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Vertical Growing as an Opportunity for Reactivating Historical Quarters

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Abstract

Migratory tendencies of the 19th century favored the growing of cities and expansions districts were created. These new neighborhoods were urban areas with residential blocks and large avenues accompanied by a marked order of streets. However, subsequent urban modifications distorted the architectural landscape of that time, creating urban landscapes that have little to do with their initial approach. In addition, the lack of investment and urban policies in those areas is generating a tendency to abandon not only historical centers but also nineteenth-century quarters, leading to their possible degradation. Nowadays expanding cities in terms of area is not always advisable or possible, due to the scarcity of resources and the potential inefficiency of the model. However, there is an opportunity to expand the city in height in buildings which still have both legal and architectural chances for doing so. This vertical growing aims at providing a solution to urban reactivation, providing a regeneration of existing housing and the construction of new ones. In the following study we will focus on this phenomenon considering the city of Valencia in Spain as an example. Present times make recommendable understanding the current migratory tendency, urban changes and strategic opportunities.

Keywords

Housing regeneration; urban re-activation; expansion district; buildability; over-elevations.

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

1. Introduction

The need to create housing in cities has generated an opportunity in many historic city centers based on buildability. This unexpected and controversial chance is mainly based on a given town planning historical sequence, but presents also many relevant economic, social and sustainable aspects, playing each one a different role. The economic factor awakened the interest in this new methodology, the urban factor made it possible, and the social and sustainable factors endorsed this practice as an attractive and viable solution.

This article addresses the urban and town planning framework, leaving the other points previously mentioned for further research. For this reason, the main objective of the research is to demonstrate that the existing urbanistic conditions made possible the practice of over-elevation, and that, in the city of Valencia this has occurred without enacting new laws and in a rather natural manner. In addition, an approximate view of the construction process required to execute this type of intervention is offered.
Over this research, we start from a historical migratory base of cities, and how this has affected the urbanistic norms in the case of Valencia. Next, the building resource is analyzed and how in the case study it is available. Finally, a small view of the possible building solution is shown. This new methodology of construction in buildings that have not exhausted their volumetry, not only generates new homes, but also promotes urban renewal in groups that probably could not assume it from the improvements made in these buildings.

The research methodology will be initially based on the study of the sequence of urban ordinances enacted during the recent history of the city which regulated mostly the volumetry of buildings, with a particular interest on the maximum number of floors allowed and the recommended cornice height. Later, an observation of the recent history of some of these unexpected upper gaps produced by subsequent urban regulations will be performed. Therefore the set of research tools employed will begin with the historical cartography of the city and the attached regulations. Bibliography on renewal of historical contexts and urban regeneration will be also employed. Finally specific bibliography, mostly press coverage, on the over-elevation phenomenon will be utilized.

2. Migratory tendencies towards cities

Cities are continually growing and need more and more space to provide their inhabitants with all the necessary requirements and amenities. As a result of the occasional lack of space, urban planning has been significantly affected throughout history giving rise to an ongoing increase of cities' area. Currently, this extension proposal constitutes an unsustainable and inefficient model, since it implies an investment of resources in new infrastructure to provide the city with connections, equipment, green areas and all kinds of services. Likewise, frequently urban centers are left unprotected from this type of urban growth, and remain in a situation of decline due to the scarcity of urban regeneration policies.
There have always been migratory flows throughout history. However, the Industrial Revolution was the period which brought remarkable urban changes in cities for the first time (Piqué, 2017). This was due to the large migrations from rural to urban areas, and the change from an economy previously based on the agricultural sector to a more industrialized economy. In Valencia, as in many other cities, there is evidence of the growth of the urban population in the second half of the 19th

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

century, either by the internal increase of residents, by the migration towards the city or even by the annexation of the adjacent villages (fig.1). The growth in the number of inhabitants accentuated the dichotomy between peripheral and central areas. Thus, outskirts mostly hosted built housing with a stark character for the working class, and urban expansion areas were destined mostly for the upper classes (De Terán, 1994).

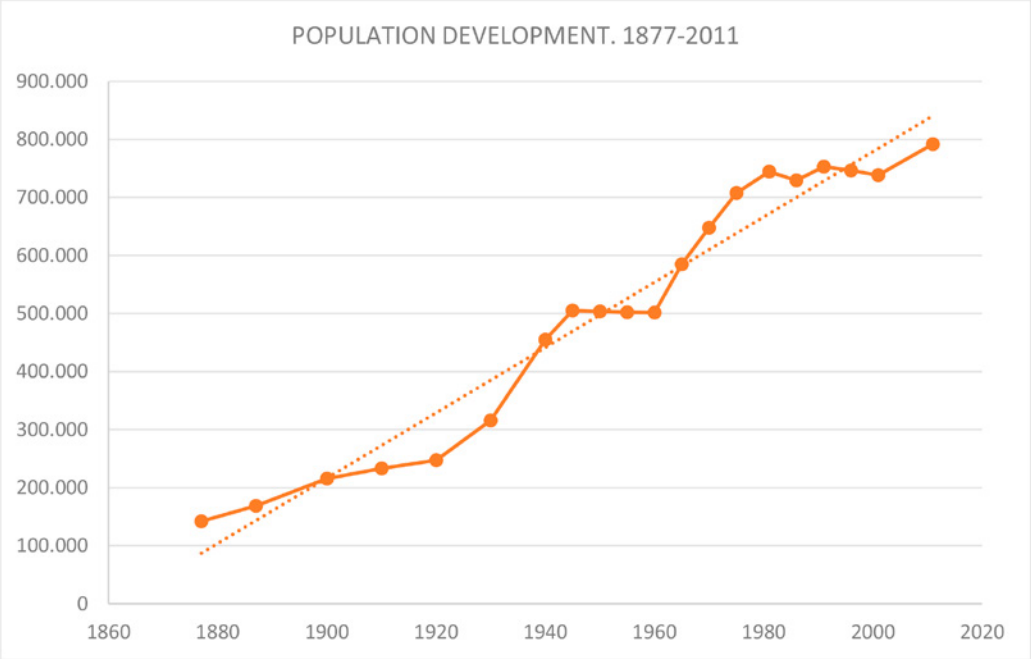

Figure 1
Line graph showing the population evolution from 1877 to 2011 in the city of Valencia.
Source: Valencia Statistics Office

The objectives of the first expansion plans were to develop and unify urban standards for the expansion of cities (fig. 2). These regulations proposed very clear grid patterns forming square blocks with chamfered corners providing great visibility at intersections. Despite the fact that the geometry was very clear, subsequent modifications and real-estate speculation have substantially modified the global vision of these historical complexes, degrading the identity of the urban landscape.
The most obvious and remarkable example is the construction of buildings much higher than the neighboring ones because a newly-enacted urban regulation made that fact possible. This extremely frequent phenomenon has lead in the case of Valencia and many other Mediterranean cities to a large amount of party walls produced by the discontinuity in height of adjacent buildings. Nowadays many neighborhoods are degraded not only by this uncomfortable disorder on the cornice line but also because of a meaningful deterioration of the construction elements revealing a lack of maintenance of the architectural heritage.
Although a state of abandonment is occasionally latent, neighborhoods of the expansion areas have always had great attractions such as urban centrality, mental connection with the upper classes, or even spatial richness. Yet, despite the current deterioration, the expansion district is usually better

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

Figure 2
Plan of urban development for Valencia

than the outskirts of the second half of the twentieth century. Therefore, a window of opportunity is now open in many buildings that, according to the current general plans, still have more suitable space to be built.
The current and frequent lack of urban policies and the need for restoration of these dwellings has opened a window to the previously mentioned strategy of extension by means of vertical growing in the neighborhoods of expansion areas. That is to say, the extension in height of apartment blocks that have not yet exhausted their vacant building capacity is considered. This generates a model of urban regeneration, due to the fact that the residents of these buildings give up their *derecho de vuelo* (right to overhang) in exchange for services in the common elements.

3. First urban development plans for expansion. A case study in Valencia, Spain

Theories and thoughts of expansion in cities were materialized in a set of innovative projects, which had to be developed due to the social and demographic change of the time (Layuno, 2013). As a result, historically, the morphology of cities reflects the historical context, culture and economic activity, from the first old towns to the urban extensions resulting from an industrial panorama in the 19th and 20th centuries (Capel, 2002).
Industrialization went hand in hand with a new conception of large cities in which the growing pop-

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

ulation and its needs gained prominence. This caused the drafting of the first urban plans (Arriola, 2005). One of the pioneering cities in carrying out an urban expansion program was the French capital in 1853, along with the leadership of Georges-Eugène Haussmann and a remarkable team of architects and engineers (Rodríguez, 2019). Nevertheless, there are also examples in the city of Vienna with projects such those by Otto Koloman Wagner. In Spain, we can find the plan for the expansion of the city of Madrid developed by Carlos Maria de Castro.
However and without a shadow of a doubt, the most important plan was the one devised by Ildefonso Cerdà in 1860 for Barcelona and its famous Eixample district. Many Spanish cities such as Valencia, Pamplona, Bilbao or León joined afterwards this trend (Capel, 2002).

In the 19th century the first regulations for the city of Valencia began to be developed including building and street matters. An example of this is the *Reglamento de policía urbana y rural* (Urban and rural police policy) in 1844, whose seventh article states that those consolidation works which may prevent the widening of the street should be denied. It is also noteworthy its tenth article which deals with issues of façade materiality, such as the fact that the material for bars and railings should be iron (Taberner, 1987). These are only a few examples from the entire regulation which yet concern about the uniformity of a city and its possible extensions.
Just like other Spanish cities, Valencia was not going to be different. For this reason, once the city walls were demolished in 1865, ordinances began to be enforced reflecting an idea of the subsequent peripheral housing development. These ordinances continued the trend towards street alignments, regulations for the composition of facades, and even began to care about the drainage and sanitation system. In addition, there are also protocols for buildings in a state of ruin and demolition on public roads. All this can be found in the *R.O. de 12 de marzo de 1878 sobre alineaciones, planos, licencias, etc* (Royal Order of March 12, 1878 on alignments, plans, licenses, etc), or in the *Ordenanzas municipales de la ciudad de Valencia* (Municipal Ordinances of the city of Valencia), approved by the Civil Government of the province on January 2, 1880 (Taberner, 1987).

However, it would not be until 1883 when the first norms of the expansion area were established and, thereby the *Programa para la formación del proyecto de ensanche de la ciudad de Valencia* (Program for the formation of the project of the city of Valencia's expansion) was created (fig. 3). In this program the following issues and aspects are perfectly detailed: documents of the expansion project, delimitation zone, rules, and even differentiation of streets in terms of importance. This program prompted the *Ordenanzas municipales especiales para el Ensanche de la ciudad* (Special Municipal Ordinances for the Expansion of the city) in 1887. In this ordinance, the limits on heights or number of floors are compiled and it is specified that buildings cannot have less than two upper floors or more than three, but it was allowed to add a mezzanine floor as long as it was compositively linked to the first floor. In the same article, the minimum heights of each floor were also fixed as well as the total height of the facade, which depended on the significance of the street, the more important it was, the higher it was allowed to be (Taberner, 1987). Therefore, an interest in the linearity of its facades and in the harmonization of the whole architectural set is palpable.
Despite this expansion, it was in 1898 when the Programa para la formación de proyectos de ampliación del Ensanche en las zonas suroeste y el margen izquierdo del río (Program for the Formation of Projects for the Expansion of the Ensanche in the Southwest and the Left Bank of the River) was elaborated, due to the continuous demographic growth, the failure of the reforms in the historic center, and the lack of extension of urban surface (Daukšis & Taberner, 2002). In the following years, different plans were drawn up and clarified the limits on alignments and gradients, until in 1912, the plan designed by the architect Francisco Mora and the engineer Vicente Pichó was finally approved (Taberner, 1987).

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

Figure 3

Topographical plan of Valencia (1883). Topographical survey provided data necessary for the drafting and approval of the expansion area in 1887. Source: España. Ministerio de Defensa. Instituto de Historia y Cultura Militar. Archivo Cartográfico y de Estudios Geográficos del Centro Geográfico del Ejército, https://patrimoniocultural.defensa.gob.es/es/

This project was dedicated to extending the axes of route that had already been previously marked, and creating a third ring road. The new plan, unlike the previous one, allowed for elevation of the maximum buildable height to 22 meters in the first order streets, and consequently the number of floors. This modification in regulations became at the same time a change in the approach to buildings and in their buildability, since it involved buildings of up to 6 floors (Taberner, 1987), making possible the punctual breaking of the volumetric continuity and harmony ambitioned by previous city planning. Another highlight was the creation of the first penthouses, not so much for residential

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

use, but for open spaces. This is specified in the sixth article, where it is stated that this enclosure should be avoiding the first bay, thereby, creating rooms set back from the first line of the façade that will later serve as a guide for the subsequent penthouses.

This inclination towards the increase in the number of floors continued to grow in the following urban changes, either because of the lack of housing or the expansion insolvency of the city. It was from 1924 onwards when, by means of the licencias condicionales (conditional licenses) granted by the city council, it was authorized to exceed the building height. This position was due to the housing shortage coupled with the labor crisis of the time, and the discrepancy between the height allowed in the historic center, 24 meters, and the expansion area, 22 meters, despite having much wider streets (Taberner, 1987). Therefore, in 1925, through the Apéndice a las nuevas ordenanzas de policía urbana (Appendix to the new urban police ordinances), it was authorized to increase the height up to 30 meters for buildings located in first order streets, provided that their width was greater than 20 meters, in addition to adding a penthouse livable from the second bay (Llopis Alonso & Perdigón, 2010).

The constant changes in ordinances and the successive expansions have promoted a clear trajectory to apartment blocks with an increasing number of floors. For these reasons, it is not surprising that some buildings were below the maximum permitted buildability, and, conversely, some exceeded this totality. Consequently, this progression of standards has given rise to new opportunities through virtual gaps in the rooftops.

4. Remaining buildability as a resource for urban regeneration

It has certainly been usual for urban planning regulations to always increase buildability. Along with buildings which have employed all the volume permitted, we can find other buildings which have not taken advantage of the maximum number of stories allowed for a range of reasons such as lack of elevator in the moment when they were built. Simultaneously, some of these buildings have a noticeable architectural value whose elements have been withering due to a lack of maintenance (Ibarloza et al., 2018). Some also present evidence of architectural barriers or outdated systems. All this has contributed to the formation of an occasionally irregular, disordered and neglected urban and architectural landscape (fig. 4).

The circumstances that have led to the search for new solutions are multiple. Firstly, we have to consider the constant migratory trend towards cities in an effort to seek work and new opportunities, which brought about a need for new housing. Other meaningfully important reasons such as the convenience of not creating new neighborhoods due to the scarcity of economic resources, the necessity in many buildings for interventions and repairs that the owners cannot afford, and the opportunity to increase the volume in expansion areas, have converged in this strategy model. Because of this, professionals have seen an opportunity in the construction of new houses on the rooftops of buildings in which buildability is possible. Residents, in compensation for this construction receive the improvement of constructive elements, facilities, or adequacy of the building accessibility to mention some examples. Being that said, it is intended to respond to many of these issues, in addition to promoting an urban revitalization. All this, the creation of new housing and the rehabilitation of buildings, helps to promote a balance between urban development and the conservation of the city (Zucconi 2014). Firstly, in order to understand this model of strategy through buildability, it is necessary to be aware that in order to make these over-elevations possible, it is indispensable to acquire *derecho de vuelo* (right to overhang), which is defined in Article 16.2 of the Decree of February 14, 1947 of the *Reglamento hipotecario* (Mortgage Regulations) as

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

> *We met for the first time in March 1946 with the intention to develop our interest in mathematics and in methods of treating facts and ideas that had concerned us in our fight against post-Hegelian ideologies. The first topic was presented by von Neumann. He described the idea of computers running on a Boolean mode and having as their base the number 2. His general thesis was that such machines could calculate any number and resolve any logical problem, provided it has a solution* (cited in Varela, 1989).

Therefore, for the construction of new houses by means of the extension in height, it is necessary a buildability and a right to overhang, together with the compliance of all the corresponding urban and architectural regulations.
Likewise, if there is a possibility of increasing the number of floors in the urban plan, it bears mentioning that structurally speaking the same thing is happening. On the one hand, there is the bearing capacity, which is usually more than required and allows to add more floors without too many problems. On the other hand, the durability of the structure is also excessive, and makes it last much longer than the acceptability of the standards of the homes which these structures hosts. In fact, if we read through the regulations of the Código Técnico de la Edificación (Technical Building Code), we can find that the period of service must be 50 years. Even so, we find that the buildings comply perfectly with this period of lifetime. All these circumstances favor the supplementation of new floors, which must obviously be adjusted to the conditions of the existing building.

Figure 4
Pictures of some streets in the expansion area of Valencia

5. Opportunity for expansion: over-elevations and recovery of architectural heritage

The extension in height of residential buildings is only one more way for urban reactivation and regeneration. The attached improvements of each residential block, as a whole, generate an upgrading strategy at a global level in the metropolis.
Graphically, it is noted that a large part of the buildings in the most central neighborhoods were built between the years 1961 and 1980, an indicator that a large number of houses are close to or have already exceeded their lifetime. If we also look at the first expansions, which in the case of Valencia are the districts of l'Eixample and Extramurs, an important percentage of the buildings were built in the nineteen forties and fifties (fig. 5). Therefore, despite the lack of maintenance that the neighborhoods may have, the age of houses is a key factor in urban renewal. The presence of architectural barriers, adaptation to new systems, low energy efficiency, or repairs of aesthetic elements in facade, go hand in hand with the conservation of the building itself. These are clear evidences of

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

lack of refurbishment.

If a possible scenario in which residential buildings require refurbishment is stablished, it should be taken into account that some of these buildings have a degree of protection, either environmental, partial or total (fig. 6). However and based on *Planes especiales de protección del ensanche de Valencia* (Special plans for the protection of the expansion area of Valencia), even in these protected buildings, urban planning regulations permit this potential supplementation of floors (fig. 7). In these programs, possible over-elevations are marked individually plot by plot (fig. 8). They also display the number of possible additional floor, aesthetic requirements of the facade, alignments with the adjacent buildings and any other aspect related to the architectural heritage of the surrounding area. Therefore, it is not surprising that, if the existence of these "special plans" contributes to an extension in height and its attached updating of existing protected building, urban development regulations will also allow the construction of more floors in buildings without any rank of protection, with the corresponding legal, architectural and urban development limitations.

It should be pointed out that urban planning regulations take into account the height and floor limitations according to the architectural environment. Therefore, individual actions always accompany a harmonization of the neighborhoods, both on a heritage and architectural levels (De Gracia, 2001). Even so, the great problem that this type of practice could face, in case of excessive speculation, would be a greater densification than the expansion district could assume.

6. A view of the process

In order to carry out these urban renovations, an investment model is needed, so the practice of building on rooftops is a possible solution: penthouses in exchange for refurbishments. However, the form of intervention must be taken into account, because there are two clearly differentiated actions. On the one hand, we must consider the improvement of conditions of existing buildings and, on the other hand, we should think of the new housing (Millán, 2018).
First, an exploration of existing buildings must be accomplished in order to locate the points to be developed. Normally, the deficiencies correspond to restoration and improvement works such as: incorporation of elevator, actions in staircases, elimination of architectural barriers, renovation of facades, updating of systems, and general building's maintenance. All these measures are agreed with the owners, who will also get a revaluation of their homes.
As for the over-elevation, either of one or several floors, it will be determined by the building's circumstances affecting its materialization and design. To begin with, the pre-existing building structure, being able to bear higher loads, will be increased in weight. Although this is possible, it cannot be done indefinitely, so the new structure must have minimum weight requirements. This leads to a lightweight structure. Another issue that must be taken into account of the existing structure is its defined position. Consequently, the new structure will be adapted to a certain geometry and typology employing light members and special components such as sleeper beams, lattice elements, etc.
So far, we have discussed material elements. However, human factor should not be left out, since the existence of neighbors is another key factor in this modality of construction. Therefore, work on site should be minimized as much as possible. Although the length of the refurbishment works has an established timeline, the inconveniences caused by the over-elevation can be mitigated, starting with industrialized modular systems. This construction typology offers the possibility of executing most of the new dwellings in a factory, and then transporting them to their final location. In this way the possible inconveniences generated by the construction of the new houses are attenuated.

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

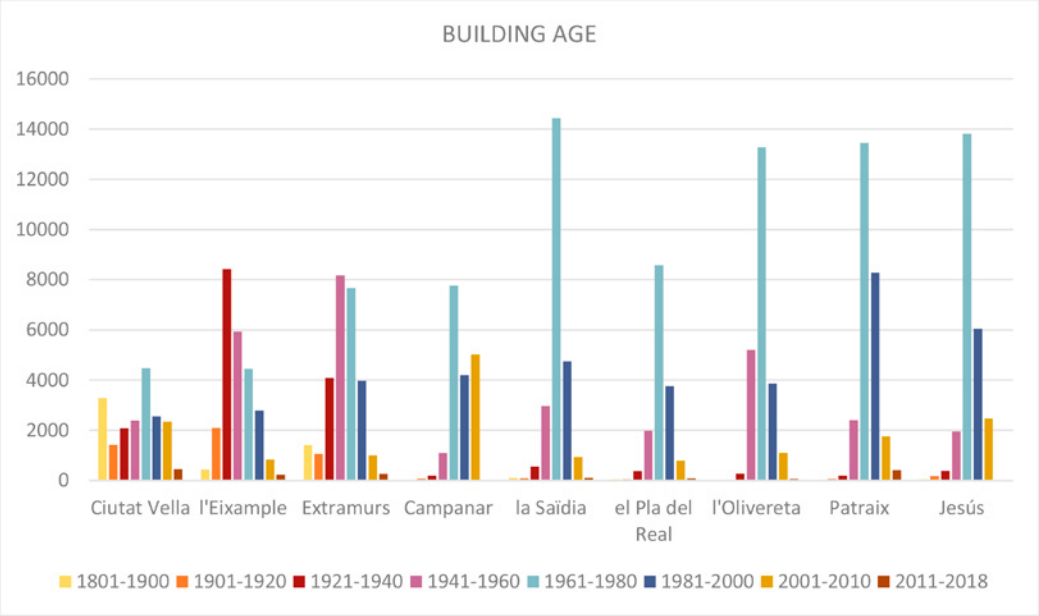

Figure 5

Bar chart of residential properties according to their age in the most central districts of Valencia, Spain

Figure 6-7

6. Buildings with a protection degree established in the 2006 special plan for the district of Russafa in Valencia, Spain.
7. Buildings with a protection degree with the possibility of volumetric expansion according to special plans for the district of Russafa in Valencia, Spain

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

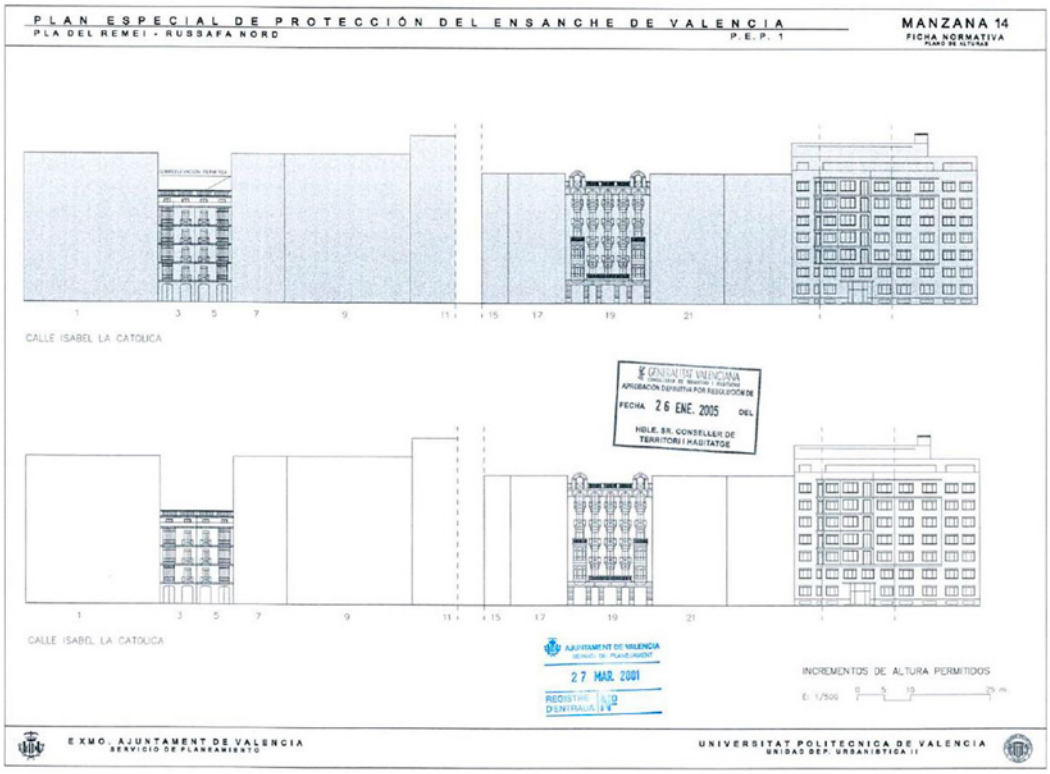

Figure 8

Examples from the archive of the "special plan for the protection of the expansion area" that indicates the over-elevation of a building. Source: City council of Valencia

As a result, the housing construction on the rooftops of buildings that have not yet exhausted their buildability, should be executed from lightweight and industrialized systems (fig. 9).

7. Conclusions

Cities need more space to accommodate new inhabitants moving from rural to urban areas. Although the usual form is extending their imprint, this type of extension is an inefficient model, as well as unsustainable, not only because of the amount of economic resources to be invested, but also because of environmental and sustainable aspects.

Historical centers' deterioration and the expansion areas caused by aging buildings and residents, suggest new opportunities for urban regeneration. Therefore, the existence of buildings which have not exhausted their buildability yet, along with current special plans, allow a supplementation of floors in buildings within neighborhoods which are assumed to be consolidated.

Not surprisingly, the deterioration of older neighborhoods generates a need for refurbishment of their buildings. In addition, lack of maintenance, presence of architectural barriers, absence of an elevator, correction of pathologies, or even restoration of heritage elements, are issues that respond to a capital investment, which in many occasions owners cannot assume.

The sum of these and other reasons enables the creation of new dwellings on the rooftops of the

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

Figure 9
Over-elevation example in Barcelona made with industrialized construction. Source: Oriol Vives, 2016

expansion district buildings where more stories are nowadays allowed, in exchange for fixing these buildings. This urban regeneration proposes the updating and adaptation of houses and apartment blocks, in protected architectural environments, revaluing urban landscape. In the same way, this set of improvements, not only favors the patrimony as a whole, but also benefits the neighbors individually. Therefore, these types of actions in cities enhance the creation of housing in a sustainable, careful and methodical way.

The construction of new dwellings presents some particular features, which are motivated by the physical and human context. The limitation of duration in the work on site, the multiple structural conditioning factors, the meticulousness in the intervention, together with energy efficient and sustainable values, will be guaranteed by a methodology of industrialized and light construction.

ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

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ISSN 2309-0103
www.archidoct.net
Vol. 8 (2) / February 2021

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