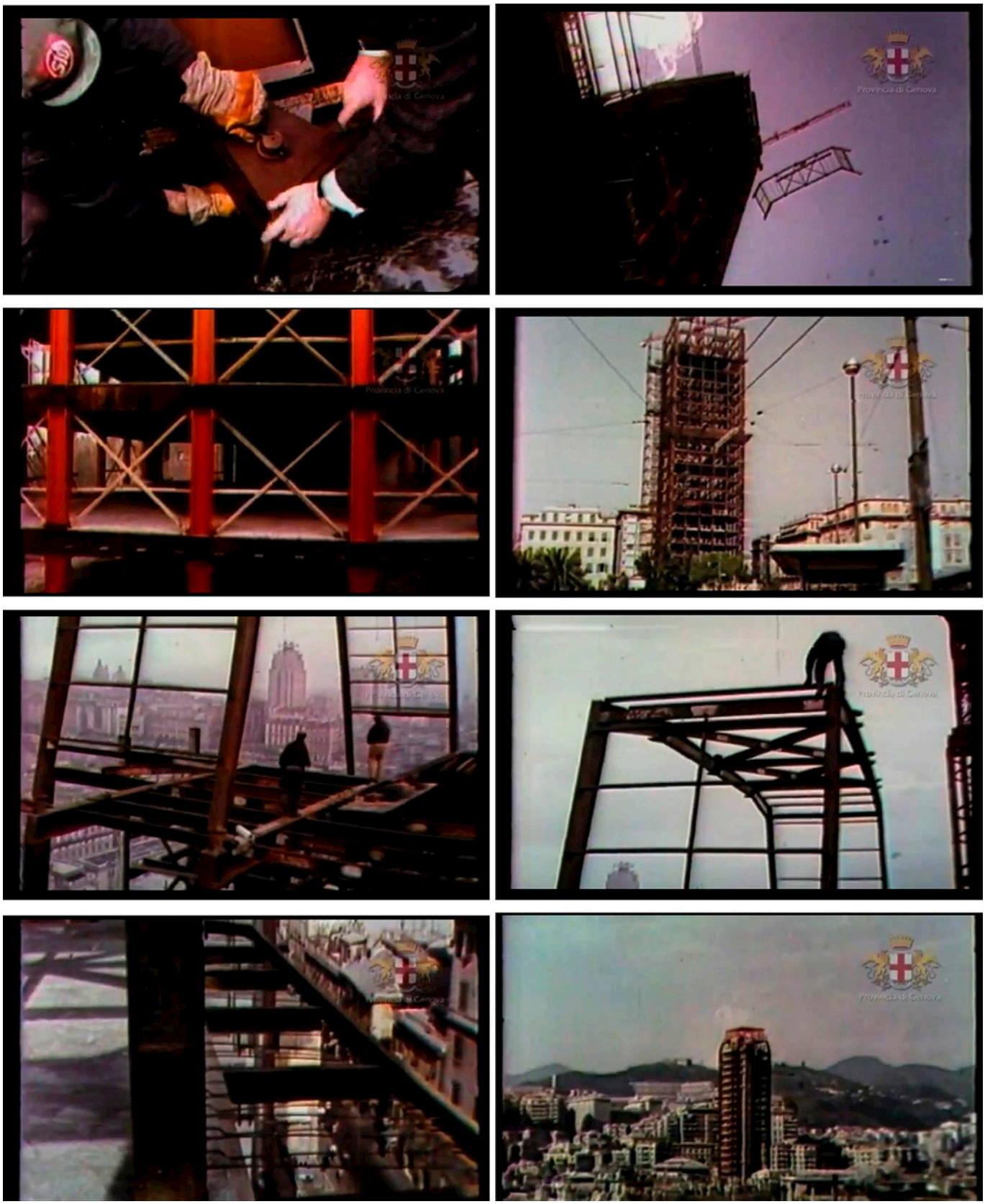


Fig. 8. *Frames from the movie* Nasce un grattacielo*: the hinge connection and the lifting of the portals; the installation of a portal and the bracing diagonals; edge beams made of steel profile for the cantilevers on the sixth and twenty-third floors; the steel structure completed with its pinnacle in the landscape of Genoa. Source: © Archivio Audiovisivi, Città Metropolitana di Genova.*

For the terminal part of the skyscraper, prefabricated units are employed on-site, consisting of two pairs of portals hinged at the base. The hinge constraint is considered the most suitable for addressing static and economic issues. The portals span over 16 m and a height of approximately 6 m. At the construction site, a pair of portals is prepared with the arrangement of connecting elements and the members for the roof installation; precise positioning is carried out with extreme accuracy due to the considerable size and extent. Diagonal braces are bolted to the upper area of the portal pairs, completing the load-bearing structure of the pinnacle; the assembly of a pair of portals takes about two hours. The pair of portals, resting on the underlying beams, is secured with bolts and then permanently fixed by welding.

The ample space inside the pinnacle will accommodate the air conditioning and lifting systems. Thanks to the high specific strength of steel, the load-bearing structure allows for the easy placement of heavy equipment at the top of the building. With the completion of the pinnacle, the tower will be ready to undergo finishing work. The external cladding will consist of prefabricated panels, which emphasize the continuous rhythm of the façade volumes, marked by two cantilevers located on the sixth and twenty-third floors, constructed with edge beams made of steel profiles and reinforced concrete slabs (Fig. 8).

The SIP Tower represents a unique milestone in the history of metal framing. In 1968, it made possible the creation of extremely linear and quickly executed joints with a limited footprint of structures, benefiting greater usable space and larger spans. Time and costs were also reduced: the assembly of the entire steel structure, unaffected by weather conditions, required 21,000 person-hours, ensuring a steady work progress. The entire unloading, assembly, and installation of the structure was accomplished using only one crane in a construction site area limited to just a few dozen m^2. Furthermore, the high strength-to-weight ratio of steel reduced loads on the foundations and, consequently, their cost.

Driven by an optimistic and innovative spirit, and perfectly fitting, are the words that conclude the documentary: «The ancient noble landscape of the city now welcomes, among its buildings differentiated by a history of many centuries, the strong and slender presence of the steel tower. It introduces into the traditional environment the essential imprint of dynamic and therefore enduring civilizations, namely the ability to consciously and harmoniously utilize the means made available by technological progress».

4. REMARKS AND CONCLUSION

Upon completing the structural steel framework, the need arises to personalize the structure. The designers, aware of the ineffectiveness of a symmetric architectural form within such a heterogeneous context, opt for a judicious differentiation of the tower's four sides. The modularity of the façade system allows architects to design the elevations using a variable use of cladding. Aluminum-glass panels, created with a self-supporting hinged system fixed at points to the structure, are employed in inhabited spaces. In contrast, cellular concrete panels hanging with an elastic system on the steel structure enclose service and distribution areas. Initially, the project developed by Gambacciani, Viziano, and Bega planned to place the distribution and service block on the north façade to provide the inhabited spaces with a view of the sea. However, the municipal offices did not accept this decision, and to emphasize the building's importance within the *Piano Particolareggiato*, the main façade must face Via San Vincenzo.

The tower appears to emerge from the ground, breaking through the base, with a front variously capped depending on the perspectives. This variability responds to an urban spatial intuition that metaphorically condenses in the building, which – quoting Pedio – «seems to want to take on, as much as it can, with a volumetric and figurative effort, the dynamics of the city» [6]. The gallery's ceiling is punctured to allow the angular load-bearing elements to slide through, highlighting the anchored-to-earth steel structure and emphasizing its measured and finished verticality. The *Torre SIP* does not seek a romantic reach for the sky; it is firmly rooted in the ground. Upon its completion, the tower asserts itself, with its well-defined volume, in the city's landscape (Fig. 9).

«If, on the one hand, – say the architects – given the current configuration of the city and the context in which

Fig. 9. *The load-bearing corner elements breaking through the base and cellular concrete panels of the distribution area. Source: © Archivio Edilizia Privata, Comune di Genova.*

it stands, the building represents a clear departure (aside from any superficial discussion about the need to refer, for any construction of quantitative commitment, to a manifest contemporaneity), a dialectic in the development of forms remains valid, where a building is both the last of one series and the first of another series» [6].

What distinguishes the work of architects Bega, Gambacciani, and Viziano is their ability to positively exploit the full potential of production rationalization, realizing an architectural artifact whose serial nature does not flatten its strong linguistic connotations. Going beyond a pedantic, albeit complex, technological coordi-

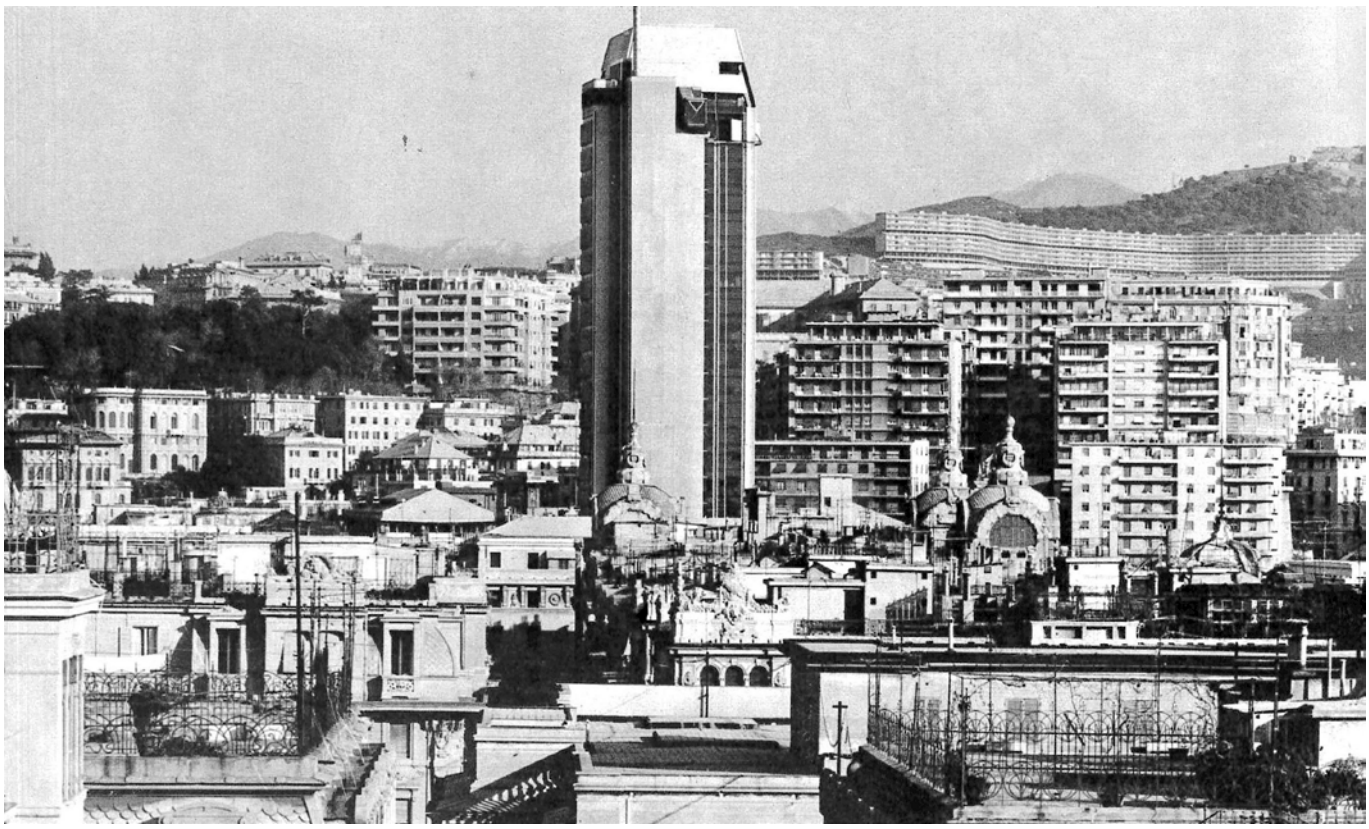


Fig. 10. *The* Torre SIP *(1970). In the background, Genoa. Source:* L'Architettura. Cronache e storia *174.*

nation and escaping with a personality from unnecessary styling, the architects create a manifestly contemporary urban intervention, choosing to graft architecture onto the city, making the building "the first of another series". Through the multiplication of cells and elements, following the canons of industrialization, the designers construct a formally qualified accomplished fact capable of also referring to the urbanistic solicitation, deepening the favorable elements of the situation and remedying planning deficiencies themselves.

Pier Carlo Santini writes about the *Torre SIP* just after the completion of the construction: «In Genoa, there is little talk of architecture, even though a lot is being built, at least at this moment. […] Dignity and correctness characterize the best cases. But there are no flights, even though the very recent SIP skyscraper seems to me to be an undeniable exception […]. Clear and simple as a crystal, as if to contradict the surrounding building modules, both near and far, this skyscraper is a new, recognizable, emerging episode in the Genoese urban landscape. Designers Bega, Gambacciani, and Viziano rightly thought that dimensionally distinct, the skyscraper had to assert an original architectural idea without succumbing to easy compromises or environmental flatteries. And the result is what it is, remarkable for what is right in the city» [5] (Fig. 10).

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The documents related to the building permit can be consulted at the *Ufficio Visura Progetti, Sportello Unico dell'Edilizia, Comune di Genova*, to whom we express our gratitude for their availability and cooperation.

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