

New and Better Practices for City Regeneration

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Abstract: By failing to incorporate quality and environmental concerns the criteria applied for the territorial and functional development of cities are no longer appropriate. In the on-going search for guidelines and strategic measures, the need for the re-densification and the restoration of a degraded urban fabric has emerged at various levels. If rationally planned, such actions can help reduce the costs inherent in uncontrolled land consumption by favouring a renewed and more effective functional mix. It follows that the recovery and maintenance of the extant heritage and its functional reconversion are part and parcel of the foregoing measures for urban enhancement and requalification. However, in Italy regeneration operations are difficult to implement: they are often promoted but usually fail to materialise. What criteria exist to advance real solutions? To provide incentives for regeneration actions, improve the quality of urban areas and the built environment, and engender a virtuous process in the national economy, new strategies must be defined at the various action levels (planning, design, and building, management). Experts, politicians, administrators and society as a whole must be involved in a much wider process that will lead to regulatory, organizational and associated changes.

Key words: Regeneration, urban enhancement, requalification, re-densification.

1. Redensification as an Answer to Urban and Architectural Sustainability

Throughout Italy, after the Second World War, a considerable number of buildings were constructed very rapidly in response to a growing demand for housing, adopting strategies to speed up construction and relegating the quality and healthiness of the indoor and outdoor living spaces to second place.

Today, the great quantity of buildings and their quality make a re-examination necessary, in the awareness that we cannot go on designating new land for habitation.

The characteristics of the housing in terms of plan, form and technology necessitate analysis and assessment in order to decide on point or radical substitution, or controlled global regeneration of the existing fabric.

Given the vastness and heterogeneity of the housing and renewed attention for the life-cycle of the existing built fabric, sterile generalisations (guidelines for seismic, energy and spatial regeneration, etc.)

producing recovery projects not always rational with respect to the economic parameters must be avoided.

We therefore felt it would be of interest to study housing developments constructed between the 1950s and early 1980s, an extremely complex period characterised by strong social, cultural and economic pressures, resulting in certain “responses” which have effectively modified subsequent architectural production in quantitative, architectural and constructional terms. This is demonstrated, for example, by the situation in Italy, where a number of regulations have been adopted in an attempt to rectify certain deficiencies: regulations to reduce energy consumption for heating buildings No. 373 of 30/04/1976, regulations on the protection of water from pollution No. 319 of 10/05/1976, regulations on the suitability of land for building No. 10 of 27/10/1977, regulations for residential building No. 457 of 05/08/1978, etc.

On the basis of the studies, analyses and in-depth research carried out in recent years, within the various disciplines and on the various scales, there is a need for experimentation on homogeneous complexes at individual building, built fabric, local area and

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landscape scale.

In this specific case, we focused on housing developments which are today showing a certain “fragility” in their integration with adjacent neighbourhoods, due to a lack of infrastructure and services, the limited sustainability of the materials, technologies and installations and their inadequate dimensions with respect to changes in the make-up of households.

In recent years, residential architecture has not been the subject of aware and sustainable “design exploration”, whether considering form, use, or the performance characteristics of the buildings themselves [1].

Many housing developments built after the Second World War are today suffering from social, spatial, functional, energetic and management obsolescence, etc., and it is not easy to decide between demolition or regeneration measures.

In recent years, various actions following diverse approaches have been defined and implemented. These differ according to the specific characteristics of the particular national situations and different improvement strategies adopted. The policies range from demolition and reconstruction of entire vast areas of housing, to modernisation aimed at maintaining large expanses of the existing built fabric and making them efficient. In Italy, huge sums of public money (2015, 2016 housing plans, etc.) have been allocated, but the necessary modernisation continues to be implemented in limited housing developments only.

During the last century, housing as a whole was built to largely quantitative, rather than qualitative, criteria and today, the urban planning schemes and buildings of many housing estates are based on innovative spatial architectural experimentation (expressed in the construction of large residential blocks, attributable to the idea of the “città per parti”—“city in parts”) and built largely using materials and technologies whose performance is today no longer adequate.

The result was complex developments with different

housing densities, structured around circulation schemes based on a dual road system (dividing areas for pedestrians and areas for traffic, or connecting the various parts), with hybrid outdoor areas and consisting of buildings with standardised apartments, mostly for four-person households, constructed at first with traditional, then industrialised, building technologies. In the 1960s, this consisted of reinforced concrete structures with prefabricated panels and components, then later, a reinforced concrete framework filled in with air bricks, in both cases with almost non-existent insulation.

These housing developments were constructed very rapidly, but their social and environmental deterioration was equally rapid and in many cases the poor technological quality led to the onset of physical, structural, performance and energy obsolescence.

For these estates, lacking services and infrastructure, with high energy consumption and statically unsafe, it is not easy to decide which is preferable, demolition or preservation and regeneration. Small and large housing developments represent a particular moment in the history of Italian public housing and today their limitations are clear.

We therefore felt it would be interesting to explore the main causes of the material deterioration and decline in performance in housing developments from the 1950s/1970s, namely:

- a lack of integration within the housing estate, despite the presence of services and infrastructure serving areas larger than the estate itself;
- the transformation of open spaces into car parks, eliminating, or at least substantially reducing, public and private gardens and parks;
- the incomplete design and construction of certain buildings in relation to their designated use;
- the structural inadequacy of a number of buildings, particularly to horizontal stresses,
- the incompatible dimensions of the apartments;
- the non-optimum ventilation and orientation of the rooms;

- the use of unsuitable or poor quality materials, or materials with poor insulating properties;
- the incorrect use of insulating materials and a lack of attention to heat dispersion through thermal bridges;
- the rapidly deteriorating performance of external door and window seals.

Noting the extent of the deterioration, we cannot help wondering, on one hand, if these housing developments have a future and, on the other, if giving them a future is economically viable.

If they are to have a future, it would, however, appear necessary:

- to specify optimum hypotheses for introducing new uses to revitalise the buildings, based on the concept of multi-functionality;
- to correctly programme the resources to be invested in modernisation and improvement of the

housing estates to increase their market value;

- to plan specific measures on the built fabric according to the type of deterioration emerging during diagnostic analyses;
- to define a correct cost-benefit ratio in order to limit restoration and management costs.

2. Regeneration of 1950's Housing Developments

The University of Trento research group began by studying housing developments from various periods, concentrating in particular on those constructed between 1949 and 1963 by Gestione INA Casa [2].

Survey of their urban plan, architecture, construction characteristics etc., immediately demonstrated the need for specific intervention strategies.

INA Casa was set up to develop housing estates for

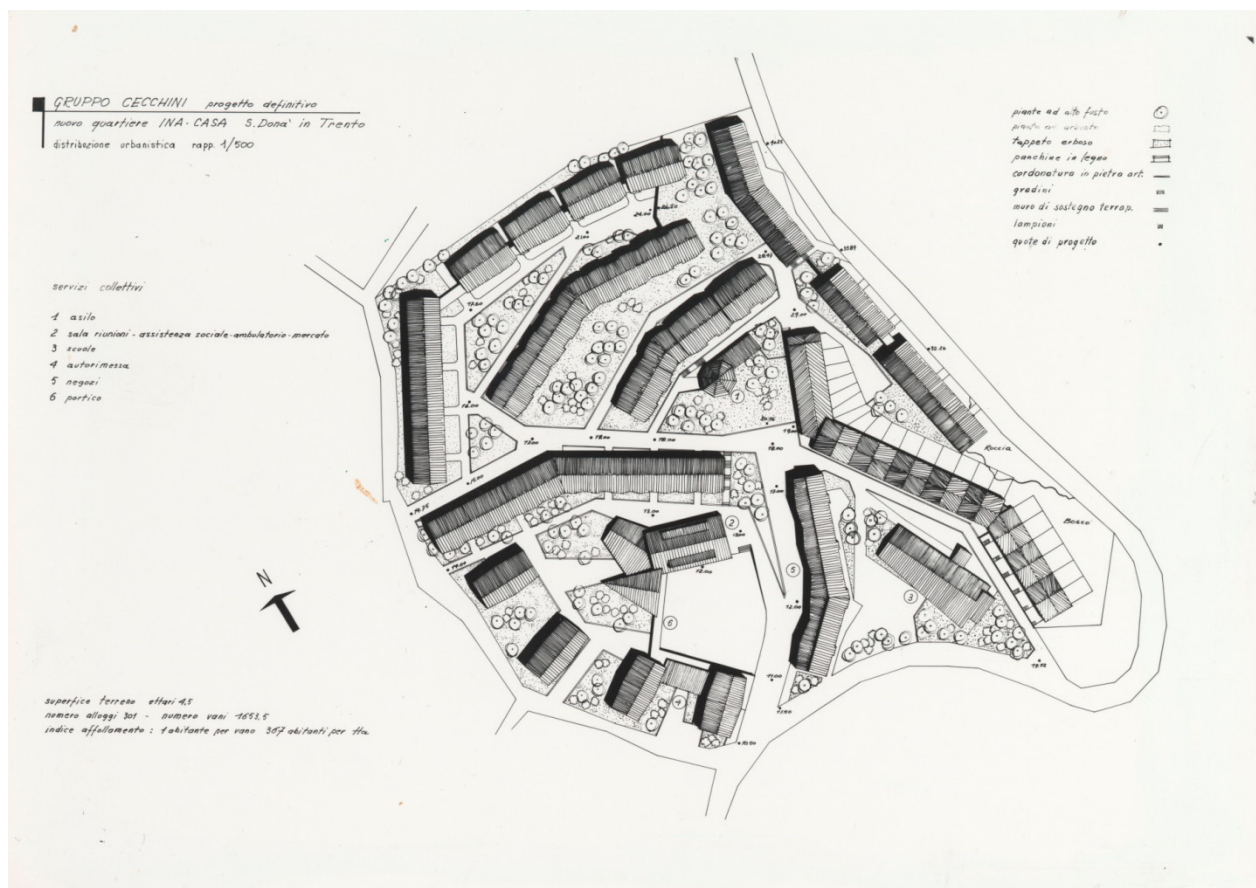


Fig. 1 Plan of the town of San Donà.

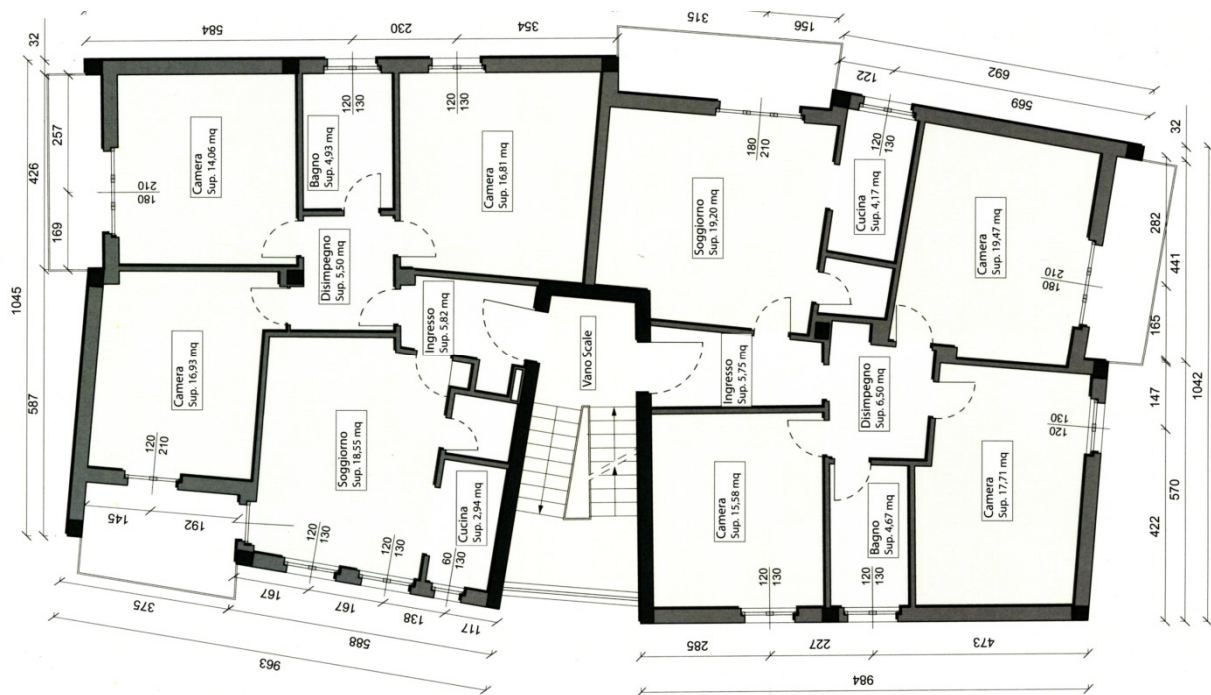


Fig. 2 The plan of a building of the town of San Donà.

workers moving to towns and cities from the countryside. With the aim of stimulating and guaranteeing efficiency and quality during both design and construction, it adopted a precise line in urban planning, architectural design and technology, valid throughout Italy.

The demand for housing in the specific towns and cities defined the size of the developments: buildings (minimum units), estates and satellite towns [3].

In the case of the larger housing developments, or where it was decided from the beginning to adopt innovative urban planning, building layout, altimetric or constructional solutions, regional or national competitions were called. This choice did actually produce innovative solutions, and these were closely examined by meticulous commissions nominated by the Gestione INA Casa management board.

To encourage innovation, the architectural division of Gestione INA Casa prepared a series of pamphlets containing recommendations and formulas, for example, for urban planning or designing individual buildings, defining the optimum construction solutions.

These pamphlets did not contain mandatory rules, but Gestione INA Casa hoped they would be respected and applied to achieve the objective of creating high quality housing developments with good living standards and a density of no more than 500 inhabitants per hectare. The area should also include spaces for public use and, to achieve the best possible living conditions, each building had to respect a certain ratio of distance from neighbouring buildings, above all avoiding cul-de-sacs or central wells.

The "...conditions of the land, exposure to the sun, landscape, vegetation, pre-existing environment and sense of colour..." should suggest the layout of the development, which had to be "... varied and lively, so as to create welcoming and restful settings, with different views from every part and with attractive vegetation, where each building can have its own distinctive physiognomy..." [4].

There were numerous and detailed indications on the apartments and the surface area was based on the number of occupants. A number of different formulas were defined (tower block, apartments arranged around a central staircase or leading off a corridor, or with access



Fig. 3 The facade of a building of the town of San Donà.

balconies), with various sizes of simplex or duplex flats to satisfy the different needs.

In the layout of the units, the routes were to be simple, linear and never overlapping and, from the smallest to the largest, the apartments were to include spaces defined in support of the actual living areas (gardens, balconies, clothes drying areas, box rooms, storage facilities, etc.).

In the context of the experimentation, certain solutions were banned, including for example: "... buildings higher than three storeys, ground floor accommodation, duplex apartments in an urban setting, uncovered communal stairs, unshielded outdoor/indoor connecting elements...".

The manual drawn up by Gestione INA Casa suggested the materials and technologies to be used to construct the buildings. All elements should have continuous foundations, reinforced concrete frameworks and clay/cement mix slabs.

Despite the use of non-specialised workers, Gestione INA Casa promoted the use of industrialised technologies.

Considerable importance was attached to leaving the

constructional elements exposed and the structure of these was therefore evident. All structural and finished elements were reinterpreted in a figurative key and played an equal role in the configuration of the façade.

Reinvention of the detail was not limited to the façade alone, but was extended to all elements, such as walls, fences, play areas and spaces for social life, etc., and this defined the overall appearance of the estates.

The configuration of the façade was the central theme in developing the project. The complex compound walls had to seem domestic, familiar and spontaneous. Each element was given expressive individuality. This meant that the roof was no longer simply a technical solution to protect the building from bad weather, but also had to accentuate the domestic dimension. From a typological and functional element as the "focus of daytime life", the loggias and balconies were to become the formal and constructional element characterising the facade. The windows could no longer have an abstract shape, but were to be crafted, autonomous, original objects, functional to the size of the opening and quantity of light required for the designated use of the room. As well as being functional

to the room, the size of the openings also had to be functional to the location, as too large a surface area could result in excessive expenditure for heating or cooling.

Among the considerable number of buildings constructed between 1949 and 1963 in every Italian region, housing developments were built with remarkable urban planning, architectural and technological quality and these have largely come down to our time without major modifications.

INA Casa was active throughout Italy, constructing both large and small housing estates and also individual buildings. The programme aimed to build modern housing, while at the same time also creating jobs, thus remedying the precarious and backward economic situation of Italy, in difficulty not least due to the war years.

Just as in all Italian cities, the programme led to the development of housing estates with variably sized apartments, arranged in tower blocks, around a central staircase or leading off a corridor, or with access balconies, with a rational road and path network, spaces and buildings for socialising, gardens and parks, sports facilities, shopping areas and infrastructure such as kindergartens and schools.

For many years, INA Casa housing developments were considered to be positive experiences, but today numerous functional, formal and technological incongruities have become apparent, making modernisation necessary.

This necessity led to analysis of the developments to verify the feasibility of their regeneration.

In this context, the satellite town of San Donà di Trento, built between 1955 and 1959, was analysed. A number of critical points have become evident, with moderate physical deterioration, but substantial internal and external spatial problems, poor energy efficiency and outdoor areas which are no longer used and where there is a lack of the now indispensable car parking space.

3. The Satellite Town of San Donà

The town was designed by a team of designers (engineers Marco Eccel, Renato Marchi, Vittorio Negri, Angelo Tomelleri and architect Mario Kiniger), coordinated by the Verona architect Libero Cecchini. These drew up a master plan for the entire area and architectural and final designs for the individual buildings. The urban plan created by the designers aimed to give the buildings and spaces the best possible exposure to the sun and to provide the services necessary to ensure personal psychophysical well-being.

The plan was adapted to the natural lie of the land and the housing was located at the edge of the lot, leaving the communal public buildings, gardens, parks and sports facilities in the centre. The terraced buildings were located in the north of the lot, following the natural lie the land, while to the south, there was a large building broken at three points to provide connections with the existing road network.

Reflecting the structure of a town, the estate was divided into different districts: to the north gravitating around the kindergarten and to the south around the square with the essential shops and social centre.

The social centre was initially located near the main entrance to the town, along a street lined with other public buildings, including the primary school. On a single level, this street became the fundamental element in the road network, into which the level or sloping residential streets from the north and shopping street from the south converged. In the initial design, along the north-east backbone there were four sloping terraced buildings with, respectively, three or four floors and a third building delimiting the area to the north, creating an additional protective barrier. To the south, there were to be four independent five-storey buildings, plus a two-storey terraced building with “duplex” apartments and possibly shops to emphasise the public nature of the square.



Fig. 4 New plan of the town of San Donà (A. Bertol).

The numerous criticisms expressed by Trento City Council building commission and experts from the Superintendency of Public Monuments resulted in numerous modifications to the arrangement and division of the buildings and a number of public buildings were not built (kindergarten and primary school).

Although its initial location remained unchanged, the social centre was reduced in size for economic reasons. A number of residential buildings were also reduced in size, for example, the detached blocks located in the southern part of the lot were built with just four above ground storeys.

The residential buildings were conceived according to eight different configurations, divided into small, medium-sized and large apartments. The apartments were basic, with a living area (lounge and kitchen) separated from the sleeping area (one, two or three rooms and a bathroom).

The individual rooms varied in size, the lounge between 15 and 20 m², the cooking area from 3 to 10 m² and the bedrooms from a minimum surface area of 12 m², but many as large as 20 m².

Analysing the accommodation, it can be seen that the living and sleeping areas accounted for two thirds

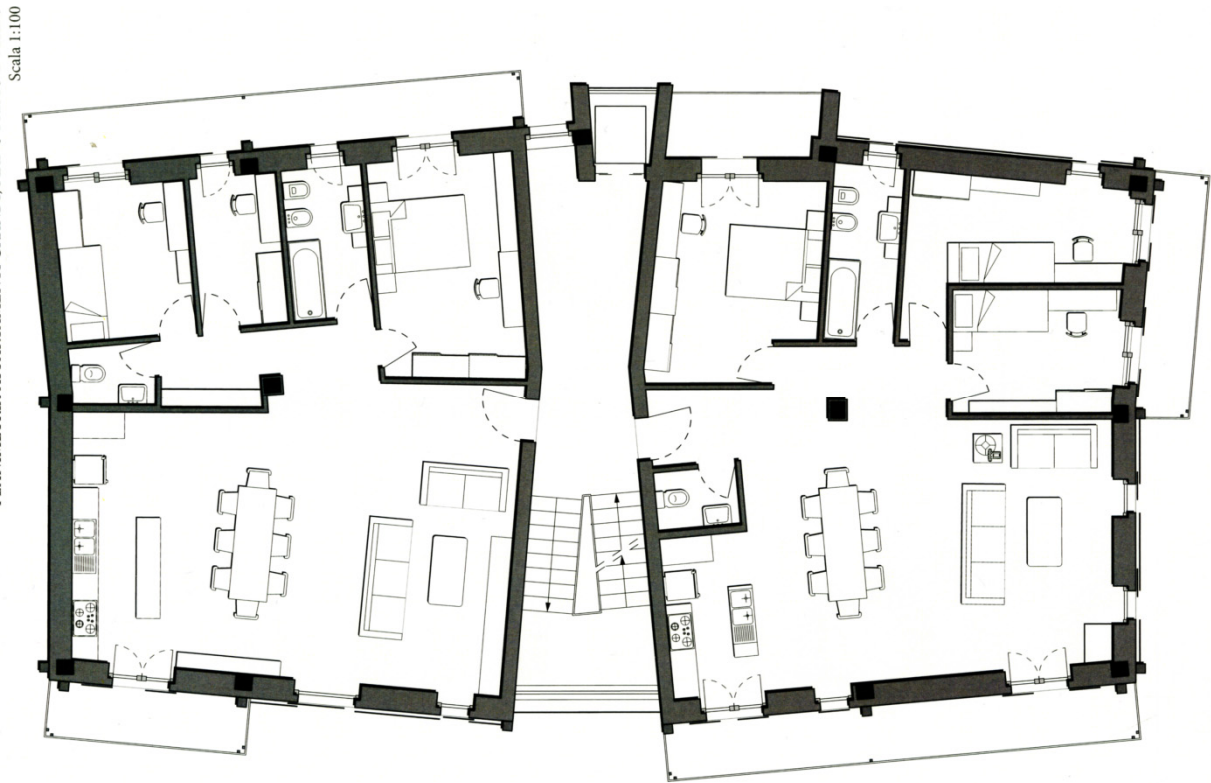


Fig. 5 New plan and new facade of a building of San Donà (A. Bertol).

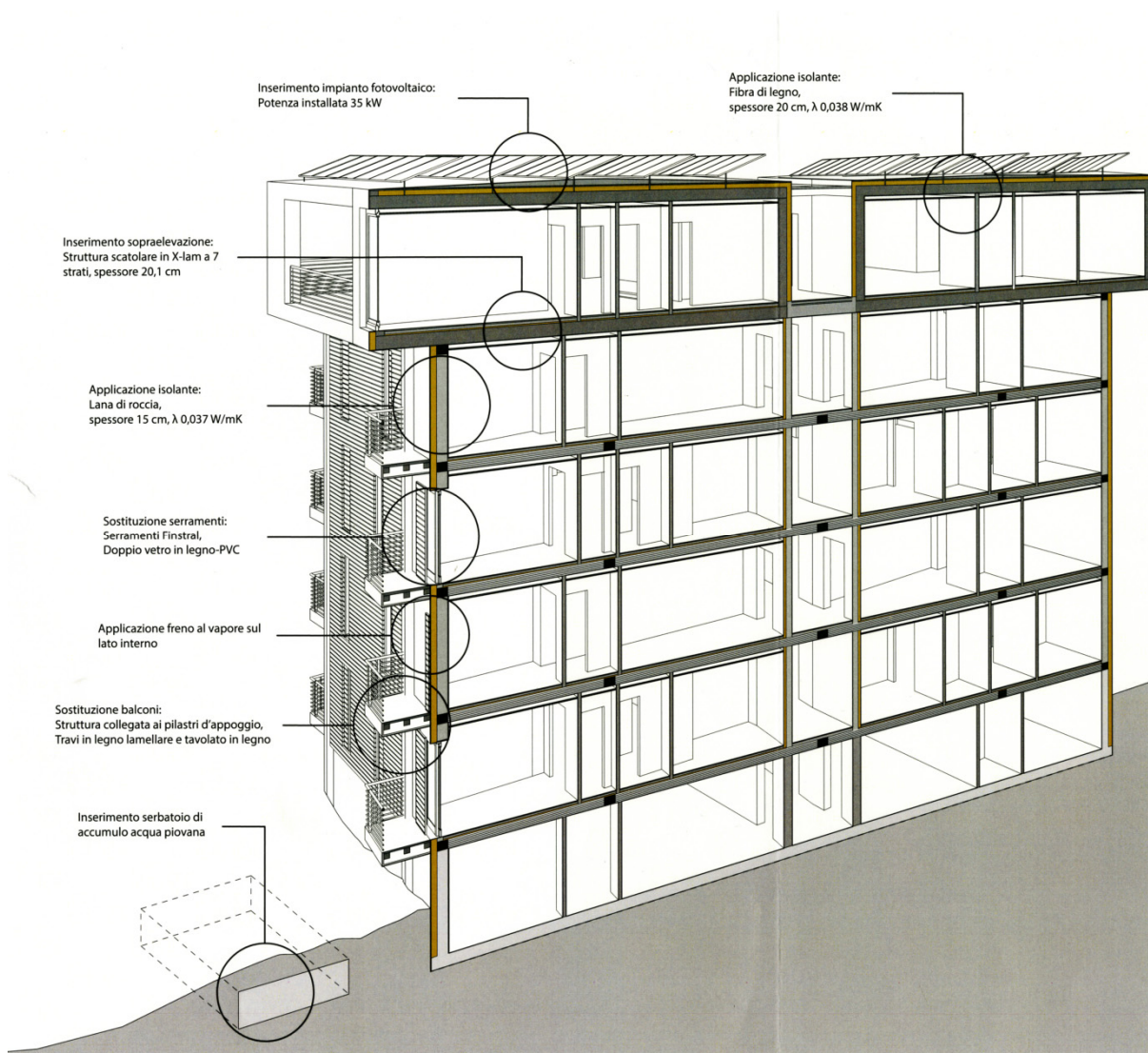


Fig. 6 New section of a new building of the San Donà (A. Bertol).

of the net floor space, while the remaining space (one third) was destined for the kitchen, bathrooms and connecting elements.

The surface area of the apartments was extended by balconies, accessed from the living area.

The buildings themselves had two, three or four above ground floors. The semi-basement floor was occupied by individual and communal storage space.

The facades of the buildings are diversified and characterised by plays of shape and colour in a two-by-two pattern, with solid areas (plaster) and empty areas (balconies), topped by pitched roofs.

The facades are broken by a regular cadence of windows. These reflect the function inside, with small

windows for the service rooms and large windows for the main rooms.

The balconies become the compositional element characterising each group of buildings, differing in the shapes and details of the wood or metal parapets.

The wide range of solutions adopted demonstrates a desire to create a different typological panorama for each lot, attenuating the uniformity of form to emphasise the underlying idea of spontaneous design.

Other elements, such as the downpipes, become architectural elements. Detached from the facade and positioned on a level with the maximum projection of the balconies, they emphasise the desire to reinterpret even the simplest of elements.

All the buildings were conceived with a reinforced concrete framework, filled in with very thick air bricks to guarantee good insulation. The load-bearing structure rested on plinths connected with ground beams, while the slabs were in clay/concrete mix, varying in thickness from 16 to 20 cm according to the distance apart of the pillars.

The foundation structures were sealed by hot application of tar paper and bitumen.

The wood window frames were the object of particularly detailed design.

All the buildings were equipped with central heating, electricity, water and sanitary systems.

The satellite town of San Donà was constructed with good quality materials, seeking to adopt technologies able to reduce building times and which would require relatively low maintenance in the future. The use of traditional, and therefore natural, materials and good construction practices created buildings which still fully satisfy the parameters today.

With this satellite town, the obligation to follow all the technical, design and construction indications provided in the manuals once again led to construction of a housing development which could today be defined as sustainable with respect to urban planning, architectural and constructional parameters.

The town was inaugurated on 26 September 1959, when about two hundred families of absolutely modest circumstances were allocated new modern apartments, surrounded by parks and gardens and rationally connected with the workplace and city centre.

4. Conclusions: The Project to Regenerate the Satellite Town of San Donà

The satellite town of San Donà was conceived and built with the aim of giving the working class of the time maximum comfort and a modern lifestyle, with rational comfortable apartments, large green spaces for children to play in, outdoor and indoor areas for socialising, schools and shops [5]. But today, just fifty years later, it appears inadequate with respect to a

number of the values and needs of today's quality of life.

The communal areas are no longer used, the green spaces have been transformed into car parks, the energy consumption of the buildings is high, and no energy is recovered. A general transformation project is therefore required, starting with the road network, improvement of the surface areas and possible construction of underground car parks.

Improvement and rationalisation of the road network in the satellite town will leave space to create additional gardens, parks and urban allotments to be allocated to the residents.

The limited height and low building density suggest that the height of the buildings could be raised. This would be feasible in urban planning, architectural and structural terms.

In this specific case, this would mean building an additional storey (originally eliminated during the construction phase), thus increasing the number of apartments whose sale on the free market could provide the resources required to improve the estate as a whole.

If rationally planned, the redensification hypothesis could help reduce the costs generated by uncontrolled land use and contribute towards a renewed and more effective functional mix.

For the satellite town of San Donà, it would also be possible to create a smart grid, in other words, a network of smart sensors able to optimise energy use and distribution.

This network could utilise the energy obtained from the excellent exposure to the sun.

The result would be a project to regenerate a satellite district which had already been a "model" in the recent past, making it "innovative" again by intervening intelligently in the conflictual relationships between man/car/home/environment/energy/nature and land and on the negative effects which characterised the last century.

Reconsidering the existing built fabric and building densification represents a fundamental strategy for

urban valorisation and improvement and also allows existing infrastructure and services to be rationalised.

Densification proposals also allow urban growth to be contained within its existing limits and can therefore also serve as a strategy for combating urban sprawl [6].

In pursuing this objective, it is important to establish a methodology for identifying suitable housing estates for redensification.

The choice of the housing complexes to be densified within cities must be carefully assessed in planning, infrastructural, architectural, structural and social terms and legislative measures alone will certainly not be sufficient to allow the aware and compatible expansion of the buildings.

In today's research scenario, it is clear that densification, urban completion and social sharing constitute a possible theme to respond to such real needs as more rational land use, more appropriate life-styles and social integration, over and above the urgent need for ideally low cost social housing.

The challenge facing us is to find various spatial qualities in the established urban landscape able to accommodate and foster environmentally sustainable life-styles as well as achieving the objectives of maximum economic exploitation.

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