The design of the modern urban environment of Rovereto, Italy: the valorisation of modern architecture

G. Cacciaguerra & M. P. Gatti
Department of Civil, Environmental and Mechanical Engineering, Trento University, Italy

Abstract

Modern society is increasingly demanding sustainability from its towns and cities, urban landscapes and building complexes. Developments now have to respect the environment, guarantee efficient and comfortable living conditions and adopt the best strategies, technologies and materials the market has to offer.

Many groups of buildings from the past have these characteristics and their validity necessitates careful preservation and valorisation.

After a period of apparent indifference, valorisation has also begun for early 20th century architecture, considered formally, functionally and technologically sustainable. Its continued ability to satisfy all needs has prevented it from being altered, while maintenance on the other hand has been constant, preventing the onset of functional and physical obsolescence.

In particular, modern architecture from the early 1900s in general demonstrates that buildings correctly satisfying urban, architectural and technological parameters do not need specific preservation and valorisation policies. They are preserved thanks to their quality and the simple passage of time is enough to ensure their valorisation, transforming them into "designer architecture", even when created by anonymous architects. An analysis was therefore carried out of buildings constructed between 1904 and 1915 by an unknown civic engineer, Ettore Gilberti, in the small provincial city of Rovereto, part of the Austro-Hungarian Empire. Ettore Gilberti was responsible for defining housing with innovative layout and technology, adopting planning and economic criteria still widely applicable to construct new parts of the city even today.

Keywords: smart city, conservation, valorisation, modern architecture.

WIT Transactions on The Built Environment, Vol 153, © 2015 WIT Press
www.witpress.com, ISSN 1743-3509 (on-line)
doi:10.2495/STR150421

1 The city "sustainability"

In recent decades, we have come to recognise the poor quality of our cities and buildings with respect to various criteria, such as land consumption, the lack of green areas, high-energy consumption during building construction, management and demolition, insalubrious living spaces, materials which are too often synthetic in nature and so forth. Ever more, the built environment fails to satisfy society's needs and constant alterations are required, modifications which, however, are not always possible due to the rigidity of the characteristics.

Modern day society requires "smart cities" and "smart homes"; in other words, cities and buildings that respect the environment, guarantee maximum efficiency and living comfort and make use of the best strategies, technologies and materials currently available. Last century's buildings are found wanting and society now demands new "sustainable" structures meeting environmental, ethical, social and economic parameters and this necessarily entails transformation or adaptation of the extant built environment. Words such as "recycle" or "reuse" are now so much a part of everyday language as to have become a moral imperative for aware societies sensitive to territorial and economic concerns.

Sector engineers and architects are required to devise new ways to construct cities and buildings but, in many cases, we fail to notice how past practice can guide us not only in constructing what is missing, but also in bringing the existing built environment into line with the new parameters. In actual fact, buildings and urban developments constructed up to just a few decades ago were consistently sensitive to the local area and adopted fully appropriate solutions and materials.

We then focussed on parts of the city constructed in the early 1900s and widely appreciated for their urban, formal, planimetric and technological quality.

The study considered a number of districts of Rovereto, a small city in the Alps which experienced a boom between 1890 and 1915 with major transformation of the existing nucleus, establishing a sort of "participated" project with the involvement of administrators, politicians, technical experts and the entire community.

A particular role in this process was played by the civic engineer Ettore Gilberti [1], who defined housing with innovative layout [2] and technology, adopting planning and economic criteria still widely applicable today to construct parts of the city and buildings we would now define as "smart".

The parts of the city he designed still, in fact, satisfy a number of parameters – for urban location, near, but not within, the established nucleus; for infrastructure, the rational balanced road system in fact guarantees access to all parts; for the green areas surrounding the small buildings and providing efficient visual isolation and acoustic insulation; for the public areas, within easy reach of the city; for the services (small shops, schools, etc.) present in the area; for the surface area and characteristics of the spaces and, finally, for the ability of the built environment and green spaces to metamorphose congruently and compatibly.

By deploying specific city-planning and building strategies in concert with the city council's administration, he applied planning and production management

procedures to city planning and architecture, and these, in their turn, led to notable savings in terms of environmental and territorial resources, and energy.

Gilberti's work denotes the great attention paid to a building's physical context, achieving maximum physical and environmental comfort, savings in terms of land and materials and reuse of materials and technologies, generating at the same time genuine innovation.

This study considered middle-class residential building development, consisting of small houses surrounded by microscopic gardens.

New shapes and technologies which set out to adapt to the natural morphology of the area, climate parameters and lifestyle cultures.

The characteristics on building and settlement scale clearly show that today's objectives are the same as those of past generations and that particular political, economic and cultural conditions allowed them to prevail and be implemented. During their lifetime [3] these aggregates have undergone few transformations, while on the other hand maintenance has been constant, preventing the onset of physical and functional obsolescence.

2 Ettore Gilberti and middle-class housing districts

In 1904, the city council of Rovereto, a small municipality under the rule of the Austro-Hungarian Empire, announced an open competition for the position of head engineer responsible for monitoring public and private building activities. The role and position of city engineer had been defined under law 206 of 26 November 1824 and all municipalities in the Hapsburg Empire with over 5,000 inhabitants were required to set up a buildings office to prepare urban modernisation and extension plans and successively build infrastructure and public and private buildings to modernise the old property. However, unlike other Tyrolean towns, Rovereto did not want another bureaucrat engineer, but an eclectic and inquisitive town planner able to attract investments for the construction of a new city.

Many applications were received from Austrian and Italian candidates but the selection procedure was never formally initiated. In the end, the city council decided to annul the competition and initiate direct contacts with potential candidates for the post in question. After much research, and at the suggestion of Professor Camillo Boito, Ettore Gilberti, a young engineer who had recently graduated (September 1904) from the Politecnico di Milano was given the job. He immediately understood and put into practice the ideas proposed by Rovereto's politicians, who wanted to construct a modern city with homogeneous districts and a large industrial park.

The city's modernisation and development project had begun as early as the second half of the 19th century, first in the form of the 1857 extension plan drawn up by city engineer Cristiano de Chiusole and later in 1896 with an urban planning scheme prepared by city engineer Edoardo Gerosa.

Ettore Gilberti found himself in a very busy city, with meagre funding and numerous state vetoes, where modern city planning concepts had been adopted to build new parts of the city and transform the old districts where hygiene conditions

were precarious and road systems obsolete. Gilberti was, therefore, obliged to be both town planner and architect. From the outset, he dedicated the same attention to territorial planning as he did to building design and always set himself the objective of high quality infrastructure in functional, formal and technological terms. As city engineer he was tasked, first, with the planning of areas for industry and small businesses, followed by residential districts for the upper middle and working classes [4], then subsequently with the resulting architectural design.

In common with other European cities at the time, in defining the modernisation and expansion process, Ettore Gilberti implemented the zoning principle. Adopting Gerosa's hypothetical principles for expansion, subsequently (1908) fully defined by the urban planning scheme drawn up by the Viennese Mayreder brothers for the entire municipality, he set out to create a city made up of parts with single functions, with districts designated for industry, small businesses, housing, services, etc.

As a result of the proposed urban expansion-transformation, a rational congruent road system was hypothesised, laying out new roads and widening existing ones to adapt them to the new mechanical vehicles.

The location of the various uses was shared by the planning proposals: the connection with the railway and thus with the industrial areas followed the axis of the 18th century buildings to the west of the historic city centre. The various public buildings (court, post office, schools, sports buildings, hotels, etc.) were located along the road. The middle-class district was to be located to the north of the historic city centre, with the working class district to the east and south. The schools were situated between the various residential areas, becoming elements both of separation and union.

Ettore Gilberti then drew up expansion schemes, for maximum effectiveness adopting the urban planning tools to obtain financing to implement the hypothesised schemes as rapidly as possible.

For example, he managed to create an interesting and profitable district for the upper middle class with modern infrastructure. The proceeds from this project enabled the municipality to construct the services and infrastructure necessary to turn Rovereto into a modern efficient city.

After close analysis, Ettore Gilberti decided to locate the district on the hill of Rovereto which enjoyed maximum exposure to the sun. The development was conceived not just as a residential area, but also as an urban park with a sinuous road destined to become a promenade for the middle classes.

The municipality purchased a large farm and Ettore Gilberti [5] drew up a plan, with same-size lots, a road and a series of pedestrian paths, some with steps to negotiate the considerable difference in level. The engineer drew up the regulations for implementation, defining the alignments, form and plan of the buildings. The regulatory annex included the obligation to observe the size and construction parameters specified in the building regulation.

When the parcels of land were sold, the purchase deed included a clause committing the city administration to undertaking design of the building. This was signed by both the buyers of the land and the municipality and specified the

Figure 1: Land division plan for the construction of the middle-class residential district of Via dei Colli.

dimensions, form and technologies of the building. The contract also established the duration of the construction work, with penalty clauses for delays in consigning the building.

The city engineering department, or rather the head engineer, was responsible for drawing up the architectural design and an extremely detailed quotation, which became the construction costs, including the technical expenditure and profit made by the municipality.

The buildings had to be constructed according to the regulations laid down for municipal buildings and on the basis of a detailed metric estimate, correlated with an analysis of prices and contract specifications.

The private individual, after signing the convention, deposited the established sum in a savings bank. Through a call for tender (with discount bidding), the municipality awarded the contract and the building work began. Subsequently, the city administration drew the sums required for construction freely from the amount deposited (direct payment for materials and labour).

If the building was consigned within the time limit established in the contract and in accordance with the design drawings, the private individual was obliged to accept it, renouncing the right to raise objections as to the quality of the materials or execution of the work, acknowledging the municipal supervision as sufficient to safeguard his interests and guarantee the compliance of the private parties involved.

Working in this way, Ettore Gilberti created districts on a human scale without wasting land, but exploiting it intensively, with the green areas in correct proportion with the built areas.

3 Ettore Gilberti and smart housing for the middle classes

Commissioned to design the majority (more than 10) of the buildings in the district, all the houses defined by Ettore Gilberti had different plans and elevations, fully interpreting the customers' spatial and formal needs. By varying the classic residential layout, he defined an aggregate based on the typology of the villa, but apparently heterogeneous.

Small volumes with a number of aboveground floors varying according to the orography of the land, but generally no more than three, together with one or more small turrets.

The buildings had storage facilities on the ground floor and one or more dwellings on the top floors.

Ettore Gilberti proposed apparently irregular layouts created by adding together elementary geometric shapes, with a surface area of about 100 sq m per level and a stairwell usually in the centre to reduce the corridors.

The dwellings were organised on one or two levels. In the smaller buildings, the residential parts generally consisted of a living area on the first floor and a sleeping area on the second floor.

The living area included living room, small dining room, kitchen and small bathroom; the sleeping area consisted of two or three bedrooms and bathroom. Storage space was included in both areas (box room, laundry room, store rooms, etc.).

The loft was used for storage, while small studies, a library and smoking room were obtained in the parts with pinnacles and turrets.

Despite the apparent irregularity, the volume was based on a traditional box grid and therefore the rooms were highly modular in size: 10, 15, 20 and 25 sq m.

The limited surface of the living area was extended with small terraces and verandas.

The independent single-function rooms were connected with rational linear corridors.

The arrangement of the rooms in the layout and thus their location derived from the orientation of the building. The main rooms were located on the downhill side, generally with a southern or south-westerly exposition; the secondary rooms (kitchen, bathroom, staircase) always had a northerly exposition.

Maximum attention was paid to the exposure of the rooms to the sun, considered as a factor to be observed to obtain maximum comfort.

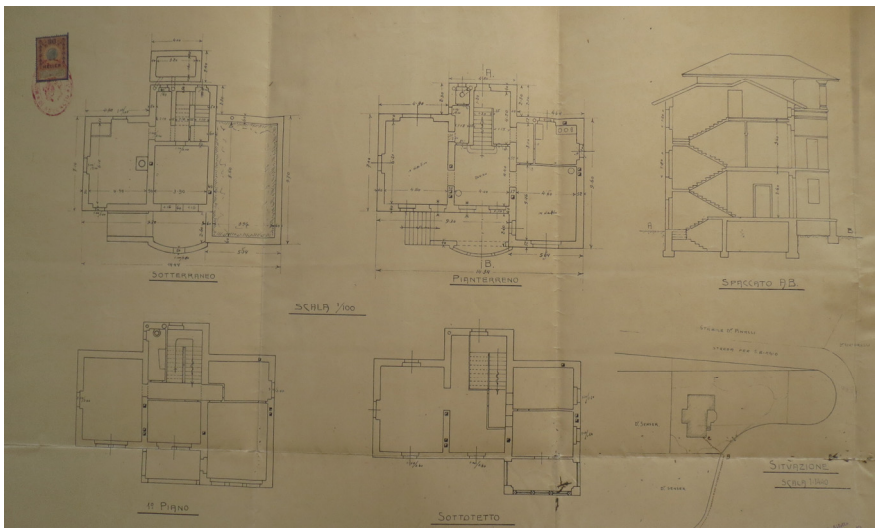

Figure 2: Plans of villa Gilberti.

The façades were divided horizontally by the socle, string course marking the main floor and coping in plaster, natural stone or artificial stone. The rhythm of the openings respected partial symmetrical orders, varying according to the specific façade.

The entrance was always identified with characteristic projecting or re-entrant openings, often becoming porticoes.

Mouldings decorated with multi-coloured floral or geometric frescoes surrounded all the openings and the same decorative motifs reoccurred on the string courses and coping under the roof.

Together all these elements created ever more complex volumes with contrasting solid and empty parts in both horizontal and vertical, making the internal spatial organisation visible on the outside.

The entire building was defined by a meticulous precise final design. For each villa, the city engineering department drew up various drawings in 1:50, 1:10 and 1:5 scale specifying the measurements and technology of each element. The documents were controlled and verified by a number of engineers and architects in the awareness that the accuracy of the drawings considerably reduced construction errors. To eliminate subsequent disputes, the design solutions were approved by both the customer and the construction company. The painstaking drawings also allowed precise metric calculations to be prepared, accurately establishing the construction costs.

In technological terms, Ettore Gilberti's houses used building materials and technologies carefully chosen to reduce construction times, guarantee maximum durability and, finally, provide maximum comfort.

New techniques were introduced alongside construction methods firmly rooted in local practices based on the use of local materials and self-construction, creating a perfect mix of tradition and change.

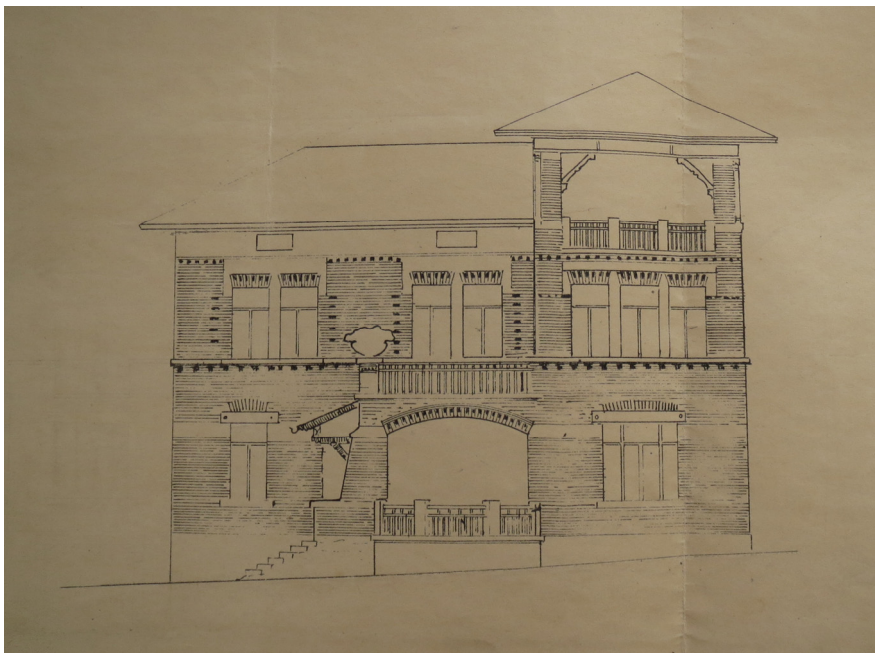

Figure 3: Front of villa Gilberti.

Thick stone or brick walls were built on Portland cement foundations to guarantee maximum protection against damp. In many cases, the perimeter structure made from small pieces of stone assembled with mortar was replaced with perforated parallelepiped blocks made from a mix of sand and fine gravel or brick.

The use of perforated blocks to construct the walls led to establishment of the box technique involving a ventilated chamber enclosed between two brick walls. The use of hollow walls saved material, but above all insulated against the heat and cold.

In many cases, the perforated block technology was strengthened by reinforced concrete pillars.

The horizontal structures varied according to the structural requirements and location. Those on the bottom levels were made from reinforced concrete with slab and ribs, while those on the top levels had a load-bearing structure in wood with iron or reinforced concrete crosspieces.

All opening in the buildings were fitted with double windows or doors made from deal wood in the living areas and iron in the storage areas. The windows in the domestic rooms were fitted with a roller blind installed between window and storm window.

Double doors were employed in outside walls. Doors with glass panels and glass internal doors created a greenhouse effect which improved indoor comfort.

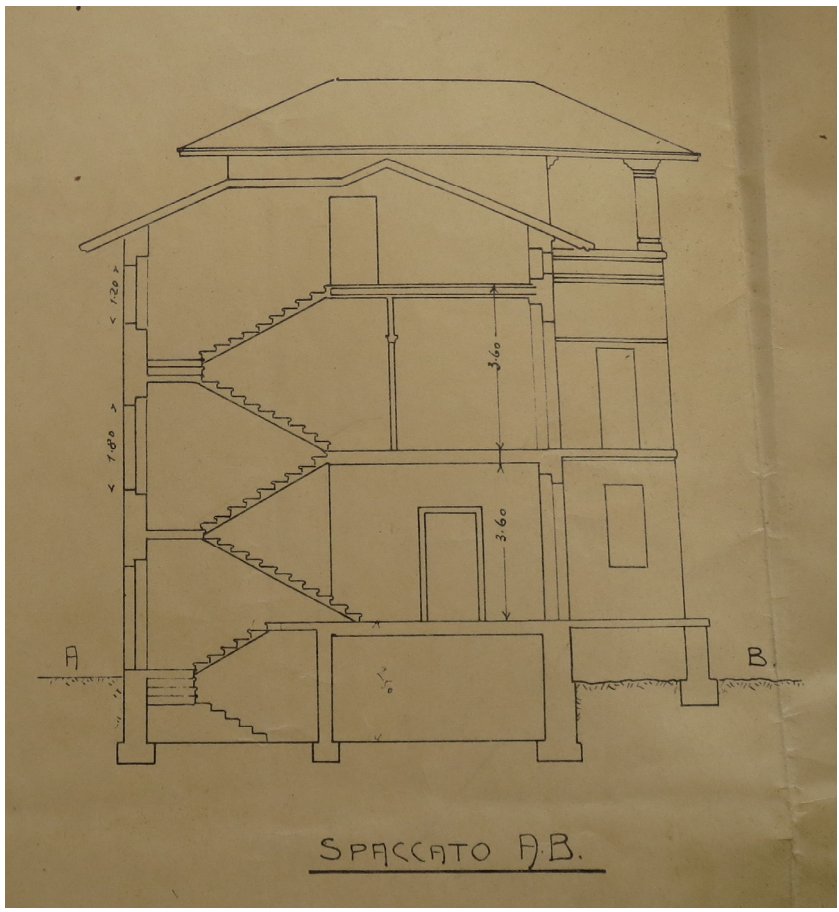

Figure 4: Section of villa Gilberti.

The dwellings incorporated the latest technology, with water supply and disposal systems, electrical installations and heating installations. In larger buildings, there was even a mechanical lift.

The building was approved for habitation only if it fully complied with the drawings and contractual documents. Full compliance of the building was verified by structural inspection and technical-administrative verification.

For the next six months, the construction company also had to guarantee elimination of any defects noted during use of the building.

4 Conclusions

Parts of the city built during the early 1900s have now become central and this position makes them particularly valuable. They are also perfectly physically and formally integrated into the old city centre.

These parts of the city are also characterised by a correct alternation of open private and public spaces and covered areas, as the land has never been exploited intensively.

Residential areas constructed during the early 1900s have generally undergone very few major alterations, the most evident resulting from post-war reconstruction. Subsequent saturation of the built fabric has almost never altered the original and regular morphology of the development.

Buildings designed by Ettore Gilberti in the early 1900s are still in an excellent state of preservation today and this confirms their architectural and functional validity. The evident respect bestowed by history and society on these buildings indirectly demonstrates their great architectural validity.

These buildings have thus always been preserved as a consequence of their functional, formal or construction quality, without inappropriate alterations.

We must therefore take note of the fact that early 20th century architecture has been valorised without the introduction of protective restrictions, but simply as a result of the perfect correspondence between its characteristics and the needs of users.

References

[1] Cacciaguerra G., Gatti M. P. & Paolini A., Ettore Gilberti. Ingegnere Architetto e Urbanista nella Udine del '900. de Marco A., Tubaro G., *Ambienti Costumi Costruzioni. Scritti in onore di Sergio Bonamico*. pp. 64-90, Milano: Mimesis Edizioni, ISBN: 9788857512730, 2012.

[2] Cacciaguerra G., Gatti M. P. & Paolini A., Ettore Gilberti: un professionista prezioso nella storia e nell'evoluzione dello IACP. Cacciaguerra G., Tubaro G., Vuga A., *Costruire città. Le case popolari protagoniste dell'assetto urbano,* GTC Editrice: Udine, pp. 125-143, ISBN: 9788890056734, 2012.

[3] Gatti M. P., Da borgo a città. L'evoluzione novecentesca di Rovereto, *Memorie dell'Accademia degli Agiati*, q. 252, ser. II, vol. V, t II, Edizione Osiride: Rovereto (TN), pp. 403-426, 2002.

[4] Cacciaguerra G., Gatti M. P. & Battaino C., Smart towns and homes in the early 20th century. The design of a modern urban environment. *Sustainable Housing Construction*, ITeCons: Coimbra, ISBN: 9789899894907, 2014.

[5] Cacciaguerra G. & Gatti M. P., Urban planning and administration in a provincial city in the early 20th century. Gambardella C., *Best Practice in Heritage, Conservation*, La scuola di Pitagora: Napoli, pp. 519-527, ISBN: 978-88-6542-347-9, 2014.