TOWARDS A SUSTAINABLE MODEL OF URBAN AND
ARCHITECTONIC INTEGRAL REHABILITATION.

An approach to problematic of eleven districts located at Carretera de Cadiz
(Highway of Cadiz), Málaga (Spain).

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Abstract

In the third quarter of last century, Malaga experienced a period of important
residential growth that produced the construction of great commuter suburbs, in
promotions of collective housing in opened block, forming an urban aggregate
without any other relation that the juxtaposition of independent pieces. The
population that initially occupied these districts came from the countryside, as
time went by, this population has been improving economically, notwithstanding
this was not reflected in the improvement of the urban surroundings.

The architectonic and city-planning characteristics of its conception: precarious
constructions without improvement by the disadvantages of the horizontal
property, a public space badly defined and invaded by the parking area, deficit
of equipment. This situation has favored the departure of a part of the original
population and the arrival of another one with greater economic difficulties and
important social differences in relation to the first.

In some cities this situation has generated important problems of marginalization
and confrontation. Out of the economic and cultural problems, the total
deterioration of the housing, the bad quality of the urban space and the lack of
consideration of the new necessities of the residents, are factors that have
affected negatively these districts.

keywords
Sustainable model, complete rehabilitation, environmental quality, collective
housing 60s and 70s, regeneration of neighborhoods.
1. The neighborhoods of Carretera de Cádiz (Málaga). Location and social characterization.

Nowadays we are immersed into a debate about the future of our towns. There exists great concern about the ways of inhabiting the cities, not only in relation to its morphology or ways of growing, but giving special importance to the citizen and the urban society where he lives.

Within the Spanish society, there has existed a clear preference for sustainability and energetic efficiency, as with the implementation of the Building Technical Code, -new current Spanish regulation on Building –higher standards of quality and energetic saving are demanded. The Spanish Public Plan of Housing and Rehabilitation 2009-2012, as well as from the Andalusian government, the Arranged Plan on Housing and Land 2008-2012, are presented as political measures to provide access to dwelling purchase. These plans also focus on the improvement of current towns, and the rehabilitation of the current amount of dwellings.

Giving response to this clear legal, social and political choice of more sustainable, fair and accessible towns, our piece of work establishes as main aims the improvement of the conditions of environmental quality and the modernization of neighborhoods which were built in the sixties and the seventies, suffering form clear intrinsic problems.

During the academic year 2006/2007 in Workshops III y IV in Escuela de Arquitectura de Málaga, the pupils carried out a complete work of data collection from the different neighborhoods which make up the area of Carretera de Cádiz de Málaga, as well as possible proposals of intervention in these, which resulted into this research line, born with the aim of deepening into these problems.

The neighborhoods object of this research are located in the western area in Málaga, which has become the area of natural growth of the city since the 60s. They are part of the district of Carretera de Cádiz where industrial areas coexist with massive dwellings, in separate or mixed way. This district is one of the smallest in the city, with a surface of 5,60 km², notwithstanding it has the highest population, about 114,000 inhabitants, approximately the fifth part of the whole population of the city ¹, which implies density of about 20,000 hab/km².

¹ 566,447 inhabitants upon the 2008 census
The neighborhoods object of research do not make up the whole district. The most representative have been chosen: Sixto, La Paz, Puerta Blanca, Reggio, San Carlos, El Torcal, Vistafranca, Ardira, La Luz, Virgen de Belén, Dos Hermanas, San Andrés I, Barceló and San Andrés II which make up an area of 1.48 Km² with a population of 48,232 inhabitants who live in 21,267 dwellings.

It is an urban sector well connected to the town, as it is joined by the longitudinal axes of Avenida de Europa and Avenida de Velazquez. The later was the former National Road N-340 which joined Málaga and Cádiz and which is being refurbished so as to allocate the future line 2 of the underground in Malaga. This implies that this would be the first district with this infrastructure. Their boundaries are: northern the railway, which is the former artificial barrier until the current underground project which is going to transform it into a new opportunity area; southern, camino del Pato and calle Realenga de San Luis; western, Mediterráneo Highway, calle de Leo Delibes and Avenida de Molière; eastern, the former gas tanks of Repsol, with an important urban project of dwelling and offices and which has been object of recent urban discussion due to the choice of a morphological model of urban towers.

It deals with an area created almost absolutely in the 70s to house the great amount of young people attracted by the employment opportunities related to the tourist and industrial boom. This is one of the most populated areas of the city with an average 145 dwellings/ha, with the highest number in the
neighborhood La Luz (222 dwellings/ha) and population densities of 33,100 hab/Km², and with the maximum in the neighborhood of Vistafranca and Ardira (77,400 hab/Km²). Notwithstanding, these data are not completely exact, as the population may be even higher, as a great part of it comes from the rural area and they are not registered in the neighborhood but in their villages where they travel every weekend.

It has a population related to the middle working class. The data of the census in 2001 about Carretera de Cádiz allow us to appreciate that more than 60% of the working population belong to the working class. 6% of the population are immigrants with other nationalities who are perfectly integrated and a great number of them work in the building sector and home-help service.

2. The land of urban vacuums

We mainly find neighborhoods of collective dwelling with typology of open block. Its origin dates back to 1960 upon II National Plan of Dwelling with the construction (1956-61) of the neighborhoods of Dos Hermanas and Sixto. Their heights were limited to 4 or 5 floor. There were no lifts and the dwelling was of reduced dimensions. From 1965, and upon the III National Plan of Dwelling (1961-1976) there is a typological change with the introduction of H typology, maintaining the same height of 5 floors that will increase until achieving an average of 10 floors with some buildings of 16 floors. In the 70s most part of the neighborhoods is built with absolute predominance of H typology of five spaces between supporting walls, brick-faced facing, ground floor as commercial premises and, without garage and executed in big areas where the blocks are structured in orthogonal, creating serialized and repetitive groups. The final result is a monotonous an dull landscape. A characteristic example is Barriada de La Luz with 2,975 dwellings of public promotion executed by the architect Juan Cachón.

In the 80s, there is an important change, both in the urban schedule of these neighborhoods as well as in the typology of their buildings. In the Partial Plan of Torcal (1976) designed by José Luis Aranguren Castro, where the dwellings are placed on the periphery, creating inside car-park and equipment areas, which have nothing to do with the orthogonal schedule of former proposals. With the General Plan of 1983 educational centers are provided with infrastructure, and later the sport centers during the 90s, as well as the building of underground car-park . (Barriada El Torcal y Puerta Blanca y San Andrés).
Nowadays, and although a big effort of urban equipment has been done, these neighborhoods are not associated to the image of life quality offered by the new models of growing of dwellings of detached houses of low density in the outskirts (López de Lucio, 2007). This has caused the moving away of a second generation of residents have moved away, looking for these environmental standards.

Notwithstanding, these models of neighborhoods offer a high density of dwelling and initially an important value of sustainability, due to the low land consumption, which avoids land sprawl, the consumption of transport and urbanization infrastructure, water consumption, the use of the car and the great expenses of conservation and maintenance. It is a fragmented town, with unconnected urban spaces and built from the repetition of the architectonic typology, functional, typological and economic homogenization of the dwelling

The first problem is the **paradox of the space**. There exists great lack of public space, in spite of having high levels of free space. In La Luz, one of the most populated neighborhoods, 62% of the area is not built. The most representative case is Dos Hermanas, where these levels reach almost 70% (68.29%). Only 10% of the land of the sector, can be considered park or playing area for children, the remaining 60% is composed by road area (32%) and a mixture of
residual pedestrian space and paved squares occupied as car-park (26.29%). The great development of the residual space is due to a city which is thought only from the autonomous architectonic production and causes the failure of the public space prevailing in these neighborhoods, with low social profitability. Although important parks have been built which relieve the lack of those spaces, the proportion of green area per inhabitant is still low. If we take into account the area of the neighborhood in many cases, the ratio is just 0.5 m²/hab, in which some spaces are included which are really “urban vacuums”, more than public spaces due to its isolation from the urban area.

Illustration 3. Urban scene: Repetition of facades and occupation of street by cars and oppressive space (San Andrés group).

The second problem is the lack of complexity elements, both functional due to the fact that they were mainly described as “dormitory towns” and architectonic: most part of the buildings imply the formal repetition of a typology and a constructive solution. The same design of the facing causes a monotonous urban landscape, where the only difference is the direction and the height of the different blocks.

The commercial network located on the ground floors is damaged in many cases, and it is formed by small shops of daily services or retailers which give certain life to these spaces. On the other hand, most part of the network of workshops and stores is old-fashioned, which does not produced enough jobs for the creation of sustainable communities.
The third problem is the car and its impact on the image and the use of the urban space. The lack of car-park in these neighborhoods makes it necessary to be assumed by the road area and in most cases by the residual space. **The street is not really a meeting point,** but the place where we double-park. The following problem is the collapse of traffic due to the decrease of the width of the streets (which are reduced from two lanes to one) and the increase of acoustic pollution.

Finally, the excessive height of the dwelling in relation to the width of the road, apart from creating an oppressive space, generates dark areas where sun light never reaches or where the sun areas are not enough. A right lighting demands right road or public space widths. If we go back to the sun schedules of CIAM the space between blocks depending on the sun orientation must range between 2,5 y 1,5 its height (Higueras, 2007). Urban regulations ruling the building of these neighborhoods presented the same heights as the width of the street. Notwithstanding, in many sectors of the neighborhoods the proportion does not come true. The lack of lightning provokes shady places which are not suitable for social interaction and which become car-park.
3. The reconstruction of the public space. The topographies of the intervention at urban scale.

The proposed strategies are aimed at the creation of sustainable communities, such as defined by Bristol Agreement (2005)\(^2\), with the limitations that imposed the inherited town. We try to renovate the neighborhoods so that people wish to live and work there, through the creation of a surrounding area of high quality. We can make them safe and with immigrant population, the only limitation is that they are already planned and developed, so that we can only adapt a city that was thought to absorb quickly a great amount of labor from the rural areas.

We explain the following strategies, in order of the difficulty of its degree of intervention:

Strategy 1. The regeneration of the public space.

1.1. Intervention in the existing squares so as to obtain parking place. This is the policy which nowadays is being put into practice by the City Council, as the execution possibilities are quite high.

1.2. Reorganization of the divided land, as solution to the residual space. It is necessary to make difference between public and private space. It is necessary to re-invent and to rebuild the residual space. In order to do our proposal is letting concession the public space between the blocks to the owners of the ground floor. This way we delete the spaces which are not exploited from an urban point of view, they become a private maintenance space, we increase the privacy of ground residential areas, which become more attractive. This strategy must be used only in neighborhoods where the percentage of residual space is high.

1.3 The creation of pedestrian areas. By turning the roads into pedestrian areas, of access limited to residents, an urban quality space is promoted, which allows the consolidation of the commercial network of the ground floors.

\(^2\) Bristol Agreement 2005.
1.4. The promotion of **commercial premises** to create activity on the streets by means of microloans or incentives for renting the premises. This promotes the functional complexity, the mixture of activities and the increase of jobs. The increase of retailers avoids daily travelling by car to big supermarkets which decreases traffic and pollution.

**Strategy 2. Intervention in fittings**

This entails the second level of intervention, which affects the dwellings which at times are not public property. The problem with fittings is that many of them are old-fashioned and the distribution of their buildings creates important physical and spatial barriers which promote the insecurity and the low environmental quality. When refurbishing these, the basements must be used as parking place, looking for structures which promote the public space, by means of constructions of high quality which help to create nodal elements and of reference in these neighborhoods.
Illustration 6. Redesigning of public spaces by the construction of pedestrian blocks, specific refurbishment of buildings and transformation of industrial areas into green areas. (Project by S. Castillo Gálvez).
**Strategy 3** The industrial areas are the great chance of these neighborhoods.

We want to start discussion about its reuse. In this case, the property is private in whole and submitted to the market laws. In any case, it must not become more residential area, but become tertiary area with an important release of space for public use. The same as in strategy 2, new architectures with hard visual impact must be used.

**Strategy 4. Urbanism per levels. New spaces of relationship.**

The lack of free spaces make us reflect on the need to interpret again aspects that have already been explained by the modern movement, such as the use of the roof for social and relationship space. (Unité d’habitation de Le Corbusier). Although this approach has not been used in practice, we think that in extreme and high density situations as the neighborhoods of Carretera de Cádiz, where the lack of park areas is relevant, it is possible to recover those aspects. Because of this, we propose promotion of the investment so as to recover these spaces, which must not become just elements to receive the new energetic demands (solar panels), but spaces with great deal of sunlight and sights.

**Strategy 5. Detailed renovation.**

Although the renovation of the existing building entails a high impact on the owners (rehousing, demolition and construction of the building on a new site). A detailed renovation is the only solution in some areas, as the profits obtained in the whole neighborhood justify the public economic investment.
Illustration 7. Use of the roof as garden areas (Above, Project by S. López Maldonado), or as open semi-public spaces. (Down, Project by M. Díaz Gallego)
4. **A methodology to analyze the architectonic problems.**

Research into the current situation of the dwellings in these neighborhoods allows to standardize the possible intervention in them, once the different pathologies and deficiencies of the buildings have been analyzed and classified.

This research process is done from a double point of view: intervention in the buildings so as to contribute to the improvement and quality of the urban image and the research of new typological options or changes in the dwellings so as to adapt them to the new social and technical requirements.

It is essential to establish some basic steps so as to systematize the wide information that will be used, as the analysis area is vast – about 150 hectares - divided into eleven neighborhoods.

The first phase is compilation, assessment and updating the available information of the pieces of work written in III and IV. Basic parameters and data were established, and we checked if in all the neighborhoods we had that information.

At this moment, we decided to design some basic data collection files to work on them, by completing and systematizing the information obtained from each sector and all the building typologies object of study.

The information contained in the files is divided into four big sections.

- **Graphic documentation.**

  We start with a situation map 1/25.000, where we can see the neighborhood and its location within the whole analyzed urban area. The following plan has an intermediate scale (1/1.000 - 1/2.000) and locates all the units of the typology object of the file. In a third scale (1/250) we can see the ground plan of the building.

- **Basic data of the building.**

  This section defines the building in relation to the typology, age, number of floors and dwellings and surface of these. This way we make a first approach to the reality of the analyzed building and we start to know it.
- Constructive data – pathologies.

For each building the most basic parameters are defined. These define the way it was built: structure and number of spaces between supporting walls, facades and roof. Besides this, two usual aspects of the analyzed area are showed and that will be object of important improvement in many cases: the absence or not of elevators in the building, and the presence of pipes on the facade.

On the other hand, the most evident pathologies in the different constructive elements are taken down: facades, roof, installations, access, energetic consumption, and fulfillment of the minimum habitability conditions. It is not a detailed study of the pathologies of each building (that should be object of future phases of this piece of work) but a data file of the deficiencies that affect the studied dwelling most frequently, which will help us define an “action plan” on them.

- Possible solutions.

In this section we take down the possible solutions to the deficiencies detailed in the previous. The aim is to do some “standard interventions” that can be applied to a certain extent (after a detailed and singular analysis of each building) so as to do the refurbishment works that we consider necessary.

Finally, the file is completed with some photographic documentation about each studied typology.
Certain codes were also established so as to name the different buildings which were object of research, considering the typological classification of these – lineal buildings, closed block, isolated block, H blocks-.

Once the information was classified in the files, and common parameters were established for all the neighborhoods, we completed the insufficient or not clear enough information with visits to the neighborhoods, taking uncompleted data and completing the technical and graphic documentation. Other additional data were added, such as the year of construction.

5. Problems of the existing buildings.

With all the available, classified and revised information, we established the problems we found, and we discovered coincidences in many cases, which could be quite useful so as to classify them and propose types of intervention
strategies. We describe them as follows:

a) Old-fashioned architectonic facade:

- Distorted image of the facades due to the lack of homogeneity in the individual refurbishment works, such as closing the balconies, changes of the woodworks and individual air conditioning system added subsequently, laundry hanging outside due to the elimination of laundry rooms,…These interventions cause a chaotic and not suitable image.

- Old-fashioned and low urban quality of the facade, which correspond to past time aesthetics and building solutions which do to fit the current aesthetic and functional demands. Uncontrolled fitting of installations on the façade.

- Lack of acoustic and thermal isolation on facades and woodworks which do not guarantee isolation. These two aspects make insufficient thermal and acoustic comfort, which does not contribute to the current demanded energetic efficiency.

b) Lack of vertical accessibility and mobility.

- Existence of architectonic barriers to get access from the street to the building.

- Lack of existence of lift in some buildings, above all in those of less than four
floors and dating from the first decade of 60s. The only solution to this problem in many cases is the installation of an elevator, which implies the use of public spaces or courtyards of the dwellings.

c) Deficiencies in the dwellings.

- Insufficient living areas, with irregular incorporation of the balconies. They are usually badly lighted and ventilated, being passages without enough useful space.

- Small kitchens and with shapes that make them difficult to furnish as they make use of areas resulting from the stairwell, elevators, aisles, halls,... In most cases, the laundry room has been incorporated, which causes lack of space to hang the clothes, so they are usually hung on the facade.

- Bathrooms located near the halls or aisles, far away from the bathrooms. In most cases there is only a small one in each dwelling.

- Small bedrooms and with insufficient spaces, which makes it difficult their lightning and ventilation.

- They are in general dwellings with rigid scheme and in many cases it is difficult to make it flexible
- The installations are old-fashioned, and as far as electric installations are concerned, it is not possible to guarantee their safety.

As it has been previously exposed, once a system of information about the typologies is achieved, it is possible to establish parallelisms, coincidences, and similarities within the pathologies or deficiencies analyzed in the building typologies.

5. Recycling the building. The topographies of architectonic intervention.

The intervention in the existing buildings is going to produce two important effects:

The first one is related to the quality of the urban environment. The analysis of the free spaces needed, in order to avoid its deterioration, an improvement of the aesthetic quality of the delimiting buildings.

This process was focused not only on the aesthetic and urban improvement of the buildings, but also to make the best of the situation so as to improve the technical quality of these, improving its energetic performance with an strategy of renovation of the facade, by using passive methods of thermal isolation and façade systems to improve the thermal and acoustic behavior, as well as to improve the lighting and ventilation aspect of the dwelling with the modification of the gaps.

The other effect of the intervention focuses on the quality itself of the dwelling, with solutions of technical improvement of the dwelling and its common areas.

These interventions also focus on the typological transformations, covering from simple transformation, that is, small changes in the distribution so as to improve its functionality and habitability, up to more complex interventions, such as the typological reorganization, oriented towards the reflection about the new residential typologies to meet the needs of the current society, which would imply more radical and theoretical transformation processes.

Strategy 1. Reorganization of the uses.

We propose that, those buildings with insufficient sunlight, could become areas used as offices, as these do not need sunlight conditions to achieve habitability. This normally corresponds to the first floors of the blocks, which are also those with noise problems. Furthermore, this provides the possibility of more uses, by
increasing the jobs in the sector.


**Strategy 2. Renovation of the facade.**

1. Introduction of new types of facades – ventilated facades, new materials, introduction of color, …special analysis with study of the incorporation of the balconies. Treatment of these spaces as hybrid between the inside and the outside, with the special attention to closing materials – mobile panels, latticework,…

The possibilities of implementation of solar or photoelectric panels on the facades offer an interesting alternative in regeneration. Although these require a deep analysis of the structural response of the building, this can be an economic incentive for the community due to the sale of the produced photovoltaic energy produced. The installation of these energetic devices on the façade makes sense as there is more surface than on the roof due to the morphological characteristics of the construction (buildings where length prevails over width). Furthermore it
allows the use of the roof for social purposes.

2. Restructuration of the gaps. Making the most of the refurbishment of the facade, new gaps would be introduced so as to guarantee the right lightning and ventilation of the inside of the dwellings, as well as the contribution to the energetic efficiency. This ensures the right lightning and ventilation of the inside of the dwellings, as well as the contribution to energetic efficiency, as it makes sure good isolation. These gaps would be built depending on the new functional needs, the new types of facades and the urban image of quality to be achieved.

**Strategy 3. Fostering the mobility.**

The introduction of elements which delete architectonic barriers in common areas (ramps, elevators and lifts), will improve the life quality of the neighbors apart from being studied as new elements of composition within the current image of quality of the building within the environment.

**Strategy 4. Typological reorganization without modification of its general functioning.**

1. To unify the space of day areas

The living room and kitchen, which are in most cases insufficient, would be treated as new spaces more flexible where the divisions would be deleted so as to achieve more spaciousness and space quality, as well as to obtain, in most cases, double direction, which would improve the lightning, as well as crossed ventilation. Making the most of this unification of spaces the balconies or laundry rooms are incorporated when necessary, but it is necessary to make sure the right use of these spaces, as well its treatment on the facade.

2. Redesigning of wet areas.

When possible, we propose to divide the bathroom area, creating two toilets instead of just one bathroom, so as to make sure the flexibility and the better use of the dwelling depending on the number of inhabitants

With this alteration it is possible to improve the functionality of the dwelling by revising the crossing and storage areas, as well as the laundry spaces. This implies a change in the installations and quality of the coatings and the bathroom fittings.
3. Reorganization of the bedrooms.

We expose the possibility of re-arrangement of the bedrooms, in some cases including one of them within the day areas, or creating a flexible space between the day and the night areas for multiple uses (working room, studying room, sitting room, guests bedroom, …)

We also propose the possibility to add the surface of one of the bedrooms to the others, this way enlarging the surface. In some cases, we propose to obtain storage room from these so as to achieve surface and use.

In the bedrooms it is possible to achieve, with the new gaps and woodwork, a right lightning and ventilation so as to ensure good isolation to be able to rest.

Illustration 9. Transformation and typological improvement possibilities by means of redesigning and enlargement of the balconies (Left) and lift installation (right).

1. Creation of dwelling typologies for young people.
   Total redistribution of the floors of the buildings, so as to obtain smaller studios and apartments, accessible for younger people, creating more dynamic and open areas

2. Creation of dwelling taking into account the needs of the elders. We can design typologies such as small studios and apartments for assistants or relatives who take care of the elders.

3. Improvement of the ground and first floors. Due to lightning and quality problems in some dwellings on the lower floors, together with the problems that these entail, we propose the possibility of re-arranging these typologies and turning them into a duplex apartment, so as to obtain a better inside quality, as far as privacy, lightning and spatial qualification are concerned.


As far as the objectives explained at the beginning of this piece of work are concerned, we consider that we have analysed in depth the problems of residential quality in the neighborhoods, taking into account the urban environmental quality and the quality itself of the dwellings, contrasting the deficiencies created by the current ways of life as well as the quality standards demanded nowadays.

We think that considering a transformation of the existing typologies, as well as its substantial improvement, contributes to the fact that the achievement of a better life quality is done in a more sustainable way, by using the existing buildings, involving the inhabitants of these neighborhoods themselves so as to make them participants of the process and make them see that the improvement of their dwellings and the external image of them contributes to a better urban space, and therefore to a better common life in the town.

By getting better energetic and technical standards, dwellings are more efficient, contributing to a more reasonable use of the resources. The quality and image of the dwellings are improved, contributing to a more reasonable use of the resources, and attending the dwelling ways and demands of the current society.
Bibliographic references


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