INTERNATIONAL CONFERENCE ON URBAN SHELTER IN DEVELOPING COUNTRIES,
SPONSORS: ICTR, UNESCO, IYSH,
LONDON, SEPTEMBER, 1987
also published at:

IAHS WORLD CONGRESS ON HOUSING BETTER HOUSING THROUGH INNOVATIVE TECHNOLOGIES AND FINANCING OPORTO, PORTUGAL, OCTOBER, 1989

PHYSICAL ASPECTS OF SHELTER PROVISION IN DEVELOPING COUNTRIES.

DR. SAYED ETTOUNEY
PHYSICAL ASPECTS OF SHELTER PROVISION IN DEVELOPING COUNTRIES -
ON THE GAP BETWEEN APPROPRIATE & PRACTICED LOW INCOME HOUSING DEVELOPMENTS
WITH REFERENCE TO EGYPT.

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SUMMARY

The physical aspects of shelter provision are stressed and the gap
between current practice and appropriate means of spatial organization of
low cost housing projects is emphasized, in three closely related sections.
Section 1, besides highlighting key physical aspects of shelter provision
points out the timely need for a shift in the architects' roles towards the
macro-setting, which is likely to remain beyond the users abilities. Section
2, puts forward the deficiencies & drawbacks of the adopted approaches
to low cost housing developments and site organization through the critical
review of a recent large-scale emergency housing project in the Gt. Cairo
Region, Egypt. Section 3, concludes the discourse and presents a three
fold approach to breach the gap between the real and affordable costs of
shelter and environs and emphasizes means of transforming physical forms
and development patterns of shelter projects.

1- INTRODUCTION

Inspite of the generally accepted understanding that 3rd World countries
governments cannot meet the escalating demand for low cost housing by
continuing to supply completed mass housing packages to those in need -
shelter provision rather than enabling communities to self shelter is
still the preferred approach to low income and emergency housing in the
cities of the poor nations.

The approach inspite of its deficiencies, shortcomings and the outrages
for effective community participation is better geared to the existing
socio-political and administrative structures, professional practice and
academic conceptions prevailing in the Third World, Ettouney (4).

The current shift from production of housing to enablement and the
related emphasis on decentralization, local control and positive community
participation in shelter provision calls for a parallel shift in the role
of architects in low income housing towards the macro setting, i.e. the
site and urban contexts. Lambert (6). This is supported by the view that,
inspite of the progressive drive towards effective users self-help, the
physical aspects of shelter and the complexities of low cost housing
settings are likely to remain beyond the capabilities and effective
control of the users in the foreseeable future, hence the accepted realm for the designers contribution.

The conceptions and physical expressions of shelter and low cost housing greatly overlap and prove hard to differentiate between; in terms of: the demand groups profiles, standards and physical features. The two should represent optimum design and maximum fitness between contextual determinants (physical & nonphysical) and the resulting forms and environs, within the limitations of tight resources and minimal costs (initial and running).

The physical aspects of shelter provision extend to cover the components of, man-made features dominated contexts, including: buildings & infrastructures, external functions and linkages, the setting and related landuses spatial organization and interactions and the macro setting determinants. These elements collectively influence and determine the success of low cost housing projects and affect cost, adaptability to users needs and acceptance by the concerned community. They also present a quantifiable realm geared to the architects and planners conventional skills and will justify the continuation of their contributions in the transition period that may extend till they master their new roles as enablers. A role that is relatively hard to grasp and achieve within the current framework of professional and academic prejudices and dogmas. (See also Lambert (6)).

The relative importance of the physical aspects of shelter is underestimated and their influence on shelter environments is not fully appreciated, this is evident in current practice in developing nations. The deficiencies of adopted approaches to low cost housing developments and site organization are highlighted in the following section, through the review of a large-scale emergency housing project, Katamiyah, Egypt.

Means of appropriating the approach to shelter provision through effective manipulation of the physical aspects (which draw from 3rd World and Egypt's experience) are then presented in the 3rd section.

2- HOW NOT TO SHELTER - ON THE DEFICIENCIES OF CURRENT TRENDS,

WITH REFERENCE TO EGYPT

2.1 PRELUDE

Egypt suffers - like most developing nations - from an acute housing problem, i.e. an expanding gap between supply & demand especially in the critical sector of low cost housing. A problem that resulted from a collection of causes, including: population growth rates, urbanization
explosion, low productivity, deficient housing & construction industry, inappropriate measures and formal housing policies, housing laws and legislations, urban land shortage etc, Ettouney (3).

The housing deficit together with the needed new stock to cover replacements and fresh demand, total some three millions housing units till the year 2000. The government was the sole supplier of housing for the low income sector during the fifties and till the midsixties, its endeavours were crippled by socio-political upheavals and limited resources and during the seventies, its contribution was a modest 5 - 10% of the total built, leaving 75 - 80% to the informal sector and 10 - 15% to the private sector, Ettouney (3), Mourad (7).

The housing problem in Egypt is also characterized by the affordability gap and that the completed minimal housing units are beyond the abilities of the majority of the demand groups, see also Abdallah (1). The problem is further accentuated by the preferred approach to low cost housing in existing and newly developed communities, i.e. completed products ready for distribution, heavily subsidized, wrongly located and inadequately supplied.

Recent awareness of the validity of alternative approaches, including community developments and sites and services and incremental growth was hampered by the attitudes of the authorities and the professionals and the few completed projects were mostly the result of foreign inputs, technical and financial, (7).

The formal approach to low income housing is characterized by a number of physical features, including: exaggerated scale of development, high standards of privation, the predominant use of medium rise apartments, located according to land availability irregard of the complexities of landuse interrelations, neglected space-between and external environments etc. The project reviewed in this section provides a representative example of government mass housing projects and maintains most of the features and deficiencies of the adopted approaches.

2.2 THE KATAMIYAH EMERGENCY HOUSING PROJECT, EGYPT - A CRITICAL REVIEW

The project is located on the Cairo - Red Sea desert road, 15 km, from Cairo, in the Eastern desert. The road defines a potential development corridor emanating from Cairo, Fig. 1. Fragmented developments; industrial, warehouses & residential-extend along the route. The project is sponsored by the Ministry of Housing and financed by its affiliated Housing and Development Bank and was initially intended for the homeless.
low income families, though the costs and relatively high standards of the completed 2nd phase (1986 - 87) dictated a shift in the allocation towards lower middle income groups.

The site is relatively flat with: gently slopes, regular shape (2120 x 530 metres & 114 hectares). The soil is characterized by pockets of swelling clay, in a harsh desert environment with frequent sand storms and marked aridity. The site is isolated with no linkages or integration to work places or community facilities. It was selected because of land availability and potential accessibility.

The project plan was carried out by the army engineering corps to accommodate corrugated metal single storey vaulted structures (also manufactured by the army). The plan was later modified by the Ministry of Housing to allow the use of conventional apartment blocks, 5 - 6 storey high. The 114 hectares rectangular site is divided into two distinct parts, Fig. 2, phase 1 (23.3 hectares) contains the metallic single storey units and phase 2 (51.6 hectares) comprising residential blocks and medium rise apartment units.

There was hardly a conception behind the original site plan in terms of hierarchy of basic units, circulation network and community facilities organization. The metallic units area was implemented according to the original plan. Later attempts to rationalize the grid iron network resulted in phase 2 spatial organization, Fig. 2. Phase 2 comprises three zones separated by the two exial access roads to the settlement, with (150 x 300 metres) residential blocks as the basic planning modules - centrally located areas were reserved for community facilities. The circulation network in phase 2, comprises four levels of roads (36,30,24 & 16 m. wide). No parking courts are provided and on street parking is used throughout. In phase 1, no distinct hierarchy of road system or planning units is evident, direct access roads 12 m. wide randomly bisect the area. Phase 2, basic planning cells (4.5 hectare) accommodate some 1000 housing units (5000 residents) each, and present a well defined physical entity surrounded by roads. Community facilities programming was left till the completion of the 2nd phase and the reserved limited areas were far less than required. This forced mixed uses into the lower floors of residential units.

Tables 1 & 2 together with Figures 2,3 & 4, illustrate the physical features of the settlement, with its two distinct phases and local identity areas. Table 1, presents the land budget of the settlement. Table 2,
**TABLE 1**

KATAMIYAH EMERGENCY HOUSING SETTLEMENT, EGYPT—THE LAND BUDGET.

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>AREA</th>
<th>HECTARES</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SQ.M.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAJOR ROADS</td>
<td>303300</td>
<td>30.33</td>
<td>26.6</td>
</tr>
<tr>
<td>PHASE 1: SINGLE STOREY METALLIC UNITS.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- NET RESIDENTAL</td>
<td>237980</td>
<td>23.80</td>
<td>20.9</td>
</tr>
<tr>
<td>- COMMUNITY FACILITIES</td>
<td>60000</td>
<td>6.00</td>
<td>5.3</td>
</tr>
<tr>
<td>- INTERNAL ROADS</td>
<td>24720</td>
<td>2.47</td>
<td>2.2</td>
</tr>
<tr>
<td>- TOTAL</td>
<td>322700</td>
<td>32.27</td>
<td>28.3</td>
</tr>
<tr>
<td>PHASE 2: RESIDENTIAL BLOCKS, WALK UPS.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- NET RESIDENTIAL / BLOCKS</td>
<td>396920</td>
<td>39.69</td>
<td>34.9</td>
</tr>
<tr>
<td>- COMMUNITY FACILITIES</td>
<td>80640</td>
<td>8.06</td>
<td>7.1</td>
</tr>
<tr>
<td>- INTERNAL ROADS</td>
<td>35040</td>
<td>3.50</td>
<td>3.1</td>
</tr>
<tr>
<td>- TOTAL</td>
<td>512600</td>
<td>51.60</td>
<td>45.3</td>
</tr>
<tr>
<td>TOTAL AREA</td>
<td>1138600</td>
<td>113.86</td>
<td>100</td>
</tr>
</tbody>
</table>

**TABLE 2**

KATAMIYAH SETTLEMENT, PHYSICAL FEATURES, PROVISION STANDARDS AND COSTS

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>PHASE 1</th>
<th>PHASE 2</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GROSS DENSITY (PERSON/HECTARE)</td>
<td>154</td>
<td>969</td>
<td>483</td>
</tr>
<tr>
<td>2. NET RESIDENTIAL DENSITY (PERSON/HECTARE)</td>
<td>210</td>
<td>1259</td>
<td>866</td>
</tr>
<tr>
<td>3. NET OPEN SPACES: THE SPACE BETWEEN (Ha)</td>
<td>17.8</td>
<td>25.7</td>
<td>43.5</td>
</tr>
<tr>
<td>4. GROUND COVERAGE (HECTARE)</td>
<td>6.0</td>
<td>14.0</td>
<td>20.0</td>
</tr>
<tr>
<td>5. GROSS PLOT RATIO</td>
<td>0.2</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>6. NET PLOT RATIO</td>
<td>0.25</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>7. PER CAPITA SHARES SQ.M./RESIDENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1 RESIDENTIAL AREA</td>
<td>47.6</td>
<td>7.9</td>
<td>11.5</td>
</tr>
<tr>
<td>7.2 BUILT FLOOR SPACE (RESIDENTIAL)</td>
<td>12</td>
<td>14</td>
<td>13.8</td>
</tr>
<tr>
<td>7.3 COMMUNITY FACILITIES</td>
<td>3.1</td>
<td>12</td>
<td>3.9</td>
</tr>
<tr>
<td>8. DEVELOPMENT COST EXCLUDING LAND, COMM-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUNITY FACILITIES, LANDSCAPING AND OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SITE INFRASTRUCTURE EGYPTISH POUNDS/SQ.M.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1 FOUNDATIONS</td>
<td>L.E./SQ.M</td>
<td>45</td>
<td>32</td>
</tr>
<tr>
<td>8.2 SUPER STRUCTURE</td>
<td>L.E./SQ.M</td>
<td>45</td>
<td>120</td>
</tr>
<tr>
<td>8.3 INSULATION</td>
<td>L.E./SQ.M</td>
<td>20</td>
<td>---</td>
</tr>
<tr>
<td>8.4 TOTAL COST</td>
<td>L.E./SQ.M</td>
<td>110</td>
<td>152</td>
</tr>
<tr>
<td>8.5 IN SITE INFRASTRUCTURE L.E./SQ.M.</td>
<td>125</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>8.6 FINAL TOTAL COST</td>
<td>L.E./SQ.M</td>
<td>235</td>
<td>174</td>
</tr>
<tr>
<td>9. AVERAGE COST OF HOUSING UNIT L.E.</td>
<td>14100</td>
<td>10440</td>
<td>15660</td>
</tr>
</tbody>
</table>
FIG. 1.
Katamiyah Settlement Location
Gt. Cairo Region, Egypt.

FIG. 2.
Katamiyah Settlement Site Plan
FIG. 3.
Phase 1 - Single Storey Metallic Structures; Dwelling Units Floor Plan, Roof & Elevation And Typical Clusters.

FIG. 4.
Phase 2 - Residential Blocks; Medium Rise Apartments - Two Typical Plans And Clusters.
FIG. 5.
Phase 1 - Single Storey Metallic Structures, Katamiyah Settlement; Visual Form, Inferior Character & Wasted Space - Between - Selected Views.
FIG. 6.
Phase 2 - Residential Blocks, Katamiyah Settlement; Appearance and Visual Quality Highlights.
summarizes the physical features, provision standards and per metre cost of the two housing types and related phases, i.e. the metallic single storey dwellings and walk-ups. Figure 3 shows the plan, elevation and typical clusters of the metallic single storey vaulted units used in the 1st phase; environmentally and functionally inferior, inflexible internally and externally and extremely expensive (each vaulted unit comprise two flats, 60 sq. m. each). Figure 4 shows typical plans and clusters of the apartment blocks used in phase two, marked by modularity, rational design and detailing and efficient landuse. The flats are of the order of 60 - 90 sq. metres, net area.

The clusters are predominantly compact and vary in treatment and spatial organization. Attempts to articulate the space-between into public and private areas was ignored during implementation. Similarly the design proposals for enhancing character and visual identity of the various residential blocks was also abandoned to a unified treatment of facades; mediocre and visually poor, Fig. 6.

The collective deficiencies and drawbacks of the reviewed project are distinctly clear in phase 1 development which may serve as an excellent example on how not to shelter in terms of; conception, site organization, selected housing types, efficiency of landuse & the organization of the space-between buildings. The failure of this part of the project is reflected in the cost of the completed unit (L.E. 14100), representing 8 - 10 fold the annual household income in this demand group, Fig. 5.

Phase 2 development, through the use of walk-ups, rational organization and modularity is by far better, in terms of, land utilization, environmental quality and general appearance. The space-between, land cover and plot ratios, Table 2, clearly indicate that the intensity of landuse in this part could be equally achieved through low rise, high density, parcellization development - more appropriate, contextually fit and free from the set of drawbacks characterizing walk-up developments in exposed desert sites. The development costs are also high and the cost of the housing unit represents 6 - 8 fold the household annual income.

3- TOWARDS AFFORDABLE SHELTER & ENVIRONS - CONCLUSIONS & RECOMMENDATIONS

In spite of the inherent complexities of the problem of shelter provision, it is justifiable to state that, its effective solution depends on three interrelated factors: development cost minimization for shelters and environs, maximum participation of the users and management of available resources & involved institutions.
Cost minimization is closely related to the physical aspects of shelter provision and directly falls in the realm of architects, urban designers & planners and within their control, (5). The physical aspects extend to include: the shelter envelopes, sites, settlements and regional settings together with the numerous related details and components.

The notion that the cost of shelter is the result of the threesome: land, materials & components and labour (1), further emphasizes the above proposition that, cost minimization depends on the effective manipulation of physical factors, which may be achieved through the following set of guidelines:

1- Shelter provision should be considered on national and regional levels and shelter developments should be closely linked to job opportunities and service facilities. In other words shelter should be integrated into urban & regional plans (1) & (5).

2- The spatial relation between shelter projects, work places & service facilities and accessibility to circulation network is a crucial factor in determining, real cost of shelter, its acceptability and success.

3- Physical forms & development patterns are key elements in cost minimization. Building types, site organization basic assumptions, adopted standards and typical solutions need to be critically evaluated and transformed.

The physical forms and development patterns of shelter & environs in turn may be appropriated through the following approaches and notions:

- Land is the key resource in shelter developments; land and not built areas should be allocated to users, leased and not sold to allow for exchange and mobility. Shelter and related facilities should be manipulated as designated land rather than buildings (See also, Correa (2)).

- The size of shelter projects should be carefully considered and integrated into existing urban fabric.

- Mixed landuse, integration of community facilities and integrated service industries into shelter developments (productive shelter areas).

- Minimization of public undesignated open spaces.

- Minimum standards, enlightened by local conventions and cultural variability should be adhered to.

- Effective use of urban land and optimum locations and dimensions of buildings, plots & infrastructure networks through the skillful use of design & planning grids.
- Compact planning, intensive landuse, parcellized single or limited families plots, low rise & high density developments with integration of internal and external functions, minimum provision for internal vehicular movement and design for pedestrians and cyclists.
- Environmentally integrated and contextually aware designs & spatial organizations.

Each of these notions represent an open ended challenge to the architects and physical planners in the 3rd World and deserves monitoring and further investigations.

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