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Mediterranean Urban Form

Mariangela Turchiarulo
Department of Civil Engineering and Architecture (DICAR), Polytechnic University of Bari
via Orabona 4, Bari, Italy
m.turchiarulo@libero.it

ABSTRACT

The urban fabric of the Islamic Mediterranean is the main concern of this research paper. It presents a deeper focus on al-Kairawan medina, sited in Tunisia, interpreted as exemplary case study, for the North Africa and, in absolutely, for the Muslim cities in the Mediterranean basin: it is a significant UNESCO World Heritage Site. The critical reading of the interrelationships among building type and building tissue allows to analyze the aggregation phenomenon of the courtyard houses, extricating its structural complexity.

The topological experience of the measured architectural surveys and their relating drawings are the main tools of knowledge to investigate the typological, morphological and constructional characteristics of the medina, at both urban and architectural scale, with particular reference to the force of the building plot. Traditionally associated with the Middle East, courtyard housing is not only one of the oldest form of domestic architecture, but it is possible to consider this cultural heritage as an architectural act par excellence: a "living material" to use for a new reflection about the architectural and urban design in the development of the future city.

KEYWORDS: Courtyard House, Medina, Mediterranean urban fabric, Typological and morphological characteristics, Construction system

1 INTRODUCTION: THE ARCHITECTURE OF THE MEDINA

The climate plays a key role in both city planning and architectural design. The scrubland, in which al-Kairawan (Tunisia) is situated, in a strategic position between the coast and the hinterland, is characterized by a hot and dry climate in summer, cold and wet in winter. In a so hostile environment, "because the only benign element is the sky providing cold at night, he (the Arab) turns up his house towards the sky, through the sahn, or the courtyard." In fact, the courtyard serves as a temperature controller and fresh air accumulator for the house; likewise, the narrow and winding street has, in turn, the same role for the city. (Fathy, 2000)

Therefore, the urban form of al- Kairawan Medina, at different scales, is dominated from the archetypal idea of enclosure: we should think of the meaning of the walls around the city and that of the rooms around the courtyard. The urban fabric is divided into a network of neighbourhoods blocks, which we can call "plates": they are clearly recognizable in their shape and size, whit its own identity and autonomy. Each neighbourhood receives its own mosque (masjid), embedded in the residential fabric; the aggregation is externally bounded by a system of main roads from which the cul de sac branch out, according to a tree structure. These lead into the heart of the residential area and sometimes inside the house, for which the lot is founding principle as the elementary cell.

Figure 1: The Medina of Al-Kairawan

Therefore, the district looks like a city inside the city, an enclosure inside the enclosure: so, it seems to express the ethnic isolation of the different tribes passing, with the Hijra, from a condition of Bedouins, constantly moving through the expansive desert, to a sedentary condition (Fusaro, 1984, pp. 9-12): from outside to inside the walls, where the urban organization (through the neighborhoods = khitat) reflects a social organization founded on the distinction between ethnic groups and crafts. Thus Islam becomes an urban law because for the Muslim religion is required a settled community and a Friday Mosque (masjid al-jami). In other words, the settlement is the essential act of Islamization of the tribes representing the conversion to the new religion (Marçais 1937).

Figure 2: Hierarchy of the streets: fork ramification of the routes

The basic units of the neighborhood (the khitat), assembled like mosaic pieces, drawing the medina which, in turn, can be thought as a large “plate” in which the voids define the urban tissue: the voids of the paths and the voids of the courtyards are like an incision in a continuum solid. They seem to be almost cut or even carved into the solid mass of the city where there is the need to reach the neighborhood core through the cul-de-sac (blind-alley) system. These connections, in fact, serve as way of penetration to the urban fabric, configuring the neighbourhood unit dimension. The cul-de-sac are carved out in the original lots of housing units, taking in width the dimension of an elementary cell (or room): it is the direct result of the gradual congestion of the neighbourhood. This distributive system represent an important element of mediation between the public space of the street and the private sphere of the house, the core of which is the courtyard.

Figure 3: Courtyard house in al-Kairawan

2 THE COURTYARD HOUSE

The climate, hot and dry in summer, cold and wet in winter, seems to influence the typological choice. In fact, the courtyard type is the reference both for the residential and specialized buildings: the patio functions as a regulator of temperature and protecting from heat becomes the primary need. We can find the imitation of the distant Mesopotamian house (with courtyard, iwans, porches and median breakthrough) in Roman-African house (with atrium, peristylium, oecus). (Revault, 1971, p. 45) The basic element of aggregation is the courtyard: the middle-class house and the princely palace will not be different types from the common house, but they will be generated by the ‘flowering’ of the courtyards. All the rooms are organized around the central patio, expressing an introverted character, typical of Islamic architecture. In fact, the elevations overlooking the street have a limited number of small openings. The facades are simple, crushed in their two-dimensionality and whitewashed. The different social status is evident only inside, into the courtyard: here the facades can put on colorful tiles and can be articulated in the projections and recesses: on the ground floor, arcades in two or three arches divided by median columns in stone or wood; on the first floor, narrow loggias with lintels and balustrades.

An intermediate access zone lies between the street and the courtyard: it represents a variable thickness that distances the heart of the house from the public space, through different variations: the skifa and driba. These filtering spaces have different geometries: the first tending to the square; the other, long and narrow, is similar to a corridor, a covered impasse. Sometimes the skifa can be doubled (in depth or width), with a chicane, or bayonet, breaking the principle of the visual axis street-courtyard. In fact, the front door of the house and the one of the courtyard are never aligned. Thus, the street and the patio are two separate and opposite domains: in the Muslim principle of "introversion" there is only one direction going from the street to the house. The converse never happens. In most cases, the stairs to the first floor

are located next to the skifa: this position, perpendicular to the street, allows the transformation of the courtyard house into the multifamily apartment building by making the entrance to the upper floor independent (now inhabited by the family of one of the children). In the case of dwellings on one floor, the staircase leading to the terrace, usually occupies one of the corners of the patio. In general, therefore, we can say that the vertical connecting element can be in the anti-nodal position respect to the house (in the presence of an upper floor) or in the anti-nodal position respect to the courtyard (in the absence of an upper floor). In addition to the skifa and stairs, on the first side of the courtyard is located the kitchen (matbkha), a storage room (bit al- muna) and a bathrooms. Under the floor of the patio is usually a tank (majen), while in the wall to the right of the entrance (even in the patio) is placed a well (bir).

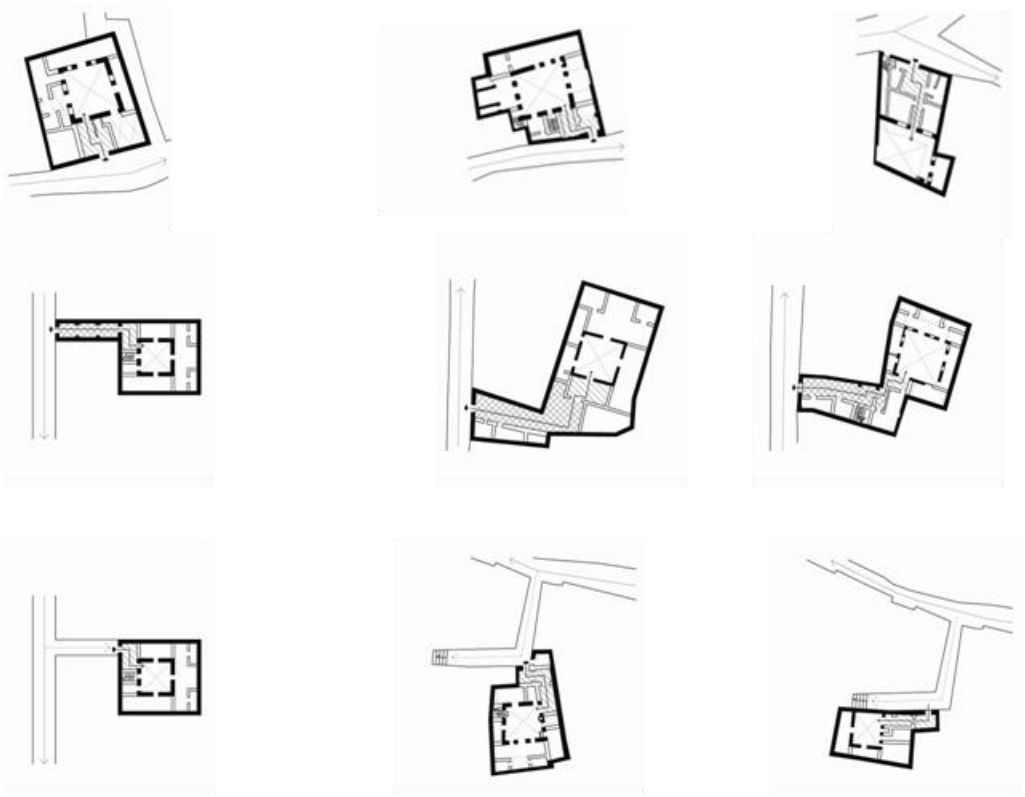

Figure 4: Space of transition: cul de sac, skifa, driba

In the hierarchy of the rooms, the most important, reserved for the head family, has an upside down "T" shape (bayt al-sadr); in many cases analyzed, it has a south-east orientation and faces the entrance of the courtyard, under the porch, when this is present. This room takes the name of "maglis": it is constituted by a large rectangular room longitudinally divided into two equal parts. The first includes, in the middle, the entrance, covered with a flat ceiling, and, on both sides, two alcoves (which accommodate the beds), covered with barrel vaults. In many cases, between the two vaults, there is a wooden ceiling: in the most important dwellings, it has a painted decoration, also present on the pediments of the two alcoves. The second part of maglis is also divided into three areas: one, in the center, is an extension of the entrance area and it is reserved for guests (the real maglis): it extends in depth to form the upside down "T". Originally, it was surrounded by wooden seats (rotba). In some houses, this part, called "kbu", also covered with barrel vault, is replaced by a niche with an arch in the back wall. The two rooms, on both sides of the kbu, are called "maqsura" (used as storage or locker rooms), each one with an access door, positioned in the alcove, near the bed.

Figure 5: The urban fabric: the khitat. Ground floor plan

The analysis carried out on the medina urban fabric shows that the median breakthrough of the T-shaped room is generated, in most cases, because of the doubling in depths of the elementary cell (within or outside the lot). More often, this is subtracted from the adjacent lot, so a co-penetration between two contiguous housing units is realized. However, there are cases in which the T-shaped room is generated not through doubling but halving the elementary cell. The aero lighting of the T-shaped room is guaranteed by three openings: a central door and two large side windows barred from wrought-iron grills with phytomorphic motifs. When the house has a cellar, very often it is below the T-shaped room and it is ventilated using this two side windows. They stretch up to the floor of the courtyard: the upper part overlooks in the alcoves of the T-shaped room, where there are the beds; the lower part, is a basement window and it uses the base, on which the beds rest, to convey light and air in the cellar.

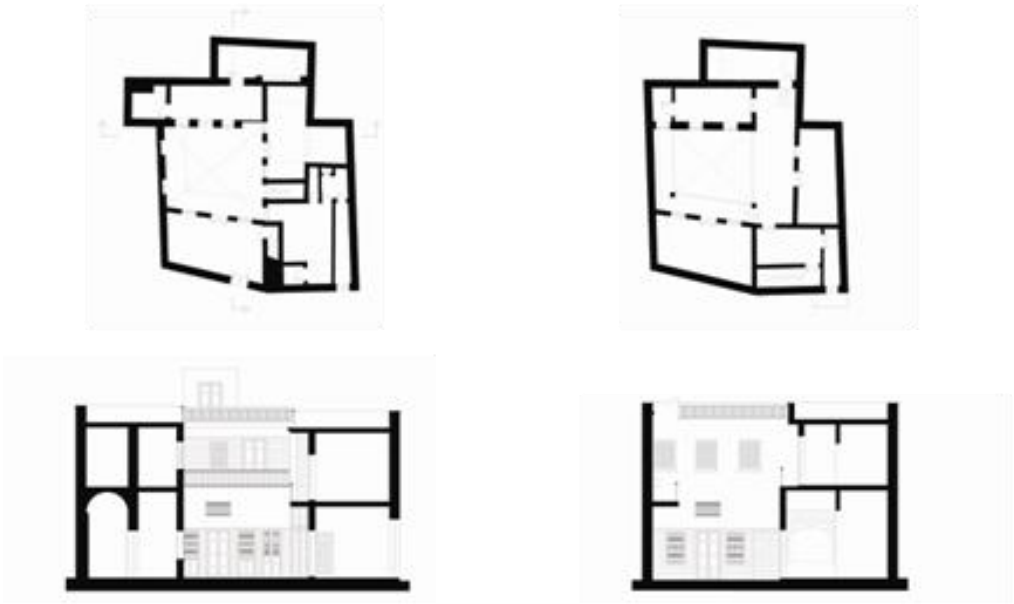

Figure 6: The courtyard house and the T-shaped room (top);
longitudinal and transversal section (bottom)

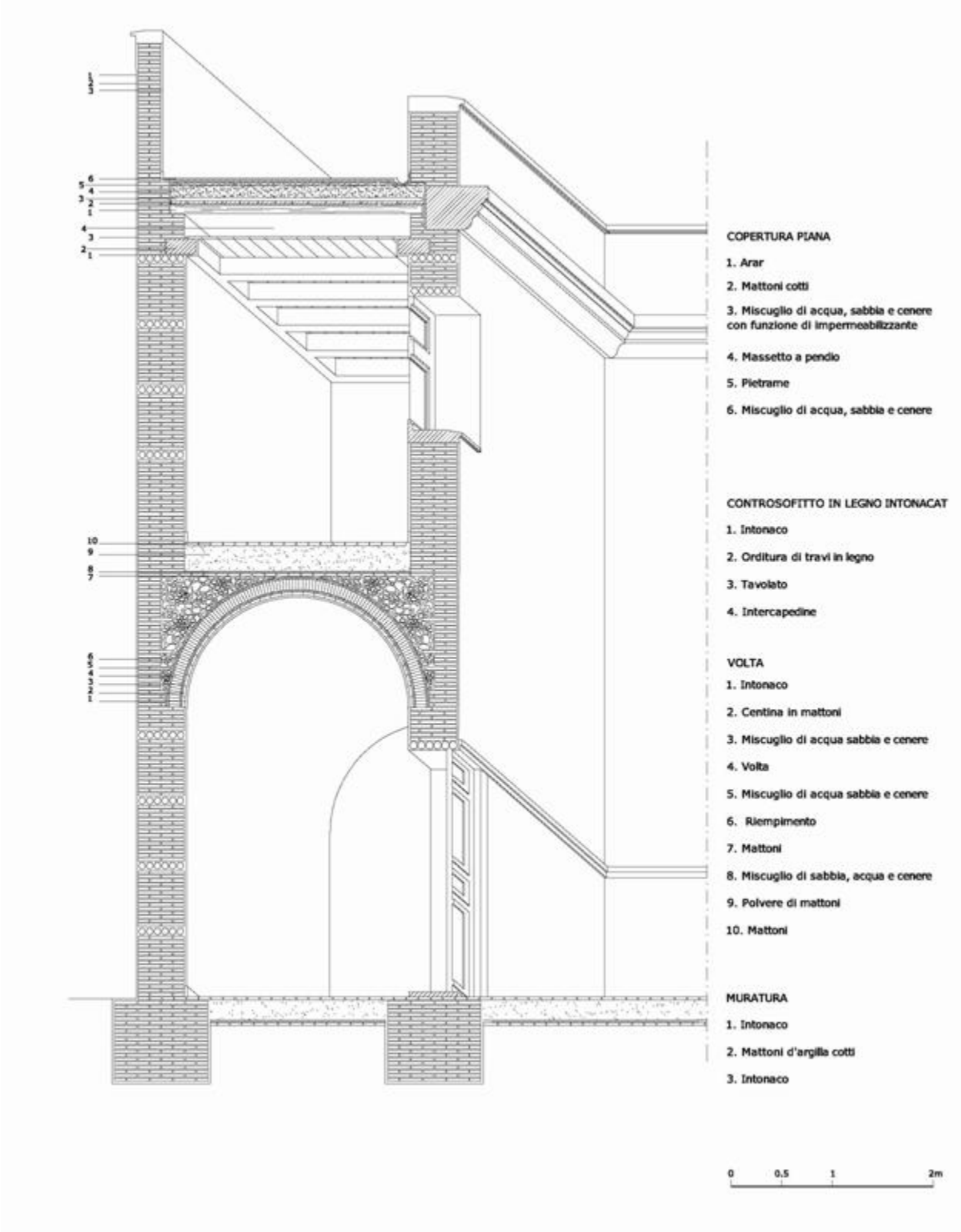

Figure 7: Cutaway axonometric

In these type of climate, the thermal well-being depends from four factors: temperature, air movement, relative humidity and solar irradiation. If the patio has the function of the temperature controller and fresh air accumulator, as mentioned above, the window cannot satisfy simultaneously the need of air, light and external view. In fact, these climatic factors are controllable independently of each other. The functions are separated and all of which is achieved by a specific structure. The small openings are positioned high up to avoid problems due to the strong and bright sunlight; so the idea of Arab house introversion is due to geographical reasons and not only to cultural principles.

Instead, the problem linked to the air circulation (which would require, on the contrary, large openings located lower) is solved with the use of wind chimneys (malkaf). For houses without malkaf, to reduce glare without reducing the air movement, the window is equipped with a screen grate (mushrabeya): it is constituted by wood elements with a circular section on a very large opening whose size is now necessary to compensate the darkening effect. (Fathy, 2000)

3 FORM AND CONSTRUCTION

From the construction point of view there is an important difference between the ground floor and the first floor of the same house: one is characterized by the aggregation of vaulted rooms, with a box-like behavior, around a courtyard; the other one has wooden ceilings because the first floor is characterized by a free plan: the load-bearing walls are only that on the unit housing and patio perimeters.

This construction choice, together with the use of timber logs load-bearing wall connections, suggests an earthquake-proof solution, which in fact is not necessary. Certainly, more than anything else, it is due to need of ensuring solidity and balance to the aggregation (the khitat), by cushioning the mutual actions between the houses.

As the climate influences the type choice, the clayey nature of the soil influences the materials choice: baked clay bricks of 3x11x22 cm are used. They have a fundamental characteristic: a high thermal capacity. The ashes (siflani), from the baking in ovens, are used, mixed with sand, as insulation material, in roofings, floors, foundations. In particular, the foundations are executed in nisf: a composite made of large bricks blocks, combined with sand, lime and tiles shards, compressed with the help of a cooper's mallet. The wall of the main facade (the only free) is often built with big blocks of stone to ensure stability and solidity, also to resist the capillary rising damp phenomena, frequent because of the presence of a groundwater. In fact, many cases of walls swelling and bulging have been detected.

The rubble masonries are made of baked bricks and nisf, with joints in clayey sand and lime. The joint is covered by an outer layer of distilled lime stucco. The solid masonry is widely used also, with a thickness between 40 and 50 cm.

Another material used in construction is the wood: in the walls, every 60 cm in height; for lintels and ceilings; for arches springers, over column capitals; in barns, where juniper wood is being used to maintain a moderate temperature, to insulate from moisture, by favoring two-year retention period for grain. In fact, the frequent presence of a barn on the top floor of the house, guarantees a perfect thermal insulation.

4 THE TYPOLOGICAL PROCESS

Through the analysis carried out on several parts of al-Kairawan urban fabric, we tried to identify the typological process of the courtyard house in this geographical-cultural area, through specialization from elementary matrices to complex derivation.

It is possible to identify two dominant variables whose characteristics are related to the two possible orientations of the routes: North-South or East-West. The two types, so identified, are characterized: the first, by a "girandole" aggregation of the rooms, with the basic module of 3 m; the second, by an axis of symmetry and a basic module of 2,4 m. It follows a different location of the T-

shaped room: it can be not aligned whit the axis of the patio (in the first case), or, on the contrary, in axis with it (in the second case).

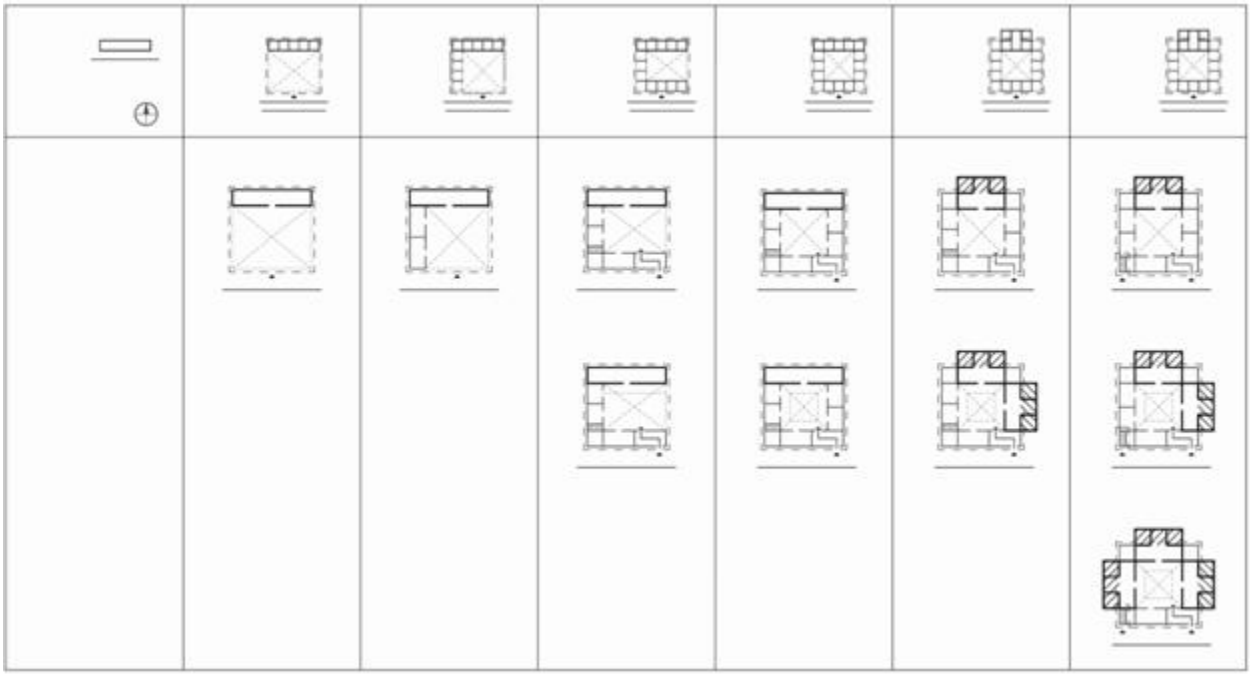

Figure 8: Typological process: aggregation of the elementary cell on an Est-Ovest oriented route

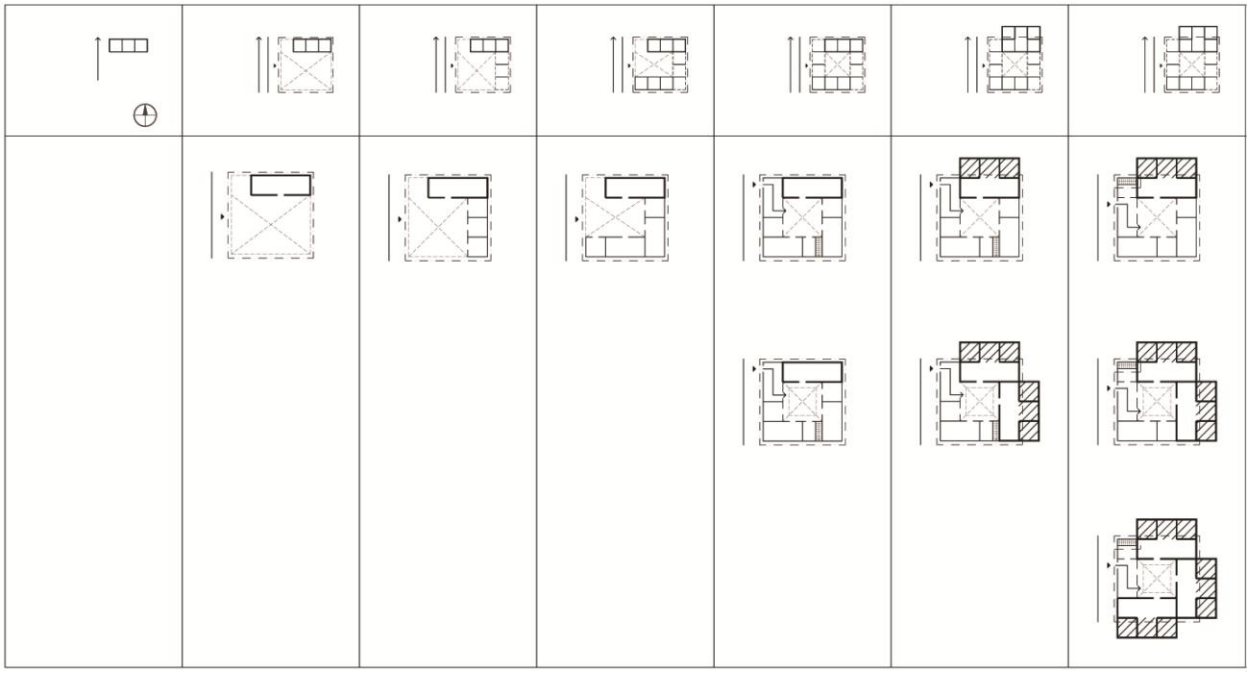

Figure 9: Typological process: aggregation of the elementary cell on an Nord-Sud oriented route

It was observed that the size of the elementary cell varies in a range between 2,5 and 3 m. However, the lot has a width ranging between 8 and 15 m, and a depth varying between 9 and 18 m.

Following the progressive process of increasing of the built inside the enclosure, according to the two methods above described, the main front on the road specialized: in fact, in this position we find the

skifa, a storage room, and the kitchen. The room of the householder also specialized: it assumes the typical “T” shape. The followings doublings of the elementary cell are in horizontally: in this phase the staircase is in anti-nodal position respect to the courtyard.

Subsequently, the multifamily process follows: the elementary cell is doubles vertically: the second floor appears for the family of one of the children. To ensure an independent access to the upper floor, the staircase is located perpendicular to the street, in anti-nodal position, this time, respect to the house. In larger and richest houses the T-shaped can also be two or three.

5 CONCLUSIONS

The typological and morphological achievements of the Islamic World, sedimented in the forms of architectures and old cities, offer, beyond a shadow of a doubt, much food for thought, for a renewed research about the extremely topical issue of the “sustainable housing and settlements”. At this historic time, the debate and research are more specifically oriented towards a survey on the correct "execution" of the building envelope, on the stratification of the wall section, for building energy-efficiency evaluation. Although necessary, this mechanistic and deterministic approach, focused on the building "skin”, too often forgets the quality space importance, transforming the facade into a caesura between exterior and interior, and even worse, between architecture and context. It is necessary to come back and reflect again on the typological and morphological issues to rediscover and re-found the meaning and sense of a “sustainable approach” to the architectural and urban design. The archetype on which we can build, for a new and contemporary reflection on Mediterranean urban form, it is the great lesson of the Islamic World: the sustainable buildings and settlements, for natural vocation, despite their apparent spatial and temporal distance, to which some masters of the last century are already cleverly inspired.

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