Cul-de-sac in the sky

"Re-reading Habitat 67"

Mohammed A. F. Itma, Maha A. F. Atmeh

Abstract— "Cul-de-sac" is in common a residential dead-end street. However, it is an important urban element used for articulating vernacular housing in the Arab cities to form a wide range of cluster. It has also a main role of providing a safe and healthy environment for residents, which is suitable for social domestic activities. This paper aims to highlight a potential idea to recover the concept of vernacular Cul-de-sac but in a contemporary way. Thus, we will try to shade light on a modern type of residential streets, which is the upper street that functions as a main stem for articulating houses around it. This type of streets was named in the modern movement as a "Street in the sky". Thus the paper investigates the connection between streets in the sky and the vernacular Cul-de-sac, by discussing a famous case of the modern housing: Habitat 67, which is cluster housing around layers of streets in the city of Montreal. The paper concludes that, the upper streets of cluster housing are an adequate approach for recovering the vernacular Cul-de-sac in terms of social and visual aspects, since it could combine characteristics of both vernacular Cul-de-sac and the street in the sky.

Index Terms—Cul-de-sac, Habitat 67, Street in the sky, Urban Housing, Modern architecture.

I INTRODUCTION

A successful housing design takes into account the historical development of the urban space and tries to keep pace with contemporary life at the same time[1]. In this era of global housing concepts, urban housing environment is often devoid of spatial and social aspects. Therefore, it is necessary to shed light on some of the successful examples of designing the urban space for housing in the modern history of architecture. In order to keep developing and adapting such examples for obtaining a better housing environment, this paper aims at shading lights on the possibility of recovering a vernacular concept of urban space into a contemporary way: this concept is the *Cul-de-sac*. In order to clarify the possibility of this recovering, the following text will be a review of the architectural characteristics of the vernacular *Cul-de-sac* in the Arab cities with a special reference to Palestinian cities, Jerusalem in specific[2]. The modern ideas of designing upper domestic streets for articulating housing will be henceforth highlighted[3]. Accordingly, the upper streets in Habitat 67 in particular, which is a cluster housing that was designed by the well-known architect Moshe Safadi in Montreal in 1967[4], will be discussed thoroughly. In conclusion, we will try to link concepts of vernacular *Cul-de-sac* to such modern ideas.

CUL-DE-SAC

Cul-de-sac[5] is a French word which means a road with a dead end; a way without an exit (Rey, 1994, p. 523). In terms of architecture, it is a type of dead-end streets or passageway (Sheppard, 2015, p. 232) used for providing privacy in the housing environment for a group of housing units (Signoretta & others, 2003, pp. 54-56). It is considered as an efficient way for reducing crossing streets, and creating a suitable environment for pedestrians in the residential areas (Eisner, Gallion, & Eisner, 1993, p. 308). This type is common, both in vernacular and contemporary architecture, in urban areas around the world. Many contemporary scholars have studied the Cul-de-sac and recommended it for increasing the social quality of housing environment (Brown & Werner, 1985). Other scholars introduced safety benefits of using the cul-de-sac in planning residential areas (Cozens & Hillier, 2008).

However, the idea of the Cul-de-sac in the vernacular architecture of the Arab cities goes beyond the concept of a dead-end passageway. It is relatively an organizing component that plays an important role of generating the compact fabric of old cities (Dumper & Stanley, 2007, p. 266). Thus, the Cul-de-sac is the urban space that has been the centre of the cluster in the residential areas. The summation of these spaces with their surrounding structures could generate a wide range and endless clusters (Rapoport, 1969, p. 5).

The Cul-de-sacs are distinctive in terms of their various sizes and shapes inside the vernacular housing. This unique composition of Arab cities was built in a flexible way to meet the families' gradual needs (Ragette, 2003, p. 50). Note the sequence between the exposed and covered areas within the Cul-de-sacs by the presence of upper rooms named in Arabic "Al-Qantara", (see figure1). These rooms are used to provide space for rest and protection from rain and sun for

pedestrians. Al-Qantara also has a great importance in the continuity of the urban fabric around the Cul-de-sac: it increases the density of buildings by providing rooms above the parts of the open-to-air space that serves as part of the houses in the upper floors (Ragette, 2003).

In addition, the Cul-de-sac became a key element in urban space design of vernacular housing of the Arab cities that symbolizes the need for privacy. Cul-de-sac was mainly found in the vernacular architecture to define the territory for each group of inhabitants in the peasant time (Signoretta & others, 2003, pp. 54-56). It has also been considered as a private

Figure 1: An example of Al-Qantara

space for people with limited income living around it, compared to rich people living in large houses and palaces with their own inner space or courtyards (Hakim, 2013, p. 168). Through architectural treatments, elements are delivering a message without putting a written sign like 'small entrances' or "the mouth" which gives the feeling that this is a private area that should not be trespassed by strangers without permission (Hakim, 2013, p. 26).

The *Cul-de-sac* in the vernacular architecture of Palestine for example, is usually composed of a sequence of corridors and interior spaces (courtyards). It starts with a main entrance, which is usually broken to provide privacy. Then follows the sequence of corridors and courtyards to form a minor element for both static and dynamic activities. Usually, the entrances of houses that surround the *Cul-de-sac* are opened to the inner corridors and courtyards. The *Cul-de-sac* is also surrounded by a series of rooms spread over more than one floor. As for the ground floor, it includes shared services like storages and guest rooms, while the upper floors constitute houses for families with the same assets. As for paths, they are bending and rarely straight due to the nature of the fabric which is the organic growth[6]. Bending paths are also useful to increase privacy of inhabitants. The paths of the Cul-de-sac are narrow and shaded; they are surrounded by high walls of houses. In some cases, paths are relatively wider to serve as a distributor for the houses instead of the courtyards which provide light compared to shaded paths, (see figure2). Thus, the Cul-de-sac has several shapes depending on the height of the surrounding houses; increasing height of the building requires wider courtyard. Concerning the shape and the area of the Cul-de-sac, they

are also influenced by the number of houses surrounding it[7].

It was verified that the vernacular Cul-de-sac is an idea in line with the time. We can observe its benefits by the existence of vernacular housing of Palestine[8]. The Cul-de-sac is still the main outdoor space of the vernacular housing in the old cities in the contemporary time. It is the main urban space that provides quiet, cool, and safe place for social interactions. In the modern era, this space is still suitable for women and children to keep away from crowded places and cars movement. Besides, the Cul-de-sac serves as a climate moderator, because it provides shade and moderate climate for residents, with minimum costs. This space is also able to enhance the cooperation between inhabitants by sharing spaces and circulation elements inside the Cul-de-sac. This helps to create stronger relationships between residents based on cooperation. These benefits introduce the Cul-de-sac as a motivating approach for designing contemporary social housing.
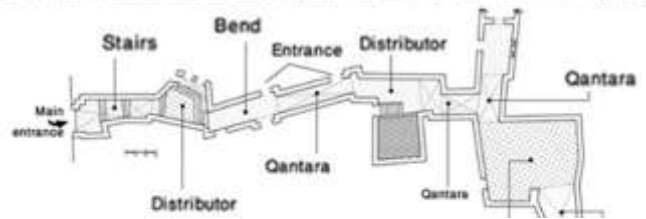
Figure 2: Up: the cluster housing in Jerusalem old city. Down: a sequence of spaces in the vernacular Cul-de-sac.

Finally, referring to the great benefits of vernacular Cul-de-sac, there is a need to learn from modern ideas that may recover traditional concepts in a contemporary way[9]. Therefore, the following will shed light on the 'street in the sky', since it is an urban space used in modern housing projects to achieve similar goals presented by the vernacular Cul-de-sac such as: density, privacy, and social interaction.

STREET IN THE SKY

In the first half of the twentieth century, the idea of Domestic Street that articulates housing units was often used in modern housing blocks as a closed environment; it is an interior but shared corridor (Sherwood, 1981, pp. 119-120). This idea is released from the main function of the corridor, which is a suitable place for circulation; to reach one's house safely. This corridor provides a closed environment for circulation between main entrances of the block, staircases, and houses entrances[10]. A wide use of corridors in modern housing has evolved to suit the need for high density housing in residential areas after the Second World War (Pfeifer & Brauneck, 2008). Using the corridor was mainly aimed to reach apartments on multi floors. This corridor was organized in a consistent manner with the ideas of modern architects, which built the architectural forms based on the repetition of a unit or network (Hurlburt, 1982, pp. 9-21)[11]. The corridor is often connected to vertical circulation elements and provided a successful function in line with the functional characteristics of architecture at that time.

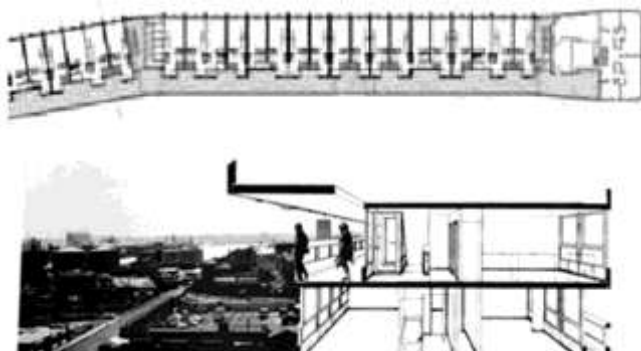Alison and Peter Smithson -with the reference to Le Cor-

Figure 3: Robin Hood Gardens, London, UK. Designed by A. & P. Smithson. Up: a side of the street in the sky and its relation with dwellings. Down: A section shows the street in the sky as an open social space (Balters. 2011).

busier ideas[12]-have introduced the upper corridor "deck" as a development for the connecting corridor between housing units (Mumford, 2001, p. 58). Famous housing blocks in London known as Robin Hood Gardens is an example of their work. In this project, all of the upper floors were considered as a ground floor and the corridor is the street that connects the residential units in each floor. In this project, the street is wide to be used in the social communication between residents to suit the daily activities of the residents. Moreover, the corridor was open to the view in the site in order to increase visual communication with the outside while circulating in the street (see figure3). Thus, the open view increases communication between the inside and outside to sustain the sense of the high floors which can be considered as the ground floors (Leupen, 2006, p. 139).

HABITAT 67

The streets of Habitat 67 project are another important example of upper streets opened to the outside view. However, the architect Moshe Safadi used a different approach of housing organization around these streets compared to the mentioned blocks. Habitat 67 is organized in a way that each house has its importance by being a nuclear cell in the hall organization, (see figure4). Thus, the resulted organization can be described as vertical terraces-housing that are articulated through upper streets. The houses are collected in a way that provides a private garden for each house to form a wide range of cluster organization around streets (Eckardt, 1978, p. 70). It is an iconic building that includes many revolutionary ideas that was considered a precedent for its time[13].

The urban spaces of habitat 67 may be influenced by the vernacular housing design of Jerusalem city in many ways. The used arrangement of structure gives the feeling that houses are similar to cells, which grow in a spontaneous way, in which the urban space has the ability to pass through

Figure 4: Habitat 67, Montreal, Canada. Designed by the Israeli/Canadian architect: Moshe Safadie 1967 (Safadie 2009.P 11).

structures to be well-defined, but endless. Thus, structures are configured to form a dominant urban mass for the surrounding, which encloses the space and controls it in a coherent way. Therefore, it is difficult to separate between mass and space because of the coherent way of attaching structures with their surroundings. In addition, the placement of streets in the back facade of the project enhances the sense of dominancy for the structures, which also simulates some vernacular concepts of designing domestic streets. This is a place with the highest degree of peace away from the main road.

However, the urban space of habitat 67 is also influenced by the trend of modernity through adapting the matrix. Standardization and repetition of urban spaces between structures are noticeable as a result of designing the structures with reference to one repeated pattern. In addition, the use of vertical circulation in specific areas facilitates reaching each house in a modern way, by making a modular division for urban spaces, which is also influenced by the matrix.

Thinking about the street as a social environment in this project included some ideas for a comfortable use of inhabitants. Looking to habitat 67, we can note that the design of the street respects the privacy of the housing units in different floors. Each group of houses has its shared space that is used as a distributor for their entrances. Thus there is a gradual transfer from the public street to houses entrances passing through this collective area that allows houses entrances to be a third level of private areas. In this way, housing entrances could have much privacy than if it were directed straight to the street. The clear orientation of the street to the sea view helps also to create a pleasant environment for people to stay and meet each other. This idea can be a development for the function of the domestic street which is used to be simply a pathway for people movement. Changing the direction -or bending- the street also helps to break the long view for pedestrians which could be a suitable way for defining territories for groups of houses. In addition, this change is a way of respecting the emerged context of housing groups in this project, as these groups are defined by a slight bending to follow the shape of the cluster.

In Habitat 67, Moshe Safadi used three types of streets. In the ground floor there is a wide space around where residential units, shared spaces, and vertical movement elements are clustered[14]. This ground street has an organized shape for cars passing, but a wide and rich shape for pedestrians' flow. The bending shape is used to follow the pattern of cluster buildings that have been shaped by structures. Different heights of ceilings are used in the pedestrian area of the street as a result of the flying structures above it, to give pedestrians a visual pleasure while moving. The second type of streets is a middle street, which is placed in the upper floors. It is more regular, and thinner than the street on the ground. The same bending shape is clear and moves along the housing composition, while being exposed, from several angles, to the surrounding view. However, the street is still able to reach the entrances of the residential houses and the vertical movement in a systematic way. The third type of streets is the upper passageway on the roof, with larger parts of it open to the air and reaching some squares on the roof. The upper passageway simulates clearly the vernacular Cul-de-sac (see figure5). It has the sequence of path and squares, and also the sequence between covered and open-air spaces. Structures surrounding the space and closing it use spontaneous organization of the houses.

Finally, modernizing and authenticity are clear in the design of domestic streets in habitat 67 for two reasons. The first is the conservation of the physical aspect of architecture that goes beyond the direct translation of functional aspects. In this project streets, and structures cooperate together to enrich the fabric, which is a revival for the vernacular concepts of designing urban housing. The second is conserving the social aspects of the street, which motivates streets of

this project to be a successful example of streets for the community.
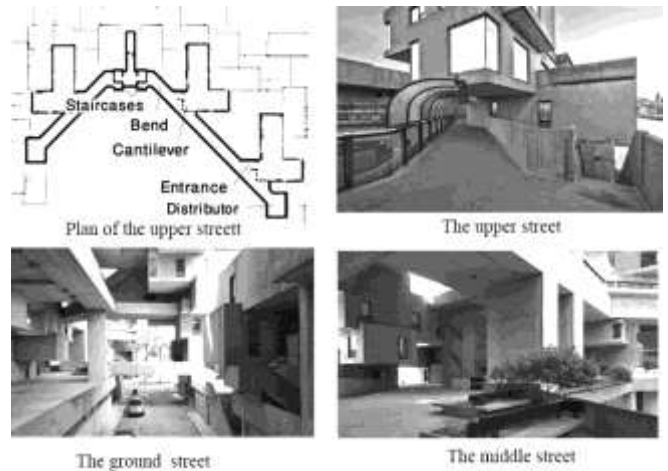

Figure 5 Streets types in Habitat 67 (C.A.C, 2001).

CONCLUSION

This paper has re-read Habitat 67 as a possible approach to recover the idea of vernacular Cul-de-sac in a contemporary way. Although the used streets in this project are not dead-end streets on the ground, they have included the spirit of the vernacular Cul-de-sac in the Arab cities. The main concept of vernacular Cul-de-sac has been recovered, which is a safe collective space between houses for social activities. The concept of exceeding the functional use of the domestic street to become a part of social housing environment has also been recovered. Thus, in an environment where cars movement is vital, raising the Cul-de-sac in the sky could recover the vernacular environment in a contemporary way.

The previous conclusion leads us to believe that upper streets of cluster organization can simulate vernacular Cul-de-sacs. These can be used as a main stem of cluster organization the same as in the vernacular housing, but in multiple layers. The upper streets of cluster housing have the characteristics of streets in the sky that spread vertically in layers to reach all houses entrances and provide a pleasant view for pedestrians. In addition, it includes a diversity of shapes and forms of urban spaces able to provide visual attractiveness. As a result, the upper street of cluster housing combines characteristics of both Cul-de-sac and the street in the sky, which can be described as "Cul-de-sac in the sky". (See Table1).

Finally, it is hoped that this study can contribute to raising the designer's awareness about learning from traditional concepts of domestic streets in the Arab cities. It is recommended that contemporary streets be designed in reference

to social and visual needs in addition to functional needs. It is also recommended that other studies try to fill a part of the gap between vernacular and contemporary streets, in order to lead towards the creation of more creative housing design in the Arab cities.

Table1: An analysis of social and visual characteristics of the three types of streets

	Social environment	Open to the view	Sequence of spaces	Sequence of open to air and covered areas	Availability for upper floors	Stem of clustered housing	Bending and visual attractiveness
Vernacular *Cul-de-sac*	yes		yes	yes		yes	yes
Street in the sky	yes	yes			yes		
Upper streets of Habitat 67	yes	yes	yes	yes	yes	yes	yes

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12 Le Corbusier named the interior corridor a "street" in his famous housing project "Unité d'Habitation" in Marseille-France 1947

[13] Architect Moshe Safadi presented the idea of the project in his theses of architecture and then developed it to be a bold and important example in the design of housing on Canada and global levels (Moshe Safdie, 2009).

[14] Such as parking, gardens, and services, which also simulate the pre-discussed idea of using the ground structures for shared functions in the vernacular *Cul-de-sac*.

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[1] The nature of man contains elements of constancy and change, which affects the subject of housing (Rapoport, 1969, pp. 78-79).

[2] Jerusalem city was chosen as a case because of its important vernacular housing.

[3] This was described by Alison and beater Smithson as 'street in the sky'. (Smithson A. & Smithson P. , 1967)

[4] The works of Moshe Safadi are influenced by the vernacular architecture of Jerusalem city, as well as the trend of pre-fabrication housing that prevailed at the time (Safdie, 2009, p. 15).

[5] "*Fond de certains objets*, P. 523 (the bottom of a thing».

[6] Most vernacular housing did not have a previous plan.

[7] See also (Messoudi, 2017)

[8] A study by the author sustains that *Cul-de-sac* in vernacular housing of Palestine is still able to respond to contemporary user's needs (Itma, 2018).

[9] In the beginning of the twentieth century, there was a shift of the vernacular concepts to international concepts in most of the Arab cities. The use of types of urban spaces for social needs became therefore less important.

[10] This corridor is common in designing housing blocks around the world.

[11] The modular of *Le-Corbusier* made a great contribution to the modern architecture.