

THE STATUS OF THE ANDALUSIAN RESIDENTIAL BUILDING STOCK WITH THE NEW REQUIREMENTS ARISING FROM THE AGING OF POPULATION.

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INTRODUCTION

Throughout the twenty-first century, the society and the architects themselves demand a “functional architecture which would be adapted to the user needs”.¹ Most researches in buildings, urban environments and cities are oriented toward reaching the efficiency in rehabilitation activities and adaptation of existing buildings in the residential sector, offering more favourable spaces to users and meeting their needs and desires.

The legacy of the twentieth century from the existing housing is the result of the enormous expansion of cities in a short period of time, using repeated architectural typologies which have not been able to adapt to changes in the family structures and economic conditions of each period of time and place.²

This communication shows the first advances in methodology and progress of the thesis developed by the architect Antonio Serrano Jimenez, directed by Ángela Barrios Padura and Marta Molina Huelva, entitled “Rehabilitation of the Andalusian residential building stock for the promotion of active aging” within the research group TEP PAIDI-954 of the Higher Technical School of Architecture of the University of Seville.³

The research proposes new integrated solutions that suit to the circumstances arising from the aging of population in the obsolete domestic and urban environments.

It is presented the process to follow in the protocols for a residential renovation, specifically adapted to the elderly, with a methodology that has been generated with a specific inspection and diagnosis document about the accessibility condition and the state of conservation of the building; and an effectiveness index that assesses the effectiveness of all individual actions based in architectural, social and economic factors.

The proposed topic has its origin and first advances during the participation in the research project “{Re}Programa: (Re) habitation + (Re) generation + (Re) programming. The recycling and the sustainable management of the Andalusian housing stock. Management of habitable surroundings from the criteria of active aging, gender and urban habitability”.⁴ This project was awarded in a

competitive call by the Regional Ministry of Public Works and Housing of the "Junta de Andalucía", for the years 2013 to 2015.

JUSTIFICACIÓN

Aging of the housing stock

One of the main challenges of architecture consists in ensuring the proper conservation of the city. In Spain this is a complex and expensive challenge because there are more than 5 million housings in collective buildings with more than 50 years old.⁵

In Andalucía, more than 50 percent of the residential buildings were built before 1980,⁶ regardless of the specific regulations related to the comfort and liveability conditions of the users; in fact, the publication of the first regulations referred to these conditions appeared in 1979⁷ when there already was a large residential built park.

These are neighbourhoods that have more than 30-40 years old, with minimal and inadequate housings that were designed with an austere distribution, regardless of family patterns and lifestyles of the user in the present and future.

In this sense, the current set of policies are emerging every day to understand rehabilitation as the optimal and sustainable process to alleviate the obsolescence existing in the cities of the XXI century. In fact, in Andalucía, in the Counselling of Public Works and Housing of the Junta de Andalucía, they have initiated some programs such as the “promotion of architectural rehabilitation” and the “promotion of the retrofitting and urban renovation”⁸ to launch initiatives for the society that could offer improvements for the maintenance of the city.

it has been promoted in these early years of the century many research and development initiatives, aimed at meeting the issues which are affecting to the European citizens, such as the projects funding program for research and innovation Horizon 2020 or the Law 8/2013, of June 26th, “rehabilitation, regeneration and urban renovation”⁹ which sets guidelines for intervention in the park built by expressing the importance of rehabilitation under social, environmental and economic criteria.

Aging population

According to the current demographic studies, the group of older people should be considered as unique and relevant social group in the twenty-first century. In 2015, the population in Spain exceeded the figure of 47 million people, of which nearly 10 million people were over 65 according to the latest statistical report of 2015 published by the CSIC.¹⁰

If we look at the pyramid of Spanish and Andalusian population studied by the Spanish National Statistics Institute (INE), it is expected a permanent and higher rising until to reach a proportion of 30 percent of people over 65 years to 2040, that's to say a third of our population.¹¹

Paradoxically older people make more use of their homes, which tend to be older and poor, without elevator and even lacking some basic services¹².

In addition, 95% of people over 65 years old want to live the rest of their lives in the same home¹³. Reasons enough for European Policies, which have encouraged autonomy and personal dignity through independent living at home, known this as “Ageing at home”.¹⁴

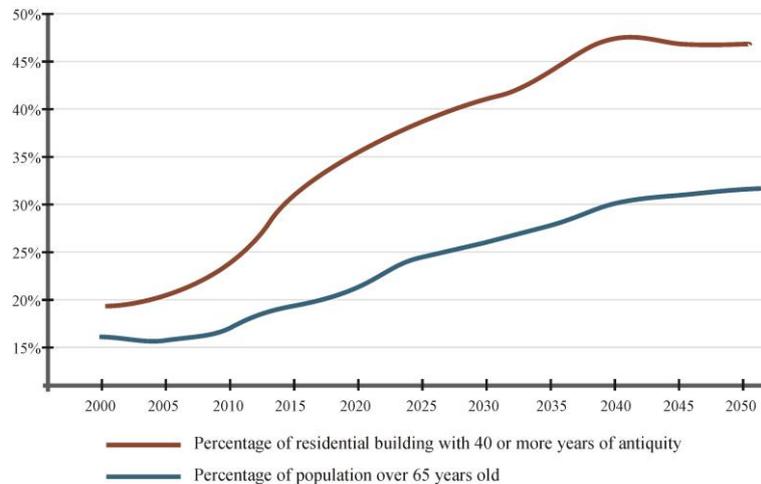


Figure 1. Proportion expected for the future about the ageing of the building and population. Elaborated by the authors. Data obtained from the Spanish National Statistics Institute (INE).

The specific problem of residential accessibility

The accessibility in residential buildings is one of the key aspects of living conditions of older people. In fact, the older of the owners, higher percentage of older housing and higher accessibility troubles exist.

According to the Observatory of the Universal Accessibility in Housing in Spain and the statistical data provided by the INE Census of Population and Housing, it ensures that almost 50% of existing buildings in Spain of three or more floor for housing, lack elevator.¹⁵

In this sense, medical studies established that in more than 40% of households of the elderly, there have been accidents within the housing by drops and blows over the past year. Improving this situation poses a risk reduction and a consequent reduction in healthcare costs.

Economic Management

In the elderly, financing difficulties are spacious, pensioners usually have a rhythm of life without financial excesses, which prevents them to undertake simple maintenance, favoring the progressive deterioration of the buildings and their environments.¹⁶

Today, some experts say that the pension system seems to be in crisis, it predicts that in the near future the ability to deal residential renovation will certainly be much more limited.

OBJECTIVES

It aims to design new strategies for architectural and urban rehabilitation in residential neighborhoods built between 1940 and 1980, to consider actions with architectural, social and economic viability in homes, buildings and urban environments in order to improve the quality of life of the elderly and recycling existing built park.

It is developed a specific tool for a suitable inspection and diagnosis that allows evaluate under the requirements of the elderly, knowing the condition of the existing buildings and urban environments where they reside, also knowing the social preferences and their ways of living from day to day.

Once known the state of conservation and program needs in urban environments selected, the research proposes:

1. The definition of interventions from the criteria established in gerontology and architecture. It will be considered rehabilitation, repairing and adaptation to ensure the welfare of the elderly users.
2. The quantification, valuation and grouping in intervention levels of all the operations according to an index of effectiveness developed, which will be weighted to reflect economic costs, duration of works, nuisances in the neighbourhood, needs for eviction to undertake the works, durability of solutions, impacts on the surrounding environment, limitations planning regulations, etc.
3. The economic and financial analysis of the process, considering the price, repayment period, individual affordable and other variables. The actions are grouped into packages of action organized according to levels of intervention.

This is a great opportunity to produce a specific methodology of intervention in residential rehabilitation, with itineraries aimed at one sector of the growing population, responding to the challenges and demands that architecture and social policies are facing with a national, European and even international institutional scope.

METODOLOGY

Definition of the sample

The research is developed in real neighbourhoods from different cities, which were built between 1940 and 1980. The selection criteria were:

- Age of the building: Between 35 and 75 years.
- Percentage of population over 65 years old: Between 30 and 50 percent.¹⁷
- State of conservation and accessibility conditions: Deficient.

The four Andalusian cities that have been selected are:

1. Sevilla: Location of "Los Remedios Viejo" (1940) in the neighbourhood of "Los Remedios". 320 housings arranged in 9 equal square blocks and a height of building ground floor and 2 floors.
2. Córdoba: Location on the "Plaza Zaragoza" (1960) in the "Sector Sur" neighbourhood of Córdoba. 150 housings arranged in the same building typology that form a triangular square with an interior space. The height of the building is ground floor more 4 heights.
3. Jerez de la Frontera: Location on "Santo Tomás de Aquino"(1965) in the south of Jerez. 540 housings with identical blocks arranged randomly. The height of the building is ground floor more 4 heights.
4. Baena: Location on "Magistrado Eguilaz" (1958) in the neighbourhood of "Ensanche" of the town. 50 housings in 5 isolated blocks. The height of the building is ground floor more 4 heights.

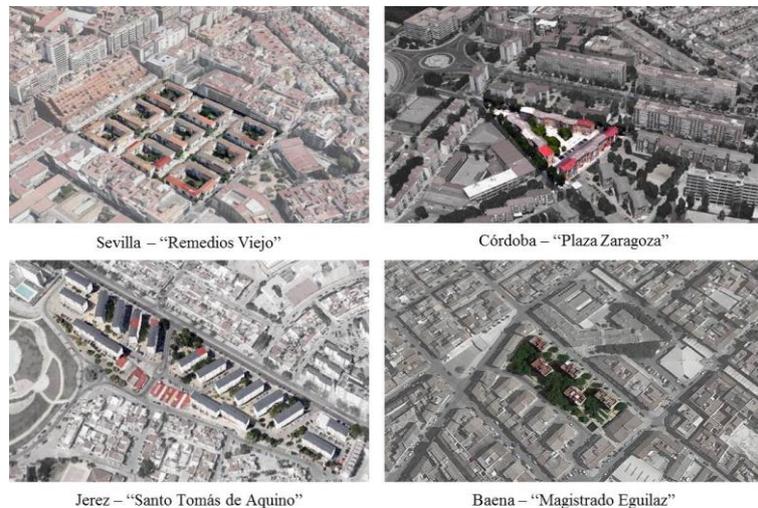


Figure 2. Selected locations as a pilot urban environment for the development of the research.

Workspace

It is defined three areas of work for the development of research:

- Immediate urban environment: It is considered the existing services in the public space and the frequently itineraries of the population to the main uses and endowments.
- Common areas of the building: Access, entrance space, vertical communication cores, courtyards, terraces and roof.
- Housing: Includes all the rooms that compose it and the specific needs and requirements of each one.

INSPECTION AND DIAGNOSIS OF THE BUILDING STATEMENT

Given the specific requirements that older people have in their way of living, it is necessary to generate a tool adapted for inspecting and evaluating the buildings and urban environments, which also setting out the specific requirements to be considered by this population in the obsolete residential environments.

Therefore, it is proposed a tool of inspection and evaluation, with a specific identity, to inspect urban environments, residential buildings and existing homes where older people live.

To do this, It has had other protocols of inspection reports as a reference, and official documents that serve as starting base for methodology of data collection and diagnosis in the building. Some of them are:

- ICE: Report of Building and Energy Conservation Assessment of the Valencian Institute of Building (IVE) and the Generalitat Valenciana.
- Methodology of Technical Building Inspection (ITE) and the current Building Assessment Report (IEE).
- Technical Building Code (CTE). Basic Document. Security of use and accessibility.

The number of inspection and diagnosis documents coincides with the division done to define the three areas of research study: Immediate urban environment; Common areas of the building and Inside the living space.

Each one will have a similar structure. It is intended to bring a parallel process in the collection of data in each field of study, that's to mean, from the general to the particular.

Informe de Evaluación de la Accesibilidad y Estado de la edificación
Zonas Comunes del Edificio

Datos generales del edificio

Foto general, Foto fachada principal, Plano de emplazamiento

Datos administrativos

Dirección: Avenida San Fernando, nº 62, Bloque F
Localidad: Jerez de la Frontera
Finca: 412-NR02
Año Construcción: 1960
Superficie Construida (m²): 675
Provincia: Cádiz
Nº total de viviendas: 10 por bloq.
Nº total de locales: - por bloques
Arquitectos: - Promotor: -
Fecha última intervención: 2006
Tipo de intervención: Colocación de tela asfáltica en cubierta y reposición de revestimiento de fachada

Definición del edificio

Tipología edificatoria: Manzana cerrada Manzana abierta Entremedianas
Centro Histórico (CH) Edificación en Manzanilla(M) Manzana con alinea (Mo)
Calificación según PGOU: Edificación abierta (A) Suburbana (S) Ciudad jardín (CJ)
Número de plantas: Sobre rasante (B+N): B+4
Áreas y servicios comunitarios: Patio interior priv. Esp. libre exterior priv. Aparcamientos priv. Trasteros
Aspecto gen. del edificio: Muy bueno Medio en la zona Deficiente Malo

Caracterización del edificio

Acceso al edificio Ref. fotográfica

Exterior: Acceso a misma cota o mediante rampa (ancho mínimo 1,20m, pendiente máxima 10%)
Dimensioneado (m): 5,50 Desnivel(m): 0,10 Obstáculos: Estrechamiento
Nº de escaleros: 1 Rampa de acceso: Pasamanos:
Evaluación: Cumple No Cumple Actuaciones necesarias: Proponer meseta de acceso que evite el escalón de entrada

Puerta: Ancho mínimo de hueco de dintel y de hueco útil de 0,20m. Aperturas mediante presión o jalisco entre 0,60 y 1,20m.
Dimensioneado (Ancho, m): 0,69 Dimensioneado (Alto, m): 1,84 Mecanismo automático:
Mecanismo de cierre: Pomos Palanca Presión Altura mecanismo: 1,50 Pesada
Evaluación: Cumple No Cumple Actuaciones necesarias: Aumentar el ancho de puerta a una hoja más grande y reducir la lip.

Espacio tras la puerta: Ancho útil mínimo horizontal de 1,20 metros en el espacio inmediato a la puerta
Pasamanos: Espacio libre horizontal: 1,05 Observaciones: -

Espacio de entrada (portal) Ref. fotográfica

Anchura útil mínima de 1,50 m libre de obstáculos en el vestíbulo del portal. Rampa con anchura mín. de 1,20m y menor al 10%. Meseta de 1,50m mínimo al inicio y final de la rampa. Altura pasamanos entre 90 y 110cm si la pendiente es >10% y entre 85,5cm.

Dimensioneado (Ancho, m): 1,05 Dimensioneado (Alto, m): 1,84 Dimensioneado (Pendiente, %): 10
Evaluación: Cumple No Cumple Actuaciones necesarias: Integrar rampa por el exterior. Y elevar meseta de acceso.

Núcleos de comunicación Ref. fotográfica

Escaleras: Anchura útil mínima de 0,90 m libre. Huella máxima de 20cm y tabica máxima de 17,50cm. Ancho libre útil de 1,20m en mesetas y al inicio y final. Pasamanos de altura entre 90 y 110 cm en el salta una altura de al menos 0,95 m. No se permiten escaleras en apoyo ni la presencia de botes.

Dimensioneado ancho de escalera (m): 0,80 Dim. huella total escal. (m): 1,65 Dimensioneado (Pendiente, %): 10 Dimensioneado (Ancho, m): 1,20
Diseño: Tramos de escalera (nº): 2 Material de acabados: Terazo Ventilación natural: Obstáculos:
Dimensioneado de huella (cm): 29 Dimensioneado de tabica (cm): 16 Bocel: Dimensioneado (Nº peldaños tramo): 7
Seguridad: Número de peldaños entre plantas: 14 Meseta partida: Material: Acero
Iluminación: Altura barandilla/pasamanos (m): 0,83 Fijación estable: Tipo de lámpara: Incandescente

Figure 3. Inspection and diagnosis report of the building in one of the case study. Elaborated by the authors.

This document already represents a contribution from the investigation because it is an inspection tool and diagnosis adjusted to the specific needs of people over 65 years, which resides in existing dwellings of the residential park immerse in a continuous ageing and also could be extrapolated to other cases necessary.

In addition, the selection of real neighbourhoods allows testing of it, and know precisely to investigate the state of the building, the needs of its users in various fields of work and the possibility of obtaining proposals from actual state of conservation with which to compare data and research results.

INDEX OF EFFECTIVENESS OF PERFORMANCE MEASURES

After evaluating the state of the building and meet the main needs in the selected urban settings, it is shown the main possible actions to be carried out in the urban environment, building and living.

Table 1. Main actions which are necessary in the obsolete housings of elderly

Urban environments	Common Spaces	Housing
- Adaptation of pedestrian routes.	- Adaptation of the entrance hallway space.	- Adaptation of spaces
- Placement of railings and handholds.	- Adaptation of itinerary in the common spaces.	- Replacement of carpentry in windows.
- Placement of seats in frequent itineraries.	- Placement of elevator.	- Elimination of the unevenness in the pavement
- Placement of public toilets.	- Placement of stair lift chair or platform.	- Adaptation of bathrooms.

- Pedestrianization of main routes to the citizen.	- Placement of handholds and railings.	- Adaptation in kitchens.
- Placement of automatic lighting in entrance gates.	- Implementation of automatic lighting with motion detectors.	- Placement of handholds and railings.
- Placement of shading devices.	- Placement of non-slip surface.	- Placement of mobile cranes on the ceiling.
- Implementation of green areas equipped with the needs of citizens		- Adapting the lighting inside the home.
		- Improvement of the manoeuvrability in mechanisms and facilities.
		- Implementation of passive conditioning measures.

To determine the degree of suitability of each operation (depending on the set of influential spatial, social and economic factors) it has been created a "Effectiveness Index," which rates the effectiveness of the performance in rehabilitation, replacement or adaptation performance.

The weighting of each result, depending on the objectives, demands and needs that have been made with the help of data tools and from surveys doing to the users of different neighbourhoods in inspection visits.

ACTUACIONES	Nº TOTAL VIVIENDAS	Nº VIVIENDAS REFORMADAS	Factores social						ÍNDICE DE EFECTIVIDAD (0-10)			
			Fase de ejecución			Fase de uso			Baremo		Promedio (P)	
			Total de acciones en el presupuesto	Duración máxima de las obras	Uso de las medidas de emergencia	Selección de materiales	Verificación de la ejecución	Uso de las medidas de emergencia	Uso de las medidas de emergencia	Uso de las medidas de emergencia		
Urbano	6	2	0.5	0.25	0.25	1	1.5	0.25	U	U1	P	
Administración Pública- Casas de vecino			0.5	0.25	0.25	1	2	0				
Promotor privado			0.75	0.8	0.25	0	0.25	0.75				
Grupo 1. ZC de estilo y residenciales												
G1-1	- Eliminación de portales o eliminación de puerta de acceso	1	800	2	0	0	0	4	4	1.2	1.2	2.7
G1-2	- Cambio en puertas de acceso a portales. Puertas especiales.	1	800	2	2	2	0	2	4	5.8	5.7	2.3
G1-3	- Elevador en escaleras interiores del portal	2	8000	4	2	1	2	0	4	6.3	6.2	4.8
G1-4	- Coblecación pasamanos en escaleras	10	70	2	1	1	2	2	2	6.5	6.7	2.8
G1-5	- Rampas en Zonas Comunes	1	2800	4	2	2	2	0	2	7.5	6.6	2.0
G1-6	- Coblecación de ascensor en huecos de cascos o huecos interiores	1	5000	5	4	2	4	5	4	6.9	7.2	7.4
G1-7	- Coblecación de ascensor en exterior de torres de viviendas	1	4000	5	4	2	4	5	2	7.0	7.2	7.3
G1-8	- Coblecación de ascensor en sótano de viviendas	1	5000	2	2	2	2	2	1	4.0	2.8	4.0
Grupo 2. Interior viviendas												
G2-1	- Ampliar anchos de puertas y pasillos	10	300	4	2	4	2	4	4	6.9	6.6	4.8
G2-2	- Regular pavimento y eliminar resacas interiores	6	400	2	2	4	0	2	2	6.2	6.4	5.4
G2-3	- Coblecación grúas de baño	1	7000	4	2	2	2	2	1	5.2	6.2	4.2
G2-4	- Coblecación pasamanos en pasillos	5	70	2	1	2	2	2	2	4.8	5.0	2.3
G2-5	- Adaptación en cocina. Control altura de encimera, mobiliario.	1	9000	2	2	2	0	2	4	3.1	6.1	3.1
G2-6	- Adaptación de baño. Cambio de bañera a ducha plana.	1	2200	4	2	2	0	4	0	6.2	6.7	6.7
G2-7	- Baños y aseos en ducha	2	50	2	1	1	2	2	2	6.2	6.9	5.1
G2-8	- Control de iluminación	1	600	2	1	2	4	1	2	4.9	2.8	2.7

Figure 4. Social assessment of all individual actions by effectiveness index.

Effectiveness Index is defined as the value that reflects the feasibility, priority level and effectiveness of each intervention by individually to the profile of interest to users, and could be extrapolated for other interest profiles, as private developer or the public administration.

The procedure allows managing operations with an effective and successful manner in obsolete urban environments, identifying the evaluation of the measures, with the requirements demanded from users, defining levels of intervention and study them by a spatial, social and economic valuation for being the most appropriate and adapted action in all the different situations that we can find.

LEVELS OF INTERVENTION

The incorporation of the effectiveness index for evaluating actions in residential rehabilitation allows a better coordination at defining the intervention levels, the economic costs and prioritize actions.

The criteria used to differentiate each of the intervention levels have been based on objective (Measurable: Cost) and subjective values (Interpretable: Demand and complexity).

For the set of selected neighborhoods it is define three levels of intervention according to some economic limits and established priority:

- Level of Intervention 1: Soft
- Level of Intervention 2: Moderate
- Level of Intervention 3: Intense.

From here, the set of individual actions are grouped into packages of action which are adapted under the existing socio-economic context and the level of intervention in the operation where it want to frame.

These actions will differ according to its implementation in the urban environment, in common areas of the building or inside the house because they depend on different interveners agents according to each case, from the community to the particular.



Figure 5. First intense proposals in the "Remedios Viejo" typology.

CONCLUSIONS

The continuous process of aging to the population attached to the constant deterioration that suffered the residential built park in cities does not allow any delay in the elaboration of the mechanisms of action and care of the elderly in their homes and residential environments.

The research aims to respond to the European Social Policies on active aging from architecture, based on the diagnosis of the current situation in the residential park built and socioeconomic conditions of the population, proposing rehabilitation operations to ensure for seniors minimum conditions health, safety, and comfort, and being technically and economically feasible.

It is provided a specific methodology of inspection and diagnosis, which allows knowing the status of the buildings and urban environments with the specific needs of older people which influence the approach of renovation measures and adaptation.

These actions are defined and evaluated according to their economic quantification, social and architectural feasibility assessment with the index of effectiveness that it is developed.

With the data collection and the assessment of all operations, it is designed some performance packages that are within the levels of intervention that have been defined, fixing a minimum and maximum in the economic costs and a priority for each case.

Therefore, there are projected and prioritized operations of building renovation that promote urban environments, buildings and houses adapted to the requirements of older people by promoting their well-being and quality of life from architecture.

In this line continues the research work and it is intended to advance in the research, based on the objectives, methodology and progress that it have been presented so as to achieve results with national and international reach in administrations, private entities and communities of neighbourhood.

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