

THE IMPLICIT ROLE OF LAND GRID IN URBAN DEVELOPMENT PROCESS

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ABSTRACT

This paper aims to underline the land grid approach which has both its natural and man-made implications in discovering the space structure with the help of plot layouts .The idea is based on the following hypothesis: The process of parceling out the land and the elements constituting the landscape are able to reveal the values of the urban development created by a society.

Keywords: Land grid - Urban grid - Plot layout- Landscape - Site features – Urban development.

1- INTRODUCTION

The urban expansion of a city must not only be envisaged in a functional and quantitative manner, but also qualitatively and physically. Indeed, this expansion materializes on the ground to become a living framework for its inhabitants.

The socio-economic, historical and cultural conditions of the land constitution and transformation of landscape are partially known. Different fields try now to understand it as a system issued from the dynamical relationship between physical (natural or man- made environment) and sociological elements.

In this scope, spatial composition of the transformation of a city must account for natural site features, past man-made additions, climate, customs of inhabitants, etc. It is therefore necessary to enhance the originality of each place with regard to the people who are going to inhabit it.

Therefore, the creation of urban development will have two aspects tightly linked:

- The first aims at understanding the existing landscape; its basic structure, features as well as its process of change.
- The second is directed towards the creation of the urban project with its socio- economic implication.

The land grid approach is based on the analysis of traces left on the ground by the former real – estate structure and / or by natural site features. It permits the evaluation of the formation of urban/natural fabrics from their origin (unplanned or planned) in order to manage their changes through their integration in the design of future urban fabrics.

The methodology of this paper will be firstly based on the inductive approach concerning the different implications of the so called "land grid", then, a case study will be conducted to demonstrate an application in Morocco (Agadir), before reaching a conclusion in this matter.

II - DIFFERENT IMPLICATIONS OF LAND GRID APPROACH

II.1 - Land Grid Techniques

In virgin areas where urban development has not yet taken place, the land grid could be obtained as follows:

- In rural valley (almost flat): The land grid in "open field" is exactly the typical relief or landscape of agricultural lands divisions (see figure 1).



Fig. 1 : An "open field" rural valley – its relief – the land grid

- In desert area (almost stepped): The land grid results from the combination of original site features such as thalwegs, relief, lines of crests, catchments areas, etc... (See figure 2).

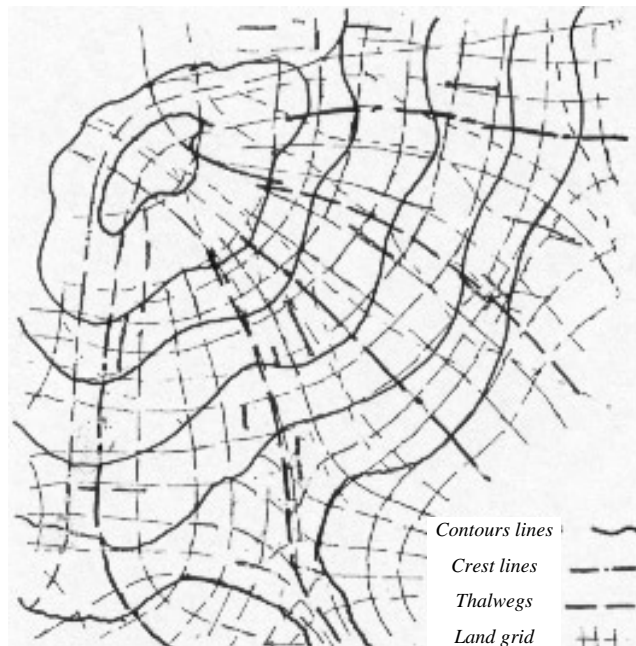


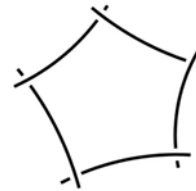
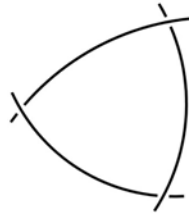
Fig. 2 : A stepped area – the component of site features – the land grid

- The obtained land grid in the two cases is a kind of orthogonal grid tightly linked to the land topography & from this geometrical grid gets always some special areas “ nodes “ which are necessary to manage a good connection between two grid direction. Through the analysis of many cases of land grid we

1-Curved triangle

2-Pentagone

are always facing two types of nodes (figure 3).



II.2-Urban Grid

Fig. 3

In areas where urban development has already taken place (desert or rural), the urban grid could be obtained by this frame made up by concrete elements such as: Plots, roads, tracks, built element, trees, canals, and so on... surveyed with the help of maps and aerial photographs at different scales. So it is a graphic representation used to demonstrate the geometrical relationship between those constitutive elements and the original land grid. (See figures 4 & 5).



Extract from plan scale 1/2000 of “Ruffins quarter” located at east side of Romainville plateau (Paris – France)



The above figure clearly shows the network formed by direction defined by the projection on the ground of the objects in their exact position

Fig.4 : The urban grid

The above figure shows the urban grid. It partially takes into account the exact location of the objects and finally brings only the geometrical relationships of the actual directions defined by the projection of these objects on the ground.



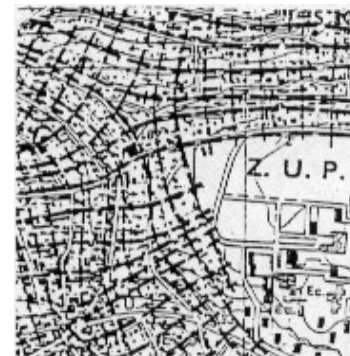
Extracted and reduced 1 / 2000



Extracted and reduced 1 / 5000

Extracted and reduced 1 / 25000

Fig.5 : The urban grid (or virgin land grid) could be obtained at different scales of aerial maps. This allows to understand the coherence of the given information when we look from one map to another.



Special attention must be paid to the " plot" as it is the starting point of any urban planned or unplanned development.

On the one hand, the plot is the assessment of land ownership. The land regulation defines the different rights related to urban land according to the plots limits and areas.

On the other hand, the plot is a territory. As such, it is the means and the direct support of urban space imprint in its relationships with natural environment and society. The plot is the basic grid of the urban space. Consequently, the plot layout can be considered perfectly as the mirror of the urban grid of any urban development.

II .3-Urban Plot Layout Process

The origin of urban plot layout in most existing projects in desert areas is quite unknown and in many cases does not obey the site features. This could be demonstrated obviously in Cairo eastern neighborhoods like Heliopolis and Nasr City where consequently - Heliopolis grid does not match with Nasr City grid (see figure 6). This situation makes difficult the good connection between those two neighborhoods yet one close to the other. In fact, any project develops without taking its neighbors into account; the rest will be chaos. At this specific point, the urban plot layout can play a primordial role.



Fig.6 : The incoherence between road grids (key element of plot lay-out) at Heliopolis and Nasr City , with regard to site relief.

On the contrary, the urban plot layout in rural areas is generally extracted from the rural plot. So, the urban grid shape is similar to the geomorphic rural land grid. The problem takes place when the urban development on agricultural land is spontaneous (unplanned); the space structure in this case will belong to agrarian geomorphic patterns rather than urban hierarchical patterns. This is clear in Boulaq El-Dakroun example (figure 7) where physical problems appear (among other socio - economic and environmental problems) notably as non- hierarchical road network and highly dense urban fabric.

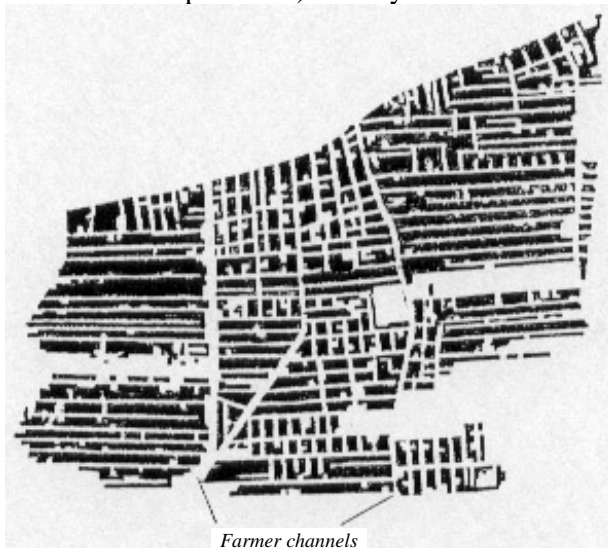


Fig.7 : Boulaq El-Dakroun. A demonstration example of informal plot layout development on agrarian lands.

Hence, the existing urban plot layout - in desert or rural areas - could be considered as a tool and a guide for a new project and not as a goal in itself, so:

- If it does not respect the site features, a compromise should be founded for the new project so as to match partially with both constraints - existing plot layout and original site features.
- If it respects the site features but reveals spatial handicaps for urban development, it must not be taken as it is and could be modified with respect to the original land grid and new project requirements.

III. DEMONSTRATIVE URBAN DEVELOPMENT PROJECT.

New Town of TAMA (MOROCCO –AGADIR)

III .1- General Characteristics of Site

The new town Of TAMA - 100,000 inhabitants- is located to the north of AGADIR on a sloping plateau covering 80, hectares (190 feddans). This plateau spreads out in a fan shape. Above the sea up to the end of a crest, limited to the north by the valley of Imouzer, to the west by the main road, and to the east by the first foothills of Atlas chain of mountains (see figure 8).

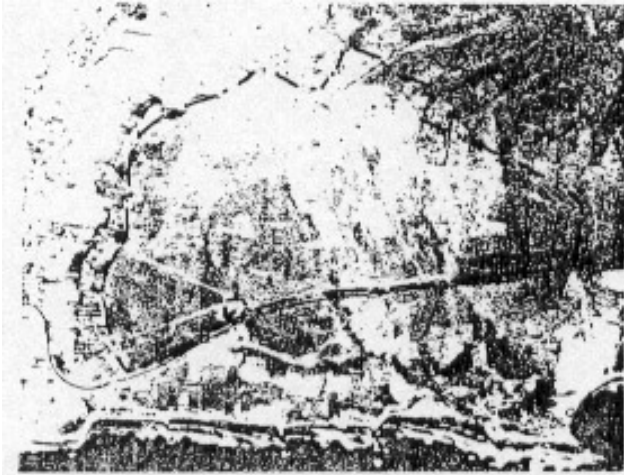


Fig.8 : Location of plateau of new town..

The natural rainwater drainage boundaries to the north and northeast formed the boundaries of the town. The site is crossed by four parallel thalwegs determining the, location of the four main rainwater and Wastewater Collectors. The theoretical crest lines are in the same direction as the thalwegs see (figure 9).

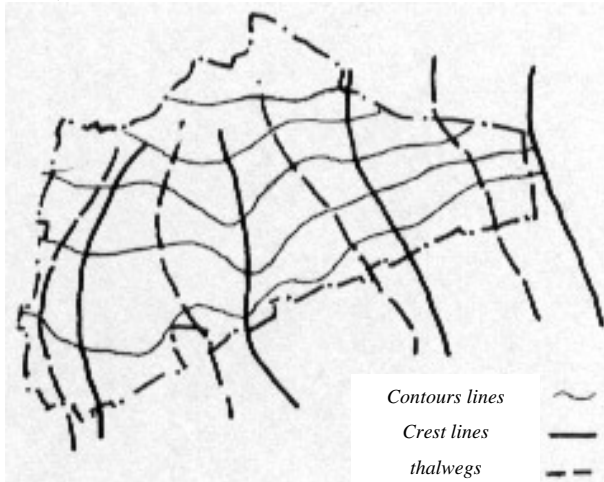


Fig.9 : Contours , thalwegs , crest lines.

On this site, Practically free of any construction and cultivation , there is nevertheless a multitude of marks on the ground (tracks, low stone walls, etc.) forming a sort of imperfect grid that could be connected by virtual lines (see figure 10).



Fig.10 : Multitude of marks on the ground.

All those elements in close relationship with the elements of topography (relief, crest lines, thalwegs, catchments areas) describe perfectly the structure of the site. They constitute altogether the basic land grid of this virgin area (see figure 11).

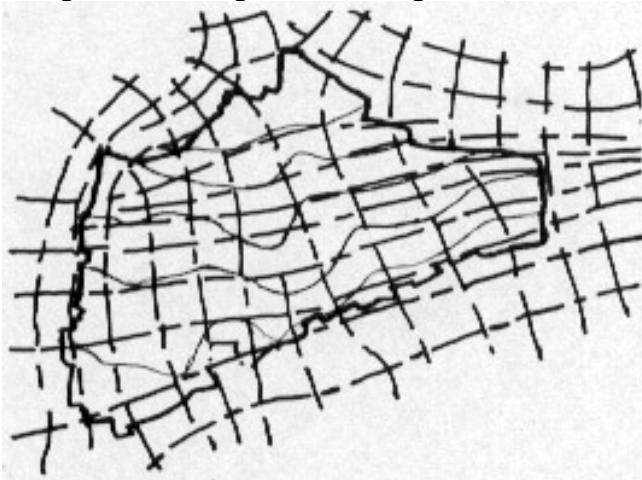


Fig.11 : The land grid (natural site structure).

III .2- Physical Planning Goals

The land grid must be matched with other Physics planning considerations and goals. The best master plan will never make a town if it ignores the characteristics of the people it wishes to house: Their resources and the built up area they produce .The town is created over time, and it must be with a considered as a living complex with a permanent correspondence between urban form and community.

Thus, The master plan of the new town of TAMA tried- in a way – to realized the living mechanisms of a Moroccan community longtime accomodated in the urban from of medina (old city), and - in another - to adapt the morphology of the urban fabric and the road layout to the original site structure (land grid) and new town planning requirements.

Several principles have been determined for the new urban form as follows:

- Mixing the various types of housing, mixing housing with activity and trade, etc...
 - Creating districts of different appearances by modifying those mixes.
 - Streamlining the road system as far as possible in order to create an urban area varied in both form and adaptation.
- Offering a large number of types of Plots for the best possible coverage of demand.

- Establishing a relationship between the size of the plots and the type of road system, so that the various types of streets may be qualified as far as possible

All these simple options also contribute to a primordial objective, that of reducing the costs of roads and miscellaneous networks to a minimum.

III .3- Constituting the Urban Fabric

The process of assembling the plots which is the master component in the creation of the urban form, must be harmonized with land grid considerations and the above - mentioned physical planning goals.

Each broad category of plot generates an urban fabric with different characteristics: Size and shape of the plots, dimension of the road, proportion of public areas, private areas, green area, space allocated to vehicles, etc...

As an example, we may take the case of law cost self- built plots for single- family housing, plots A and B, with an area of 100m²-130m².

Figure No. 12.a. shows one of the typical assemblies of those plots in order to form a block. That block is organized around two dead- end streets (derb) 5m wide.

Figure No. 12.b. shows the inter-connection of four typical blocks which form a basic assembly in order to constitute the urban fabric. This assembly is bordered by larger plots', C and D or G and H giving on wider streets with width of 8m and 14 m*.

Then, the " theoretical' urban fabric must be adapted to the topography so that the various networks can operate to the best of their ability. In particular, counter sloping derbs must be avoided. The layout of the streets will have to curve , and certain plots will have to accommodate deformations due to the topography (see figure 12.c.). At the same time, the block must take into, account the overall program, i.e. the integration of the facilities offered, road links from one block to another, etc... as shown in fig.12-c.

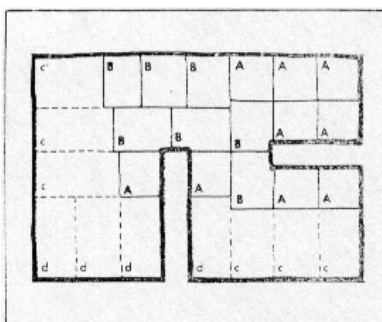


Fig.12-a : Typical assembly of plots in a block

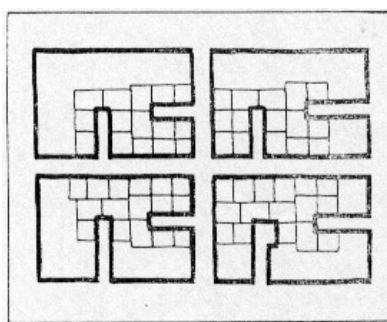


Fig.12-b : Assembly of four typical blocks

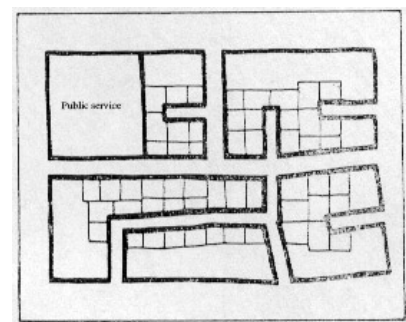


Fig.12-c : Deformation of blocks to fit with site relief

III .4- Overall Harmony land Grid/ urban Development

* These spatial assemblies correspond to the following objectives:

A. High density : 72 housing units per hectare

B. Proportion of public / private areas 25% / 75 %

From plot to block, the land grid of the site is considered as the basic support for setting up all the blocks of the town with regard to previously mentioned physical planning goals and program requirements (see figure 13).

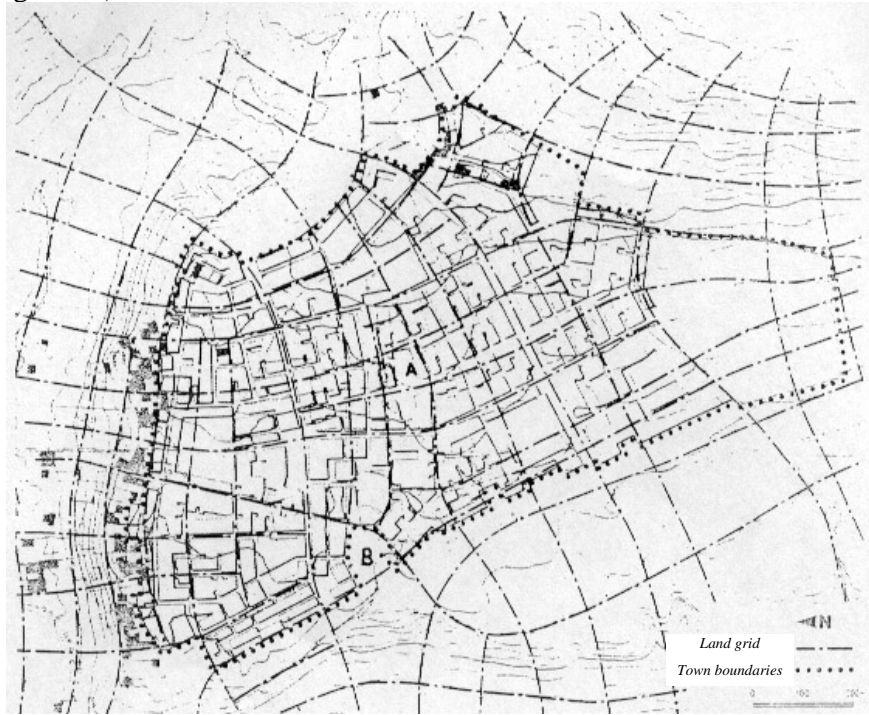


Fig.13 : Overall harmony land grid / urban grid

The design of the town shows a layout where the street network, in the same order as the plots, follows closely the natural terrain. This makes it possible (1) to limit excavation / backfill ratio,(2) to avoid excessive depth of the buried networks, (3) to benefit from natural slopes for water piping and drainage (4) to integrate existing constructions to the east and especially to the north, (5) to reduce substantially construction costs while making a contribution to the urban character (6) to exploit properly the strategic points of the site like (for example) the mosque "A" as a landmark on a crest line .

The urban grid will be re-adapted only at the place of the future "sea square- corresponding to a local depression, so as to permit a unique profound and wide angle open area where the beach and the sea could be seen on a lower level (see figure 14). This shows that the urban grid could be deviated in special zones where specific spatial considerations prevail.

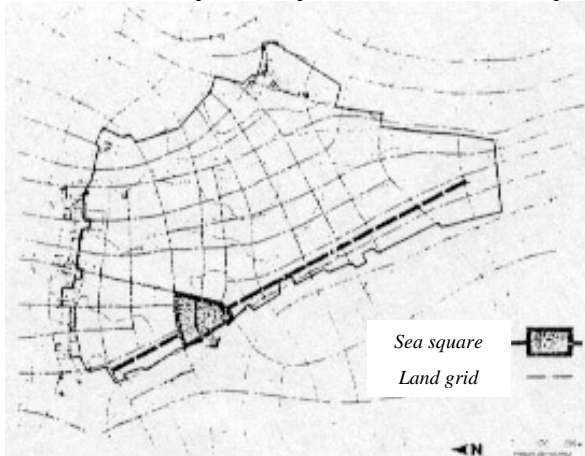


Fig.14 : Sea square – deviation of urban grid

IV. CONCLUSION

The concealed relationship between original site features (virgin or already urbanized) and a new urban fabric must preoccupy the designers before undertaking foreseen urban project.

The success of the exploitation of natural or past man-made opportunities of the site - in a new urban development - depends, to a great extent, on the good comprehension of the different implications of land grid approach.

It is obvious that, to be efficient, the land grid approach must be harmonized with other urban planning goals (socio-economic, spatial, environmental, etc...).

The first distinction of land grid is that it fits perfectly the urban development with the specific circumstances of each site; therefore, with the originality of each site and its various features (nature or past man - made).

The second distinction of this approach resides in its ability of enhancing the values of different spatial opportunities of a virgin – site / existing urban fabric when a new project is foreseen. It is an intelligent manner to manage the creation / expansion of any fabric through the good exploitation / linkage of the new plot layout.

The third distinction is expressed in terms of costs. Following the land grid approach helps to reduce significantly the costs of an urban development especially in excavation/ backfill works, in road networks and infrastructures. Otherwise, enormous costs could exist when the new urban project opposes to the natural terrain and/ or the existing urban grid.

The importance of the exploitation of this approach-especially nowadays - is revealed when we observe the repetition of some pre-destinated forms and models for urban development projects regardless of the location and the site constraints of each one. The land grid offers an endless variety of potential plot layouts, depending on the specificity of site opportunities and constraints (virgin or already urbanized), whatever the urban planning context is.

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